Draft Environmental Assessment

Big Suamico River Federal Navigation Channel Maintenance Dredging and Placement

U.S. Army Corps of Engineers
Chicago District

September 2024

DRAFT FINDING OF NO SIGNIFICANT IMPACT

BIG SUAMICO RIVER FEDERAL NAVIGATION CHANNEL MAINTENANCE DREDGING AND PLACEMENT
VILLAGE OF SUAMICO, BROWN COUNTY, WISCONSIN

The U.S. Army Corps of Engineers, Chicago District (USACE) conducted an environmental analysis in accordance with the National Environmental Policy Act of 1969, as amended. The final Environmental Assessment (EA) dated (to be determined), for the Big Suamico River Federal Navigation Channel Maintenance dredging and placement addresses navigation opportunities and feasibility in the Big Suamico River Federal Navigation Channel in Village of Suamico, Brown County, Wisconsin.

The Final EA, incorporated herein by reference, evaluated a "no action" alternative and two alternatives that would improve navigation for the Big Suamico River Federal Navigation Channel. The recommended plan is Alternative 2, which includes:

- Dredging up to 45,000 cubic yards of material from the Big Suamico River Navigation Channel
- In-water placement of dredged material into Lake Michigan along the western side of Longtail Point

For all alternatives, the potential effects were evaluated, as appropriate. A summary assessment of the potential effects of the recommended plan are listed in Table 1:

Table 1: Summary of Potential Effects of the Recommended Plan

	Insignificant effects	Insignificant effects as a result of mitigation*	Resource unaffected by action
Air quality	☒	☐	☐
Aquatic resources/wetlands	☒	☐	☐
Invasive species	☒	☐	☐
Fish and wildlife habitat	☒	☐	☐
Threatened/Endangered species/critical habitat	☐	☐	☒
Historic properties	☐	☐	☒
Other cultural resources	☐	☐	☒
Floodplains	☐	☐	☒
Hazardous, toxic & radioactive waste	☐	☐	☒
Hydrology	☒	☐	☐
Land use	☐	☐	☒
Navigation	☒	☐	☐

	Insignificant effects	Insignificant effects as a result of mitigation*	Resource unaffected by action
Noise levels	☐	☐	☒
Public infrastructure	☐	☐	☒
Socio-economics	☐	☐	☒
Environmental justice	☐	☐	☒
Soils	☐	☐	☒
Tribal trust resources	☐	☐	☒
Water quality	☐	☒	☐
Climate change	☐	☐	☒

All practicable and appropriate means to avoid or minimize adverse environmental effects were analyzed and incorporated into the recommended plan. Best management practices (BMPs) as detailed in the EA will be implemented, if appropriate, to minimize impacts.

No compensatory mitigation is required as part of the recommended plan.

Public review of the Draft EA and FONSI was completed on (to be determined). All comments submitted during the public review period were responded to in the Final EA and FONSI.

Pursuant to section 7 of the Endangered Species Act of 1973, as amended, the U.S. Army Corps of Engineers determined that the recommended plan will have "no effect" on federally listed species or their designated critical habitat. Although USACE initially determined that the project "may effect" one proposed endangered species, the Salamander Mussel, the USFWS stated in an email dated 21 May 2024 that "no effect" was the appropriate determination for the Salamander Mussel.

Pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, the USACE determined that the recommended plan will have no adverse effects on historic properties. In a letter dated 13 May 2024, USACE notified the Wisconsin State Historic Preservation Office (SHPO) of its no adverse effects determination, and the Wisconsin SHPO concurred with this determination in an email on 31 May 2024. Under 36 C.F.R. § 800.5, no further consultation under Section 106 is required with the Wisconsin SHPO. USACE coordinated with the Forest County Potawatomi Community of Wisconsin; Fort Belknap Indian Community of the Fort Belknap Reservation of Montana; Hannahville Indian Community, Michigan; Lac Vieux Desert Band of Lake Superior Chippewa Indians; Little Traverse Bay Bands of Odawa Indians, Michigan; Menominee Indian Tribe of Wisconsin; Miami Tribe of Oklahoma; Oneida Nation of Wisconsin; and Ottawa Tribe of Oklahoma. No responses were received.

Pursuant to the Clean Water Act of 1972, as amended, the discharge of dredged or fill material associated with the recommended plan has been found to be compliant with section 404(b)(1) Guidelines (40 CFR 230).

A water quality certification pursuant to section 401 of the Clean Water Act will be obtained from the State of Wisconsin prior to construction. In a letter dated 15 August 2024, the State of Wisconsin stated that the application process was complete and the start will soon begin a 30-day comment period

on the application will soon begin. All conditions of the water quality certification will be implemented in order to minimize adverse impacts to water quality.

This project is located within the state of Wisconsin's Coastal Management Program (WCMP) boundaries. A determination of consistency with the Wisconsin Coastal Zone Management program pursuant to the Coastal Zone Management Act of 1972 was sent to the Wisconsin Coastal Management Program on _____. Coordination is ongoing, but USACE assumes that the Wisconsin Coastal Zone Management program will concur with the finding. All conditions of the consistency determination shall be implemented in order to minimize adverse impacts to the coastal zone.

All applicable environmental laws have been considered and coordination with appropriate agencies and officials has been completed.

Technical, environmental, and cost effectiveness criteria used in the formulation of alternative plans were those specified in the Water Resources Council's 1983 Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies. All applicable laws, executive orders, regulations, and local government plans were considered in evaluation of alternatives. Based on this report, the reviews by other Federal, State, and local agencies, Tribes, input of the public, and the review by my staff, it is my determination that the recommended plan would not cause significant adverse effects on the quality of the human environment; therefore, preparation of an Environmental Impact Statement is not required.

_____ _____

Date **KENNETH P. ROCKWELL**
COL, EN
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Chapter 1 – Purpose & Need

1.1 – National Environmental Policy Act and Related Procedures

The National Environmental Policy Act (NEPA) (42 United States Code [U.S.C.] 4321 et seq.), the Council on Environmental Quality (CEQ) NEPA regulations (40 CFR Parts 1500 to 1508), and the U.S. Army Corps of Engineers' (USACE) NEPA implementing regulations (33 CFR Part 230) require that the USACE consider the potential environmental effects of a proposed action before making a decision on the proposed action. This Environmental Assessment (EA) includes the direct, indirect, and cumulative effects of dredging sediment from the Big Suamico River federal navigation channel and placing the dredged material in an expanded in-water area, and/or nearshore, and/or on shore. This EA provides the USACE and other decision makers with the information needed to make an informed decision about the dredging and placement activities.

1.2 – Project Locations & Authorization

1.2.1 Dredging

The Suamico River has an authorized federal navigation channel located in Suamico, Wisconsin on the western shore of Lake Michigan (Figure 1). Construction, operation, and maintenance of the existing federal navigation project at the Big Suamico River, Wisconsin, was authorized by the River and Harbor Act of 1937.

The river is located approximately 8 miles north of Green Bay, Wisconsin. The federal navigation channel runs from a short distance upstream from the mouth of the Suamico River and out into Lake Michigan. The total length is about 3,700 feet of authorized channel, with the channel being 100 feet wide in the bay and 60 feet wide in the river. The authorized depth is 8 feet below Low Water Datum (LWD) of the International Great Lakes Datum 1985 (IGLD85). The channel is used for recreational and commercial use, such as charter fishing activities. The Village of Suamico's boat ramp is located just upstream of the federal channel. Estimated dredging needs in the Suamico River are approximately 25,000 to 45,000 cubic yards.

1.2.2 Placement Locations

As further described in Chapter 2 (Alternatives) below, the proposed locations for the placement of dredged material are along Longtail Point, just south of the mouth of the Suamico River (Figure 2). Under Alternative 1, placement would occur upland on Longtail Point, or under Alternative 2, placement would occur in-water along the shoreline of Longtail Point.

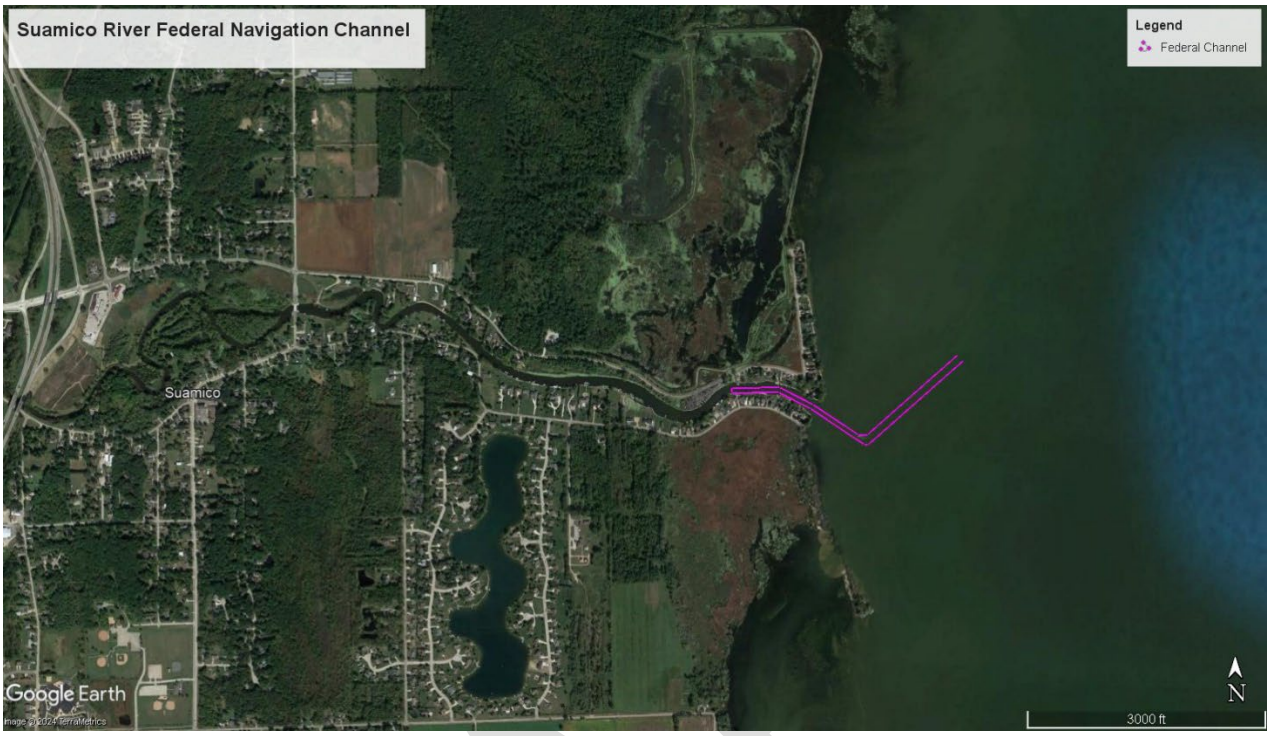

Figure 1- Location map

Figure 2 - Big Suamico River federal navigation channel and dredged material placement area (Alternative 1 upland placement or Alternative 2 in-water placement)

1.3 – Purpose & Need

The primary purpose of this federal action is to support the navigability of the Suamico River.

The primary need is to dredge the river to support current use and maintain functionality as a place of refuge and for support of charter fishing vessels. The approach channel provides access between Lake Michigan and the Suamico River. Many recreational boaters launch from the Suamico boat ramp and access the lake via the river. USACE performs maintenance dredging within the approach and entrance channels in order to maintain appropriate depths for vessels entering and exiting the river. Failure to continue maintenance dredging within the river would result in restricting access of recreational vessels and reduced economic benefits from fewer charter trips and reduced launch fees.

1.4 – Related NEPA Documentation and Studies

- USACE, Detroit. 1988. Environmental Assessment maintenance Dredging and Upland Disposal for the Suamico River, Brown County, Wisconsin.
- USACE, Detroit. 2000. Maintenance Dredging and Upland Placement of Dredged Material from the Big Suamico River Suamico, Brown County, Wisconsin.
- Draft Technical Memorandum for Longtail Point and Dead Horse Bay Coastal and Lacustrine Habitat Restoration. Lower Green Bay/Fox River AOC. July 2024.

1.5 – Dredging History

USACE last dredged the Suamico River in 2002, placing 17,000 cubic yards of material into an upland site.

Chapter 2 – Proposed Alternatives

2.1 – No Action Alternative

Under the No Action Alternative, USACE would not dredge the Suamico River. The No Action Alternative would not adversely impact physical resources; biological resources; or cultural, archaeological, or social resources. No action could potentially reduce human safety, employment, commercial, and recreational activity in the area by limiting the navigability of the river.

2.2 – Alternative 1 - Upland Placement

Under Alternative 1, Upland Placement , USACE would dredge material from the Suamico River and place it unconfined on an upland portion of Longtail Point shown in Figure 3. The material would be contained by berms or other means as needed to prevent it from flowing back into Lake Michigan.

2.3 – Alternative 2 - In-water Placement

Under Alternative 2, In-water Placement, involves the placement of dredged material directly into Lake Michigan under the ordinary high water mark. For this alternative, in-water areas on the western side of Longtail Point as shown in Figure 3 would be used. In-water placement is regularly used for Great Lakes dredged material. The dredged material may remain in a mound at the site or disperse depending on the material's physical properties and the hydrodynamics of the site. The proposed in-water disposal site is just offshore of Longtail Point on its western edge, in a degraded wetland area. Dredged material would then nourish the shoreline and provide a base for emergent wetland growth.

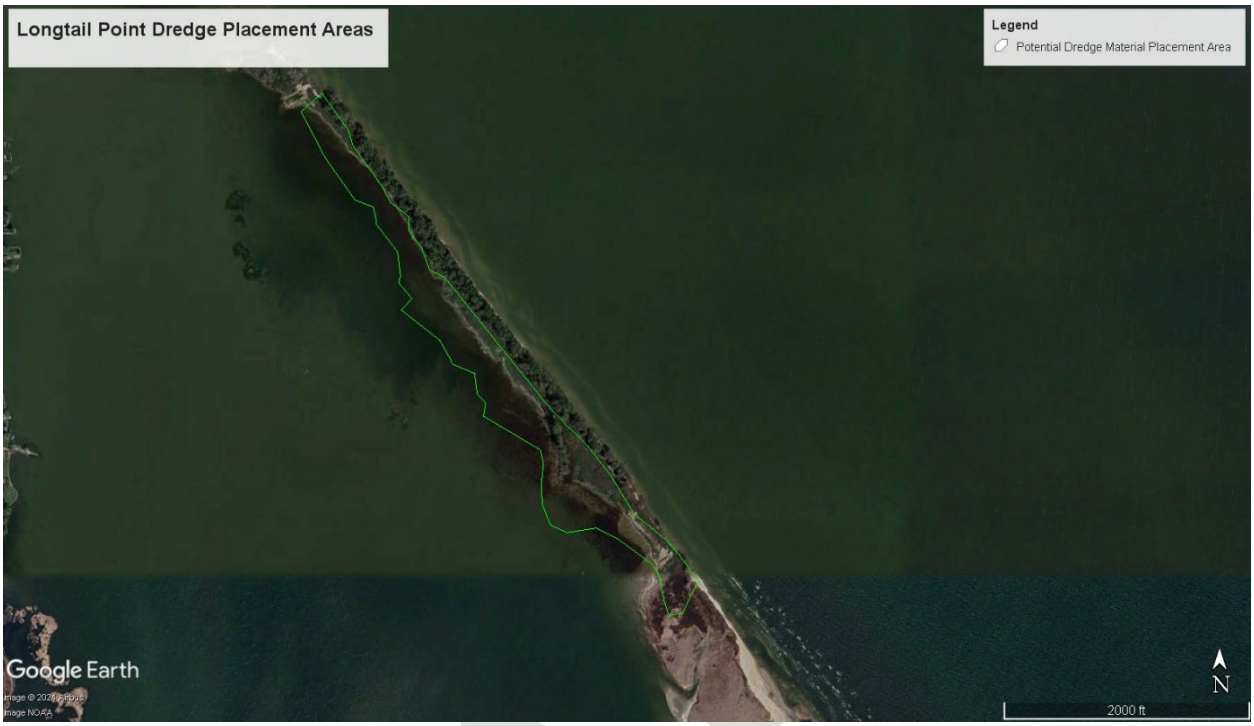

Figure 3 - Longtail Point Dredge Placement Area (Alternative 1 upland placement or Alternative 2 in-water placement)

2.4 – Recommended Plan

Alternative 2 (In-Water Placement) is the Recommended Plan, which involves USACE dredging material from the Suamico River and placing it directly into Lake Michigan under the ordinary high water mark on the western side of Longtail Point.

Chapter 3 – Existing Conditions and Alternative Impacts

This chapter identifies those environmental, cultural, and social resources that could potentially be affected by the proposed dredging of the Suamico River and the placement alternatives. It also evaluates the potential environmental impacts associated with the No Action Plan, Alternative 1, and Alternative 2.

3.1 – Physical Resources

3.1.1 – Geology

The study area is underlain by Pleistocene glacial till. The Kirby Lake Member is present in the subsurface throughout northwestern and west-central Brown County (Pittsfield, Suamico, Hobart, Ashwaubenon, and Lawrence Townships and the village of Howard). The Kirby Lake Member is composed of silty clay loam till. Stones (particles greater than 2 mm in diameter) generally make up less than 10 percent of the till. The average grain-size distribution of the matrix (the fraction less than 2 mm in diameter) is 16 percent sand, 46 percent silt, and 38 percent clay (Need 1985).

Bedrock geology of the study area is the Sinnippee Group, consisting of two formations. The overlying Galena Formation is gray to tan, fine to medium grained crystalline dolostone; containing crinoid debris and Fisherites, along with trace sulfide mineralization in vugs and fractures. It contains interbedded green shaly intervals, especially near base of unit. The Galena Formation is 150 feet thick (Luczaj 2011).

The underlying Platteville Formation is gray to tan dolostone, burrowed with minor white cherty intervals. It is sandy near the base with distinctive well developed carbonate hardgrounds, trace sulfide mineralization, and occasional cephalopods. The Platteville Formation is 50 feet thick (Luczaj 2011).

Both Alternative 1 and Alternative 2 (the Recommended Plan) include placement of dredged material upon or near the Longtail Point shoreline, which would support sediment transport and efforts to slow down erosion of coastal glacial features and till/outwash materials; albeit minor and short-term. Both Alternative 1 and Alternative 2 (the Recommended Plan) could have short-term beneficial effects on geological resources by counteracting localized erosion of coastal glacial materials, and no direct or indirect, short-term or long-term adverse effects on geologic resources.

Under the No Action Alternative, no material would be dredged or placed, and there would be no impact to geologic resources or existing geologic processes.

3.1.2 – Green Bay Hydrodynamics

There is anticlockwise circulation in Green Bay during dominant southwesterly wind and a reversal of this pattern during episodes of northeasterly wind. It is common for two water layers to flow through the mouth of the bay in opposite directions during the stratified season. Cold hypolimnetic lake water entering through the mouth and extending far into the bay maintains stratification and promotes flushing. The effects of resonance of forced and free long wave disturbances are prominent in current records; these oscillations are coherent and in phase across the mouth (Miller and Saylor 1985).

Under Alternative 2 (the Recommended Plan), in-water placement would place dredged material into the littoral drift system and support increasing sediment transport quantities and efforts to slow down coastal erosion; however, it would be minor and short-term comparatively to the greater natural littoral drift system. Under Alternative 1, upland placement would largely keep dredged material out of the water, although water levels can vary by several feet and lower elevations can be periodically inundated. It is anticipated that both Alternative 1 and Alternative 2 (the Recommended Plan) would have no adverse effects to Green Bay hydrodynamics.

Under the No Action Alternative, accumulated sediment would remain in the Big Suamico River federal navigation channel and may have small effects on local hydrodynamics, but no significant effects to the rest of Green Bay.

3.1.2 – Sediment Quality

The most recent sediment data available for the project area is from a sampling event of the Big Suamico River federal navigation channel and reference sites conducted in 2022 and a supplementary sampling event conducted in 2023. A Tier 1 and Tier 2 Contaminant Determination was completed in 2024 for the Big Suamico River federal navigation channel. Samples from the federal channel show that the shoaled material in the federal channel is, on average, 32% fines (silt plus clay). The sediment was found to be chemically clean, though nutrient levels were elevated, and it was determined to be suitable for in-water placement. The Contaminant Determination is included as an attachment to the 404(b)(1) analysis (Attachment 01) in Appendix B.

The sediment quality at the Big Suamico River federal navigation project would not be significantly impacted by the proposed dredging and sediment placement activities under both Alternative 1 and 2. With time, the dredged areas of the federal channel would re-shoal. The sediment quality at the placement location(s) would not be impacted by the placement of materials from the Big Suamico River federal navigation channel, because the sediment at both the in-water and upland proposed placement locations is chemically and physically similar to that in the federal channel. The proposed work would increase the mass of sediment at discrete locations but would not impact sediment quality.

Under the No Action Alternative, no material would be dredged or placed and there would be no impact to sediment quality.

3.1.3 – Water Quality

Lake Michigan is an extremely important resource for drinking water supply, industrial water supply, fishing, recreation, and waterborne commerce. There are no known drinking water intakes in the vicinity of the project area, though the lower Fox River was historically a significant source of water for industrial use in Green Bay, Wisconsin. Water quality degradation has occurred in the lower portion of Green Bay principally due to organic wastes, excessive nutrients, toxic substances, and oxygen consuming wastes from industrial, sewage treatment, and agricultural sources. The lower Fox River, the main tributary to Green Bay, contributes most of the nutrients and toxic substances found in lower Green Bay, though the water quality in the area is improving. However, algae blooms, including harmful algal blooms (HABs) are an ongoing issue for Green Bay and have been tested for and shown to appear in the bay since 2016 (NEW Water, 2018). Green Bay is listed in the State of Wisconsin 303d (WDNR 2024) list as a Water in Restoration for high total phosphorous, which is a contributing factor to HABs.

Alternative 2 (the Recommended Plan) would place dredged material into the nearshore water of Green Bay in Lake Michigan, and it would have temporary and localized impacts on the water quality at the dredging and placement location due to the mixing of the sediment and water and the release of water entrained in the sediment to the water column. The impact characteristics of any dredging operation would include temporary increases in-water turbidity (cloudiness), nutrient levels, and a temporary decrease in dissolved oxygen. The main impact would be turbidity caused by the suspension of fines, and potentially increased ammonia due to the release of soluble nitrogen from the sediment matrix. Both of these conditions would be temporary, and any released materials would be quickly mixed within the water column and diluted to levels below significant adverse impact. Best Management Practices (BMPs), including turbidity barriers and turbidity monitoring during placement of dredged material, would be used to mitigate the short-term impacts of in-water placement. No long-term impacts are identified for Alternative 2 (the Recommended Plan). Alternative 2 (the Recommended Plan) in-water alternative would have minimal short-term impacts to the Lake Michigan water. Alternative 1, upland placement, would have similar impacts as Alternative 2 to the water quality, because return water from upland placement would have similar nutrient impacts to water quality unless it is treated prior to entering Lake Michigan. Any impact of upland placement would be minimal and short-term.

Under the No Action Alternative, there would be no disturbance of the sediment and no impact to water quality.

3.1.4 – Air Quality

The local air quality in Brown County is not considered 'non-attainment' under the Clean Air Act for any National Ambient Air Quality Standards. Brown County was last listed as non-attainment in 1978 for Sulphur dioxide, however it is now in maintenance status and has been since 1992.

Due to the small scale and short duration of this project, the main sources of emissions would be vehicle emissions and dust associated with the construction activities. The project does not include any stationary sources of air emissions, and a General Conformity Analysis was not completed. The temporary mobile source emissions from this project are *de minimis* in terms of the National Ambient Air Quality Standards and the State Implementation Plan. The project is not expected to be a significant source of Green House Gas emissions. All construction vehicles will comply with federal vehicle emission standards. USACE and its Contractors comply with all federal vehicle emissions requirements. USACE follows EM 385-1-1 for worker health and safety, and requires all construction activities to be completed in compliance with federal health and safety requirements. Therefore, under Alternative 1 and Alternative 2 (the Recommended Plan), there would be no significant direct or indirect, long-term or short-term impacts on air quality.

Under the No Action Alternative, no dredging would occur and there would be no impacts on air quality.

3.1.5 – Hazardous, Toxic & Radioactive Wastes (HTRW)

The Big Suamico River federal navigation channel is a recreational harbor that was last dredged in 2002. The sediment in the federal channel is mainly fine sand with silt, with no notable chemical impurities. The source of the sediment is littoral material from north of the harbor in Green Bay and material deposited from the Suamico River. Upland runoff to Suamico River and Green Bay is also a potential source of sediment, though there are no specific discharge locations that would impact sediment from the Big Suamico River federal navigation channel to a significant degree. Much of the land use upstream

of the federal channel is agricultural, and agricultural runoff is likely to contribute to elevated nutrient levels in the sediment and water of the project area.

The shoreline of the federal channel is lined with single-family homes. Directly upstream of the federal channel is the Brown County Suamico Boat Ramp, a public boat ramp used for recreational navigation. Surrounding the shoreline immediately adjacent to the Big Suamico River federal navigation channel is the Green Bay West Shores Wildlife Area, a large state-owned area for wildlife habitat conservation and wildlife-based recreation.

A search of available environmental records was conducted using the USEPA Envirofacts system and Wisconsin Bureau for Remediation and Redevelopment Tracking System to identify potential sources of sediment contamination in the project area. No releases or sites which could be sources of contamination were identified within the search radius for the federal channel or proposed placement location. Historic sediment data also indicate no elevated levels of contaminants above the state or federal standards/ guidelines, with the exception of elevated nutrient levels.

The Chicago District completed a 2024 contaminant determination for hydraulically or mechanically dredged sediment from the Big Suamico River federal navigation channel. The contaminant determination used a tiered approach that includes an evaluation of contaminant sources, transport and pathways, and physical and chemical tests including an evaluation of sediment, site water, and elutriate results. The Tier 2 finding is that sediment from the federal channel is generally suitable for both in-water and upland placement (see Attachment 01 in Appendix B). The risk of encountering any HTRW materials during the dredging of the Big Suamico River federal navigation channel is considered very low. Therefore, under both Alternative 1 and Alternative 2 (the Recommended Plan), there would be no significant direct or indirect, long-term or short-term impacts on HTRW.

Under the No Action Alternative, no dredging would occur and there would be no impacts on HTRW.

3.2 – Ecological Resources

3.2.1 – Longtail Point Habitat and Native Plant Communities

Longtail Point is part of the larger Long Tail Unit of the Green Bay West Shores Wildlife Area, a 434-acre property located south of the Suamico River.

Longtail Point is a sand-spit depositional feature projecting into Green Bay. The habitat types and acreage on the point are dependent on the level of water in Green Bay. Habitat types grade from emergent wetlands to sedge meadows, shrub-carr and cottonwood copses. The mainland portions of the unit have emergent marsh, lowland forest and shrub-carr.

Howe, et al (2018) extensively surveyed habitats and native plant communities along Longtail Point. The following existing conditions are largely based on their studies.

The vast majority of Longtail Point consists of emergent high energy marsh, which is largely dominated by *Phragmites* and hybrid cattail though there are a few native species:

- River bulrush (*Bolboschoenus fluviatilis*), locally common
- Joint rush (*Juncus nodosus*), moderately common

- Giant bur-reed (*Sparganium eurycarpum*), rare
- Monkey-flower (*Mimulus ringens*), rare
- Ditch stonecrop (*Penthorum sedoides*), rare
- Marsh bluegrass (*Poa palustris*), rare
- Bebb's sedge (*Carex bebbii*), rare
- Soft-stem bulrush (*Schoenoplectus tabernaemontani*), rare

A continuous band of submergent marsh in Dead Horse Bay flanks the western shore of the peninsula. Native submergent macrophyte species that are dominant are common bladderwort (*Utricularia vulgaris*), coontail (*Ceratophyllum demersum*), and sago pondweed (*Stuckenia pectinata*). Dense mats of forked duckweed (*Lemna trisulca*), floating just beneath the water surface, are moderately common in some areas. So too are beds of the rhizomatous perennial water celery (*Vallisneria americana*). It is in this area of Dead Horse Bay that small beds of water celery are most common. The invasive Eurasian water-milfoil (*Myriophyllum spicatum*) has a discontinuous distribution along the shore and is moderately common in some areas. Submergent marsh also occurs within the central northern part of the peninsula in a small, relatively high quality area that contains many native emergent plants. Other native aquatic macrophytes include:

- Small pondweed (*Potamogeton berchtoldii*), very locally common
- Turion duckweed (*Lemna turionifera*), rare throughout
- Great duckweed (*Spirodela polyrrhiza*), rare throughout
- Nodding water-nymph (*Najas flexilis*), rare, mostly throughout
- Leafy pondweed (*Potamogeton foliosus*), rare throughout
- Common water-milfoil (*Myriophyllum sibiricum*), rare and somewhat local
- Common waterweed (*Elodea canadensis*), rare, mostly throughout
- Arum-leaved arrowhead (*Sagittaria cuneata*, submergent form), rare and local

The third most common habitat at Longtail Point is hardwood swamp, which contains both native and invasive plant species. It is primarily dominated by cottonwood (*Populus deltoides*) and box elder (*Acer negundo*), though it also has green ash (*Fraxinus pennsylvanica*), sandbar willow (*Salix interior*), and river bank grape (*Vitis riparia*).

Great Lakes beach habitat extends along nearly the entire northern shoreline of the peninsula and primarily consists of sand and zebra/quagga mussels (*Dreissena* spp.), though there is some *Phragmites*. Native plants that inhabit these shorelines include beach rocket (*Cakile edentula* ssp. *Edentula* var. *lacustris*), a state special concern species, beach pea (*Lathyrus japonicus* var. *maritimus*), wild four o'clock (*Mirabilis nyctaginea*), and cottonwood.

Under Alternative 1, the upland placement of dredged material would result in short-term impacts to the native plant community and potentially to wetland communities within the project area. In the short term, extant biota will be buried by the placed dredged material. In an upland environment, this material will remain in place for an unknown period of time until it is revegetated or removed through natural shoreline processes. Although the area will revegetate naturally, the resulting community will be different from well-established communities on Longtail Point due to weedy species being the likely colonizers of recently placed material. Over the long term, the vegetation community will become similar to the extant vegetation on Longtail Point; therefore, upland placement would not have a direct or indirect, long-term adverse impact on the vegetation on Longtail Point.

Under Alternative 2 (the Recommended Plan), in-water placement will have short-term impacts to submergent marsh communities along the western edge of the peninsula. Placement of the material will

bury extant biota. Most submergent vegetation has evolved strategies to deal with burial and shifting sediments, so recovery or recolonization of placed sediment should occur rapidly. For areas built up through the placement of dredged material, these sites will be colonized by local flora and create new marsh habitat. Over time, the vegetation community on the placed dredged material will become similar to the extant vegetation on Longtail Point. In-water placement will occur below the ordinary high water mark (OHWM) and will not impact any jurisdictional wetlands. Therefore, the recommended plan would have minor, direct, short-term impacts to submergent vegetation but no direct or indirect long-term adverse impacts to vegetation.

Under the No Action Alternative, there would be no placement of material on Longtail Point and no impacts to habitat or native plant communities.

3.2.5 – Macroinvertebrates

Howe, et al (2018) surveyed macroinvertebrates at Longtail Point. Their findings are listed below.

Over 40 species of arthropods have been recorded at Longtail Point, including many important aquatic species, such as:

- Predaceous diving beetles (*Hydrovatus* sp., *Hygrotus* sp.)
- Long-horn caddisfly (*Oecetis* sp.)
- Microcaddisfly (*Oxyethira* sp., *Agraylea* sp.)
- Small squaregilled mayfly (*Caenis* sp.)
- Water boatmen (*Trichocorixa* sp.)
- Pygmy backswimmer (*Neoplea* sp.)
- Water beetle (*Laccophilus* sp.)
- Amphipod (*Gammarus* sp.)
- Whirligig beetle (*Dineutus* sp.)

As well as the following mollusk species:

- Pea clams (Pisidiidae [family])
- Bladder snail (Physidae [family])
- Ramshorn snail (Planorbidae [family])
- Pond snails (*Pseudosuccinea* sp., *Stagnicola* sp.)

Both Alternative 1 and Alternative 2 (the Recommended Plan) involve dredging activities. Noise, disturbance, and turbidity would cause short-term and minor impacts to invertebrates in the dredging area. Some invertebrates would undoubtedly be taken in with dredged material and then placed with the rest of the sediment. Based on the limited special footprint of the potential dredging and placement areas, impacts to overall macroinvertebrate communities through dredging would be temporary and minimal.

Under Alternative 1, upland placement of dredged material will result in short-term impacts to macroinvertebrates in the project area. Extant biota will be buried by the placed dredged material. In an upland environment, this material will remain in place for an unknown period of time until it is revegetated or removed through natural shoreline processes. Burrowing insects, worms, and other invertebrates will have to dig out of the placed material. The placed dredged material will be rapidly recolonized by invertebrates from adjacent, unaffected areas.

Under Alternative 2 (the Recommended Plan), in-water placement would place dredged material into nearshore waters, which are the natural zones for sediment movement through the littoral drift process. These zones are naturally barren with continually shifting sands and substrates. Due to these conditions, macroinvertebrate diversity is low, and those taxa that live in the conditions are adapted to sands and gravels continually been entrained and deposited by waves (Albert 2005). It is anticipated that Alternative 2 (the Recommended Plan) would have no adverse effects to littoral macroinvertebrate communities.

Alternative 1 and Alternative 2 (the Recommended Plan) would have minor direct short-term adverse impacts to macroinvertebrates. No significant direct or indirect, short-term or long-term adverse impacts to macroinvertebrates are anticipated as a result of either Alternative 1 or Alternative 2 (the Recommended Plan).

Under the No Action Alternative, no material would be placed and there would be no impacts to macroinvertebrates.

3.2.6 – Fishes

Brown County records from 1885 describe a wide diversity of native fish in Green Bay, including perch, muskellunge, sunfish, crappies, suckers, catfish, and many others (Smith and Snell 1891, Qualls et al. 2013). Many of the fish species described in this early account are still represented in the project area, although invasive species and habitat modifications have changed the shoreline fish community irreversibly.

Howe et al (2018) record over 20 fish species have been recorded offshore near Longtail Point, including:

- GizzardShad (*Dorosoma cepedianum*)
- Trout Perch (*Percopsis omiscomaycus*)
- White Bass (*Morone chrysops*)
- Yellow Perch (*Perca flavescens*)
- Freshwater Drum (*Aplodinotus grunniens*; aka Sheepshead)
- Walleye (*Sander vitreus*)
- Spottail Shiner (*Notropis hudsonius*)
- Northern Pike (*Esox lucius*)
- Muskellunge (*Esox masquinongy*; aka Musky)
- Banded Killifish (*Fundulus diaphanus*),

Both Alternative 1 and Alternative 2 (the Recommended Plan)involve dredging activities. No work would take place between May 15 and October 15 to avoid impacts to sensitive fish and bird species. Noise, disturbance, and turbidity would cause short-term and minor impacts to fish in the dredging area. Fish would likely vacate the area and seek alternative areas to forage or rest. These impacts would be minor and only last as long as dredging was occurring.

For the upland placement Alternative 1, erosion controls would be in place to ensure minimal runoff or loss of dredged material. There would be no direct or indirect, short-term or long-term adverse effects to fish under Alternative 1.

Alternative 2 (the Recommended Plan) would place dredged material into nearshore waters, which are the natural zones for sediment movement through the littoral drift process. These zones are naturally barren with continually shifting sands and substrates, which provide spawning and foraging conditions for fish. Although fish have adapted to continually moving substrates, large deposits of sediment in the placement area for durations longer than a few days could impact fish eggs. Considering the dredging exclusion period, it is anticipated that neither Alternative 1 nor Alternative 2 (the Recommended Plan) would have direct or indirect, short-term or long-term adverse effects on fish communities.

Due to the increased concentrations of ammonia in the sediment, USACE investigated the potential impacts of ammonia on fishes found within the study area. The lowest median 96-hr LC 50 (pH=7.8-8.4) for the species known to occur within the area is 0.51 mg/l for larval Northern Pike (Partridge, 2001). No data on LC 50 ammonia concentrations were found for Banded Killifish, Freshwater Drum, and Trout Perch. Given that larval fish species tend to be more susceptible to ammonia toxicity, USACE assumes that the species with no known LC 50 would not have a LC 50 value less than 0.51 mg/l. The calculation demonstrates a projected concentration of in-water ammonia of 0.39 mg/l within the placement site. This concentration falls below the lowest known LC 50 for species that occur within the project area. Therefore, the projected ammonia values of 0.39 mg/l are only anticipated to have short-term minor effects on surrounding fish species for the recommended plan. As stated previously, USACE anticipates that most fish will move out of the area during the placement of the dredged material. Nonetheless, BMPs such as sediment containment booms should be implemented to promote settling of the material and minimize effects to the surrounding area.

The No Action Alternative would involve no placement or dredging of material and there would be no impacts to fish.

3.2.7 – Terrestrial Communities

Amphibians

Howe et al (2018) report six anuran (frog/toad) species, many of whom likely breed at Longtail Point: American bullfrog (*Lithobates catesbeianus*), American toad (*Bufo americanus*), eastern gray treefrog (*Hyla versicolor*), green frog (*Lithobates clamitans*), northern leopard frog (*Lithobates pipiens*), and spring peeper (*Pseudacris crucifer*). Eastern tiger salamander (*Ambystoma tigrinum*) and blue-spotted salamander (*Ambystoma laterale*) are expected to occur along the west shore of Green Bay (as noted in Roznik 1979), though neither has been officially reported at Longtail Point.

Reptiles

Although not well studied, several reptiles are expected to occur along the west shore of Green Bay (as noted in Roznik 1979), including common garter snake (*Thamnophis sirtalis*) and eastern snapping turtle (*Chelydra serpentina*). Painted turtle (*Chrysemys picta*) has been officially recorded at Longtail Point (Howe et al 2018).

Both Alternative 1 and Alternative 2 (the Recommended Plan) involve dredging activities. Noise, disturbance, and turbidity would cause indirect, short-term, and minor impacts to amphibians and reptiles in the dredging area under both alternatives. Amphibians and reptiles would likely vacate the

area and seek alternative areas to forage or rest. These impacts would be minor and only last as long as dredging was occurring.

Under Alternative 1, upland placement of dredged material could potentially have direct, short-term impacts on amphibians or reptiles in upland or wetland habitats. Depending on the timing of dredged material placement, hibernating animals may be buried by dredged material and need to dig out further than expected the following spring.

Under Alternative 2 (the Recommended Plan), in-water placement would place dredged material into nearshore waters, which are the natural zones for sediment movement through the littoral drift process. Due to these conditions, amphibian and reptile diversity is absent to low. It is anticipated that the in-water placement alternative would have no long-term, direct or indirect adverse effects on amphibian or reptile communities.

No material would be placed or dredged under the No Action Alternative, and there would be no impacts to amphibians or reptiles.

3.2.8 – Birds

Although there are 150-250 possible bird species present in the project area throughout the year, at least 50 bird species have been officially recorded across all seasons at Longtail Point, including: Black Tern Caspian Tern, Forster's Tern, Common Tern, Great Egret, Bald Eagle, Veery, Common Gallinule, Yellow-headed Blackbird, Black-crowned Night-Heron, American White Pelican, Wood Duck, Mallard, Red-winged Blackbird, and Blue Heron (Howe et al 2018).

Both Alternative 1 and Alternative 2 (the Recommended Plan) involve dredging activities. No work would take place between May 15 and September 30 to avoid impacts to sensitive fish and bird species. Noise, disturbance, and turbidity would cause indirect, short-term, and minor impacts to birds in the dredging area. Birds would likely vacate the area and seek alternative areas to forage or rest. These impacts would be minor and only last as long as dredging was occurring.

Alternative 1, upland placement of dredged materials, would constrain the dredged materials to the terrestrial portions of Longtail Point. Placement in an upland location would cover existing vegetation and reduce habitat available for migrating birds, though the area would revegetate. Upland placement would result in a minor, indirect, and short-term adverse impact to birds.

Alternative 2 (the Recommended Plan), would place dredged material into nearshore waters, where birds to do not nest. However, certain species of birds have adapted to feeding on macroinvertebrates in these areas, such as certain Sandpiper and Plover species. Also, wading birds and diving duck species likely hunt for fish in nearshore waters. These activities would be temporarily disrupted during placement. Impacts to bird species from this alternative would be indirect, short-term, and minimal.

Under the No Action Alternative, no material would be dredged or placed, and there would be no impacts to birds.

3.2.9 – Threatened & Endangered Species

The U.S. Fish and Wildlife Service (USFWS) Information, Planning, and Conservation (IpaC) system (Project Code: 2024-0083710) was used to determine which listed species were likely to be found in the project area. The following federally listed species and their critical habitats are identified by the USFWS as potentially occurring within the project area:

- Tricolored Bat (*Perimyotis subflavus*) – Proposed Endangered - Caves and abandoned mines or road-associated culverts in winter. Forested habitats and occasionally human structures during the spring, summer, and fall.

- Monarch Butterfly (*Danaus plexippus*) – Candidate – Fields, roadside areas, open areas, wet areas or urban gardens. Milkweed and flowering plants are needed for monarch habitat. Adult monarchs feed on the nectar of many flowers during breeding and migration, but they can only lay eggs on milkweed plants.

- Salamander Mussel (*Simpsonaias ambigua*) – Proposed Endangered –Rivers, streams, and in some cases lakes with natural flow regimes. Requires the Mudpuppy (*Necturus maculosus*) as glochidia host.

- Northern Long Eared Bat (*Myotis septentrionalis*) – Endangered - Hibernates in caves and mines – swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests and woods.

- Rufa Red Knot (*Calidris canutus rufa*) – Threatened – Coastal Areas or large wetland complexes

No portions of the project area are listed as critical habitat for any of these federally-listed species. No work would take place between May 15 and September 30 to avoid impacts to sensitive fish and bird species.

After utilizing the determination keys provided by the IPaC system (Project Code: 2024-0083710) and coordinating with USFWS, a determination of "No Effect" was reached for all listed species. Although USACE initially determined the Salamander Mussel, a proposed endangered species, as "may effect", the USFWS stated in an email dated 21 May 2024 that "No Effect" was the appropriate determination for the Salamander Mussel.

3.3 – Cultural & Social Resources

3.3.1 – Social Setting

The Big Suamico River federal navigation channel is located in Suamico, Wisconsin. Suamico had a population of 12,820 as of the 2020 census with a median household income of $111,320. The median age in the village was 40.4 years. 27.5% of residents were under the age of 18; 5.6% were between the ages of 18 and 24; 25.7% were from 25 to 44; 33% were from 45 to 64; and 8.2% were 65 years of age or older. The gender makeup of the village was 51.0% male and 49.0% female.

There are no anticipated direct or indirect, short-term or long-term adverse impacts on the social setting in the vicinity of the dredging or placement area under either Alternative 1 or Alternative 2 (the Recommended Plan).

3.3.2 – Archaeological & Historic Properties

The placement area at Longtail Point is located within the boundaries of an existing archaeological site, although the site was never fully delineated or evaluated. The site was originally located in 1933, with further testing done in 1980. It was reported at the time that the site was largely destroyed, however isolated discoveries have been made since then.

Alternative 1 and Alternative 2 (the Recommended Plan), the dredging placement area on or adjacent to the western edge of Longtail Point is located outside of any known historic sites. No excavation or disturbance is expected to occur, and material placement should have the benefit of protecting resources if any exist in the area. The dredging limits are located entirely within the federal navigation channel, which has been routinely dredged and disturbed. Therefore, no direct or indirect short-term or long-term adverse impacts on archaeological or historic resources are anticipated under either Alternative 1 or Alternative 2 (the Recommended Plan).

Under the no action plan, no dredging would occur and no impacts to historic properties would occur.

3.3.3 – Recreation

The project area is located just downstream from the Village of Suamico's boat landing, where recreational vessels can enter the Suamico River and then proceed to Lake Michigan.

Longtail Point has a number of possible recreational activities that are supported by the Wisconsin Department of Natural Resources (WDNR), including:

- Birding
- Cross country skiing (no designated trail)
- Fishing
- Hiking (no designated trail)
- Hunting (especially noted for deer, waterfowl and small game)
- Trapping
- Wild edibles/gathering
- Wildlife viewing

Alternative 1 and Alternative 2 (the Recommended Plan) would dredge the Big Suamico River federal navigation channel and allow continued access to Lake Michigan from inland harbors and boat ramps. This will improve recreational opportunities. Dredged material placement on Longtail Point is intended to provide shoreline protection and habitat benefits which could support long-term recreational uses as well. Overall, both Alternative 1 and Alternative 2 (the Recommended Plan) may have minor direct and indirect, short-term impacts on recreation, but they are not anticipated to result in any direct or indirect, short-term or long-term significant adverse impacts to recreation. Ultimately, the project will result in long term benefits to recreation as boat access is improved between the Suamico River and Lake Michigan.

Under the No Action Alternative, no impacts to recreation are expected because no dredging would take place.

3.4 - Cumulative Effects

Consideration of cumulative effects requires a broader perspective than examining just the direct and indirect effects of a proposed action. It requires that reasonably foreseeable future impacts be assessed in the context of past and present effects to important resources. Often it requires consideration of a larger geographic area than just the immediate "project" area. One of the most important aspects of cumulative effects assessment is that it requires consideration of how actions by others (including those actions completely unrelated to the proposed action) have and will affect the same resources. In assessing cumulative effects, the key determinant of importance or significance is whether the incremental effect of the proposed action will alter the sustainability of resources when added to other present and reasonably foreseeable future actions. Cumulative environmental effects for the proposed dredging of the Big Suamico River federal navigation channel were assessed in accordance with guidance provided by the Council on Environmental Quality (CEQ) and the U.S. Environmental Protection Agency (USEPA) (USEPA 315-R-99-002).

3.4.1 – Scope of Cumulative Effects Analysis

Through this environmental assessment, the cumulative effects issues and assessment goals are established, the spatial and temporal boundaries are determined, and reasonably foreseeable future actions are identified. Cumulative effects are assessed to determine if the sustainability of any of the resources is adversely affected, with the goal of determining the incremental impact to key resources that would occur should the proposed work be implemented. The spatial boundary being considered is normally in the general area of the proposed activity; however, the area may be expanded on a case-by-case basis if some particular resource condition necessitates broadening the boundary.

Three temporal boundaries were considered:

- Past – Pre-1830s because this is the approximate time that the Lake Michigan shoreline and littoral drift started being modified for development
- Present – 2024, when the decision is being made on sand placement.
- Future – 2074, the year used a typical planning window(~50 years)

Projecting the reasonably foreseeable future actions can be difficult. The proposed, dredging of the Big Suamico River federal navigation channel under Alternatives 1 or 2 is reasonably foreseeable; however, the actions by others that may affect the same resources are not as clear. Projections of those actions must rely on judgment as to what are reasonable based on existing trends and where available, projections from qualified sources. Reasonably foreseeable does not include unfounded or speculative projections. Some future projections were taken from watershed and specific studies generated for the general project area. In this case, reasonably foreseeable future actions include:

- Continued use of the Suamico River as a place of refuge and for access to recreational boating
- Continued restoration of the Green Bay Area of Concern (AOC) including habitat restoration in Green Bay

Continued natural shoreline erosion and shoreline sediment migration, varying with water levels and affected by human coastal activities including dredging, sediment placement, and shoreline armoring.

3.4.2 – Cumulative Effects on Resources

Dredging of the Suamico River will provide generally beneficial cumulative effects for reasonably foreseeable actions within the general area of activity. The continued use of the Suamico River for boating access will benefit from dredging. Efforts to reduce erosion at Longtail Point will benefit from dredged material placement along its western shore. Also, work to restore the Green Bay AOC will benefit from additional marsh habitat and improved stability of Longtail Point.

Chapter 4 – Coordination & Compliance

4.1 – Regulatory Requirements

The Recommended Plan is in compliance with appropriate statutes, Executive Orders (EO), and regulations, including the Natural Historic Preservation Act of 1966, as amended; the Endangered Species Act of 1973, as amended; Fish and Wildlife Coordination Act, as amended; EO 12898 (Environmental Justice); EO 11990 (Protection of Wetlands); EO 11988 (Floodplain Management); Section 10 of the Rivers and Harbors Act of 1899; the Clean Air Act, as amended; the Clean Water Act, as amended, and the National Environmental Policy Act of 1969.

4.1.1 Environmental Justice

EO 12898 (Environmental Justice) requires that, to the greatest extent practicable and permitted by law, and consistent with the principles set forth in the report on the National Performance Review, each federal agency make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories and possessions, the District of Columbia, the Commonwealth of Puerto Rico, and the Commonwealth of the Mariana Islands. Per EO 12898 (Environmental Justice), the USEPA Environmental Justice website has been consulted (15 May 2024) and indicates that the project area is not in an environmental justice community (Figure 4).

SELECTED VARIABLES	VALUE	STATE AVERAGE	PERCENTILE IN STATE	USA AVERAGE	PERCENTILE IN USA
POLLUTION AND SOURCES					
Particulate Matter (µg/m^3)	7.41	7.98	19	8.08	29
Ozone (ppb)	57.6	58.6	30	61.6	21
Diesel Particulate Matter (µg/m^3)	0.0926	0.179	24	0.261	14
Air Toxics Cancer Risk* (lifetime risk per million)	20	19	12	25	5
Air Toxics Respiratory HI*	0.2	0.21	7	0.31	4
Toxic Releases to Air	500	8,100	35	4,600	46
Traffic Proximity (daily traffic count/distance to road)	33	320	32	210	32
Lead Paint (% Pre-1960 Housing)	0.13	0.4	19	0.3	39
Superfund Proximity (site count/km distance)	0.086	0.12	62	0.13	61
RMP Facility Proximity (facility count/km distance)	0.28	0.59	54	0.43	66
Hazardous Waste Proximity (facility count/km distance)	0.4	1.4	43	1.9	46
Underground Storage Tanks (count/km^2)	0.3	3.3	34	3.9	35
Wastewater Discharge (toxicity-weighted concentration/m distance)	0.00072	0.028	57	22	45
SOCIOECONOMIC INDICATORS					
Demographic Index	6%	24%	7	35%	4
Supplemental Demographic Index	5%	12%	8	14%	7
People of Color	7%	21%	37	39%	18
Low Income	6%	28%	7	31%	9
Unemployment Rate	2%	4%	49	6%	37
Limited English Speaking Households	0%	1%	0	5%	0
Less Than High School Education	2%	8%	18	12%	18
Under Age 5	4%	5%	44	6%	46
Over Age 64	13%	18%	32	17%	38
Low Life Expectancy	17%	19%	33	20%	28

*Diesel particulate matter, air toxics cancer risk, and air toxics respiratory hazard index are from the EPA's Air Toxics Data Update, which is the Agency's ongoing, comprehensive evaluation of air toxics in the United States. This effort aims to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that the air toxics data presented here provide broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. Cancer risks and hazard indices from the Air Toxics Data Update are reported to one significant figure and any additional significant figures here are due to rounding. More information on the Air Toxics Data Update can be found at: https://www.epa.gov/haps/air-toxics-data-update.

Figure 4 – EJ Screen data for Suamico, Wisconsin

EO 14008 was signed in 2021 and ordered the CEQ to develop a new tool called the Climate and Economic Justice Screening Tool (CEJST). The tool provides information to identify disadvantaged communities experiencing burdens in eight different categories, climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development. Census tracts appear shaded on the website's mapping tool if they are experiencing these burdens. Figure 5 is a screenshot from the CEJST website and indicates the project area is not within or adjacent to a tract that is considered disadvantaged.

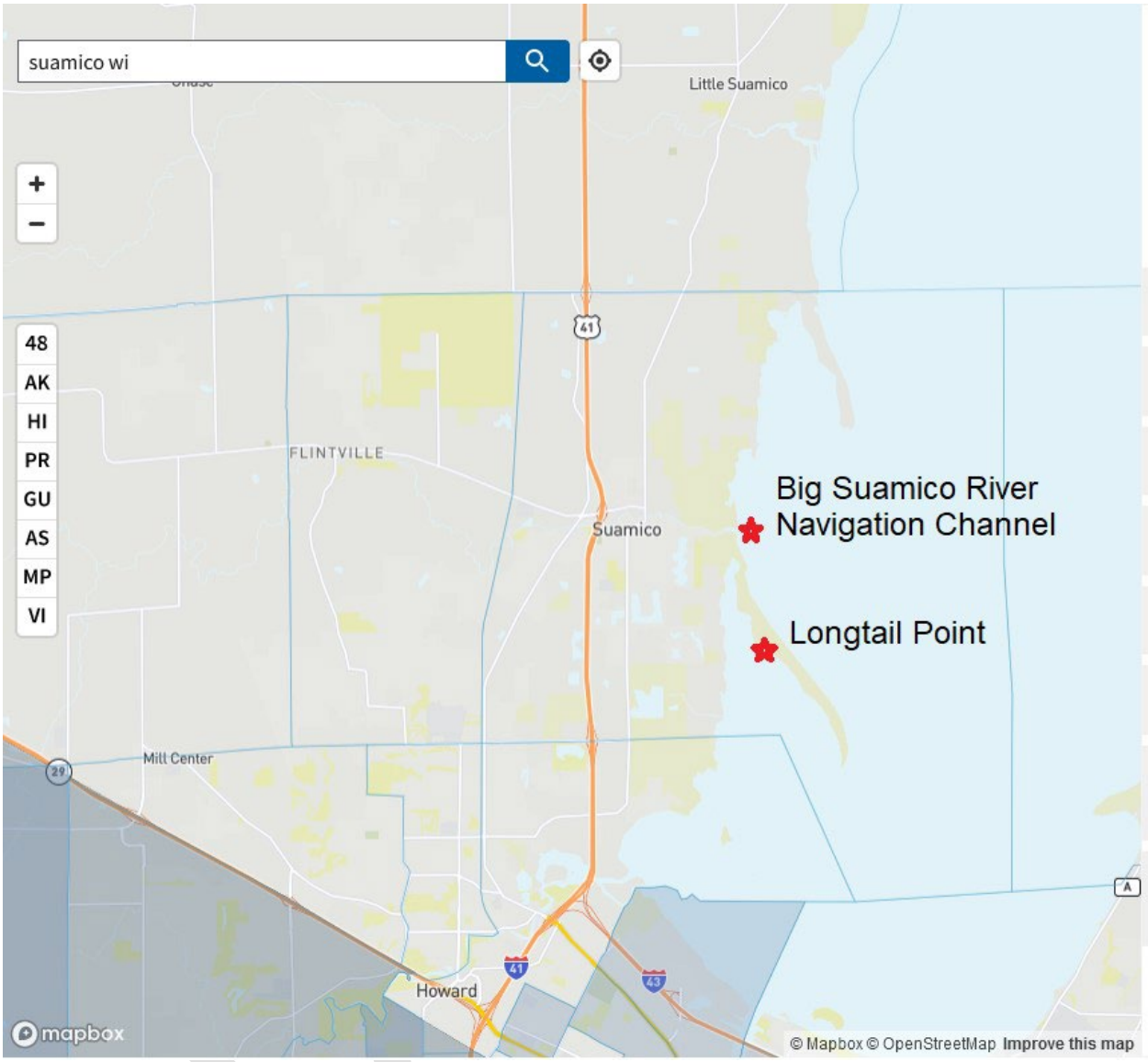

Figure 5 - CEJST map for Suamico, Wisconsin

4.1.2 Clean Air Act

Analysis of air quality impacts as they relate to the Clean Air Act are found in Section 3.1.4.

4.1.3 – Section 401 / 404 of the Clean Water Act

Alternative 2 (the Recommended Plan) would include dredging and placing the dredged sediment in nearshore waters within or near the littoral zone. Based on elutriate testing, water quality impacts associated with the placement are expected to be localized and temporary, and to be fully consistent with USACE guidance. A water quality certification pursuant to section 401 of the Clean Water Act will

be obtained from the State of Wisconsin prior to construction. In a letter dated 15 August 2024, the State of Wisconsin stated that the application process was complete and a 30-day comments period on the application. No work will proceed until the certification is received. The USACE conducted as evaluation of the effects of the proposed discharge of dredged material into waters of the United States, and results of the evaluation can be found in the Section 404(b)(1) Contaminant Determination, dated March 2024 (Appendix B).

4.1.4 – Section 7 of the Endangered Species Act

Section 7 of the Endangered Species Act requires Federal agencies to ensure that actions they fund, authorize, permit, or otherwise carry out will not jeopardize the continued existence of any listed species or adversely modify designated critical habitats. Coordination with the USFWS commenced with a project scoping letter dated 14 May 2024.

USACE accessed the USFWS IPaC website on April 30, 2024 to determine whether endangered, threatened, proposed, or candidate species could potentially be present in the action area, and if the action area overlapped with any designated or proposed critical habitat (Project Code: 2024-0083710). The results of the IPaC search are shown in Section 3.2.9. After utilizing the determination keys provided by the IPaC system and coordinating with USFWS, a determination of "No Effect" was reached for all of the listed species. Although USACE initially determined that the proposed project "may effect" one proposed endangered species, the Salamander Mussel (*Simpsonaias ambigua*), the USFWS stated in an email dated 21 May 2024 that "no effect" was the appropriate determination for the Salamander Mussel.

4.1.5 – Section 106 of the National Historic Preservation Act

Section 106 of the National Historic Preservation Act (16 USC 470) requires Federal agencies to consider the effects of proposed Federal undertakings on historic properties included or eligible for the National Register of Historic Places. The implementing regulations for Section 106 (36 C.F.R. § 800) require Federal agencies to consult with various parties, including the Wisconsin State Historic Preservation Office (SHPO), and Indian tribes, to identify and evaluate historic properties, and to assess and resolve effects to historic properties. USACE determined that the project will not adversely affect historic properties and notified Wisconsin SHPO of this "no effects" determination by letter on 13 May 2024 pursuant to 36 C.F.R. § 800.11. No response from Wisconsin SHPO was received within 30 days, and, pursuant to 36 C.F.R. § 800.5, no further consultation under Section 106 is required. USACE coordinated withthe Forest County Potawatomi Community of Wisconsin; Fort Belknap Indian Community of the Fort Belknap Reservation of Montana; Hannahville Indian Community, Michigan; Lac Vieux Desert Band of Lake Superior Chippewa Indians; Little Traverse Bay Bands of Odawa Indians, Michigan; Menominee Indian Tribe of Wisconsin; Miami Tribe of Oklahoma; Oneida Nation of Wisconsin; and Ottawa Tribe of Oklahoma. No responses were received.

4.1.6 – EO 13186 – Responsibilities of Federal Agencies to Protect Migratory Birds

Federal agencies shall restore or enhance the habitat of migratory birds and prevent or abate pollution or detrimental alteration of the environment for migratory birds. This project lies within a significant portion of the Mississippi Flyway along the western shoreline of Lake Michigan that particularly favors both ecological and economically valuable species including neo-tropic migrants and waterfowl. The dredging project would be in compliance by creating additional marsh habitat as a result of material

placement. Compliance with environmental windows would also reduce the likelihood of impacts to migratory and resident birds by avoiding work during nesting periods.

4.1.7 – Coastal Zone Management Act

This project is located within the state of Wisconsin's Coastal Management Program (WCMP) boundaries. The Chicago District expects the project to be fully consistent with the enforceable polices of Wisconsin's approved coastal management plan. USACE sent its consistency determination in a letter to WCMP on August 8, 2024, and USACE anticipates that the WCMP will concur with this determination.

4.1.5 – Fish & Wildlife Coordination Act

The Fish and Wildlife Coordination Act, 16 U.S.C. 661 et seq., requires consultation with the USFWS for recommendations to minimize impacts on fish and wildlife resources. Coordination with the USFWS is ongoing.

4.2 – Public Review and Agency Coordination

Coordination with federal and state agencies, tribal organizations, and other stakeholders was conducted as set forth in policy. The following describes coordination, including scoping and public and agency review, that has occurred. The NEPA scoping process extended from December 21 2023 through January 22, 2024. In total, three responses were received from agencies and stakeholders. For correspondence and coordination refer to Appendix A. Public and agency review occurred from(to be determined). All comments received during public review were considered, incorporated into the final EA, as appropriate and are maintained in Appendix A

Areas of Known or Expected Controversy

There are no known areas of expected controversy.

4.3 – FONSI

This Draft Environmental Assessment was completed for the proposed maintenance dredging of the Big Suamico River federal navigation channel and Alternative 1 and Alternative 2 (the Recommended Plan) presented in Chapter 2. The assessment has found that there would be no significant adverse effects resulting from implementation of any of the alternatives. A 30-day Agency and Public Review period is being held and all pertinent comments received will be incorporated into the document. The Final Environmental Assessment document and supporting appendices will be made publicly available. All applicable laws, executive orders, regulations, and local government plans are being considered in evaluation of alternatives. Based on this draft report, USACE believes that Alternative 2 (the Recommended Plan) would not cause significant adverse effects on the quality of the human environment; therefore, preparation of an Environmental Impact Statement is not anticipated at this time.

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Appendix A – Coordination

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, CHICAGO DISTRICT
231 SOUTH LASALLE STREET, SUITE 1500
CHICAGO IL 60604

December 21, 2023

Planning Branch
Planning, Programs and Project Management

Dear Recipient:

The U.S Army Corps of Engineers, Chicago District (USACE) will be preparing a National Environmental Policy Act (NEPA) document on the effects associated with a proposed dredging project for the authorized federal navigation channel on the Big Suamico River.

The proposed project would dredge the approximately 3,700-foot federal channel up to the 8-foot authorized depth, removing approximately 20,000 cubic yards of material from the navigation channel. The proposed disposal location is either in-water placement or upland placement along Longtail Point, located approximately one mile south of the mouth of the river. Attachment 1 shows the proposed dredging location and proposed upland placement location.

As part of the NEPA scoping process, USACE is seeking comments regarding potential impacts from the proposed action. Enclosure 2 is a list of state and federal agencies, tribal nations, and elected officials receiving this request. Please provide comments by January 22, 2024 to Mr. Jason Zylka, Ecologist, via email at jason.zylka@usace.army.mil.

Sincerely,

David F. Bucaro, P.E., PMP, WRCP
Chief, Planning Branch
Chicago District

Enclosures
1 – Project Map
2 – Distribution List

Big Suamico Dredging 2023

Attachment 1 - Project Map

Legend

- Federal Channel
- Long Tail Point Lighthouse
- Potential Dredge Material Placement Area

Shoots Bar & Grill

Sensiba State Wildlife Area

Sunset Beach Park

Suamico

Idlewild Community Park

Long Tail Point Beach

Brown County WI Barkhausen Waterfowl...

Dead Horse Bay

Long Tail Point Lighthouse

Google Earth

Image NOAA

Image © 2023 TerraMetrics

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Enclosure 2 - Distribution List

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From: Bowman, Reena P
To: Zylka, Jason J CIV USARMY CELRC (USA)
Cc: Arneson, Jade R; Galbraith, Betsy M; Marquardt, Shauna
Subject: [Non-DoD Source] Re: [EXTERNAL] Big Suamico Dredging Scoping letter
Date: Wednesday, December 27, 2023 8:22:01 AM

Hello Jason,

Thank you for providing an opportunity to comment. There have been a few changes in regards to Fish and Wildlife Service contacts. Please update your distribution list as follows:

Shauna Marquardt
Field Office Supervisor
U.S. Fish and Wildlife Service, Ecological Services Field Office
shauna_marquardt@fws.gov

Betsy Galbraith
Deputy Field Office Supervisor
U.S. Fish and Wildlife Service, Ecological Services Field Office
betsy_galbraith@fws.gov

Jade Arneson
Biologist
U.S. Fish and Wildlife Service, Ecological Services Field Office
jade_arneson@fws.gov

Have a great day.

Reena Bowman (she/her)
Fish and Wildlife Biologist
U.S. Fish and Wildlife Service
3815 American Blvd. East
Bloomington, MN 55425
920-634-5435

From: Zylka, Jason J CIV USARMY CELRC (USA) <Jason.J.Zylka@usace.army.mil>
Sent: Friday, December 22, 2023 6:36 PM
To: Zylka, Jason J CIV USARMY CELRC (USA) <Jason.J.Zylka@usace.army.mil>
Subject: [EXTERNAL] Big Suamico Dredging Scoping letter

Greetings,

A scoping letter is attached to this email for dredging of the Big Suamico River near Suamico Wisconsin.

Project details and comment submittal instructions are included in the scoping letter.

Thank you in advance for your time and comments. Happy Holidays!

Jason Zylka
Ecologist
US Army Corps of Engineers, Chicago District
231 S. LaSalle Street, Suite 1500
Chicago, IL 60604-1437
jason.zylka@usace.army.mil
Phone (312) 846-5311
Mobile (312) 415-7341
Fax (312) 886-2891

From: EPA Region 5 NEPA Program
To: Zylka, Jason J CIV USARMY CELRC (USA)
Subject: [Non-DoD Source] RE: Big Suamico Dredging Scoping letter
Date: Wednesday, January 3, 2024 1:48:42 PM

Good afternoon, Jason-

EPA's NEPA program is in receipt of USACE Chicago District's email requesting scoping review of the Big Suamico Dredging Project. At this time, due to staffing constraints, EPA's NEPA Program will not be reviewing or providing comments on the document. However, we appreciate you notifying of us the project information's availability.

To ensure that all USACE Chicago District's planning and NEPA documents are received by the NEPA program, please continue to submit all NEPA-related documents and requests to the EPA Region 5 NEPA email box at R5NEPA@epa.gov.

Thanks,

Krystle

Krystle Z. McClain, P.E., NEPA & EJ Programs Supervisor, MultiMedia Section 2
Tribal and Multi-Media Programs Office | Office of the Regional Administrator
EPA Region 5 | 77 West Jackson Blvd. | Chicago, Illinois 60604
Phone: (312) 886-7573 Email: mcclain.krystle@epa.gov

From: Zylka, Jason J CIV USARMY CELRC (USA) <Jason.J.Zylka@usace.army.mil>
Sent: Friday, December 22, 2023 6:37 PM
To: Zylka, Jason J CIV USARMY CELRC (USA) <Jason.J.Zylka@usace.army.mil>
Subject: Big Suamico Dredging Scoping letter

Greetings,

A scoping letter is attached to this email for dredging of the Big Suamico River near Suamico Wisconsin.

Project details and comment submittal instructions are included in the scoping letter.

Thank you in advance for your time and comments. Happy Holidays!

Jason Zylka
Ecologist
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231 S. LaSalle Street, Suite 1500

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DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, CHICAGO DISTRICT
231 SOUTH LASALLE STREET, SUITE 1500
CHICAGO IL 60604

May 14, 2024

Environmental and Cultural Resources Section
Planning Branch

SUBJECT: Big Suamico Dredging Project, IPaC Project Code 2024-0083710

Dear Recipient:

The U.S. Army Corps of Engineers, Chicago District (USACE) will be preparing a National Environmental Policy Act (NEPA) document on the effects associated with a proposed dredging project for the authorized federal navigation channel on the Big Suamico River.

The proposed project would dredge the approximately 3,700-foot federal channel up to the 8-foot authorized depth, removing approximately 20,000 cubic yards of material from the navigation channel. The proposed disposal location is either in-water placement or upland placement along Longtail Point, located approximately one mile south of the mouth of the river. Attachment 1 shows the proposed dredging location and proposed upland placement location.

As part of the NEPA process, USACE used the USFWS IPaC system to determine threatened or endangered species that may be present within the project area. A determination key was then used to assess potential impacts to listed species. A determination of “may effect” was reached the Proposed Endangered Salamander Mussel.

As part of the Section 7 consultation process, USACE is seeking recommendations to avoid or minimize impacts to these species. Please contact Mr. Jason Zylka (jason.zylka@usace.army.mil) at 312-846-5311 to discuss this project.

Sincerely,

Alex Hoxsie

Alex Hoxsie
Chief, Environmental and Cultural Resources
Chicago District

Enclosures
1 – Project Map
2 – Species List
3 – Consistency Letter

Big Suamico Dredging 2023

Attachment 1 - Project Map

Legend

- Federal Channel
- Long Tail Point Lighthouse
- Potential Dredge Material Placement Area

Shoots Bar & Grill

Sensiba State Wildlife Area

Sunset Beach Park

Suamico

Idlewild Community Park

Long Tail Point Beach

Brown County WI Barkhausen Waterfowl...

Dead Horse Bay

Long Tail Point Lighthouse

Google Earth

Image NOAA

Image © 2023 TerraMetrics

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
Minnesota-Wisconsin Ecological Services Field Office
3815 American Blvd East
Bloomington, MN 55425-1659
Phone: (952) 858-0793

In Reply Refer To: 04/30/2024 15:52:06 UTC
Project Code: 2024-0083710
Project Name: Big Suamico Dredging

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

This response has been generated by the Information, Planning, and Conservation (IPaC) system to provide information on natural resources that could be affected by your project. The U.S. Fish and Wildlife Service (Service) provides this response under the authority of the Endangered Species Act of 1973 (16 U.S.C. 1531-1543), the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d), the Migratory Bird Treaty Act (16 U.S.C. 703-712), and the Fish and Wildlife Coordination Act (16 U.S.C. 661 *et seq.*).

Threatened and Endangered Species
The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and may be affected by your proposed project. The species list fulfills the requirement for obtaining a Technical Assistance Letter from the U.S. Fish and Wildlife Service under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

Consultation Technical Assistance
Please refer to refer to our Section 7 website for guidance and technical assistance, including step-by-step instructions for making effects determinations for each species that might be present and for specific guidance on the following types of projects: projects in developed areas, HUD, CDBG, EDA, USDA Rural Development projects, pipelines, buried utilities, telecommunications, and requests for a Conditional Letter of Map Revision (CLOMR) from FEMA.

We recommend running the project (if it qualifies) through our **Minnesota-Wisconsin Federal Endangered Species Determination Key (Minnesota-Wisconsin ("D-key"))**. A demonstration video showing how-to access and use the determination key is available. Please note that the Minnesota-Wisconsin D-key is the third option of 3 available d-keys. D-keys are tools to help Federal agencies and other project proponents determine if their proposed action has the potential to adversely affect federally listed species and designated critical habitat. The Minnesota-Wisconsin D-key includes a structured set of questions that assists a project proponent in determining whether a proposed project qualifies for a certain predetermined consultation outcome for all federally listed species found in Minnesota and Wisconsin (except for the northern long-eared bat- see below), which includes determinations of “no effect” or “may affect, not likely to adversely affect." In each case, the Service has compiled and analyzed the best available information on the species’ biology and the impacts of certain activities to support these determinations.

If your completed d-key output letter shows a "No Effect" (NE) determination for all listed species, print your IPaC output letter for your files to document your compliance with the Endangered Species Act.

For Federal projects with a “Not Likely to Adversely Affect” (NLAA) determination, our concurrence becomes valid if you do not hear otherwise from us after a 30-day review period, as indicated in your letter.

If your d-key output letter indicates additional coordination with the Minnesota-Wisconsin Ecological Services Field Office is necessary (i.e., you get a “May Affect” determination), you will be provided additional guidance on contacting the Service to continue ESA coordination outside of the key; ESA compliance cannot be concluded using the key for “May Affect” determinations unless otherwise indicated in your output letter.

Note: Once you obtain your official species list, you are not required to continue in IPaC with d-keys, although in most cases these tools should expedite your review. If you choose to make an effects determination on your own, you may do so. If the project is a Federal Action, you may want to review our section 7 step-by-step instructions before making your determinations.

Using the IPaC Official Species List to Make No Effect and May Affect Determinations for Listed Species

1. If IPaC returns a result of “There are no listed species found within the vicinity of the project,” then project proponents can conclude the proposed activities will have **no effect** on any federally listed species under Service jurisdiction. Concurrence from the Service is not required for **no effect** determinations. No further consultation or coordination is required. Attach this letter to the dated IPaC species list report for your records.
2. If IPaC returns one or more federally listed, proposed, or candidate species as potentially present in the action area of the proposed project – other than bats (see below) – then project proponents must determine if proposed activities will have **no effect** on or **may affect** those species. For assistance in determining if suitable habitat for listed, candidate, or proposed species occurs within your project area or if species may be affected by project activities, you can obtain Life History Information for Listed and Candidate Species on our office website. If no impacts will occur to a species on the IPaC species list (e.g., there is no habitat present in the project area), the appropriate determination is **no effect**. No further consultation or coordination is required. Attach this letter to the dated IPaC species list report for your records.

3. Should you determine that project activities **may affect** any federally listed, please contact our office for further coordination. Letters with requests for consultation or correspondence about your project should include the Consultation Tracking Number in the header. Electronic submission is preferred.

Northern Long-Eared Bats
Northern long-eared bats occur throughout Minnesota and Wisconsin and the information below may help in determining if your project may affect these species.

This species hibernates in caves or mines only during the winter. In Minnesota and Wisconsin, the hibernation season is considered to be November 15 to March 31. During the active season (April 1 to November 14) they roost in forest and woodland habitats. Suitable summer habitat for northern long-eared bats consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags ≥3 inches dbh for northern long-eared bat that have exfoliating bark, cracks, crevices, and/or hollows), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit the characteristics of a potential roost tree and are located within 1,000 feet (305 meters) of forested/wooded habitat. Northern long-eared bats have also been observed roosting in human-made structures, such as buildings, barns, bridges, and bat houses; therefore, these structures should also be considered potential summer habitat and evaluated for use by bats. If your project will impact caves or mines or will involve clearing forest or woodland habitat containing suitable roosting habitat, northern long-eared bats could be affected.

Examples of unsuitable habitat include:

- Individual trees that are greater than 1,000 feet from forested or wooded areas,
- Trees found in highly developed urban areas (e.g., street trees, downtown areas),
- A pure stand of less than 3-inch dbh trees that are not mixed with larger trees, and
- A monoculture stand of shrubby vegetation with no potential roost trees.

If IPaC returns a result that northern long-eared bats are potentially present in the action area of the proposed project, project proponents can conclude the proposed activities **may affect** this species **IF** one or more of the following activities are proposed:

- Clearing or disturbing suitable roosting habitat, as defined above, at any time of year,
- Any activity in or near the entrance to a cave or mine,
- Mining, deep excavation, or underground work within 0.25 miles of a cave or mine,
- Construction of one or more wind turbines, or
- Demolition or reconstruction of human-made structures that are known to be used by bats based on observations of roosting bats, bats emerging at dusk, or guano deposits or stains.

If none of the above activities are proposed, project proponents can conclude the proposed activities will have **no effect** on the northern long-eared bat. Concurrence from the Service is not required for **No**

Effect determinations. No further consultation or coordination is required. Attach this letter to the dated IPaC species list report for your records.

If any of the above activities are proposed, and the northern long-eared bat appears on the user's species list, the federal project user will be directed to either the range-wide northern long-eared bat D-key or the Federal Highways Administration, Federal Railways Administration, and Federal Transit Administration Indiana bat/ Northern long-eared bat D-key, depending on the type of project and federal agency involvement. Similar to the Minnesota-Wisconsin D-key, these d-keys helps to determine if prohibited take might occur and, if not, will generate an automated verification letter. Additional information about available tools can be found on the Service's northern long-eared bat website.

Whooping Crane
Whooping crane is designated as a non-essential experimental population in Wisconsin and consultation under Section 7(a)(2) of the Endangered Species Act is only required if project activities will occur within a National Wildlife Refuge or National Park. If project activities are proposed on lands outside of a National Wildlife Refuge or National Park, then you are not required to consult. For additional information on this designation and consultation requirements, please review "Establishment of a Nonessential Experimental Population of Whooping Cranes in the Eastern United States."

Other Trust Resources and Activities
Bald and Golden Eagles - Although the bald eagle has been removed from the endangered species list, this species and the golden eagle are protected by the Bald and Golden Eagle Act and the Migratory Bird Treaty Act. It is the responsibility of the project proponent to survey the area for any migratory bird nests. If there is an eagle nest on-site while work is on-going, eagles may be disturbed. We recommend avoiding and minimizing disturbance to eagles whenever practicable. If you cannot avoid eagle disturbance, you may seek a permit. A nest take permit is always required for removal, relocation, or obstruction of an eagle nest. For communication and wind energy projects, please refer to additional guidelines below.

Migratory Birds - The Migratory Bird Treaty Act (MBTA) prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Service. The Service has the responsibility under the MBTA to proactively prevent the mortality of migratory birds whenever possible and we encourage implementation of recommendations that minimize potential impacts to migratory birds. Such measures include clearing forested habitat outside the nesting season (generally March 1 to August 31) or conducting nest surveys prior to clearing to avoid injury to eggs or nestlings.

Communication Towers - Construction of new communications towers (including radio, television, cellular, and microwave) creates a potentially significant impact on migratory birds, especially some 350 species of night-migrating birds. However, the Service has developed voluntary guidelines for minimizing impacts.

Transmission Lines - Migratory birds, especially large species with long wingspans, heavy bodies, and poor maneuverability can also collide with power lines. In addition, mortality can occur when birds, particularly hawks, eagles, kites, falcons, and owls, attempt to perch on uninsulated or unguarded power poles. To minimize these risks, please refer to guidelines developed by the Avian Power Line Interaction Committee and the Service. Implementation of these measures is especially important along sections of lines adjacent to

wetlands or other areas that support large numbers of raptors and migratory birds.

Wind Energy - To minimize impacts to migratory birds and bats, wind energy projects should follow the Service's Wind Energy Guidelines. In addition, please refer to the Service's Eagle Conservation Plan Guidance, which provides guidance for conserving bald and golden eagles in the course of siting, constructing, and operating wind energy facilities.

State Department of Natural Resources Coordination
While it is not required for your Federal section 7 consultation, please note that additional state endangered or threatened species may also have the potential to be impacted. Please contact the Minnesota or Wisconsin Department of Natural Resources for information on state listed species that may be present in your proposed project area.

Minnesota
Minnesota Department of Natural Resources - Endangered Resources Review Homepage
Email: Review.NHIS@state.mn.us

Wisconsin
Wisconsin Department of Natural Resources - Endangered Resources Review Homepage
Email: DNRERReview@wi.gov

We appreciate your concern for threatened and endangered species. Please feel free to contact our office with questions or for additional information.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds
- Wetlands

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

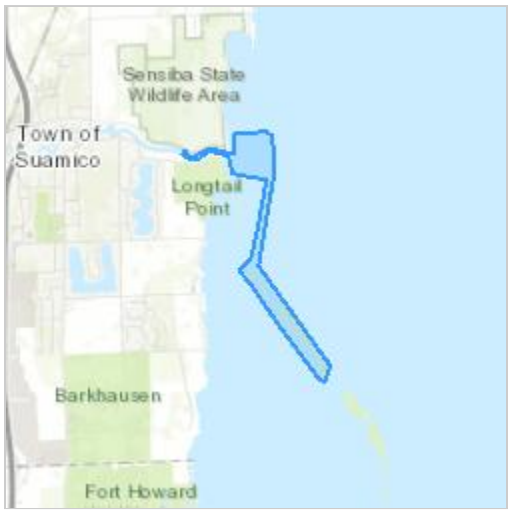
This species list is provided by:

Minnesota-Wisconsin Ecological Services Field Office
3815 American Blvd East
Bloomington, MN 55425-1659
(952) 858-0793

PROJECT SUMMARY

Project Code: 2024-0083710
Project Name: Big Suamico Dredging
Project Type: Navigation Channel Improvement
Project Description: Dredging of the Big Suamico River, with dredge material placement near Longtail Point
Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@44.6182848,-88.00420950924675,14z



Counties: Brown County, Wisconsin

ENDANGERED SPECIES ACT SPECIES

There is a total of 5 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 1 of these species should be considered only under certain conditions.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Endangered
Tricolored Bat *Perimyotis subflavus* No critical habitat has been designated for this species. This species only needs to be considered under the following conditions: ▪ This species only needs to be considered if the project includes wind turbine operations. Species profile: https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

BIRDS

NAME	STATUS
Rufa Red Knot *Calidris canutus rufa* There is **proposed** critical habitat for this species. Species profile: https://ecos.fws.gov/ecp/species/1864	Threatened

CLAMS

NAME	STATUS
Salamander Mussel *Simpsonaias ambigua* There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6208	Proposed Endangered

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

BALD & GOLDEN EAGLES

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act[1] and the Migratory Bird Treaty Act[2].

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats[3], should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

---

1. The Bald and Golden Eagle Protection Act of 1940.
2. The Migratory Birds Treaty Act of 1918.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

There are likely bald eagles present in your project area. For additional information on bald eagles, refer to Bald Eagle Nesting and Sensitivity to Human Activity

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Dec 1 to Aug 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper

Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

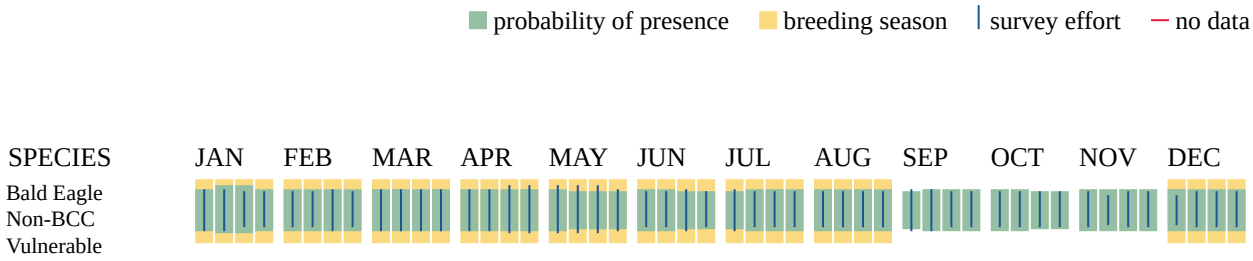
Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)
Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (–)
A week is marked as having no data if there were no survey events for that week.



Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats[3] should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

---

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
American Golden-plover *Pluvialis dominica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/10561	Breeds elsewhere
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Dec 1 to Aug 31
Black Tern *Chlidonias niger surinamenisis* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3093	Breeds May 15 to Aug 20
Black-billed Cuckoo *Coccyzus erythropthalmus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10
Bobolink *Dolichonyx oryzivorus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9454	Breeds May 20 to Jul 31
Canada Warbler *Cardellina canadensis* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9643	Breeds May 20 to Aug 10

NAME	BREEDING SEASON
Cerulean Warbler *Setophaga cerulea* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/2974	Breeds Apr 22 to Jul 20
Chimney Swift *Chaetura pelagica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9406	Breeds Mar 15 to Aug 25
Eastern Whip-poor-will *Antrostomus vociferus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/10678	Breeds May 1 to Aug 20
Golden-winged Warbler *Vermivora chrysoptera* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8745	Breeds May 1 to Jul 20
Lesser Yellowlegs *Tringa flavipes* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Long-eared Owl *asio otus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3631	Breeds Mar 1 to Jul 15
Marbled Godwit *Limosa fedoa* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9481	Breeds May 1 to Jul 31
Pectoral Sandpiper *Calidris melanotos* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9561	Breeds elsewhere
Red-headed Woodpecker *Melanerpes erythrocephalus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9398	Breeds May 10 to Sep 10
Ruddy Turnstone *Arenaria interpres morinella* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/10633	Breeds elsewhere

NAME	BREEDING SEASON
Rusty Blackbird *Euphagus carolinus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9478	Breeds elsewhere
Semipalmated Sandpiper *Calidris pusilla* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9603	Breeds elsewhere
Short-billed Dowitcher *Limnodromus griseus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9480	Breeds elsewhere
Upland Sandpiper *Bartramia longicauda* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9294	Breeds May 1 to Aug 31
Western Grebe *aechmophorus occidentalis* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/6743	Breeds Jun 1 to Aug 31
Wood Thrush *Hylocichla mustelina* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9431	Breeds May 10 to Aug 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

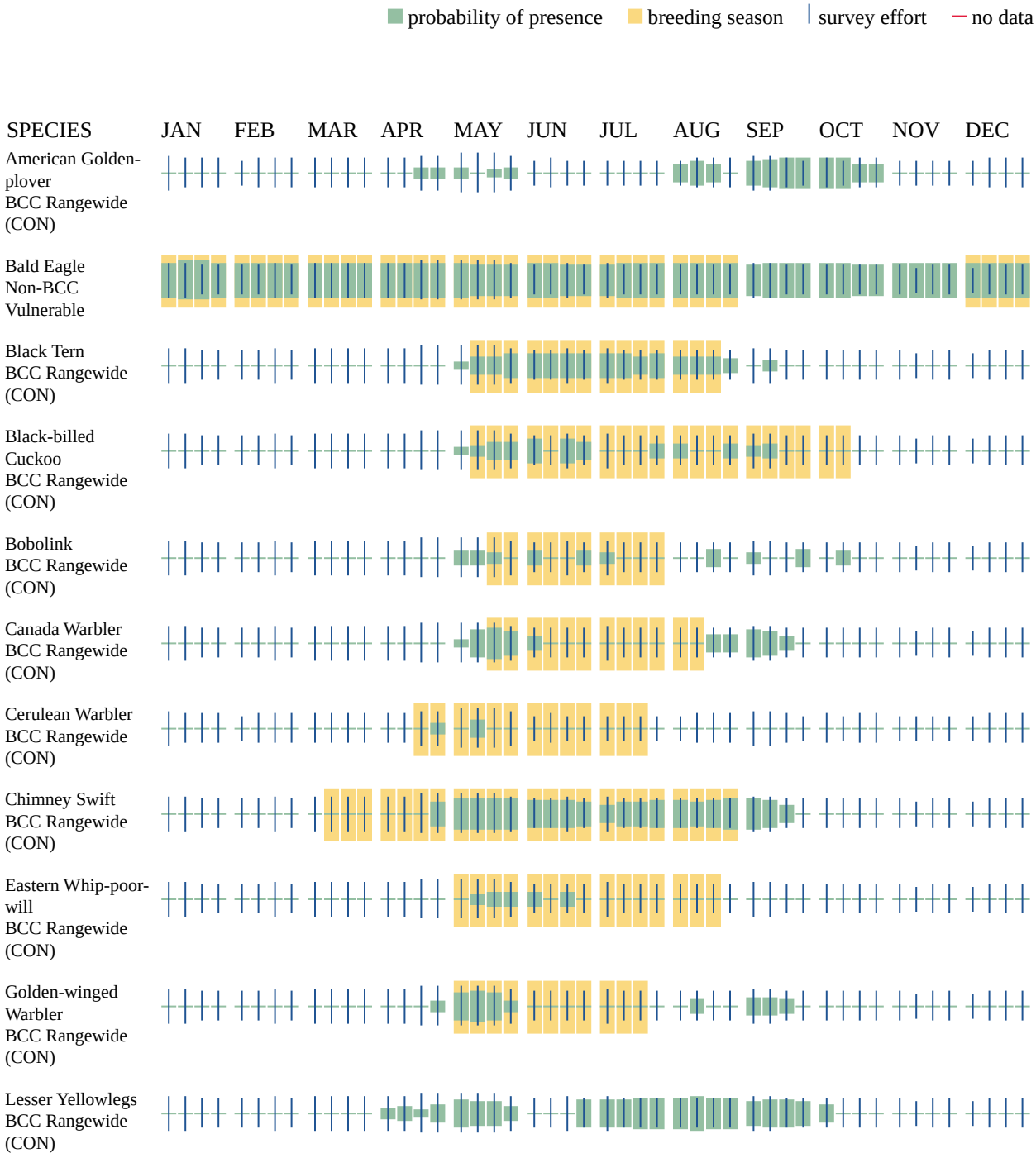
Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)

Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (–)
A week is marked as having no data if there were no survey events for that week.



Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

WETLANDS

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

WETLAND INFORMATION WAS NOT AVAILABLE WHEN THIS SPECIES LIST WAS GENERATED. PLEASE VISIT HTTPS://WWW.FWS.GOV/WETLANDS/DATA/MAPPER.HTML OR CONTACT THE FIELD OFFICE FOR FURTHER INFORMATION.

IPAC USER CONTACT INFORMATION

Agency: Army Corps of Engineers
Name: Jason Zylka
Address: 231 S. LaSalle Suite 1500
City: Chicago
State: IL
Zip: 60604
Email jason.zylka@usace.army.mil
Phone: 3128465311

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Minnesota-Wisconsin Ecological Services Field Office
3815 American Blvd East
Bloomington, MN 55425-1659
Phone: (952) 858-0793

In Reply Refer To: 05/13/2024 20:25:31 UTC
Project code: 2024-0083710
Project Name: Big Suamico Dredging

Subject: Consistency letter for 'Big Suamico Dredging' for specified threatened and endangered species that may occur in your proposed project location consistent with the Minnesota-Wisconsin Endangered Species Determination Key (Minnesota-Wisconsin DKey).

Dear Jason Zylka:

The U.S. Fish and Wildlife Service (Service) received on **May 13, 2024** your effect determination(s) for the 'Big Suamico Dredging' (Action) using the Minnesota-Wisconsin DKey within the Information for Planning and Consultation (IPaC) system. You have submitted this key to satisfy requirements under Section 7(a)(2). The Service developed this system in accordance of with the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended; 16 U.S.C 1531 et seq.).

Based on your answers and the assistance of the Service's Minnesota-Wisconsin DKey, you made the following effect determination(s) for the proposed Action:

Species	Listing Status	Determination
Monarch Butterfly (*Danaus plexippus*)	Candidate	No effect
Rufa Red Knot (*Calidris canutus rufa*)	Threatened	No effect
Salamander Mussel (*Simpsonaias ambigua*)	Proposed Endangered	May affect
Tricolored Bat (*Perimyotis subflavus*)	Proposed Endangered	No effect

Determination Information

Thank you for informing the Service of your "No Effect" determination(s). Your agency has met consultation requirements and no further consultation is required for the species you determined will not be affected by the Action.

Additional Information

Sufficient project details: Please provide sufficient project details on your project homepage in IPaC (Define Project, Project Description) to support your conclusions. Failure to disclose important aspects of your project that would influence the outcome of your effects determinations may negate your determinations and invalidate this letter. If you have site-specific information that leads you to believe a different determination is more appropriate for your project than what the Dkey concludes, you can and should proceed based on the best available information.

Future project changes: The Service recommends that you contact the Minnesota-Wisconsin Ecological Services Field Office or re-evaluate the project in IPaC if: 1) the scope or location of the proposed Action is changed; 2) new information reveals that the action may affect listed species or designated critical habitat in a manner or to an extent not previously considered; 3) the Action is modified in a manner that causes effects to listed species or designated critical habitat; or 4) a new species is listed or critical habitat designated. If any of the above conditions occurs, additional consultation with the Service should take place before project changes are final or resources committed.

Species-specific information

Bald and Golden Eagles: Bald eagles, golden eagles, and their nests are protected under the Bald and Golden Eagle Protection Act (54 Stat. 250, as amended, 16 U.S.C. 668a-d) (Eagle Act). The Eagle Act prohibits, except when authorized by an Eagle Act permit, the “taking” of bald and golden eagles and defines “take” as “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb.” The Eagle Act’s implementing regulations define disturb as “… to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.”

The following species and/or critical habitats may also occur in your project area and **are not** covered by this conclusion:

- Northern Long-eared Bat *Myotis septentrionalis* Endangered

Coordination with the Service is not complete if additional coordination is advised above for any species.

Action Description
You provided to IPaC the following name and description for the subject Action.

1. Name

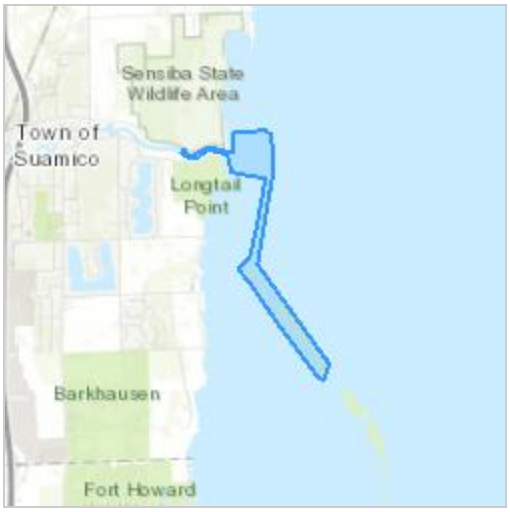
Big Suamico Dredging

2. Description

The following description was provided for the project 'Big Suamico Dredging':

> Dredging of the Big Suamico River, with dredge material placement near Longtail Point

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@44.6182848,-88.00420950924675,14z



QUALIFICATION INTERVIEW

1. This determination key is intended to assist the user in evaluating the effects of their actions on Federally listed species in Minnesota and Wisconsin. It does not cover other prohibited activities under the Endangered Species Act (e.g., for wildlife: import/export, Interstate or foreign commerce, possession of illegally taken wildlife, etc.; for plants: import/export, reduce to possession, malicious destruction on Federal lands, commercial sale, etc.) or other statutes. Additionally, this key DOES NOT cover wind development, purposeful take (e.g., for research or surveys), communication towers that have guy wires or are over 450 feet in height, aerial or other large-scale application of any chemical (such as insecticide or herbicide), and approval of long-term permits or plans (e.g., FERC licenses, HCP's).

   Click **YES** to acknowledge that you must consider other prohibitions of the ESA or other statutes outside of this determination key.

   Yes
2. Is the action being funded, authorized, or carried out by a Federal agency?

   Yes
3. Are you the Federal agency or designated non-federal representative?

   Yes
4. Does the action involve the installation or operation of wind turbines?

   No
5. Does the action involve purposeful take of a listed animal?

   No
6. Does the action involve a new communications tower?

   No
7. Does the activity involve aerial or other large-scale application of ANY chemical, including pesticides (insecticide, herbicide, fungicide, rodenticide, etc)?

   No
8. Will your action permanently affect local hydrology?

   No
9. Will your action temporarily affect local hydrology?

   Yes
10. Will your project have any direct impacts to a stream or river (e.g., Horizontal Directional Drilling (HDD), hydrostatic testing, stream/road crossings, new stormwater outfall discharge, dams, other in-stream work, etc.)?

    Yes

11. Does your project have the potential to impact the riparian zone or indirectly impact a stream/river (e.g., cut and fill; horizontal directional drilling; construction; vegetation removal; pesticide or fertilizer application; discharge; runoff of sediment or pollutants; increase in erosion, etc.)?

    Note: Consider all potential effects of the action, including those that may happen later in time and outside and downstream of the immediate area involved in the action.

    Endangered Species Act regulation defines "effects of the action" to include all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action. (50 CFR 402.02).

    Yes

12. Will your action disturb the ground or existing vegetation?

    Note: This includes any off-road vehicle access, soil compaction (enough to collapse a rodent burrow), digging, seismic survey, directional drilling, heavy equipment, grading, trenching, placement of fill, pesticide application (herbicide, fungicide), vegetation management (including removal or maintenance using equipment or prescribed fire), cultivation, development, etc.

    No

13. Will your action include spraying insecticides?

    No

14. Does your action area occur entirely within an already developed area?

    Note: Already developed areas are already paved, covered by existing structures, manicured lawns, industrial sites, or cultivated cropland, AND do not contain trees that could be roosting habitat. Be aware that listed species may occur in areas with natural, or semi-natural, vegetation immediately adjacent to existing utilities (e.g. roadways, railways) or within utility rights-of-way such as overhead transmission line corridors, and can utilize suitable trees, bridges, or culverts for roosting even in urban dominated landscapes (so these are not considered "already developed areas" for the purposes of this question). If unsure, select NO..

    No

15. Your project is within the range of federally listed freshwater mussels. Have surveys for freshwater mussels been conducted according to a Service-approved survey plan?

    Note: You must receive prior approval for any proposed mussel survey by contacting the Minnesota-Wisconsin Ecological Services Field Office. All mussel surveys in Minnesota and Wisconsin must comply with State approved protocols.
    Minnesota Mussel Protocol: https://files.dnr.state.mn.us/eco/nhnrp/mn-mussel-survey-and-relocation-protocol.pdf.
    Wisconsin Mussel Protocol: https://molluskconservation.org/Library/Protocol%20PDFs/WI%20Wadable%20Mussel%20Protocol_8-18-15.pdf

    No

16. [Semantic] Does the project intersect the Salamander mussel AOI?

    Automatically answered
    Yes

17. Will the action occur during the red knot migration windows (May 15-June 15 or July 1-September 30?)

    No

18. [Hidden Semantic] Does the action area intersect the monarch butterfly species list area?

    Automatically answered
    Yes

19. Under the ESA, monarchs remain warranted but precluded by listing actions of higher priority. The monarch is a candidate for listing at this time. The Endangered Species Act does not establish protections or consultation requirements for candidate species. Some Federal and State agencies may have policy requirements to consider candidate species in planning. We encourage implementing measures that will remove or reduce threats to these species and possibly make listing unnecessary.

    If your project will have no effect on monarch butterflies (for example, if your project won't affect their habitat or individuals), then you can make a "no effect" determination for this project.

    Are you making a "no effect" determination for monarch?

    Yes

20. [Hidden semantic] Does the action intersect the Tricolored bat species list area?

    Automatically answered
    Yes

21. The tricolored bat was proposed for listing as endangered on September 13, 2022. During winter, tricolored bats hibernate in caves, abandoned mines, and abandoned tunnels ranging from small to large in size. During spring, summer and fall months, they roost primarily among leaf clusters of live or recently dead deciduous/hardwood trees.

    What effect determination do you want to make for the tricolored bat (Only make a "may affect" determination if you think the project is likely to jeopardize the continued existence of the species)?

    1. "No effect"

IPAC USER CONTACT INFORMATION

Agency: Army Corps of Engineers
Name: Jason Zylka
Address: 231 S. LaSalle Suite 1500
City: Chicago
State: IL
Zip: 60604
Email jason.zylka@usace.army.mil
Phone: 3128465311

From: Utrup, Nick J
To: Zylka, Jason J CIV USARMY CELRC (USA)
Subject: [Non-DoD Source] Re: [EXTERNAL] Coordination for Project Code 2024-0083710
Date: Tuesday, May 21, 2024 9:39:29 AM

Hi Jason,

We don't have any records of salamander mussels on the western shore or Lake Michigan, including the Big Suamico River. I would be comfortable saying that the project will have "no effect". The closest known population for salamander mussel is the north branch of the Pensaukee River.

Thanks,

Nick

Nick Utrup
Minnesota-Wisconsin Ecological Services Field Office
U.S. Fish and Wildlife Service
3815 American Boulevard East
Bloomington, MN 55425

Phone: (612) 600-6122
Email: Nick_Utrup@fws.gov

From: Twin Cities, FW3 <TwinCities@fws.gov>
Sent: Monday, May 20, 2024 9:07 AM
To: Utrup, Nick J <nick_utrup@fws.gov>
Subject: Fw: [EXTERNAL] Coordination for Project Code 2024-0083710

Good morning, Nick - I believe this one goes to you.
Happy Monday,
Tam

****

U.S. Fish and Wildlife Service
Minnesota-Wisconsin Ecological Services Field Office*
3815 American Boulevard East
Bloomington, MN 55425

*f/k/a Twin Cities Ecological Services Field Office

(952) 858-0793
****

From: Zylka, Jason J CIV USARMY CELRC (USA) <Jason.J.Zylka@usace.army.mil>
Sent: Tuesday, May 14, 2024 2:18 PM
To: Twin Cities, FW3 <TwinCities@fws.gov>
Subject: [EXTERNAL] Coordination for Project Code 2024-0083710

Greetings,

Please find the attached letter for consultation on IPaC project code 2024-0083710.

The only species with a “may effect” determination was the Proposed Endangered Salamander Mussel, and I’d like to be sure we’ve fully met our consultation requirements.

Thank you!

Jason Zylka
Ecologist
US Army Corps of Engineers, Chicago District
231 S. LaSalle Street, Suite 1500
Chicago, IL 60604-1437
jason.zylka@usace.army.mil
Phone (312) 846-5311
Mobile (312) 415-7341
Fax (312) 886-2891

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, CHICAGO DISTRICT
231 SOUTH LA SALLE STREET, SUITE 1500
CHICAGO IL 60604

May 13, 2024

Environmental & Cultural Resources Section
Planning Branch

Ms. Daina Penkiunas
State Historic Preservation Officer
Wisconsin Historical Society
816 State Street
Madison, WI 53706

SUBJECT: FY24 Big Suamico River Maintenance Dredging and Placement Project, Brown County, Wisconsin

Dear Ms. Penkiunas:

The U.S. Army Corps of Engineers (Corps) proposes to conduct maintenance dredging for the authorized federal navigation channel on the Big Suamico River, Brown County, Wisconsin (Figure 1). The purpose of the required maintenance dredging is to support the navigability of the federal channel. Dredged material would be placed along Longtail Point, just south of the Big Suamico River. As part of our review under Section 106 of the National Historic Preservation Act, the Corps has determined that the proposed federal action is an undertaking that has the potential to affect historic properties. This letter provides a brief project description, documents the area of potential effect (APE), summarizes the efforts to identify historic properties, and provides agency findings. The letter requests agreement with the Corps' finding that there will be no adverse effect to historic properties by the proposed undertaking.

The Big Suamico River has an authorized federal navigation channel located in Suamico, Wisconsin on the western shore of Lake Michigan (Figure 1). The river is located approximately 7 miles north of Green Bay, Wisconsin. The federal navigation channel runs from a short distance upstream of the mouth of the river out into Lake Michigan. The total length is about 3,700 feet, with the channel being 100 feet wide in the bay and 60 feet wide in the river. The authorized depth is 8 feet. The channel is used for recreational and commercial use. For the proposed dredging project, up to 30,000 cubic yards of shoaled material would be hydraulically dredged from the channel. The dredged material would be pumped hydraulically via pipeline from the dredge site to the placement area. The locations for the placement of dredged material are along Longtail Point (Figure 1). Placement will either occur upland on Longtail Point or in water along the shoreline of Longtail Point.

The undertaking is located in Brown County, Township 25 North, Range 21 East, Sections 19, 24, 30 (Figure 2). The APE for the undertaking encompasses the project area including staging and access, and totals approximately 180 acres. The Corps believes that

the APE is sufficient to identify and consider both direct and indirect effects of the proposed project.

The Corps has conducted an archival review for the project APE. The placement area at Longtail Point is located within the boundaries of site BR-0175, although the site was never fully delineated or evaluated. The site was originally located in 1933, with further testing done in 1980. It was reported at the time that the site was largely destroyed, however isolated discoveries have been made since then, including human remains near the Longtail Point Lighthouse. The dredged material placement area is located outside of the discovery vicinity on the western edge of the landform. No excavation or disturbance is expected to occur and material placement should have the benefit of protecting resources if they still exist in the area. The dredging APE is located entirely within the federal navigation channel and has been routinely dredged and disturbed since its authorization in 1937.

The Corps has made a reasonable and good faith effort to identify historic properties that may be affected by this undertaking. The proposed maintenance dredging is regular and routine in nature and is located within the previous dredging channel. While the placement area is located within the potential boundaries of BR-0175, the activity will not create any ground disturbance and would have the benefit of protecting any intact resources that could be subject to erosion or vandalism. Therefore, the Corps has determined that there would be no adverse effect to historic properties by the proposed undertaking.

The Corps requests your review and agreement with our finding of No Adverse Effect to Historic Properties. If you have any questions or desire additional information, please contact the project Archaeologist, Ms. Ashley Dailide, at ashley.m.dailide@usace.army.mil or (312) 846-5581.

Sincerely,

Alex Hoxsie

Alex Hoxsie
Chief, Environmental & Cultural Resources
Chicago District

Enclosures

Figure 1: Project Vicinity Map

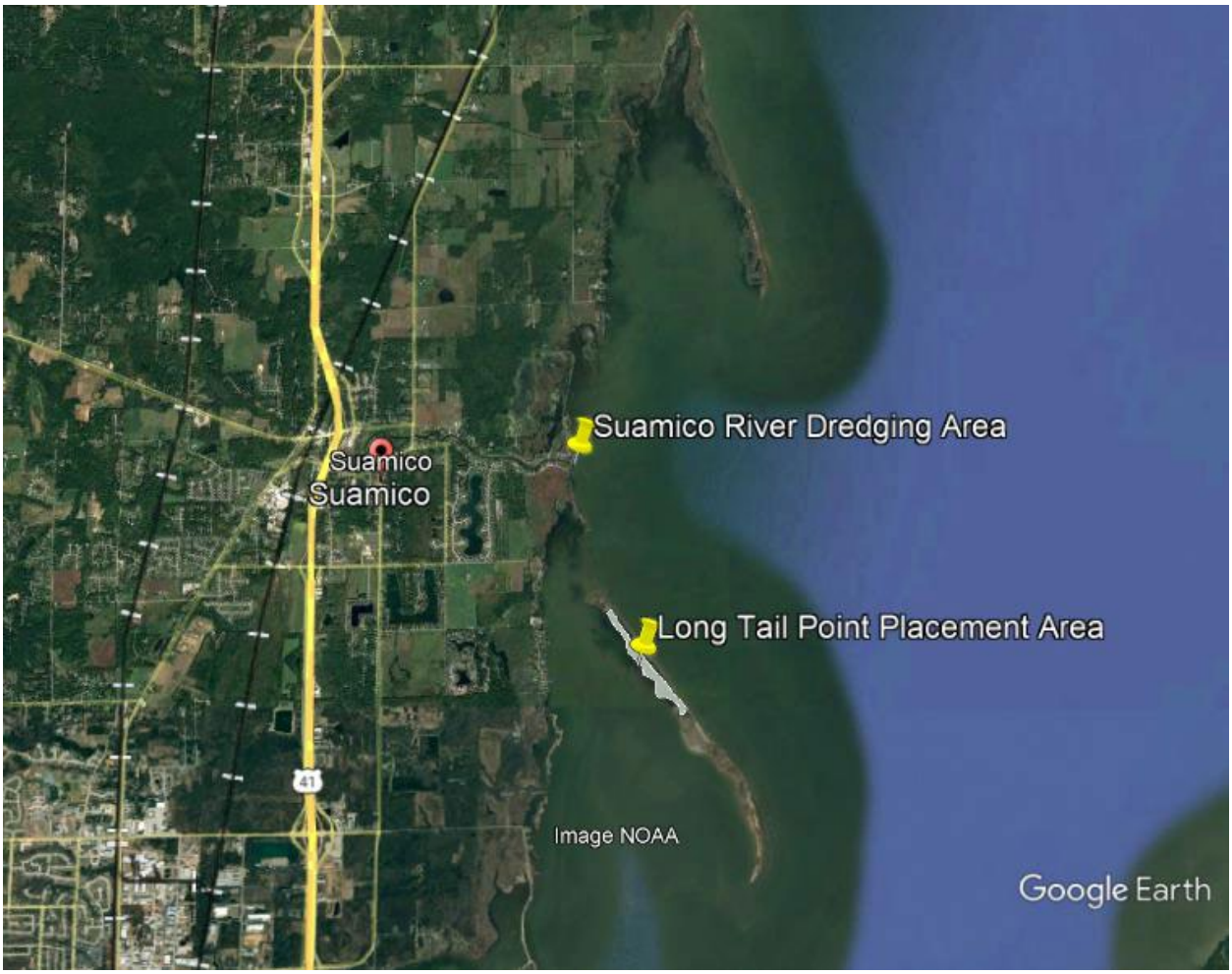
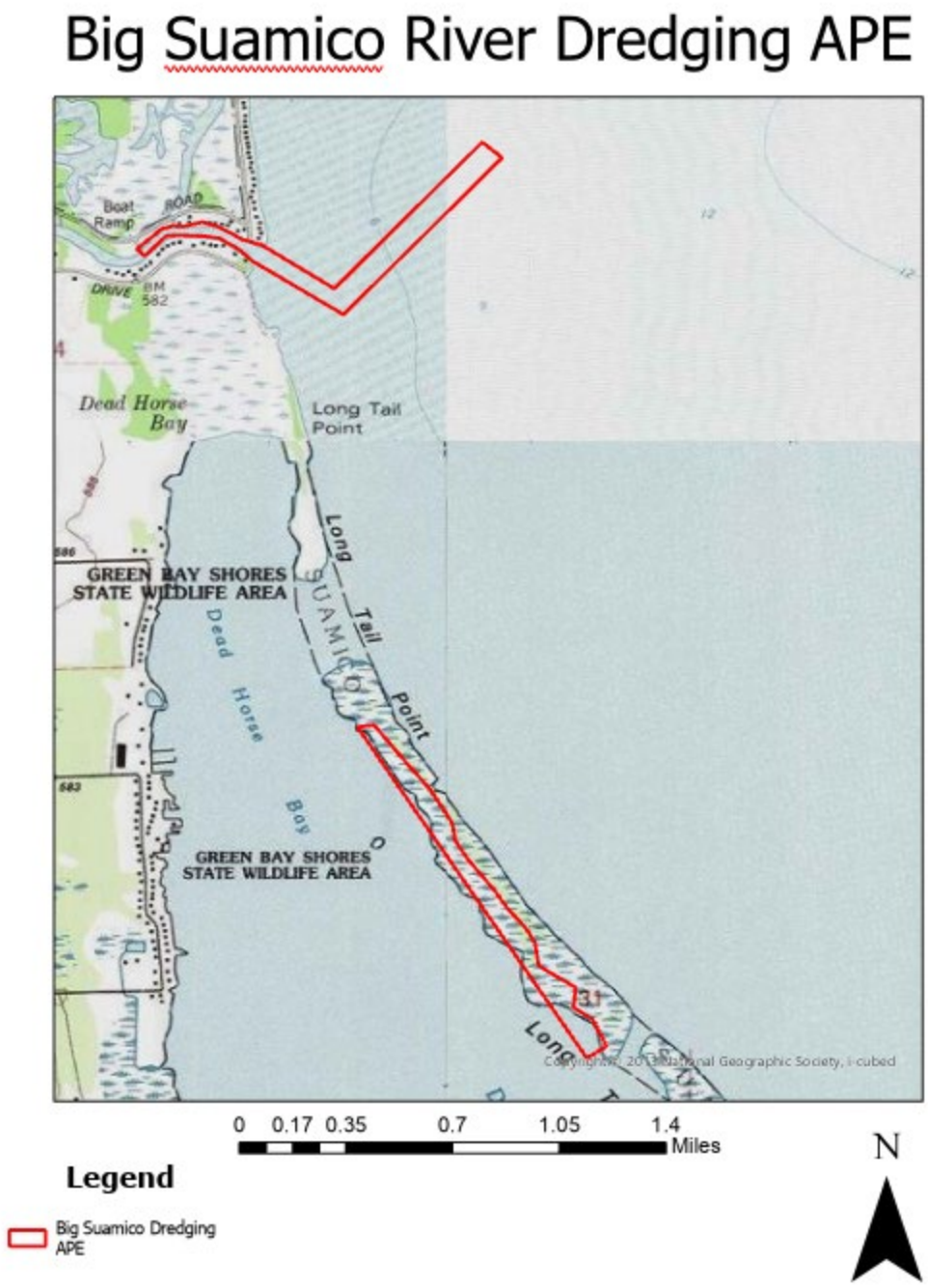


Figure 2: FY24 Big Suamico River Dredging APE Map



From: Dailide, Ashley M CIV USARMY CELRC (USA)
To: Zylka, Jason J CIV USARMY CELRC (USA)
Cc: Jordan, Alexis M CIV USARMY CELRC (USA)
Subject: FW: [Non-DoD Source] SHPO Review: 24-1027/BR - Big Suamico River Maintenance and Dredging Project
Date: Tuesday, July 9, 2024 11:41:23 AM

Hi Jason – Alexis said you were asking about Big Suamico. I thought I had forwarded this to you, but might have only sent it to Alex since you were out.

Cheers,
Ashley

From: tyler.howe@wisconsinhistory.org <tyler.howe@wisconsinhistory.org>
Sent: Friday, May 31, 2024 2:10 PM
To: Dailide, Ashley M CIV USARMY CELRC (USA) <Ashley.M.Dailide@usace.army.mil>
Subject: [Non-DoD Source] SHPO Review: 24-1027/BR - Big Suamico River Maintenance and Dredging Project

Good afternoon, Ashley:

We have completed our review of WHS #24-1027, Big Suamico River Maintenance and Dredging project and concur with your findings that no historic or cultural resources eligible for, or included on, the National Register of Historic Places (NRHP) were encountered within the project's Area of Potential Effect (APE). Moreover, the WI SHPO concurs with your determination the proposed federal undertaking will have No Effect on historic properties.

It is the opinion of the WI SHPO you have fulfilled your section 106 of the National Historic Preservation Act (NHPA) consultation requirements with our office. If your plans change or cultural materials/human remains are found during the project, including dredge placement locations, please halt all work and contact our office.

Please use this email as your official SHPO concurrence for NHPA requirements of the project. If you require a hard copy signed form, please contact me and I will provide you a signed copy as soon as possible.

Thank you,

Tyler

Tyler B. Howe, PhD
Compliance Section Manager
State Historic Preservation Office

Wisconsin Historical Society
816 State Street, Madison, WI 53706

tyler.howe@wisconsinhistory.org

Wisconsin Historical Society
Collecting, Preserving, and Sharing Stories Since 1846

Big Suamico Harbor
Maintenance Dredging and Placement

Wisconsin

Environmental Assessment
Appendix B - Section 404(b)(1) Analysis

U.S. Army Corps of Engineers
Chicago District

June 2024

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I. Project Description

A. Locations

Big Suamico Harbor is a federal navigation project on the west shore of Green Bay, Lake Michigan in the Village of Suamico. The harbor is located approximately eight miles north of Green Bay Harbor and 44 miles southwest from Menominee Harbor. The federally authorized channel is 3,700 feet long, with approximately half of the channel in the Suamico River and half extending into Green Bay.

The proposed placement area for dredged material from Big Suamico is near Long Tail Point, a narrow peninsula roughly 1 mile southeast of the mouth of Suamico River. Over the last several decades, erosion has narrowed the peninsula and caused breach gaps. The placement area runs along the leeward shoreline of Long Tail Point.

B. General Description

The goal of the current action is to conduct maintenance dredging at Big Suamico Harbor. The dredged sediment will be placed along Long Tail Point to promote coastal resiliency by nourishing the shoreline. Dredging has historically been performed sporadically to maintain the waterway and was last done by USACE in 2002.

C. Authority and Purpose

Big Suamico Harbor was authorized by the River and Harbor Act of 1937 and provides an entrance channel from Green Bay into the Suamico River for recreational crafts. The channel extends roughly 1,900 feet into Green Bay and 1,800 feet into Suamico River, with widths of 100-feet in the bay and 60-feet in the river. The total length of the channel is about 3,700-feet. The authorized depth of the area is -8 ft Low Water Datum (LWD) International Great Lakes Datum 1985 (IGLD85).

The Harbor has not been dredged since 2002. Currently, roughly two-thirds of the entire federal project area has shoaled between 2 and 6 feet above project depth (-8 ft LWD). Due to the current extent of the shoaling, maintenance dredging of the harbor is proposed for 2024.

D. General Description of Dredged or Fill Material

(1) General Characteristics of Material

Sediment samples in the federal channel were collected in 2022 and 2023. For this sampling effort, the harbor was broken into two management units (MU): MU1 consisted of the portion of the federal channel in Suamico River and MU2 covered the portion of the channel in Green Bay. All sediment core samples were fine grained – primarily fine sand with silt. The sediment cores contained elevated levels of ammonia-nitrogen and phosphorus when compared to grab samples taken at the reference sites. The sediment is chemically clean otherwise. The Contaminant Determination (Attachment 1) includes more information about the quality of the material.

(2) Quantity of Material

Currently, there is approximately 30,000 cubic yards of sediment shoaled above the authorized depth in the federal channel. Including 2 feet of overdredge, up to 45,000 cubic yards of material is available to be dredged from the federal channel.

This harbor was most recently dredged in 2002, when 17,000 cubic yards of material was dredged and placed, unconfined, in an upland area approximately 1 mile from the federal channel. Prior to that, 23,000 and 33,000 cubic yards were dredged and placed upland in 1993 and 1988, respectively.

(3) Source of Material

The portion of the federal channel in Green Bay receives sediment from the littoral process of Green Bay, there are no breakwaters to protect the harbor from lake-induced erosion and accretion. Nearshore currents in Green Bay typically flow counterclockwise, so sediment travels south along the western shore of Green Bay. The federal channel receives sediment from the marshy Sensiba Nature Preserve directly to the north, Little Suamico River, and other streams and rivers north of the federal channel on the western shore of Green Bay (UWGB, 2023).

Another possible source of sediment is the Suamico River, a portion of which flows through and empties into the federal channel. It is likely that sediment is mobilized into Suamico River during rain events and carried into the federal channel. Non-point upland sources (erosion) and point sources (i.e., storm sewers) upstream of the federal channel can contribute solids and contaminants which settle in the channel.

E. Description of the Proposed Placement Site(s)

(1) Location

The proposed placement area for dredged material from Big Suamico is near Long Tail Point (LTP), roughly 1.3 miles south of federal channel.

Dredged sediment will be placed below the Ordinary High Water Mark (OHWM) along the leeward shoreline of LTP, between the two breach gaps, as a submerged nearshore berm, a thin cover in vegetated areas, or a cross shore swash zone. This placement would promote coastal resiliency by placing sediment within the nearshore littoral zone, so that sediment is placed within the active wave environment. Dredged material would then nourish the shoreline and provide a base for emergent wetland growth.

(2) Size

The placement site has a surface area of approximately 132,200 square yards. The placement area is long along the shoreline of Long Tail Point, approximately 5,000 feet long, and narrow, approximately 340 feet wide. The placement area is very shallow, so it is difficult to survey and have accurate bathymetry. The placement area is assumed to have a water depth of 0-2 feet.

(3) Type of Site

Long Tail Point is a natural sand spit south of Big Suamico Harbor in Green Bay. It has experienced significant erosion over the last several decades. The placement area runs along the leeward shoreline of Long Tail Point, within the nearshore littoral zone.

(4) Type of Habitat

The majority of Long Tail Point consists of emergent high energy marsh, which is largely dominated by Phragmites and hybrid cattail though there are a few native species. A continuous band of submergent marsh in Dead Horse Bay flanks the western shore of the peninsula. The third most common habitat at

Long Tail Point is hardwood swamp, which contains both native and invasive plant species.

(5) Timing and Duration of Discharge

Due to concerns regarding listed migrant birds, Piping Plover and to avoid minor effects to fish spawning and recruitment, it is recommended that no sand be placed before August 15th. Excluding weather events which may delay or stop dredging operations, the dredging of 45,000 cubic yards from the federal channel will last approximately three to four weeks.

F. Description of Placement Method

Dredged material is to be placed in the littoral zone below the OHWM. The placement location is very shallow (0-2 feet of water depth), so mechanical crane, bottom dump scow, or other mechanical means of placing dredged sediment will most likely not be feasible for this project. While there are no limiting factors to prevent mechanical dredging in the federal channel, it is most likely that the material will be dredged and placed hydraulically due to placement site constraints. For assumed hydraulic pipeline dredging and placement, the sediment will be slurried with a minimum of 8 parts water to 1 part dredged solids and pumped through a pipeline from the dredging location to the placement area. The depth and position of the pipe and rate of discharge will be controlled to limit scouring of the existing sediment and beach of Long Tail Point and prevent excess turbidity.

Additional turbidity controls will be utilized to ensure that large turbidity plumes are not created from the placement of the dredge material. Turbidity monitoring will be conducted, in addition to constant visual monitoring during dredging and placement operations, by comparing turbidity levels downcurrent of the placement area to an off-site reference area. If turbidity levels near the placement area exceed the reference area's by a set action limit, dredging operations will either be stopped or adjusted to prevent further turbidity spread. A turbidity control BMP, in the form of a physical barrier, will be in place around the placement area during dredging operations to limit the spread of turbidity which may be created during the placement of material.

II. Factual Determinations

A. Physical Substrate Determinations

(1) Substrate Elevation and Slope

The federal channel has an authorized depth of -8 ft LWD. Currently, material is shoaled up to six feet above that depth, with the shallowest points being in the Suamico River and at the bend of the channel in Green Bay.

Material will be placed in the nearshore littoral zone of Long Tail Point. The placement area, though currently submerged below the OHWM, was once upland and formed part of the Long Tail Point peninsula. Due to erosion and high lake levels, Long Tail Point has significantly reduced in size and the much of the former shoreline, including the project area, is now underwater. The project area, like much of the former footprint of Long Tail Point, is very shallow and has only a minor slope. It is estimated that the water at the placement area is 0-2 feet deep.

(2) Sediment Type

The sediment to be dredged from the federal channel is fine grained – primarily fine sand with silt and clay. On average, the sediment in the federal channel is 66% sand and 32% fines (silt + clay).

The sediment in the placement area is mainly fine sand with some silt. Along the leeward side of Long Tail Point, the sediment is, on average, 74% sand and 26% fines. In the placement area, there is a high level of organic matter at the surface of the sediment due to dense vegetation in and near the placement area. More information regarding sediment type can be founding in Attachment 1, the Contaminant Determination.

(3) Dredged/Fill Material Movement

Littoral transport is the movement of sediments in the near shore by waves and currents. Dredged sediment would be placed in the nearshore littoral zone along the leeward shoreline of Long Tail Point. The leeward side of Long Tail Point is largely protected from wind and wave action, However, overtime it is expected that sediment would move toward the Long Tail Point shoreline, nourishing the shoreline. It is also expected that the addition of sediment along the leeward side of Long Tail Point would provide a good base for the growth of new and expansion of existing emergent wetlands.

(4) Physical Effects on Benthos

Existing periphyton, epibenthic plankton, and benthic macroinvertebrate organisms that currently reside in the substrate of the area to be dredged or placement area(s) would be removed or disturbed when the dredged materials are removed from the water, placed back into the water, or placed on/near beaches. The existing sediment within the dredging area will need to be removed to allow for an adequate navigation depth. After this material is removed it will be transported to a predetermined deposition site as listed above and placed upon the existing sediment in the area. Organisms that typically reside in high wave energy environments near shorelines are generally tolerant of turbid waters and adapted to elevated suspended solids concentrations. As a result, the periphyton, epibenthic plankton, and macroinvertebrate organisms would quickly repopulate, grow, and recolonize on/in the benthos after operations have ended.

(5) Other Effects

There would be no other significant substrate impacts.

(6) Actions Taken to Minimize Impacts

Due to the high fines content of the dredged material, a silt curtain or similar turbidity control will be implemented to mitigate the temporary turbidity caused by hydraulically placed sediment. Additionally, turbidity monitoring will be conducted during the placement of dredged material to ensure that a larger area outside of the placement location is not impacted by the temporary turbidity of placement.

B. Water Circulation, Fluctuation and Salinity Determinations

(1) Water

a) *Salinity*

Lake Michigan is a freshwater lake. The proposed work is not expected to increase or decrease the salinity of the water and will not add salts to the system.

b) *Water Chemistry*

As part of the 2022 sampling in the federal channel, composites of core samples collected in each management unit were used to prepare two elutriate samples. The elutriate samples was prepared using the standard elutriate preparation procedure mixing 4 parts sediment to one part water. This method is an approximation of placing the material in the water and gives a conservative estimate of potential contaminant partitioning into the water column. The elutriate samples were analyzed for PCBs, pesticides, aluminum, arsenic, cadmium, chromium, copper, iron, lead, manganese, nickel, selenium, silver, zinc, mercury, hardness, alkalinity, ammonia-nitrogen, chemical oxygen demand, pH, oil & grease, total dissolved solids, total phosphorus. The elutriate samples did not exceed the state's water quality standards for the tested contaminants, except in the case of ammonia-nitrogen (1.77-6.76 mg/L). This is expanded upon in Section II.B.1.f. Only short-term and localized increases are likely to occur during placement.

A water sample was taken from each management unit and from reference sites. The samples were analyzed for PCBs, pesticides, aluminum, arsenic, cadmium, chromium, copper, iron, dissolved iron, lead, manganese, nickel, selenium, silver, zinc, mercury, hardness, alkalinity, ammonia-nitrogen, chemical oxygen demand, pH, oil & grease, total dissolved solids, total suspended solids, total phosphorus, and *E. Coli*. All water samples exceeded the state's water quality standard for total phosphorus.

c) *Clarity and Color*

Because the dredged material has a high percentage of fines, it will likely cause a short-term decrease in water clarity. Short-term, minor, and localized changes to the water clarity and color are expected due to temporary increases in the concentration of suspended solids and turbidity during work, though impacts to clarity and color outside of the immediate placement area will be mitigated by turbidity controls.

d) *Odor and Taste*

The dredged materials are not anticipated to cause any considerable long-term effects on, or changes to, odor and taste of the water. As mentioned above, the placement will likely cause short-term, minor, and localized increase of suspended solids and turbidity. These changes might be associated with slight changes to odors or tastes of the water in the vicinity of the work area, but any potential changes are expected to be temporary and limited to the work area.

e) *Dissolved Gas Levels*

The dredged materials are not anticipated to cause any considerable long-term effects on, or changes to, the dissolved gas levels in the water. As mentioned above, the placement will likely cause short-term, minor, and localized increases of suspended solids concentrations and turbidity. These increases in the work area may have an effect on the dissolved gas and nutrient levels in the water column, which could adversely impact some of the aquatic plants and organisms in the immediate vicinity of the material placement. In particular, increases of suspended solids and turbidity could slightly reduce the amount of dissolved oxygen in the water column, and this is because the biological and chemical content of the suspended solids might react with some of the dissolved oxygen already present. However, the aquatic plants and organisms that have adapted to dynamic shoreline environments are generally tolerant of the turbid waters that occur during storm events, so most of the aquatic plants and organisms should be able to withstand the short-term and minor changes in dissolved gas and nutrient levels. Any changes to the dissolved gas levels in the water should be temporary and confined to the work area. While the state does not have a water quality standard for chemical oxygen demand, the elutriate samples were tested for chemical oxygen demand and showed concentrations of 33.9 mg/L and 35.3 mg/L.

f) *Nutrients*

Overall, the dredged materials are not anticipated to cause any considerable long-term effects on, or changes to, the nutrient levels in the water. The work may cause temporary, minor, and localized changes to the suspended solids, turbidity, and nutrient levels. These changes could adversely impact some of the aquatic plants and organisms in the vicinity of the work area, but the aquatic plants and organisms along the shoreline should be tolerant of the turbid waters that occur during storm events and should quickly recover.

There is no water quality standard (WQS) for total phosphorus for lower Green Bay, from the mouth of the Fox River to a line from Long Tail Point to Point au Sable, which encompasses the placement area (Wis. Admin. Code NR 102.06(5)(c)). However, the elutriate samples for both management units (0.082 mg/L and 0.085 mg/L) have lower levels of total phosphorus than the water samples collected in the management units (0.22 mg/L and 0.2 mg/L) and at reference sites (0.23 mg/L and 0.31 mg/L). This suggests that the dredging action appears to disrupt the nutrient equilibrium. This may result in adsorption of total phosphorus from the water column, likely due to increased reaction between phosphorus and reactants during dredging. Overall, negative impacts to phosphorus levels in the water due to dredging and placement activities are not expected.

There is a WQS for total ammonia, which is calculated based on pH. Using the measured background pH of 8.6 (from a reference site nearest the placement location), the calculated WQS for total ammonia is 1.8 mg/L, which ammonia levels in the management unit elutriate samples (32.4 and 35.6 mg/L) exceed. However, elutriate concentrations are not intended to be directly compared to water quality standards; the actual contamination concentration of ammonia will be lower than the elutriate concentrations because of the dilution required for hydraulic dredging. Further detail regarding dilution and mixing zone is below in Section II.f.1 and Attachment 1. Overall, it is anticipated that there will be temporary, minor, and localized impacts to the ammonia levels in the water at the placement site. The dredged materials are not anticipated to cause any considerable long-term effects on, or changes to, the ammonia levels in the water.

g) *Eutrophication*

Eutrophication is commonly caused when water is subjected to prolonged and elevated nutrient levels. Phosphorus is commonly the limiting nutrient throughout the Great Lakes and is the principal factor in determining if a water system becomes eutrophic (Maccoux, 2013). As discussed in the section above, the dredging and placement is not expected to negatively impact phosphorus levels in the water at the placement area. Overall, all nutrient levels should return to Lake Michigan background concentrations shortly after the materials have been placed and the suspended particles have settled from the water column. The changes to suspended solids, turbidity, and nutrient levels are temporary and confined to the work area.

h) *Others as Appropriate*

There would be no other significant water impacts.

(2) Current Patterns and Circulation, Current Flow and Water Circulation

The proposed project will place dredged material in the near shore littoral zone of Long Tail Point in Green Bay.

There is anticlockwise circulation in the bay during dominant southwesterly wind and a reversal of this pattern during episodes of northeasterly wind. It is common for two water layers to flow through the mouth of the bay in opposite directions during the stratified season. Cold hypolimnetic lake water entering through the mouth and extending far into the bay maintains stratification and promotes flushing. The effects of resonance of forced and free long wave disturbances are prominent in current records; these oscillations are coherent and in phase across the mouth (Miller and Saylor 1985).

In-water placement would place dredged material into the littoral drift system and support increasing sediment transport quantities and efforts to slow down coastal erosion; however it would be minor and short-term comparatively to the greater natural littoral drift system. The proposed project will have no adverse effects to Green Bay hydrodynamics.

(3) Normal Water Level Fluctuations

Lake Michigan is an extremely large lake that has a huge surface area and contains an immense volume of water. According to the Great Lakes Atlas (Government of Canada and USEPA, 1995), Lake Michigan has a water surface area of 22,300 square miles (57,800 square kilometers) and a volume of 1,180 cubic miles (4,920 cubic kilometers). It can take multiple months, seasons, or even years of persistently wet/dry conditions to cause an impact to the water levels of the Great Lakes (USACE, 2013). The USACE, Detroit District, tracks the water levels in each of the Great Lakes, and the primary factors that determine water level changes are precipitation falling on the lake surface, runoff draining to the lake, evaporation from the lake surface, diversions into or out of the lake, and connecting channel inflows and outflows (USACE, 2013). The very small volumes of material that would be moved for this project are insignificant in terms of water level impacts to the lake.

(4) Salinity Gradients

Lake Michigan is a freshwater lake, so the effect of the Project on salinity gradients is not applicable.

(5) Actions That Will Be Taken to Minimize Impacts

The dredged sediment is expected to have a high fines content, so short-term, minor, and localized changes to the water clarity and color are expected. A silt curtain or similar turbidity control will be implemented to mitigate the temporary clarity and color change caused by placement of this fine sediment. Additionally, turbidity monitoring will be conducted outside the work area to ensure placement activities will not impact a larger area.

In order to help mitigate ammonia-nitrogen levels, material may be pumped to the placement area by a hydraulic pipeline. This significantly dilutes the concentration of ammonia-nitrogen in the dredged slurry and could reduce the potential impact of ammonia to the placement area water. Dilution due to hydraulic dredging/ placement will be dilute to a minimum of a sediment-to-water ratio of 1:8, though it is possible to further dilute the sediment if desired, though this reduces dredging efficiency.

C. Suspended Particulate/Turbidity Determinations

(1) Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Placement Site

Sediment core samples from the federal channel had moderate fines (passing the #200 sieve) concentrations: 32.5% and 30.8% averaged across each management unit. Sediment grab samples from the nearest refence site to the placement area also had moderate fines concentrations: 25.8% averaged across the reference site. Though the dredged material does have slightly higher fines concentrations

than the placement area, it is within 15% of the fines concentration of the placement area, as required by Wis. Admin. Code NR 347.07(4)(a). Short-term, minor, and localized increases in the concentration of suspended solids and turbidity are expected during work.

(2) Effects (degree and duration) on Chemical and Physical Properties of the Water Column

a) *Light Penetration*

The activities are expected to cause minor, temporary, and localized increases of suspended solids and turbidity that will likely decrease the clarity of the water and reduce the penetration of light through the water column. These minor increases are anticipated to be low relative to the increased levels of suspended solids and turbidity that typically result from storm events and adverse weather conditions. The project is therefore not expected to cause any long-term adverse impacts.

b) *Dissolved Oxygen*

Minor, temporary, and localized increases of suspended solids and turbidity might cause a slight reduction in the level of dissolved oxygen in the water. This reduction may be due to the biological and chemical content of the suspended solids, which could react with the dissolved oxygen and slightly lower concentrations in the water column.

c) *Toxic Metals and Organics*

Metals were measured in sediment in the federal channel and reference sites as part of the 2022 sediment sampling event. Metals were detected in management unit samples at slightly lower levels than previous sampling events. Lead and mercury levels were significantly lower than previous sampling events. Compared to reference sites, aluminum, iron, and lead concentrations were higher at management sites, but none of these parameters exceeded state guidelines for threshold effect concentration (WDNR, 2003).

As discussed in Section II.B.1.b *Water Chemistry*, elutriate samples were tested for, among other things, phosphorus and ammonia. As concluded, the activities might cause minor, temporary, and localized increases of organics. However, the project is not expected to cause any long-term adverse impacts.

d) *Aesthetics*

The proposed project is not anticipated to cause any long-term effects on, or changes to, the aesthetics of the water at the project site. There will likely be some temporary and minor increases of suspended solids and turbidity in the work area, and these increases are commonly associated with short-term and slight decreases of water clarity and/or changes to the color of the water. Nevertheless, these adverse aesthetic impacts should be short-term and minor, and the water is expected to return to a normal clarity and color as the suspended particles settle from the water column. In addition, the visual presence of barges, vessels, backhoes, and other construction equipment in the water or on the beach may generate noise and cause temporary and minor adverse impacts to the aesthetic beauty of the placement site.

e) *Others as Appropriate*

(3) Effects on Biota

a) *Primary Production, Photosynthesis*

Primary production generally refers to the fixation of solar energy by phytoplankton for an aquatic ecosystem. The dredging and placement of material will likely cause some minor, temporary, and localized increases of suspended solids and turbidity, but the effects are anticipated to be low relative to the increased levels of suspended solids that typically result from storm events and adverse weather conditions. Turbidity will temporarily reduce the ability of sunlight to reach submergent vegetation and phytoplankton. Burial of extant vegetation from placement will also temporarily impact photosynthesis. Species in near shore environments are adapted to drifting sediments and should either recolonize or emerge through the dredged material after placement. It is also possible that productivity is increased due to increased nutrient availability. The project is not expected to cause any significant or long-term adverse impacts, positive or negative, to primary production or photosynthesis for the biota.

b) *Suspension/Filter Feeders*

The dredging and placement of material will cause some minor, temporary, and localized increases of suspended solids and turbidity, which could benefit suspension/ filter feeders. The effects are anticipated to be low relative to the increased levels of suspended solids and turbidity that typically result from storm events and adverse weather conditions, and the project is not expected to have any long-term effects on suspension/ filter feeders.

c) *Sight Feeders*

Persistently high turbidity levels can cause adverse impacts to sigh-dependent species because the reduction in clarity can hinder the feeding ability of these species, and thereby limit their growth and increase their susceptibility to disease. The dredging and placement of material is expected to cause minor, temporary, and localized increases of suspended solids and turbidity, but as mentioned previously, the effects are anticipated to be low relative to the increased levels of suspended solids and turbidity that typically result from storm events and adverse weather conditions. Although there may be minor, temporary, and localized impacts, the project is not expected to have any persistent, long-term, and adverse effects on sight feeders.

(4) Actions Taken to Minimize Impacts

The proposed action that will be taken to minimize the adverse impacts are the same actions discussed earlier. Although there may be minor and temporary adverse impacts within the local work area, these actions should minimize any broad effects outside the immediate vicinity of the work area.

D. Contaminant Determinations

The most recent Contaminant Determination for Big Suamico Harbor was completed in 2024 and is included as Attachment 1. The evaluation indicates that the sediment is of good chemical quality and appropriate for beneficial use and/or in-water placement, assuming the placement location has an appropriate comparative fines percentage. However, the sediment is fine-grained and would not be suitable for beach nourishment projects or similar. If in-water placement is not possible, the material is also suitable for unconfined upland disposal. As discussed in the above sections, the proposed placement area fulfills the requirements for in-water placement.

E. Aquatic Ecosystem and Organism Determinations

(1) Effects on Plankton

Plankton are pelagic, which means they live within the water column itself, as opposed to benthic organisms that live along the bottom (Water Encyclopedia, 2016). Plankton generally drift along with the water currents and/or float on or near the water surface, as opposed to nekton, which are active swimmers that can propel themselves through water currents. Plankton are typically divided into phytoplankton, which includes photosynthesizing species like algae that derive energy from sunlight, water, and carbon dioxide, and zooplankton, which consume food in order to derive energy. Although most planktonic species are small and often microscopic, there are large plankton organisms that are still considered to be plankton because they drift with the water current.

Researchers have found that Lake Michigan has experienced substantial and complex changes to the food-web structure since the 1980s (Vanderploeg et al., 2012; Makarewicz et al., 1998; and Scavia et al., 1988). The paper by Vanderploeg et al. (2012) lists the following changes: (1) a decrease in phosphorus loading, (2) increased control of planktivorous alewife (*Alosa pseudoharengus*) by the introduction of Pacific salmon, (3) the invasion of the visual-feeding spined predatory cladoceran *Bythotrephes longimanus* in the mid-1980s from northern Europe, (4) invasion by a host of Ponto-Caspian species, including zebra (*Dreissena polymorphia*) and quagga mussels (*Dreissena rostiformis bugensis*) during the 1990s, and (5) loss of the spring phytoplankton bloom in 2007 and 2008 likely caused by intense filtering during winter and spring by quagga mussels following their massive population expansion into deep water starting in 2004.

The many changes, invasive or non-native species, and complex interactions that have occurred in Lake Michigan makes it difficult to assess and/or quantify the effects on different species and the food-web (Vanderploeg et al., 2012). The proposed dredging and placement project will cause some minor, temporary, and localized impacts to some phytoplankton and zooplankton. There are approximately 50+ species of plankton present in the Great Lakes with an estimated average biomass of several milligrams per cubic meter (Vanderploeg et al, 2012; INHS, 2019; NOAA, 1993). Due to the nature of these organisms and large scale of Lake Michigan in comparison to the project site, the impacted populations of plankton in the vicinity should recover quickly, and no considerable long-term effects on plankton communities are anticipated.

(2) Effects on Benthos

Benthos refers to the organisms (plants and animals) that inhabit the bottom of a sea, stream or lake. For the current project, the benthos includes organisms that live on, in, or near the bottom of Lake Michigan. The removal of the dredged sediment material, as well as the placement of the material in open water near shore areas will cause some minor destruction and temporary adverse effects on the existing benthos in the local work area. However, benthic communities that are established near the shoreline are generally tolerant and adapted to dynamic, high wave and energy environments. As such, the disturbed areas are likely to be recolonized quickly be the same species, and no long-term effects or modifications to species diversity or dynamics is anticipated.

(3) Effects on Nekton

Nekton refers to the aquatic life (organisms) that can swim freely and are generally independent of the water currents (Water Encyclopedia, 2016). The work activities are expected to cause noise, disturbance, and turbidity which would cause short-term and minor impacts to fish and other nekton in the dredging and placement areas. Fish and other nekton would likely vacate the area and seek alternative areas to forage or rest. These impacts would be minor and only last as long as dredging/ placement activities were occurring.

The in-water placement alternative would place dredged material into nearshore waters, which are the natural zones for sediment movement through the littoral drift process. Although many nekton have adapted to continually moving substrates, large deposits of sediment in the placement area for durations longer than a few days could impact eggs. Considering the dredging exclusion period, it is anticipated that all of the placement alternatives would have no direct or indirect, short-term or long-term adverse effects on nekton communities.

(4) Effects on Aquatic Food Web

When discussing the effects on plankton, it was previously noted that Lake Michigan experienced substantial and complex changes to the food web since the 1980s (Vanderploeg et al., 2012; Makarewicz et al., 1998; and Scavia et al., 1988). Although it is likely that proposed dredging and placement of material might cause effects on some food web organisms in the vicinity, particularly sedentary organisms along the bottom, the project sites are small compared to the extremely large size of Lake Michigan, and the food web organisms near the shoreline should be tolerant and adapted to dynamic, high wave and energy environments. The food web organisms should repopulate and become reestablished shortly after the project is completed, so any adverse impacts to the aquatic food web are expected to be minor, temporary, and localized. Dredging and placement activities are not expected to have any permanent or considerable long-term effects on the food web structure.

(5) Effects on Special Aquatic Sites

a) *Sanctuaries and Refuges*

No sanctuaries or refuges are in the project area, so this topic is not applicable.

b) *Wetlands*

In water placement will have short term impacts to submergent marsh communities along the western edge of the peninsula. Placement of the material will bury extant biota. Most submergent vegetation has evolved strategies to deal with burial and shifting sediments, so recovery or recolonization of placed sediment should occur rapidly. Impacts are expected to be minor and temporary.

c) *Mud Flats*

There are no mud flats in the vicinity of the site, so this topic is not applicable.

d) *Vegetated Shallows*

Burial of extant vegetation from placement is expected. Species in near shore environments are adapted to drifting sediments and should either recolonize or emerge through the dredged material after placement, impacts are expected to be minor and temporary.

e) *Coral Reefs*

There are no coral reefs in freshwater environments, so this topic is not applicable.

f) *Riffle and Pool Complexes*

There are no riffle and pool complexes in the project area, so this topic is not applicable.

(6) Threatened and Endangered Species

The following federally listed species and their critical habitats are identified by the USFWS as occurring within the project area:

- Tricolored Bat (Perimyotis subflavus) – Caves and abandoned mines or road-associated culverts in winter. Forested habitats and occasionally human structures during the spring, summer, and fall.
- Monarch Butterfly (Danaus plexippus) – Candidate – Pine barrens and oak savannas on sandy soils and containing wild lupines (Lupinus perennis), the only known food plant of the larvae.
- Salamander Mussel (Simpsonaias ambigua) – Proposed Endangered –Rivers, streams, and in some cases lakes with natural flow regimes.
- Northern Long Eared Bat (Myotis septentrionalis) – Threatened – Hibernates in caves and mines – swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests and woods.
- Rufa Red Knot (Calidris canutus rufa) – Threatened – Coastal Areas or large wetland complexes

The USACE has determined there will be "no effect" to these species as a result of this project.

(7) Actions Taken to Minimize Impacts

Dredging and placement of material will only occur between October 15th and "ice-on" (when Green Bay freezes over in the winter, typically mid-late November) to reduce impacts on birds and aquatic organisms.

F. Proposed Disposal Site Determinations

(1) Mixing Zone Determination

Dilution calculations for the mixing zone were performed as part of the Contaminant Determination (Attachment 1). They show that, based on elutriate concentrations of ammonia, 30,000 cubic yards of material would need a mixing zone of approximately 285,700 cubic yards of water to achieve the WQS for ammonia under worst-case conditions. The estimated water volume of the placement location (158,600 cubic yards) is insufficient to dilute the ammonia to an appropriate concentration. The use of inefficient dredging (a higher water-to-sediment ratio) would further dilute the ammonia and could achieve the WQS within the placement location. Additionally, these calculations assume the dredged material is placed all at once, though in reality the dredged material would be placed over the course of weeks, allowing gradual dilution of ammonia to occur throughout placement activities. The dynamic nature of Green Bay would further aid dilution of the ammonia. Therefore, there are no expected negative long-term impacts associated with placement.

(2) Determination of Compliance with Applicable Water Quality Standards

None of the proposed materials are expected to be a source of toxic or persistent contamination, and the materials are not anticipated to cause any considerable long-term effects on, or changes to, the water chemistry or quality. Minor, short-term, and localized adverse impacts may occur within the immediate work area due to increases in the concentration of suspended solids and turbidity that are

associated with the dredging activities. An Individual 401 Water Quality Certification is currently being pursued with the Wisconsin Department of Natural Resources. In general, the activities are expected to comply with the applicable water quality standards and no violations are anticipated.

(3) Potential Effects on Human Use Characteristic

a) *Municipal and Private Water Supply*

There are no known drinking water intakes in the vicinity of the project area, so this topic is not applicable.

b) *Recreational and Commercial Fisheries*

The dredging and placement activities that occur during the project will not have any effects on the operations of commercial fisheries because there are not commercial fisheries in the vicinity of the project area. There may be very minor, temporary, and localized disruptions for recreational fishing in the immediate vicinity of the project due to the implementation of restrictions around the site to ensure public safety and secure the construction site and equipment.

c) *Water Related Recreation*

It is likely that access to the Big Suamico federal channel and access to the Suamico Boat Landing from Green Bay will be impacting during dredging operations. It is likely that recreational boating in Dead Horse Bay be impacted in the vicinity of the placement area due to the presence of equipment and active work. These restrictions would potentially result in some minor, temporary, and localized inconveniences related to harbor accessibility and use of Dead Horse Bay for recreational boat users in the immediate vicinity of the project either entering/ existing Suamico River or in open water Dead Horse Bay. However, the dredging operations are expected to be completed within a reasonably short duration, and the working area around the work barge(s) is expected to be small in relation to Dead Horse Bay.

d) *Aesthetics*

The proposed dredging operations will maintain the navigable channel depth and reduce sediment levels in the federal channel. Placement of the dredged material in the nearshore of Long Tail Point will provide nourishment to Long Tail Point, which is experiencing erosion from the natural process of littoral drift, storm events, and ice shoves.

During operations, it is likely that the aesthetics of the local area will occasionally be affected by the additional noise and operations of the vessels and heavy equipment while dredging is conducted. This may include the visual presence of barges, vessels, hydraulic pipes and pumps, and other construction equipment in the water. Since the placements area is at Long Tail Point and Dead Horse Bay, which is commonly used by recreational boaters, the activities may adversely impact the noise and visual aesthetics for those users. The active dredging and placement of sediment likely cause short-term and temporary increases in the suspended solids and turbidity of the immediate area. These increases could reduce the aesthetic quality of the water by causing minor and temporary impacts to the clarity or color of the water in the project area. In general, the aesthetic effects are expected to be minor and temporary and should only impact those people and organisms in the immediate vicinity.

e) *Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves*

Brown County and State of Wisconsin wildlife areas are located near the federal project area; Sensiba State Wildlife Area (approximately 300 acres) is north of the channel; Long Tail Point is a designated wetland roughly 1 mile southeast of the mouth of Suamico River. Dredging and placement activities will not negatively impact these wildlife areas.

G. Determination of Cumulative Effects on the Aquatic Ecosystem

The Section 404(b)(1) Guidelines indicate that cumulative effects are the effects attributable to the collective effect of numerous individual dredged or fill material placement events. Although the impact from one particular, individual dredged or fill material placement event may only cause a minor effect on the aquatic ecosystem, numerous individual dredged or fill material placement events could cause a more substantial effect on the aquatic ecosystem.

Maintenance dredging at Big Suamico is an infrequent event, the most recent being in 2002. Since then, sedimentation has continually occurred in the federal channel from the Suamico River depositing material as it enters Green Bay and the natural littoral drift of material from north of the channel in Green Bay. This deposition in the federal channel limits the amount of material that is deposited further south along the coast, effectively eliminating the replenishment process and increasing the near shore erosion rate of Long Tail Point. Placement of material from the federal channel south at Long Tail Point will return sediment to nearshore system and continue its movement along the coast, effectively maintaining the process of littoral drift and reducing the impact of erosion on Long Tail Point.

Dredging of the Big Suamico Harbor will provide generally beneficial cumulative effects for reasonably foreseeable actions within the general area of activity. The continued use of the Suamico River for boating access will benefit from dredging. Efforts to reduce erosion at Long Tail Point will benefit from dredged material placement along its western shore. Also, work to restore the Green Bay Area of Concern (AOC) will benefit from additional marsh habitat and improved stability of Long Tail Point. Though there will likely be impacts to the aquatic community in the immediate area around dredging and placement activities, any disturbances are expected to be small, localized, and temporary. Given all this and the overall size of the nearshore area of Lake Michigan the aquatic ecosystem should quickly recover from the minor effects, and no long-term, permanent, or cumulative effects are anticipated.

H. Determination of Secondary Effects on the Aquatic Ecosystem

According to the Section 404(b)(1) Guidelines, secondary effects are the effects associated with the placement of dredged or fill material, but they are not a direct result from the placement of dredged or fill material. For example, secondary effects may include the effects from activities to be conducted on fast land that was created by the placement of dredged or fill material.

The nearshore placement at Long Tail Point may increase available habitat for new coastal marsh in the area where dredged material is placed. This is not expected to cause any negative secondary effects on the aquatic ecosystem.

III. Findings of Compliance or Non-Compliance with the Restrictions on Discharge

A. Adaptation of the Section 404(b)(1) Guidelines to this Evaluation

No adaptation of the Section 404(b)(1) guidelines was made for this evaluation.

B. Evaluation of Availability of Practicable Alternatives to the Proposed Discharge Site Which Would Have Less Adverse Impact on the Aquatic Ecosystem

The "no action" alternative would be to cease dredging operations in and around Big Suamico Harbor. This alternative is unacceptable since the Federal Government has determined that there is an economic benefit to the navigational maintenance activities and Congress has authorized and funded the actions. Dredging of the harbor allows recreational navigation to continue.

The sediment to be dredged from the federal channel is acceptable for upland placement. The "upland placement" alternative would include removing sediment from the nearshore system, further starving the coast directly to the south of the federal channel of material and increasing the erosion of Long Tail Point. Dredged material placed upland would need to be contained by berms or other means to prevent it from flowing back into Lake Michigan. This alternative has significantly higher costs than the proposed in-water alternative.

C. Compliance with Applicable State Water Quality Standards

Comparison of the elutriate results to the State of Wisconsin water quality standards suggest that the only water quality standard at risk of being exceeded is ammonia-nitrogen. As described in Section II.5.a and II.f.1, there are mitigation actions taken to minimize the impact of ammonia-nitrogen at the placement location. Additionally, the dynamic and dispersive nature of Lake Michigan would mitigate any potential negative long-term impacts associated with placement at Long Tail Point. Only minor, short-term, and localized increases of ammonia-nitrogen are likely to occur during placement.

The nature of hydraulic dredging dilutes the dredged sediment to a 1:8 sediment-to-water ratio. Additionally, the dynamic and dispersive nature of Lake Michigan would mitigate any potential negative long-term impacts associated with placement. Only short-term and localized increases are likely to occur during placement.

D. Compliance with Clean Water, Endangered Species, National Historic Preservation and Marine Sanctuaries Acts

The USACE has coordinated with the Wisconsin DNR, USFWS, and the Wisconsin SHPO to coordinate on the Clean Water Act, Endangered Species Act, and National Historic Preservation Act. No marine sanctuaries are present in the project area.

E. Evaluation of Extent of Degradation of the Waters of the United States

(1) Significant Adverse Effects

The proposed fill activity is not expected to have any significant, long-term adverse impacts on recreational, aesthetic, and economic values; or on human health or welfare including municipal and private water supplies, recreational and commercial fisheries, plankton, fish, shellfish, wildlife communities (including community diversity, productivity, and stability), or special aquatic sites.

(2) Significant Adverse Effects on Life Stages of Aquatic Life and Other Wildlife Dependent on Aquatic Ecosystems

It was indicated previously that the work activities may cause minor auditory disturbances to nekton the work area and minor and temporary increases of ammonia-nitrogen levels in the water column.

However, these impacts are not considered to be significant because, compared to the tremendous size of Lake Michigan, the work area is small. There might be some minor, temporary, and localized adverse impacts, but the proposed activity is not anticipated to degrade or have any permanent or noticeable effects on plankton, fish, shellfish, or wildlife communities (including community diversity, productivity, and stability).

(3) Significant Adverse Effects on Aquatic Ecosystem Diversity, Productivity and Stability

The proposed activity is not expected to have any significant, long-term adverse impacts on wetlands or the aquatic ecosystem. As previously stated, elevated levels of suspended solids would be expected to settle or dissipate within a relatively short time period, and the minor and temporary increases of suspended solids concentrations produced by dredging and placement operations are expected to be considerably lower than the increased turbidity that would typically result from adverse weather conditions that produce high waves and strong currents. Any elevated levels of ammonia-nitrogen in the water of the placement area would be expected to dissipate within a short time period and be localized to the placement area.

F. Appropriate and Practicable Steps Taken to Minimize Potential Adverse Impacts of the Discharge on the Aquatic Ecosystem

In order to prevent adverse aquatic ecosystem impacts during placement, material to be placed in-water nearshore transported via bottom dump scow, sealed scow, or hydraulic pipeline. Once a bottom dump scow is in place, the bottom doors open and material is dropped directly down, minimizing resuspension; due to the shallow nature of the placement area, this is not a likely placement alternative. Alternatively, material could be placed in water in discrete aliquots using a crane and bucket; though this placement option may also be limited due to the nature of the placement location. Material placed hydraulically will be pumped as a slurry directly into the nearshore at velocities and with the pipe opening positioned to reduce turbidity and prevent erosion of the existing Long Tail Point shoreline. A silt curtain or similar physical turbidity control will be installed around the placement area to mitigate an increase in turbidity due to the high fines content of the dredged material. Dredging and placement of material will only occur between October 15th and “ice on” to reduce impacts on birds and aquatic organisms.

G. On the Basis of the Guidelines, the Proposed Placement Sites for the Discharge of Fill Material is:

Specified as complying with the requirements of these guidelines, with the inclusion of appropriate and practical conditions to minimize adverse effects on the aquatic ecosystem.

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V. Attachment 1: Contaminant Determination

Contaminant Determination

Maintenance Dredging and Beneficial Use
Big Suamico Harbor, Brown County, Wisconsin

Completed by:
U.S. Army Corps of Engineers, Chicago District
231 South LaSalle Street
Chicago, Illinois 60604

March 2024

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1. Introduction

The U.S. Army Corps of Engineers (USACE), under its operations and maintenance authority, proposes to conduct maintenance dredging of the federal channel and provide suitable dredged material for littoral zone placement.

The following document was prepared by the U. S. Army Corps of Engineers (USACE) Chicago District, to state and evaluate information regarding the effects of the proposed discharge of dredged material into waters of the United States. The following evaluation was prepared in accordance with Section 404(b)(1) of the Clean Water Act (CWA), Public Law 92-500 and with the regional guidance, *Great Lakes Dredged Material Testing and Evaluation Manual* (USEPA and USACE 1998b) and *Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. - Testing Manual* (USEPA and USACE 1998a), also known as the "Inland Testing Manual."

2. Project Description

2.1. Location

Suamico Harbor is a federal navigation project on the west shore of Green Bay, Lake Michigan in the Village of Suamico (Figure 1). The harbor is located approximately eight miles north of Green Bay Harbor and 44 miles southwest from Menominee Harbor. The federally authorized channel is 3,700 feet long, with approximately half of the channel in the Suamico River and half extending into Green Bay (Figure 1). Brown County and State of Wisconsin wildlife areas are located near the federal project area; Sensiba State Wildlife Area (approximately 300 acres) is north of the channel; Long Tail Point is a designated wetland roughly 1 mile southeast of the mouth of Suamico River.

The proposed placement for dredged material from Big Suamico is near Long Tail Point, roughly 1.3 miles from the federal channel. The placement area runs along the leeward shoreline of Long Tail Point (Figure 2).

2.2. Background

Big Suamico Harbor was authorized by the River and Harbor Act of 1937 and provides an entrance channel from Green Bay into the Suamico River for recreational crafts. The channel extends roughly 1,900 feet into Green Bay and 1,800 feet into Suamico River, with widths of 100-feet in the bay and 60-feet in the river. The total length of the channel is about 3,700-feet. The authorized depth of the area is -8 ft Low Water Datum (LWD).

Currently, roughly two-thirds of the entire federal project area has shoaled between 2 and 6 feet above project depth (-8 ft LWD). Figure 3 shows the current bathymetry in the federal channel. Areas with shoaling (more than two feet above project depth, less than or equal to a depth of 6 ft LWD) are highlighted. Dredging has historically been performed sporadically to maintain the waterway. USACE last dredged the harbor in 2002; the sediment was considered clean and placed upland. Due to the current extent of the shoaling, maintenance dredging of the harbor is proposed for 2024.

2.3. Sediment Placement Site

A placement location has been proposed for material dredged from Big Suamico Harbor based on the material's physical and chemical characteristics. In accordance with the Sec. 125 of Water Resources Development Act (WRDA) 2020: "It is the policy of the United States for the Corps of Engineers to maximize the beneficial use, in an environmentally acceptable manner, of suitable dredged material obtained from the construction or operation and maintenance of water resources development projects". The proposed placement site listed below beneficially uses the dredged sediment from Big Suamico Harbor.

Long Tail Point (LTP) is a natural sand spit south of Big Suamico Harbor in Green Bay. LTP has experienced significant erosion over the last several decades, but high lake levels in the last 5 years has accelerated erosion and two breach gaps have appeared since 2015. Figure 4 and Figure 5 show the progression of erosion of Long Tail Point between 1938 and 2023.

Sediment will be placed along the leeward side of LTP, between the two breach gaps, as a submerged nearshore berm, a thin cover in vegetated areas, or a cross shore swash zone. This placement would promote coastal resiliency by placing sediment within the nearshore littoral zone, so that sediment is placed within the active wave environment. Dredged material placed in the water along the leeward shoreline of LTP would nourish the shoreline and help maintain the natural features while not negatively impacting the existing, high-quality habitat in Dead Horse Bay northwest of the proposed placement location.

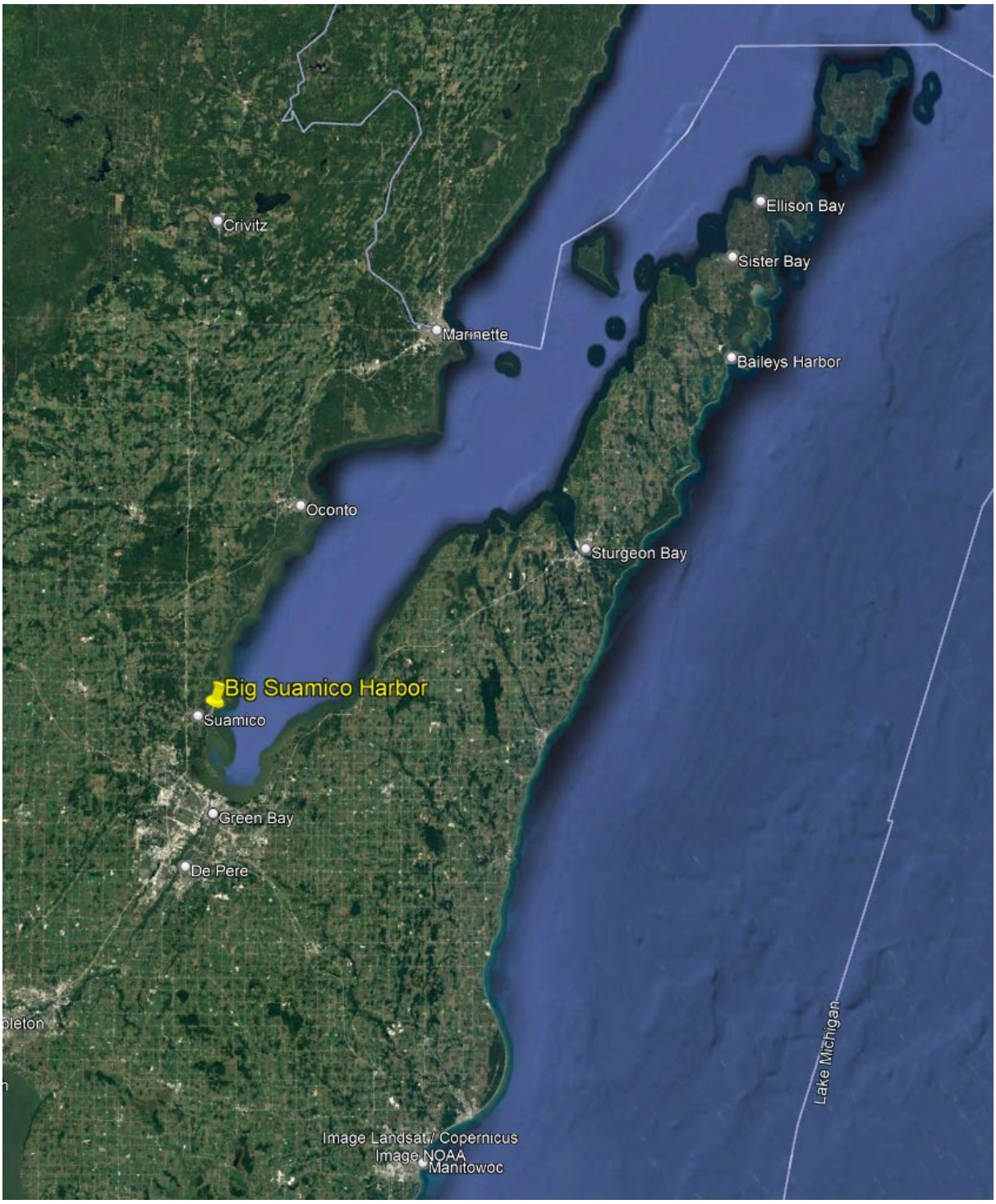


Figure 1: Big Suamico Harbor location

Figure 2: Big Suamico Harbor and potential placement locations

Figure 3: Big Suamico Harbor bathymetry

Figure 4: Long Tail Point, June 1938 (USDA)

Figure 5: Long Tail Point, June 2023 (Google Earth)

3. Tier 1 Analysis

3.1. Approach

The U.S. Environmental Protection Agency (USEPA) and the U.S. Army Corps of Engineers (USACE) jointly developed the *Great Lakes Dredged Material Testing and Evaluation Manual* to establish procedures for evaluating potential environmental impacts associated with the discharge of dredged material in inland waters, near coastal waters, and surrounding environs. This document outlines a structured, sequential approach to sediment evaluation and testing to determine if dredged sediment from harbors and rivers tributary to the Great Lakes may be disposed in open-waters of the Great Lakes. The objective of the tiered testing approach is to make optimal use of resources in generating the required information for a factual determination of compliance with the Clean Water Act Section 404(b)(1), using an integrated chemical, physical, and biological evaluation approach.

3.2. Tier 1 Objectives

The purpose of the Tier 1 evaluation is to compile readily available, existing information in order to make a factual determination regarding compliance with the Clean Water Act (CWA) Section 404(b)(1), and to generate a list of “Contaminants of Concern”. Disposal operations that are excluded from testing or have historic data sufficient for the factual determination may proceed without additional testing. If a factual determination of non-compliance can be made and it is determined that the dredged sediments will not be disposed in open water, additional testing is not required, except as necessary for consideration of other disposal options. If the information is insufficient for a factual determination, it is deemed inconclusive, a Tier 2 evaluation is performed. If necessary, a Tier 3 evaluation is performed to determine toxic effects of sediment contaminants on biological life. The Tier 1 evaluation is not intended to provide a comprehensive investigation of all potential sources of sediment contamination, but rather is intended to indicate whether sediment bulk chemistry testing is warranted based on existing data and potential sources of sediment contamination.

3.3. Sediment Sources

The sedimentation in Big Suamico Harbor, particularly in the channel in Green Bay, is affected by the sediment transport mechanisms present in Green Bay, since there are no breakwaters to protect the harbor from lake-induced erosion. The current in Green Bay moves primarily counterclockwise, so the current around the harbor flows generally north to south. Green Bay is also affected by seiches, which can cause significant changes in water level over the course of hours. Sedimentation may also be affected by boat wash waves, particularly during higher stages, which disturb sand deposits along the banks of the Bay and Suamico River.

Another possible source of sediment is the Suamico River, a portion of which flows through and empties into the federal channel. A review of flowrates in the river indicates that the river flow varies greatly but is generally low velocity, with an estimated mean

annual flow velocity of 1.09 feet/ second (fps) (USEPA, 2019). Scour velocity is typically considered to be around 2 fps, at which one would expect significant sediment transport. However, fine material may be transported at flow velocities equal to or less than 1 fps. It is likely that sediment is mobilized into Big Suamico River during rain events and carried into the federal channel. Non-point upland sources (erosion) and point sources (i.e., storm sewers) upstream of the federal channel can contribute solids and contaminants which settle in the channel.

Sediment sources impact the quality of sediment found in the federal channel. The chemical quality and grain size of the material determine how dredged material may be disposed of. Due to the relatively slow flow of Big Suamico River and longshore current of Green Bay, primarily fine material would be deposited into the federal channel.

3.4. Contaminant Transport and Pathways

3.4.1. Land Use

The portion of the federal channel in Suamico River is bound by single-family homes directly to the north and south. The parcels lining both riverbanks are coded as residential. On the northern riverbank, directly upstream of the federal channel, is the Brown County Suamico Boat Ramp, a public boat ramp used for recreational navigation. Land to the north and south of the residences is part of Green Bay West Shores Wildlife Area. To the north is the Sensiba State Wildlife Area. This is a 570-acre property owned by the state and has coastal marshes along the shore of Green Bay. Inland areas are wooded with a mixture of bottomland hardwoods, oak, aspen, and cottonwood. Some former agricultural fields are a mix of shrubs and grasses. To the south of the federal channel is Longtail Point, a 434-acre state-owned property. It is a sand-spit depositional feature projecting into Green Bay. The habitat types and acreage on the point are dependent on water level in the bay but include emergent wetlands, sedge meadows, shrub-car, cottonwood copses, and lowland forest. This area is an important stopover for migrating waterfowl.

3.4.2. Soil Type

Soils near Big Suamico Harbor consist of muck and loamy fine sand. The wildlife areas to the north and south both have Marsh soil types. In the residential areas and directly on the banks of Suamico River and Green Bay is Roscommon muck – a 0-5 inch layer of muck over loamy fine sand and sand.

Soils at the placement locations are similar to the area around Big Suamico Harbor; generally fine and mucky. Near Long Tail Point, soils are marsh, muck, and loamy fine sand.

3.4.3. Hydrology and Tributary Flows

Big Suamico is a federally authorized channel on the western shore of Green Bay (as shown in Figure 1). It provides an entrance channel 8 feet deep extending from the vicinity of the western end of the county boat launch in Suamico River eastward to the river mouth and east-northeastward approximately 1,800 feet into Green Bay. Suamico

River flows easterly from Pittsfield, WI, where the West Branch Suamico River and South Branch Suamico River meet and become Suamico River. Suamico River terminates roughly 15.92 miles away, into Green Bay. Suamico is classified as a cool-cold headwater supporting aquatic life. At the portion of the river with the federal channel, the average annual flow velocity is roughly 1.1 feet per second (USEPA, 2019). There are several tributaries of the Suamico river, described in Table 1, below. Many tributaries are small, shallow streams that provide drainage for residential neighborhoods and farmlands.

The North Branch Suamico River – Suamico River hydrologic unit drains approximately 41 square miles. Streams in this watershed are generally small and shallow. The depth to groundwater is often shallow and large swampy areas are common. Near Green Bay, and inland for several miles, wetlands are prominent and are valuable spawning habitat for Green Bay fish species (USEPA 2023, b).

Table 1: Tributaries of Suamico River

Name	Location of tributary[1]	Length of tributary (miles)	Stream Order[2]	Type
West Branch Suamico River	0	9.03 mi	3	Overland flow, Intermittent
South Branch Suamico River	0	7.30 mi	4	Overland flow, Intermittent
Unnamed	0.41	2.13 mi	2	In Water flow, Intermittent
Potter Creek	0.98	5.97	3	Overland flow, Intermittent
Unnamed	1.78	2.38	2	Overland flow, Intermittent
Unnamed	3.55	0.89	1	In Water flow, Intermittent
Unnamed	3.72	2.81	2	Overland flow, Intermittent
Unnamed	4.60	1.47	1	Overland flow, Intermittent
Unnamed	5.44	1.21	2	Overland flow, Intermittent

North Branch Suamico River	6.04	4.80	3	Overland flow, Perennial
Unnamed	7.64	0.79	1	Overland flow, Intermittent
Unnamed	8.54	0.88	1	Overland flow, Intermittent
Unnamed	8.77	1.21	1	Overland flow, Intermittent
Unnamed	9.35	1.28	1	Overland flow, Intermittent
Hidden Lake Creek	10.18	2.47	2	Overland flow, Intermittent
Unnamed	11.26	0.12	1	Overland flow, Intermittent
Unnamed	12.12	0.67	1	Overland flow, Intermittent
Unnamed	12.13	0.14	1	Overland flow, Intermittent
Unnamed	12.39	0.22	1	Overland flow, Perennial
Haller Creel	13.00	6.28	2	In Water flow, Intermittent
[1]Location of tributary is based on the river mile of Suamico River at which the tributary meets the river. Mile 0 is where Suamico River originates (where South and West Branches meet). The river terminates into Green Bay at mile 15.92.				
[2]Strahler's stream ordering system is a well-known classification based on stream/ tributary relationships. The uppermost channels in a drainage network (i.e., headwater channels with no upstream tributaries) are designated as first-order down to their first confluence. A second-order stream is formed below the confluence of two first-order channels. Third-order streams are created when two second-order channels join, and so on.				

Source: USEPA, 2023b

The portion of the federal channel in Green Bay receives sediment from the littoral process of Green Bay. Nearshore currents in Green Bay typically flow counterclockwise, so sediment travels south along the western shore of Green Bay. The federal channel receives sediment from the marshy Sensiba Nature Preserve directly to the north, Little

Suamico River, and other streams and rivers north of the federal channel (UWGB, 2023).

3.5. Sources of Information Investigated

3.5.1. Database Search

A search of available environmental records was conducted using the USEPA Envirofacts system and the Wisconsin Bureau for Remediation and Redevelopment Tracking System (BRRTS) to identify potential sources of sediment contamination in the area of the harbor and the proposed placement sites as part of a Tier 1 evaluation of Big Suamico Harbor (USACE, 2022). The database sources are described further below.

Table 2: Recommended search radii for Federal and State database searches

Database	Minimum Search Distance (mi)
Federal NPL site list	1.0
Federal delisted NPL site list	0.5
Federal CERCLA list	0.5
Federal CERCLA NFRAP site list	0.5
Federal RCRA CORRACTS Facilities List	1.0
Federal RCRA non-CORRACTS TSD Facilities List	0.5
Federal RCRA Generators List	Property and Adjoining Properties
State Equivalent NPL	1.0
State Equivalent CERCLA	0.5
State Landfill/Solid Waste Disposal Site Lists	0.5
State LUST Lists	0.5
State registered UST List	Property and Adjoining Properties

SEMS

The Superfund Enterprise Management System (SEMS) contains data on any potentially hazardous waste site that has been reported by states, municipalities, private companies, or private persons pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The SEMS database indicates the stages of evaluation and remediation that have been completed for any given site. The SEMS database includes the National Priority List (NPL), which identifies over 1,200 sites for priority cleanup under the Superfund program, and the SEMS No Further Remedial Action Planned (NFRAP) List, which includes a listing of sites that have been

removed from SEMS for various reasons. The database search located no sites within the minimum search distance for project area or proposed placement locations.

RCRAInfo

The Resource Conservation and Recovery Information (RCRAInfo) database lists sites which generate, transport, store, and/or dispose of hazardous waste defined by the Resource Conservation and Recovery Act (RCRA). The RCRAInfo database includes RCRA Corrective Action Report (CORRACTS), which identify hazardous waste handlers with RCRA corrective action activity; RCRA treatment, storage, and disposal facilities (TSDFs), and RCRA conditionally exempt small quantity generators (CESQGs), RCRA very small quantity generators (VSQGs), small quantity generators (SQGs), and large quantity generators (LQGs) facilities. The database search did not locate any RCRA sites within the minimum search distance for the project area or proposed placement locations.

SHWS

The State Hazardous Waste Sites (SHWS), or State Oversight List, are the state equivalent to CERCLIS and NPL. These sites may or may not have already been listed on the federal CERCLIS list. For Wisconsin, this database is called the Bureau for Remediation and Redevelopment Tracking System (BRRTS), which lists Environmental Repair Program sites. There are no ERP sites listed within one mile of the project area or proposed placement locations.

SWF/LF

The WDNR records the state's Solid Waste Facilities/Landfill sites (SWF/LF). These sites may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites. The database search located no SWF/LF sites within a ½ mile of the project area or proposed placement locations.

LUST/UST

The WDNR lists registered underground storage tanks (USTs), as required by RCRA Subtitle I, as well as leaking underground storage tank reports (LUSTs). No USTs or LUSTs were identified within the minimum search distance for the project area. One LUST site was identified within the minimum search distance for the proposed Long Tail Point placement location – the case was minor, closed in 2003, and did not result in continuing obligations.

3.5.2. Historic Sediment Data

Historic sampling in the federal channel was completed in 1983, 1987, 1992, and 1999. Additional sampling in Suamico River, outside the federal channel, was completed in 2001. The most recent sediment results in the federal channel, in 1999, indicated fine sand, silt and clay in the channel, with the percentage of silt and clay increasing moving upriver. In this sampling event, sediment sampling results exceeded groundwater Residual Contaminant Levels (RCLs) for arsenic, though arsenic did not exceed the

background threshold value (BTV). Prior to 1999, sediment sampling results exceeded groundwater RCLs for heavy metals (including arsenic, cadmium, manganese, nickel, and selenium). Arsenic never exceeded the BTV. The results of historic sampling data can be found in Appendix B.

3.6. Potential Sources of Sediment Contamination

3.6.1. Agricultural Sources

Land use in the area around Big Suamico Harbor is agricultural and residential in nature. The large presence of agricultural zoning indicates that agricultural runoff is likely to be the most significant potential source of sediment contamination in Big Suamico Harbor. There is also nutrient run-off associated with residential areas in the form of lawn and soil erosion, which could contribute organic compounds from stormwater runoff of roads and yards. There are several tributaries that flow through farmlands and residential areas, carrying this runoff to the Suamico River and the federal channel.

3.6.2. Industrial and Municipal Discharges, Overflows, and Bypasses

There are a few industrial facilities near Big Suamico Harbor and no companies discharge into the Big Suamico River. Additionally, there are no municipal discharges, as wastewater is taken to Green Bay for treatment. As such, industrial and municipal discharges are unlikely to affect sediment quality in Big Suamico Harbor. Companies that discharge further upstream or into Green Bay were not considered in this discussion, since it is unlikely that these discharges would impact Big Suamico Harbor.

3.6.3. Previous Dredging or Fill Discharges

The federal channel was dredged in 1957, 1965, 1989, 1993, and 2002. In 1957 and 1965, approximately 16,000 and 13,000 cubic yards of material were dredged, respectively, but the placement site is unknown. In 1989, 33,000 cubic yards of material was placed, upland unconfined, in an industrial park approximately 2 miles away from the federal channel at the end of Suamico Lane. The industrial park placement site has not yet been developed but is owned by investment companies. In 2002, 17,000 cubic yards of material was placed, unconfined, in an upland area approximately 1 mile from the federal channel, just west of Longview Land and south of Riverside Drive. The area is now residential.

3.6.4. Air Deposition

There are no specific air depositional sources (such as large point emission stacks) which would be likely to contribute significantly to sediment volume or content. The nearest pollution sources are in Green Bay, Wisconsin, but are unlikely to affect the sediment quality in the federal channel. Given the limited development of the area surrounding the federal channel, vehicle exhaust and similar anthropogenic sources are not likely to have a significant impact on the federal channel.

3.6.5. Biological Deposition (detritus)

Given the agricultural nature of the area, it is possible that biological detritus contributes to the sediment quality in the harbor. Lake Michigan and Green Bay are known to have potentially large zebra mussel and quagga mussel populations. Although shells may be present in the sediment, biological detritus is unlikely to contribute significantly to sediment volume or content.

3.7. Tier 1 Conclusion

Evaluation of historic sediment data within Big Suamico suggests that the underlying sediment may be suitable for in-water or upland placement. However, based on an overall evaluation of the historic sediment data, historic sediment contamination matrix, and the potential sources of sediment contamination identified in this report, the Chicago District, U.S. Army Corps of Engineers concludes that the existing information is insufficient to make a factual determination regarding compliance with the Clean Water Act, Section 404(b)(1). As such, a Tier 2 evaluation is required, which will involve the analysis of representative sediment and elutriate samples.

3.7.1. Sediment Contaminant List

Based on the information obtained from the Tier 1 sediment evaluation, a list of potential Contaminants of Concern has been compiled, as shown in Table 3. The constituents indicated on this list should be evaluated through analytical testing during the Tier 2 evaluation.

Table 3. Big Suamico Harbor Contaminants of Concern

Parameter	Matrix
Aluminum	Sediment and Elutriate
Arsenic	Sediment and Elutriate
Cadmium	Sediment and Elutriate
Chromium	Sediment and Elutriate
Copper	Sediment and Elutriate
Iron, Total	Sediment and Elutriate
Iron, Dissolved	Elutriate
Lead	Sediment and Elutriate
Manganese	Sediment and Elutriate
Mercury	Sediment and Elutriate
Nickel	Sediment and Elutriate
Selenium	Sediment and Elutriate
Silver	Sediment and Elutriate
Zinc	Sediment and Elutriate
Ammonia-Nitrogen	Sediment and Elutriate
Oil & Grease	Sediment and Elutriate
Total Phosphorus	Sediment and Elutriate
Chemical Oxygen Demand	Sediment and Elutriate
Total Organic Carbon	Sediment

pH	Elutriate
Hardness	Elutriate
Alkalinity	Elutriate
Total Dissolved Solids	Elutriate
Total Suspended Solids	Elutriate
Total PCBs	Sediment and Elutriate
Pesticides	Sediment and Elutriate
E. coli	Elutriate

4. Tier II Evaluation

4.1. Tier II Objectives

The purpose of the Tier II evaluation is to determine the sediment quality, including the physical and chemical characteristics. These data will be used to make a factual determination regarding sediment suitability for beneficial use as shoreline protection material and to determine project compliance with the Clean Water Act Section 404(b)(1).

4.2. Threshold Screening Values

Sampling results in the management units were compared to guidelines and standards created by the state of Wisconsin for both sediment and water quality. Water and elutriate results were compared to state water quality standards for Lake Michigan found in Wisconsin Admin Code chapters NR 102 and 105.

Sediment results were compared to WDNR's *Consensus-Based Sediment Quality Guidelines* (RR-088). These guidelines were developed to be used for screening sediment quality data to help estimate the likelihood of toxicity to benthic macroinvertebrate species. This document provides effect-based sediment quality guidelines (SQG). These SQGs have a lower (threshold effect concentration – TEC) and upper (probable effect concentration – PEC) effect level at which toxicity to benthic-dwelling organisms are predicted to be unlikely and probably, respectively. This document provides guidelines for PAHs, PCBs, heavy metal, and pesticide constituents.

4.3. Sampling Data

The Tier 2 sampling event occurred in August and September 2022. The scope of work (SOW) of this sampling event can be found in Appendix C. The sampling consisted of the collection of sediment core and grab, site water, and elutriate samples. In the federal channel, 6 core sediment samples were collected plus one duplicate and one MS/MSD. At the reference sites, 6 sediment grab samples were collected. Site water was collected for each management unit and reference site, plus one equipment blank. Elutriate samples are a composite of water and equal volumes of sediment over each management unit.

Due to an error in one of the sediment core samples collected in September 2022 (MU2-C3), a resampling event was conducted in April 2023 (the SOW of this event can be found in Appendix D). The sampling consisted of the collection of sediment grab samples. In the federal channel, 3 grab sediment samples were collected in the vicinity of MU2-C3. Two additional grab samples were collected at the reference site near Dead Horse Bay.

Table 4: Summary of field and QA/QC samples for Tier II Evaluation

Sample Type	Number of Field Samples (+ QA/QC)
Sediment Core	6 (+1 duplicate, +1 MS/MSD)

Sediment Grab	11 (8 reference site samples, 3 federal channel samples)
Site Water	4 (+1 equipment blank)
Elutriate	2 – composite of core samples collected in each management unit

Sediment cores were collected using a direct push hammer mounted on a pontoon platform. Figure 14 shows the core sample equipment and set up. Each core sample was vertically homogenized over the entire depth of the core (from the sediment surface to a depth of -10 LWD) and analyzed for sediment bulk chemistry parameters. Though the authorized depth of Suamico is -8 LWD, sediment cores were taken to a depth of -10 LWD to allow for one foot of overdredge and an additional foot of contingency.

Sediment grab samples were collected at three reference sites: Longtail Point (BSH22-RS1), Duck Creek Delta (BSH22-RS2), and in/ near the breach of Long Tail Point (BSH23-RS) to evaluate Big Suamico sediment's suitability for placement at these or similar sites. Sediment grabs were collected using a standard ponar sampler mounted on a winch. In some cases, multiple grabs were required to collected sufficient sediment volume. The grab samples were homogenized and analyzed for sediment bulk chemistry parameters. It should be noted that Reference Site 1 sample locations had to be relocated in the field because the planned locations were inaccessible via boat due to shallow waters. These Longtail Point reference site samples are more indicative of open water conditions than of coastal wetland conditions, as was originally intended.

4.3.1. 2022 Sediment Data

Sediment samples were analyzed for grain size, conventional parameters (nutrients, organic carbon, and similar items), metals, PAHs, oil & grease, and total PCBs. The results are summarized in Table 5 - Table 9. Overall, the results from this sampling event are similar to previous years' results. (Sampling results from 2022 can be found in Appendix A. Historic sampling results can be found in Appendix B.)

All management unit sediment core samples were fine grained – primarily fine sand with silt. There was a thin, top layer of dark organic debris at each sample location. MU1-C1 had the coarsest material, with 11.3% gravel (perhaps due to a 3-inch layer of charcoal at a 2-foot depth), 64% sand, and 24% fines. MU1-C3 had the finest material, with 0% gravel, 59% sand, and 41% fines. Overall, the sediment grain size between MU1 and MU2 is not significantly different; MU1 has an average of 64% sand and 33% fines, MU2 has an average of 69% sand and 31% fines. In appearance, all sediment appeared sandy or silty (due to high percentages of fines) with no odor or staining. Figure 15 through Figure 23 show sediment core samples collected in the field.

The sediment cores contain elevated levels of nutrients, particularly ammonia-nitrogen. There are no standards or guidelines for nutrient levels in sediment, but, when compared to grab samples taken at the reference sites, it is clear that ammonia-nitrogen and phosphorus are elevated in the federal channel compared to background levels. The average concentration of ammonia-nitrogen in MU1 is 268 mg/kg and MU2 is 205 mg/kg, compared to RS1's 3.3 mg/kg average and RS2's 14.5 mg/kg average. Similarly,

the average concentration of phosphorus in MU1 is 313 mg/kg and MU2 is 158 mg/kg, RS1 is 56 mg/kg and RS2 is 143 mg/kg.

Metals were present in the management unit samples, though at slightly lower levels than previous sampling events. Of note, lead and mercury levels are both significantly lower than previous sampling events; these metals are often indications of environmental impacts and, because they have identified human and environmental effects, are generally a good indication of the suitability of the sediment for beneficial use.

Pesticides and PCBs levels were all low, often undetectable, similar to previous results. For Big Suamico Harbor, the low metals, PCB, and pesticide concentrations are an indication of the overall good quality of the sediment.

However, one sample was an exception: MU2-C3. This sample has elevated levels of PAHs, which exceed the state of Wisconsin's recommended guidelines for probable effect concentrations (PEC). However, it is USACE's belief that this sample was an anomaly for the following reasons: 1) the location of the sample was the farthest out into Green Bay. The most likely source of PAH contamination would be the shore, and there is no record of spills or contamination in the area that could cause this elevated PAH. 2) The PAH levels at MU2-C3 were orders of magnitude higher than all other samples. Which, given the location of the sample and proximity to MU2-C2 (which has low PAH levels), doesn't make sense. 3) MU2-C3 was the deepest sampling location, meaning the least amount of sediment was collected for sampling, increasing the probability of contamination from the top layer of organics, etc. The suspected anomalous sample was investigated by returning to the vicinity of MU2-C3 and collecting additional grab samples to confirm that this initial PAH sample was not representative of the sediment quality in Management Unit 2. All other constituents in MU2-C3 follow the trend of low concentrations similar to previous sampling results. A resampling effort was conducted in April 2023 and is described in Section 4.3.3; the results suggest that the PAH levels in MU2-C3 was an outlier.

Compared to management unit samples, the reference site samples generally had low concentrations of tested parameters. The management unit samples had significantly higher nutrient levels (ammonia and phosphorus) than the reference sites. The management unit samples also have significantly higher TOC levels than RS1 (and only slightly higher than RS2 levels). Aluminum, iron, and lead levels are also higher in the management units than reference sites. However, none of these parameters exceed the state guidelines for threshold effect concentration or probable effect concentration in the management units, meaning the sediment quality of the federal channel is still within the recommended range for in-water placement in the state of Wisconsin.

The grab samples were fine grained. RS1 (Long Tail Point) was mainly fine sand with silt, though the samples got siltier farther NW along the island. RS2 (Duck Creek Delta) was finer than the management unit core samples and RS1, with primarily silt with fine sand. Figure 24 to Figure 29 show the reference site samples collected in the field.

4.3.2. 2022 Elutriate and Water Data

Water and elutriate data are summarized in Table 9. All water (management units and reference sites) and elutriate samples exceed the state's standard (0.007 mg/L) for phosphorus concentrations. The water samples for the management units and reference sites are similar, with an average value of 0.21 mg/L in the management units and 0.27 mg/L in the reference sites. The elutriate samples show a decrease of phosphorus from the water samples with an average value of 0.084 mg/L, though they are still above the state standard. Otherwise, elutriate samples of the management units do not show a significant increase of any parameters from the water samples, with the exception of ammonia-nitrogen. This suggests that the sediment does not have a significant impact on the water quality.

4.3.3. 2023 Sediment Data

As described above, in Section 4.3.1, the sediment core sample MU2-C3 was suspected to have erroneously high PAH concentrations. In April 2023 three grab samples were collected in the vicinity of MU2-C3 to determine if PAH levels in the area were elevated. The original proposed sampling coordinates for these grab samples did not match up with the mapped locations. Instead, grab samples were collected in areas with at least two feet of shoaling in the vicinity of MU2-C3 (Figure 30). Grab samples collected in the federal channel were analyzed for PAHs and grain size. The results are summarized in Table 10. Overall, the results show that PAH levels in the vicinity of MU2-C3 are under threshold levels and similar to the rest of the federal channel. Figure 32 through Figure 34 show federal channel grab samples collected in the field.

All federal channel sediment grab samples were dark and fine grained – primarily fine sand with silt and clay. In appearance, all sediment appeared sandy or mucky (due to high percentages of fines) with no odor or staining. The average total PAH level in the vicinity of MU2-C3 is 0.0703 mg/kg, far lower than 6.6841 mg/kg that was originally detected at MU2-C3. This suggests that PAH levels in the federal channel are below sediment quality guidelines.

Additionally, two reference site grab sediment samples were collected near the northwest end of Long Tail Point (Figure 31). These grab samples were analyzed for grain size, conventional parameters (nutrients, organic carbon, and similar items), metals, PAHs, and oil & grease. The results are summarized in Table 10. Reference site grab samples are fine grained – primarily fine sand with some silt. Compared to the samples taken in the federal channel, these samples are sandier and have lower PAH levels. The sediment sampled from this reference site also had lower nutrient levels than previously sampled in the federal channel. This sediment had an average concentration of 112 mg/kg of total phosphorus and levels of ammonia were undetectable. Figure 35 and Figure 36 show reference site grab samples collected in the field.

4.3.4. Nutrients in Sediment, Elutriate, and Surface Water

Nutrients are a major concern in lower Green Bay. In the 1980s, the International Joint Commission designated lower Green Bay (from De Pere Dam to Long Tail Point) as an

Area of Concern (AOC) due to its degraded water quality. Phosphorus load reductions were indicated as a high priority of this AOC (Maccoux, 2013). Therefore, nutrient loading and control is a priority for the state, which includes concerns that dredged sediment would have impact on water quality if placed in-water.

4.3.4.1. Phosphorus

Phosphorus is commonly the limiting nutrient throughout the Great Lakes and is the principal factor in determining if a water system becomes eutrophic (Maccoux, 2013). Roughly 70% of the annual phosphorus for Green Bay comes from the Fox River. Modeling suggests that over 80% of all phosphorus deposited in the bay is permanently buried. Big Suamico River is not considered a major source of phosphorus in the lower Green Bay (Klump, 1996). Excess nutrients in water, in particular phosphorus, can cause algal blooms, which can lead to eutrophication and impair water quality and ecosystem (Ecosystem and Environment Inc, 2014).

As discussed in Sections 4.3.1 and 4.3.3, phosphorus levels in the sediment of the federal channel are, on average, greater than in the reference sites. Figure 6, below, shows the relative concentrations of total phosphorus between all points sampled for total phosphorus in the federal channel and reference sites (sample points shown in Figure 7).

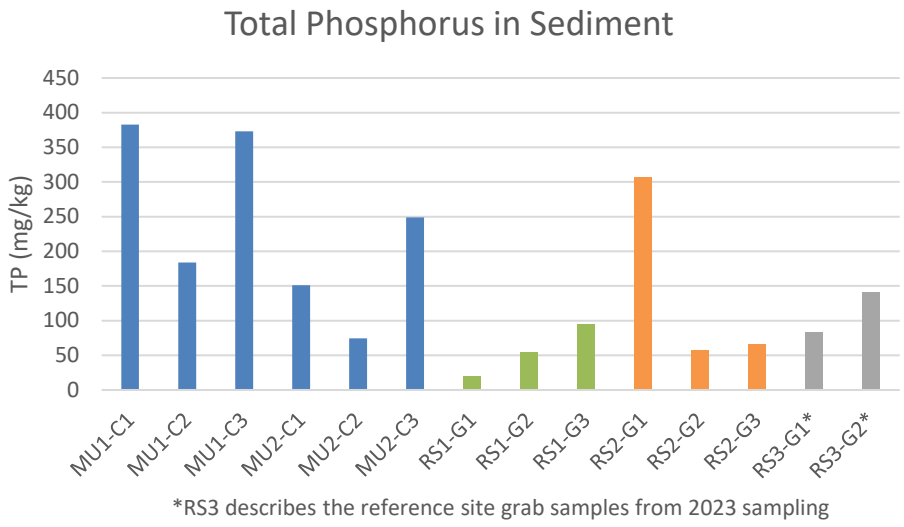


Figure 6: Total Phosphorus in Sediment Samples

Figure 7: Sample Points for total phosphorus

The elutriate samples for both management units have lower levels of total phosphorus than the water samples collected in the management units and at reference sites. This suggests that, if sediment is placed in-water, phosphorus levels in the water will not be impacted. Figure 8 shows the relationship between TP in sediment and DP measured in water and elutriate samples. Despite the higher concentrations of TP in management unit sediment, water in the federal channel has lower concentrations of DP, and the elutriate samples have even lower concentrations of DP. This suggests that the percentage TP made up of DP and DRP in the management unit sediment is relatively small. It also suggests that placing dredged material in-water would not increase the concentration of bioavailable phosphorus in the water table and may sequester phosphorus already in the water table.

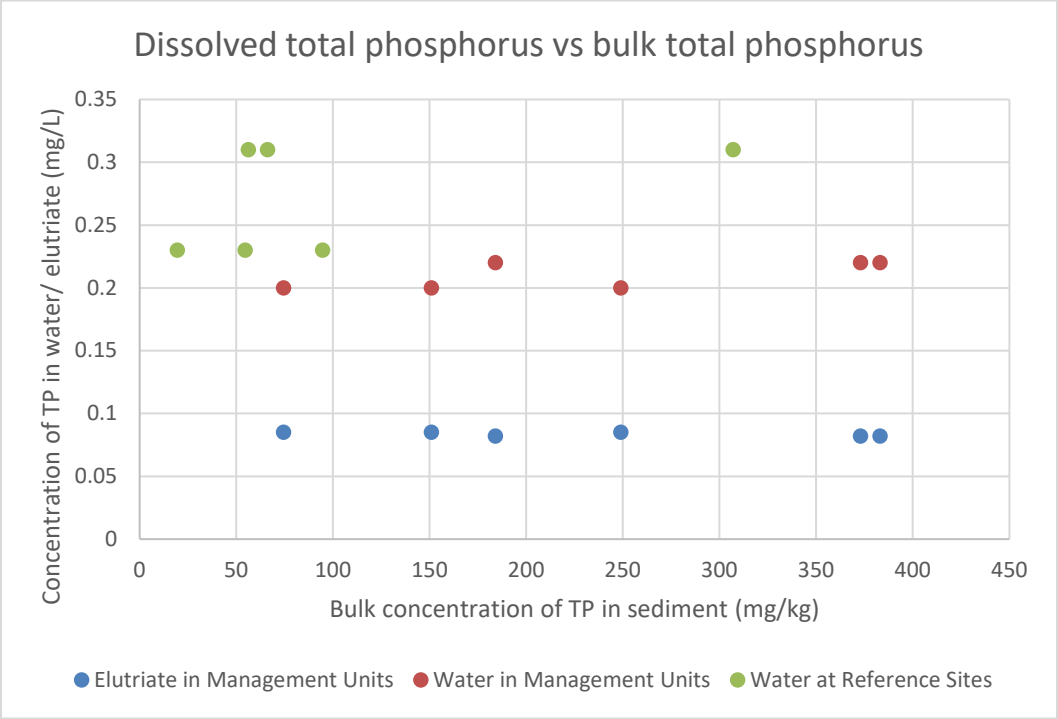


Figure 8: TP in sediment vs water

Overall, comparing elutriate and background water results for phosphorus suggest that the dredging action appears to disrupt the nutrient equilibrium. This may result in adsorption of total phosphorus from the water column, likely due to increased reaction between phosphorus and reactants during dredging.

4.3.4.2. Ammonia

As discussed in Section 4.3.1, ammonia levels in the sediment of the federal channel are significantly higher than the reference sites, though there is no standard or guideline for ammonia levels in sediment in Wisconsin. The average concentration of ammonia in the federal channel is 236 mg/kg; the average concentration of ammonia is 6.5 mg/kg at Reference Site 1 (Longtail Point) and 15.5 mg/kg at Reference Site 2 (Duck Creek

Delta). The high ammonia content in the federal channel sediment likely reflects upland runoff impacts to the river.

There is water quality standard (WQS) for total ammonia, which is calculated based on pH. Using the measured background pH of 8.6 (from Reference Site 1), the calculated WQS for total ammonia is 1.8 mg/L, which ammonia levels in elutriate (32.4 and 35.6 mg/L) exceed.

Elutriate concentrations are not intended to be directly compared to water quality standards. The Standard Elutriate Test (SET) is used to predict the release of contaminants to the water volume resulting from open water disposal of dredged material. The elutriate test is a simplified simulation of the dredging and disposal process wherein predetermined amounts of dredging site water and sediment are mixed together to approximate a dredged material slurry. For the SET, site water and sediment are combined in a sediment-to-water ratio of 1:4 on a volume basis (TAC, 2022). Based on previous LRC hydraulic dredging projects, a conservative estimate for the sediment-to-water ratio is 1:8. Actual contaminant concentration of ammonia will be lower than the elutriate concentrations due to the dredging performance and may be much lower depending on the dredging efficiency.

Unionized ammonia (NH_3) is a chemical compound which is toxic to aquatic organisms. The measured ammonia in the elutriate samples and water samples represents total ammonia (consisting of NH_4^+ + NH_3). The fraction of unionized ammonia is heavily dependent on temperature and pH, and can be calculated in freshwater from the Henderson-Hasselbach equation if pH and pKa are known (USEPA, 2013):

$$pKa = 0.09018 + (2729.92/(273.2+T)$$

$$NH_3 = \text{total ammonia} - \text{total ammonia}/(1+10^{(pH-pKa)})$$

Where T is temperature. Using T = 20 C and a pH range of 7.6-8.6 (a typical range for Lake Michigan), one finds the concentration of NH_3 in the elutriate to range from 0.55 mg/L – 4.79 mg/L. However, as described above, these initial concentrations from the dredging operation are subject to significant dilution during sediment placement. Further evaluation of a specific placement location is required to determine the actual concentration of unionized ammonia that will be present during dredged material placement, see Section 4.4.

4.4. Mixing Zone and Dilution

The Great Lakes Testing Manual uses mixing zones for evaluating concentrations at the sediment disposal area; this is the concentration that would be experienced by aquatic organisms. Using the formula

$$D = (C_e-C_s)/(C_s-C_a)$$

the dilution factor can be calculated. In this equation D = dilution factor, C_e = elutriate concentration of compound, C_a = acute toxicity criterion for the compound, and C_s = water quality standard. Using a worst-case scenario of C_e = 17.8 mg/L (the elutriate concentration for MU2, halved to reflect more likely hydraulic dredging discharge), C_a = 0.088 mg/L (Reference Site 1 water concentration), C_s = 1.77 mg/L (the WQS for total ammonia calculated using a pH = 8.6), one obtains a dilution factor of 9.5. Assuming a volume of material to be dredged is equal to 30,000 cubic yards (the volume of material currently shoaled in Big Suamico Harbor), the disposal site would need a mixing zone of approximately 285,700 cubic yards of water to achieve the WQS for ammonia under worst-case conditions.

Figure 9, below, shows the proposed in-water placement location for dredged material in red. Due to the shallow and highly vegetated nature of the placement area, it is difficult to get accurate bathymetric contours of this area. However, it is estimated that the depth of the placement area is 1-2 feet throughout. The surface area of the placement location is approximately 132,200 square yards. Assuming an average depth of 1.2 feet, the placement location contains approximately 158,600 cubic yards of water. This is an insufficient volume to appropriate dilute the water within the placement location. However, inefficient dredging (a higher water-to-sediment ratio) would further dilute the ammonia and could achieve the WQS within the placement location.

Based on the above dilution equations, 30,000 cubic yards of dredged material placed in approximately 158,600 cubic yards of water will dilute total ammonia to approximately 2.9 mg/L. As described in the Section 4.3.4.2, unionized ammonia (NH_3) is the toxic fraction of total ammonia and is of greatest concern to aquatic organisms. Using the Henderson-Hasselbach equation, it can be determined that approximately 0.39 mg/L of NH_3 will be present in the placement area (assuming a pH of 8.6 in the placement water). This value can be compared to the lowest 96-hour LC50 for the species known to occur within the area: 0.51 mg/L for larval Northern Pike. Based on this, the dilute concentration of unionized ammonia in the placement area will have only minor effects on surrounding fish species.

Further, though the sediment may be contained to the placement location using turbidity controls, it is likely that dilute contaminants may spread further from the placement location, in a larger mixing zone. Highlighted in Figure 9 is a potential mixing zone (outlined in yellow), with an area of 596,500 square yards. Though this area is still shallow, it is deeper than the placement location. Assuming an average depth of 1.6 feet, this larger mixing zone contains approximately 954,400 cubic yards of water – a more than sufficient volume to dilute ammonia concentrations to the WQS.

Figure 9: Proposed Placement Location - Longtail Point

4.5. Tier II Conclusions

In summary, the Chicago District has completed a contaminant determination for sediments to be dredged from Big Suamico Harbor, Brown County, Wisconsin, as required by Section 404(b)(1) of the Clean Water Act (CWA). The determination used a tiered approach that included physical and chemical tests of the sediment, water, and elutriate samples. The evaluation indicates that the sediment is of good chemical quality and appropriate for beneficial use and/or in-water placement. However, the sediment is fine-grained and would not be suitable for beach nourishment projects or similar. Per Wis Admin Code Ch NR 347, the average percentage of silt plus clay in the dredged material cannot exceed the average percentage of silt plus clay in the existing placement location by more than 15%. Assuming the placement location has an appropriate comparative fines percentage, this sediment is suitable for use as shoreline protection material in Green Bay. Additionally, comparison of elutriate results to the State of Wisconsin water quality standards suggests that total ammonia in elutriate samples from MU1 and MU2 exceeds the water quality standard. Exceeding the water quality standards in the elutriate does not necessarily imply an inverse impact to water quality at the disposal area. Consistent with Section 230.10(b)(1) of the Clean Water Act

and in accordance with the *Great Lakes Dredged Material Testing and Evaluation Manual,* and the *Inland Testing Manual,* dilution and dispersion should be considered prior to application of water quality standards. The water quality impact of dredged material placement would be short term and localized within the disposal area; allowing for mixing at the disposal site would mitigate potential impacts to a temporary and localized zone around the discharge point. The proposed placement area along Long Tail Point has similar physical properties to the material in the federal channel and would benefit from the placement of dredged material. If in-water placement is not possible, the material is also suitable for unconfined upland disposal.

Figure 10: Management Unit Sample Locations

Point	Sample Type	LAT	LONG	Amount of Sample Collected (ft)
BSH22-MU1-C1	Core	44.6320573	-88.0127868	7.1
BSH22-MU1-C2	Core	44.6320528	-88.0112297	4.7
BSH22-MU1-C3	Core	44.6315248	-88.0095093	4.6
BSH22-MU1-W	Water	Water sample collected at BSH22-MU1-C2		N/A
BSH22-MU1-E	Elutriate	Composite of MU1-C1, MU1-C2, MU1-C3		N/A
BSH22-MU2-C1	Core	44.6310292	-88.0084142	6
BSH22-MU2-C2	Core	44.6305326	-88.0073621	7
BSH22-MU2-C3	Core	44.6305959	-88.0062793	2.5
BSH22-MU2-W	Water	Water sample collected at BSH22-MU2-C2		N/A
BSH22-MU2-E	Elutriate	Composite of MU2-C1, MU2-C2, MU2-C3		N/A

Figure 11: Proximity of Reference Sites to Big Suamico Harbor

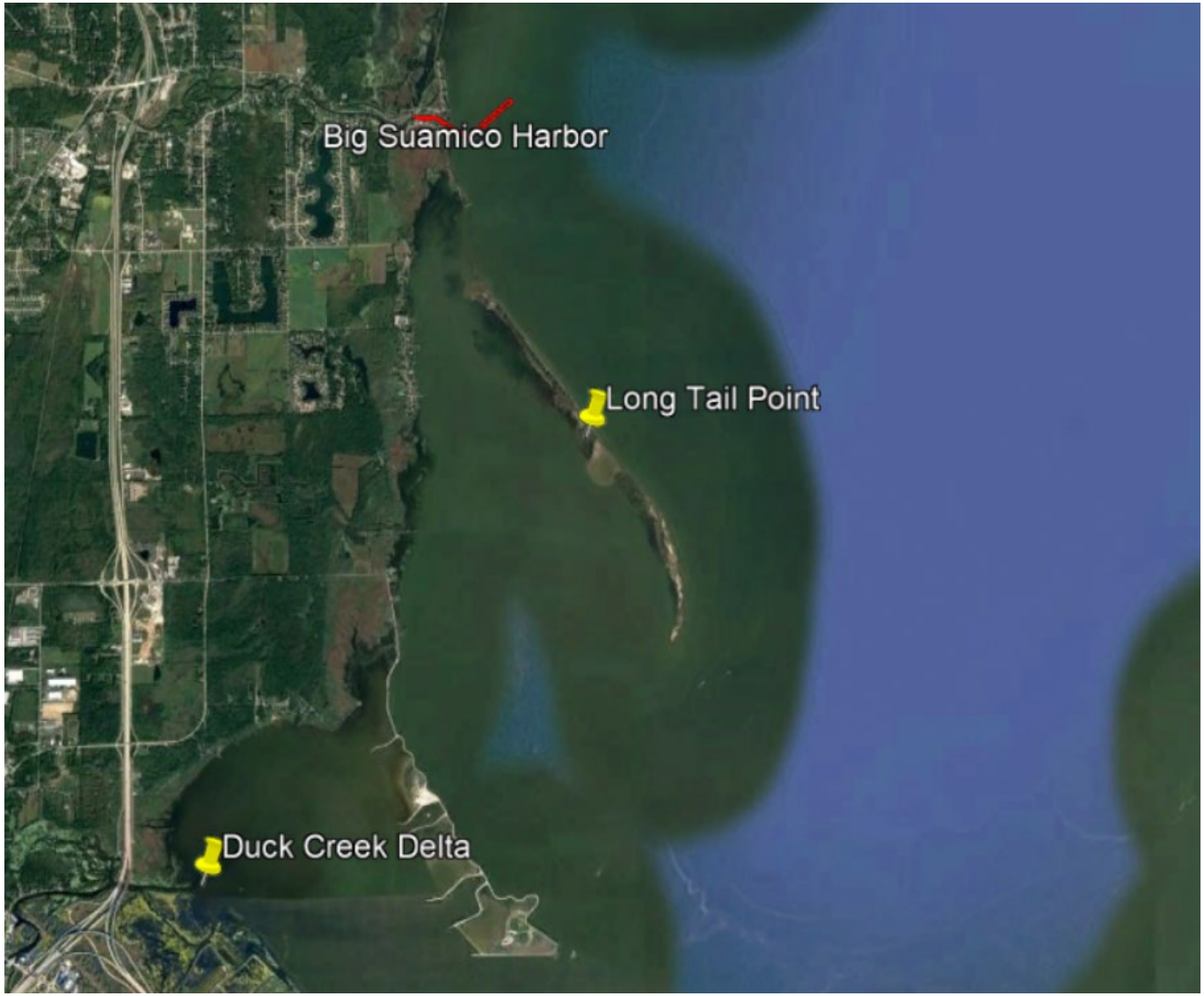
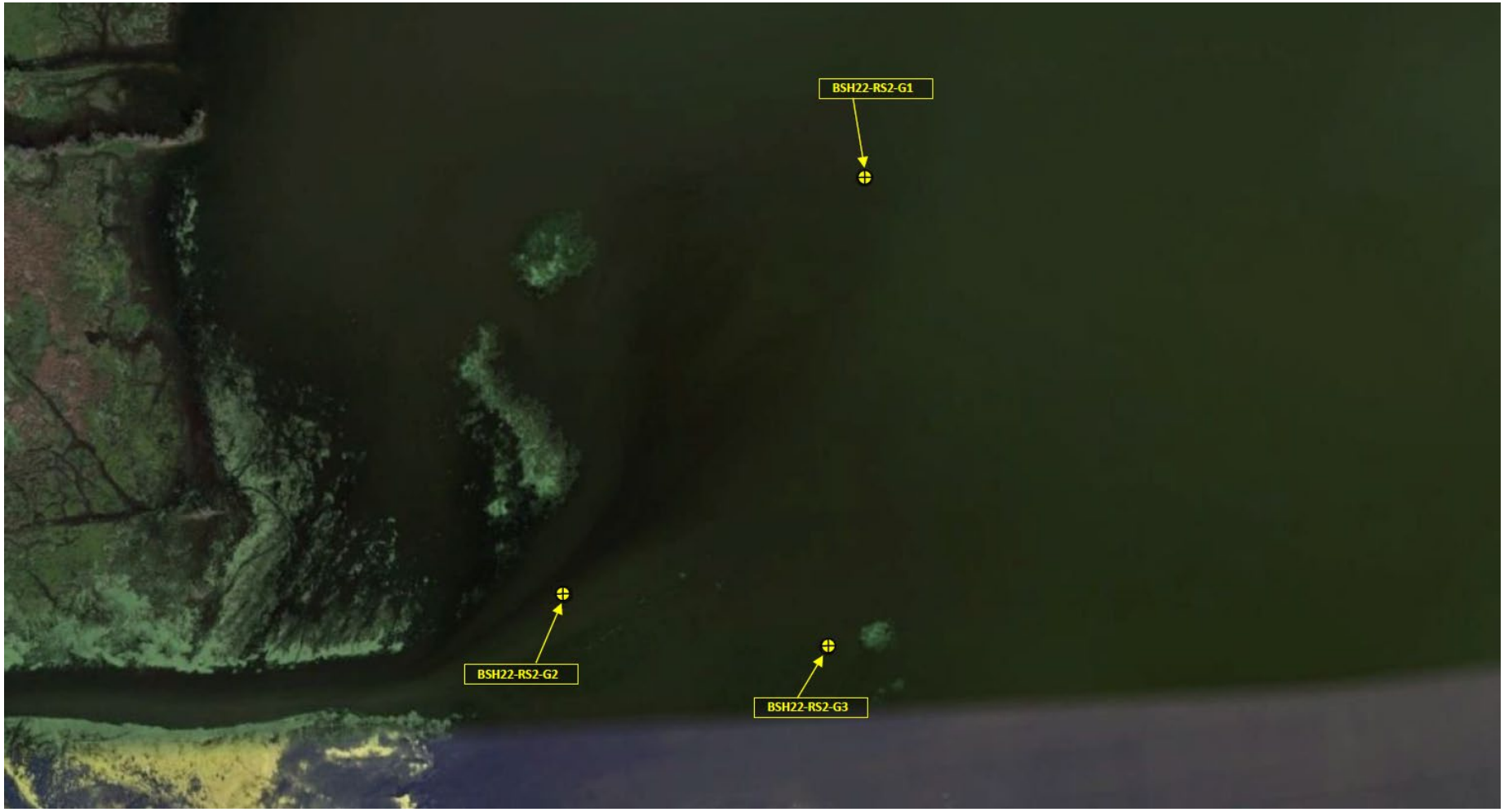


Figure 12: Reference Site 1 Sample Locations

Figure 13: Reference Site 2 Sample Locations



Point	Sample Type	LAT	LONG
BSH22-RS1-G1	Grab	44.6096082	-88.0032643
BSH22-RS1-G2	Grab	44.6006723	-87.9918376
BSH22-RS1-G3	Grab	44.59188	-87.9826779
BSH22-RS1-W	Water	Water sample collected at BSH22-RS1-G2	
BSH22-RS2-G1	Grab	44.5688387	-88.0341979
BSH22-RS2-G2	Grab	44.5651381	-88.0386516
BSH22-RS2-G3	Grab	44.5644344	-88.0310305
BSH22-RS2-W	Water	Water sample collected at BSH22-RS2-G2	

Figure 14: Core sampling set-up

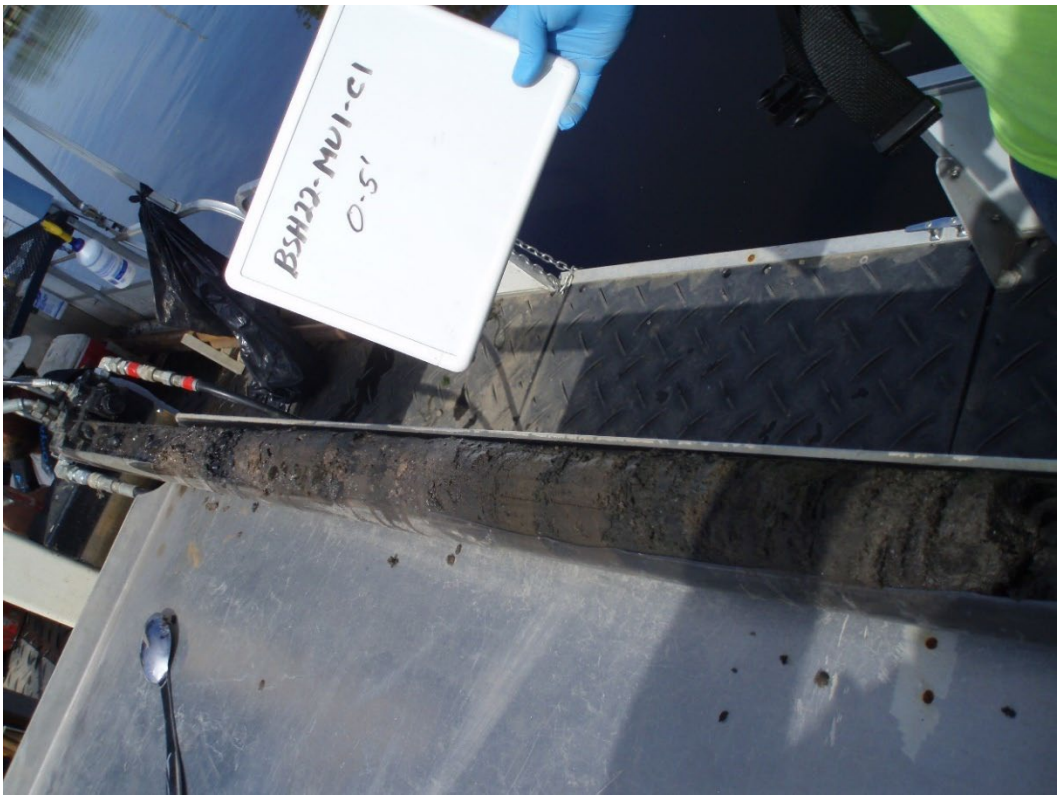


Figure 15: MU1-C1 Core

Figure 16: MU1-C1 composited and homogenized sample


Figure 17: MU1-C3 core

Figure 18: MU1-C3 composited and homogenized sample

Figure 19: MU1 elutriate sediment composite

Figure 20: MU1 elutriate water collection

Figure 21: MU2-C1 core

Figure 22: MU2-C2 core

Figure 23: MU2-C3 core

Figure 24: RS1-G1 homogenized

Figure 25: RS1-G2 homogenized

Figure 26: RS1-G3 homogenized

Figure 27: RS2-G1 homogenized

Figure 28: RS2-G2 homogenized

Figure 29: RS2-G3 homogenized

Table 5: 2022 Management Unit Core Samples - Sediment Chemistry Analysis

PARAMETER	UNIT	TEC[1]	PEC[2]	MU1-C1	MU1-C2	MU1-C3	MU2-C1	MU2-C2	MU2-C3
Polycyclic Aromatic Hydrocarbons (PAHs)									
Total PAHs	mg/kg	0.65-3.75	8.44-53.1	0.109	0.02683	0.0671	0.06566	0.03811	**6.6841**
Anthracene	mg/kg	0.02-0.13	0.31-1.97	0.0028	<0.0013	0.0022	<0.0013	<0.0012	**0.17**
Benzo[a]anthracene	mg/kg	0.04-0.25	0.39-2.45	0.012	<0.0022	0.006	0.0065	0.0031	**0.72**
Benzo[b]fluoranthene	mg/kg	0.09-0.56	4.96-31.2	0.01	<0.0012	0.0047	0.0091	0.0018	**0.54**
Benzo[k]fluoranthene	mg/kg	0.09-0.56	4.96-31.2	0.0043	<0.0015	<0.0018	0.0026	<0.0014	**0.16**
Benzo[g,h,i]perylene	mg/kg	0.06-0.4	1.19-7.46	0.0054	<0.0011	0.0024	0.0044	0.0011	**0.29**
Benzo[a]pyrene	mg/kg	0.06-0.35	0.54-3.38	0.012	<0.0021	0.0047	0.0067	0.002	**0.54**
Chrysene	mg/kg	0.06-0.39	0.48-3.01	0.012	<0.0027	0.0058	0.0071	0.0036	**0.67**
Dibenz(a,h)anthracene	mg/kg	0.01-0.08	0.05-0.31	<0.0035	<0.0032	<0.0037	<0.0032	<0.003	**0.086**
Fluoranthene	mg/kg	0.16-0.99	0.83-5.2	0.012	0.0016	0.0085	0.0058	0.0061	**0.69**
Fluorene	mg/kg	0.03-0.18	0.2-1.25	0.0017	<0.00097	<0.0012	<0.00098	<0.00091	**0.12**
Indeno[1,2,3-cd]pyrene	mg/kg	0.07-0.47	1.19-7.46	0.005	<0.0025	<0.0029	0.0034	<0.0023	**0.21**
Phenanthrene	mg/kg	0.08-0.48	0.43-2.73	0.0065	<0.0013	0.0059	0.0021	0.0015	**0.8**
Pyrene	mg/kg	0.07-0.45	0.56-3.54	0.015	0.0017	0.012	0.009	0.0069	**1.4**
Acenaphthene	mg/kg	0-0.02	0.03-0.21	<0.0016	<0.0014	<0.0017	<0.0014	<0.0013	**0.11**
Acenaphthylene	mg/kg	0-0.01	0.05-0.3	**0.0041**	<0.0011	**0.0025**	<0.0011	<0.0001	**0.17**
Naphthalene	mg/kg	0.07-0.41	0.21-1.31	<0.0011	<0.00096	<0.0011	<0.00098	<0.0009	0.0081
Polychlorinated Biphenyls (PCBs)									
PCBs, Total	µg/kg	22.2-140	250-1575	<0.25	<0.22	1.3	<0.22	1.7	2.8
PCB-1016	µg/kg			<0.22	<0.2	<0.24	<0.2	<0.19	<0.18
PCB-1221	µg/kg			<0.25	<0.22	<0.26	<0.22	<0.21	<0.2
PCB-1232	µg/kg			<0.17	<0.15	<0.18	<0.15	<0.14	<0.14
PCB-1242	µg/kg			<0.1	<0.09	<0.11	<0.092	<0.085	<0.082
PCB-1248	µg/kg			<0.17	<0.15	1.3	<0.15	1.7	2.8
PCB-1254	µg/kg			<0.21	<0.18	<0.22	<0.19	<0.17	<0.17
PCB-1260	µg/kg			<0.2	<0.18	<0.21	<0.18	<0.17	<0.16
TOC	mg/kg			24800	17000	27000	7490	4290	12600

PARAMETER	UNIT	TEC[1]	PEC[2]	MU1-C1	MU1-C2	MU1-C3	MU2-C1	MU2-C2	MU2-C3
Metals									
Aluminum	mg/kg			3270	2720	3510	2600	1280	2940
Arsenic	mg/kg	9.8	33	1.3	0.93	1.3	1.1	0.84	4.5
Cadmium	mg/kg	0.99	5	0.086	0.078	0.1	0.078	<0.065	0.16
Chromium	mg/kg	43	110	7.6	6.4	8.7	8.3	5	8.3
Copper	mg/kg	32	150	6.1	5.3	7.3	5.6	2.5	8
Iron	mg/kg	20000	40000	6480	5240	6530	5850	3390	8520
Lead	mg/kg	36	130	3.5	3.6	4	3.6	1.9	4.5
Manganese	mg/kg	460	1100	159	102	136	134	74.1	188
Nickel	mg/kg	23	36	5.1	4.3	5.6	5.1	3	5.7
Selenium	mg/kg			0.14	0.15	0.19	0.17	<0.14	0.38
Silver	mg/kg	1.6	2.2	<0.028	<0.024	<0.028	<0.029	<0.032	<0.036
Zinc	mg/kg	120	460	22.5	17.2	21.5	20.5	10.7	24.1
Mercury	mg/kg	0.18	1.1	0.029	0.026	0.031	<0.015	0.014	0.02
Ammonia-Nitrogen	mg/kg			216	215	373	230	294	90
COD	mg/kg			1490	2340	3550	1310	2130	1260
Oil and Grease	mg/kg			<122	<109	<130	<111	<102	<98
Volatile Solids	%			67.6	68.1	56	66.1	75	70.8
Total Solids	%			5.1	5.3	6.7	4	1.6	3.3
Phosphorus	mg/kg			383	184	373	151	74.4	249
Pesticides									
Aldrin	µg/kg	0.74-4.66	29.6-186	<0.021	R	<0.023	<0.019	<0.018	<0.017
alpha-BHC	µg/kg	2.22-13.9	37.0-233	<0.017	R	<0.018	<0.015	<0.014	<0.014
beta-BHC	µg/kg	1.85-11.6	77.8-489	<0.019	R	<0.02	<0.017	<0.016	<0.015
delta-BHC	µg/kg			<0.022	R	<0.023	<0.02	<0.02	<0.018
gamma-BHC (Lindane)	µg/kg	1.11-6.99	1.85-11.6	<0.018	R	<0.019	<0.016	<0.015	<0.014
Chlordane (technical)	µg/kg	1.19-7.46	6.67-41.9	<0.3	R	<0.31	<0.27	<0.25	<0.24
Chlorobenside	µg/kg			<0.027	R	<0.029	<0.025	<0.023	<0.022
DCPA	µg/kg			<0.022	R	<0.023	<0.02	<0.019	<0.018

PARAMETER	UNIT	TEC[1]	PEC[2]	MU1-C1	MU1-C2	MU1-C3	MU2-C1	MU2-C2	MU2-C3
4,4'-DDD	µg/kg	1.81-11.4	10.3-65.2	<0.014	R	<0.015	<0.013	<0.012	<0.012
4,4'-DDE	µg/kg	1.56-9.79	23.3-146	<0.014	R	<0.015	<0.013	<0.012	<0.011
4,4'-DDT	µg/kg	1.96-12.3	211-1333	<0.05	R	<0.052	<0.045	<0.042	<0.04
Dieldrin	µg/kg	0.7-4.43	22.9-144	<0.025	R	<0.018	<0.016	<0.015	<0.014
Endosulfan I	µg/kg			<0.019	R	<0.02	<0.017	<0.016	<0.015
Endosulfan II	µg/kg			<0.015	R	<0.016	<0.014	<0.013	<0.012
Endosulfan sulfate	µg/kg			<0.032	R	<0.034	<0.029	<0.027	<0.026
Endrin	µg/kg	0.81-5.13	76.6-482	<0.013	R	<0.014	<0.012	<0.01	<0.011
Endrin aldehyde	µg/kg			<0.025	R	<0.026	<0.022	<0.021	<0.02
Heptachlor	µg/kg			<0.022	R	<0.023	<0.02	<0.018	<0.018
Heptachlor epoxide	µg/kg	0.93-5.83	5.93-37.3	<0.018	R	<0.019	<0.016	<0.015	<0.014
Methoxychlor	µg/kg			<0.027	R	<0.029	<0.024	<0.023	<0.022
Mirex	µg/kg	2.59-16.3	5.19-32.6	<0.013	R	<0.014	<0.012	<0.011	<0.01
Toxaphene	µg/kg	0.37-2.33	0.74-4.66	<1.9	R	<2.0	<1.7	<1.6	<1.5

Bolded = Value exceeded TEC (Threshold Effect Concentration) (WDNR, 2003).
Red text = Value exceeded PEC (Probable Effect Concentration) (WDNR, 2003).
< = Less than. This value is less than the detection limit and cannot be quantified with certainty.
R = This result has been rejected by the project team and should not be used.[3]

[1]Ranges indicate parameters for which TEC is dependent on TOC.
[2]Ranges indicate parameters for which PEC is dependent on TOC.
[3]All 22 pesticides results for MU1-C2 were rejected due to lack of surrogate compound recovery.

Table 6: 2022 Management Unit Core Sediment Grain Size

GRAIN SIZE	UNIT	MU1-C1	MU1-C2	MU1-C3	MU2-C1	MU2-C2	MU2-C3
Gravel	%	11.3	0	0	0	0.4	0
Coarse Sand	%	4	0.1	0.7	0.4	0.7	0.5
Medium Sand	%	9.2	1.1	2.7	0.3	0.9	0.3
Fine Sand	%	50.8	66.7	56	65.4	66.7	71.9
Silt	%	15.6	23.1	28.5	28.4	26.1	22.3
Clay	%	9.1	9	12.1	5.5	5.2	5.1
Gravel Total	%	11.3	0	0	0	0.4	0
Sand Total	%	64	67.9	59.4	66.1	68.3	72.7
Fines Total	%	24.7	32.1	40.6	33.9	31.3	27.4

Table 7: 2022 Reference Sites Grab Samples: Sediment Bulk Chemistry Analysis

PARAMETER	UNIT	TEC[1]	PEC[2]	RS1-G1	RS1-G2	RS1-G3	RS2-G1	RS2-G2	RS2-G3
Polycyclic Aromatic Hydrocarbons (PAHs)									
Total PAHs	mg/kg	0.47-26.6	6.69-376	0.01089	0.04813	0.0218	0.0939	0.02966	0.02347
Anthracene	mg/kg	0.02-0.95	0.25-13.9	<0.00055	0.0024	<0.0011	<0.0018	<0.0012	<0.0012
Benzo[a]anthracene	mg/kg	0.03-1.79	0.31-17.3	<0.00095	0.0036	<0.0019	0.0092	<0.002	<0.002
Benzo[b]fluoranthene	mg/kg	0.07-3.97	3.93-221	<0.0005	0.003	<0.001	0.014	0.0029	<0.0011
Benzo[k]fluoranthene	mg/kg	0.07-3.97	3.93-221	<0.0006	<0.0013	<0.0012	0.0041	<0.0014	<0.0013
Benzo[g,h,i]perylene	mg/kg	0.05-2.81	0.94-52.8	<0.000445	<0.00095	<0.00089	0.0051	0.0013	<0.00096
Benzo[a]pyrene	mg/kg	0.04-2.48	0.43-23.9	<0.0009	0.0025	<0.0018	0.01	<0.002	<0.0019
Chrysene	mg/kg	0.05-2.74	0.38-21.3	<0.00115	0.0026	<0.0023	0.0096	<0.0025	<0.0025
Dibenz(a,h)anthracene	mg/kg	0.01-0.55	0.04-2.23	<0.0013	<0.0028	<0.0026	<0.0045	<0.0029	<0.0028
Fluoranthene	mg/kg	0.12-6.99	0.65-36.8	<0.00055	0.0067	<0.0011	0.0094	0.003	<0.0012
Fluorene	mg/kg	0.02-1.28	0.16-8.86	<0.000405	0.0014	<0.00081	<0.0014	<0.00089	<0.00087
Indeno[1,2,3-cd]pyrene	mg/kg	0.06-3.31	0.94-52.8	<0.00105	<0.0022	<0.0021	0.0052	<0.0023	<0.0022
Phenanthrene	mg/kg	0.06-3.37	0.34-19.3	<0.00055	0.0088	<0.0011	0.0027	0.0012	<0.0012

PARAMETER	UNIT	TEC[1]	PEC[2]	RS1-G1	RS1-G2	RS1-G3	RS2-G1	RS2-G2	RS2-G3
Pyrene	mg/kg	0.06-3.22	0.45-25.1	<0.00049	0.0065	<0.00098	0.012	0.0029	0.0011
Acenaphthene	mg/kg	0-0.11	0.03-1.47	<0.0006	0.0015	<0.0012	<0.002	<0.0013	<0.0013
Acenaphthylene	mg/kg	0-0.1	0.04-2.12	<0.00045	<0.00096	<0.00091	<0.0015	<0.00099	<0.00097
Naphthalene	mg/kg	0.05-2.91	0.16-9.27	<0.0004	0.00092	<0.00081	<0.0014	<0.00088	<0.00087
Polychlorinated Biphenyls (PCBs)									
PCBs, Total	µg/kg	17.6-991	198-11174	<0.18	<0.2	<0.18	2.1	0.98	1.8
PCB-1016	µg/kg			<0.17	<0.18	<0.17	<0.28	<0.18	<0.18
PCB-1221	µg/kg			<0.18	<0.2	<0.18	<0.31	<0.2	<0.2
PCB-1232	µg/kg			<0.13	<0.13	<0.13	<0.21	<0.14	<0.14
PCB-1242	µg/kg			<0.076	<0.081	<0.075	<0.13	<0.082	<0.081
PCB-1248	µg/kg			<0.13	<0.13	<0.12	2.1	0.98	1.8
PCB-1254	µg/kg			<0.16	<0.17	<0.15	<0.26	<0.17	<0.17
PCB-1260	µg/kg			<0.15	<0.16	<0.15	<0.25	<0.16	<0.16
TOC	mg/kg			<1210	<1290	<1220	34100	6210	5290
Metals									
Aluminum	mg/kg			651	773	735	4200	2130	919
Arsenic	mg/kg	9.8	33	0.72	0.53	0.65	1.4	1	0.42
Cadmium	mg/kg	0.99	5	<0.058	<0.068	<0.048	0.2	0.083	<0.06
Chromium	mg/kg	43	110	2.7	3.1	3	18.4	6.2	2.6
Copper	mg/kg	32	150	1.2	1.8	0.85	11.2	5.1	1.3
Iron	mg/kg	20000	40000	2190	2130	2630	8750	4670	1960
Lead	mg/kg	36	130	1	1.4	1.2	7.3	2.6	1.3
Manganese	mg/kg	460	1100	51.4	40.2	125	184	108	36.7
Nickel	mg/kg	23	36	1.6	1.6	1.5	11.1	4.3	1.7
Selenium	mg/kg			<0.13	<0.15	<0.1	0.31	<0.15	<0.13
Silver	mg/kg	1.6	2.2	<0.029	<0.034	<0.024	<0.05	<0.035	<0.03
Zinc	mg/kg	120	460	15.9	9.8	5.9	37.1	17.6	10
Mercury	mg/kg	0.18	1.1	<0.012	<0.013	<0.0093	0.057	<0.012	<0.012
Ammonia-Nitrogen	mg/kg			<6.2	<6.6	<6.8	28.6	11.6	<6.3

PARAMETER	UNIT	TEC[1]	PEC[2]	RS1-G1	RS1-G2	RS1-G3	RS2-G1	RS2-G2	RS2-G3
COD	mg/kg			1600	1480	1690	3050	1680	1590
Oil and Grease	mg/kg			<91.4	<96.8	<91.8	<154	<99.4	<97.9
Volatile Solids	%			80.1	75.3	80.3	51.1	71.6	72.3
Total Solids	%			<0.5	0.76	<0.5	6.1	1.7	1
Phosphorus	mg/kg			19.5	54.6	94.7	307	56.3	66.1
Pesticides									
Aldrin	µg/kg	0.59-33.1	23.46-1322	<0.016	<0.017	<0.016	<0.027	<0.017	<0.017
alpha-BHC	µg/kg	1.76-99.1	29.33-1652	<0.013	<0.013	<0.013	<0.021	<0.014	<0.014
beta-BHC	µg/kg	1.47-82.6	61.58-3471	<0.014	<0.015	<0.014	<0.024	<0.015	<0.015
delta-BHC	µg/kg			<0.016	<0.017	<0.016	<0.028	<0.018	<0.017
gamma-BHC (Lindane)	µg/kg	0.88-49.6	1.47-82.6	<0.013	<0.014	<0.013	<0.023	<0.015	<0.014
Chlordane (technical)	µg/kg	0.94-52.8	5.28-297	<0.22	<0.23	<0.22	<0.37	<0.24	<0.24
Chlorobenside	µg/kg			<0.02	<0.022	<0.02	<0.034	<0.022	<0.022
DCPA	µg/kg			<0.016	<0.018	<0.017	<0.028	<0.018	<0.018
4,4'-DDD	µg/kg	1.44-80.9	8.21-462	<0.011	<0.012	<0.011	<0.018	<0.012	<0.012
4,4'-DDE	µg/kg	1.23-69.4	18.4-1041	<0.01	<0.011	<0.011	<0.018	<0.011	<0.011
4,4'-DDT	µg/kg	1.55-87.6	167-9454	<0.037	<0.039	<0.037	<0.063	<0.04	<0.04
Dieldrin	µg/kg	0.56-31.4	18.1-1024	<0.013	<0.014	<0.013	<0.022	<0.014	<0.014
Endosulfan I	µg/kg			<0.014	<0.015	<0.014	<0.024	<0.015	<0.015
Endosulfan II	µg/kg			<0.011	<0.012	<0.011	<0.019	<0.012	<0.012
Endosulfan sulfate	µg/kg			<0.024	<0.025	<0.024	<0.04	<0.026	<0.025
Endrin	µg/kg	0.65-36.4	60.7-3421	<0.0096	<0.01	<0.0097	<0.016	<0.011	<0.01
Endrin aldehyde	µg/kg			<0.018	<0.02	<0.019	<0.031	<0.02	<0.02
Heptachlor	µg/kg			<0.016	<0.017	<0.016	<0.027	<0.018	<0.017
Heptachlor epoxide	µg/kg	0.73-41.3	4.69-264	<0.013	<0.014	<0.013	<0.022	<0.014	<0.014
Methoxychlor	µg/kg			<0.02	<0.021	<0.02	<0.034	<0.022	<0.022
Mirex	µg/kg	2.05-115	4.11-231	<0.0096	<0.01	<0.0097	<0.016	<0.011	<0.01
Toxaphene	µg/kg	0.29-16.5	0.59-33.1	<1.4	<1.5	<1.4	<2.4	<1.5	<1.5
Bolded = Value exceeded TEC (Threshold Effect Concentration) (WDNR, 2003).									

PARAMETER	UNIT	TEC[1]	PEC[2]	RS1-G1	RS1-G2	RS1-G3	RS2-G1	RS2-G2	RS2-G3
Red text = Value exceeded PEC (Probable Effect Concentration) (WDNR, 2003).									
< = Less than. This value is less than the detection limit and cannot be quantified with certainty.									
[1]Ranges indicate parameters for which TEC is dependent on TOC.									
[2]Ranges indicate parameters for which PEC is dependent on TOC.									

Table 8: 2022 Reference Site Sediment Grain Size

GRAIN SIZE	UNIT	RS1-G1	RS1-G2	RS1-G3	RS2-G1	RS2-G2	RS2-G3
Gravel	%	0	0	0	0	0	0
Coarse Sand	%	0	0.2	0.2	0.5	1	0
Medium Sand	%	0	0.9	0.1	1	1	0.2
Fine Sand	%	97.2	85.3	38.7	26.1	53.5	49.9
Silt	%	1.7	12.5	60.6	65.1	41.1	46.8
Clay	%	1.1	1.1	0.4	7.3	3.5	3.2
Gravel Total	%	0	0	0	0	0	0
Sand Total	%	97.2	86.4	39	27.6	55.5	50.1
Fines Total	%	2.8	13.6	61	72.4	44.6	50

Table 9: 2022 Management Unit Elutriate and Water Samples, Reference Site Water Samples

PARAMETER	UNIT	WQS[1]	MU1-E	MU2-E	MU1-W	MU2-W	RS1-W	RS2-W
Polychlorinated Biphenyls (PCBs)								
PCBs, Total	µg/L		<7.6	<7.6	<0.0076	<0.0076	<0.0076	<0.0076
PCB-1016	µg/L		<0.0045	<0.0045	<0.0045	<0.0045	<0.0045	<0.0045
PCB-1221	µg/L		<0.0054	<0.0054	<0.0054	<0.0054	<0.0054	<0.0054
PCB-1232	µg/L		<0.005	<0.0049	<0.0049	<0.0049	<0.0049	<0.0049
PCB-1242	µg/L		<0.0017	<0.0017	<0.0034	<0.0034	<0.0034	<0.0034
PCB-1248	µg/L		<0.0038	<0.0038	<0.0076	<0.0076	<0.0076	<0.0076
PCB-1254	µg/L		<0.00215	<0.00215	<0.0043	<0.0043	<0.0043	<0.0043
PCB-1260	µg/L		<0.00185	<0.00185	<0.0037	<0.0037	<0.0037	<0.0037

PARAMETER	UNIT	WQS[1]	MU1-E	MU2-E	MU1-W	MU2-W	RS1-W	RS2-W
Pesticides								
Aldrin	µg/L		<0.00034	<0.00034	<0.00034	<0.00034	<0.00034	<0.00034
alpha-BHC	µg/L	0.0037	<0.00023	<0.00022	<0.00022	<0.00022	<0.00022	<0.00022
beta-BHC	µg/L		<0.00035	<0.00035	<0.00035	<0.00035	<0.00035	<0.00035
delta-BHC	µg/L		<0.00061	<0.00061	<0.00061	<0.00061	<0.00061	<0.00061
gamma-BHC (Lindane)	µg/L	0.96	<0.00028	<0.00028	<0.00028	<0.00028	<0.00028	<0.00028
Chlordane (technical)	µg/L	700	<0.0069	<0.0068	<0.0068	<0.0068	<0.0068	<0.0068
Chlorobenside	µg/L		<0.0017	<0.0017	<0.0017	<0.0017	<0.0017	<0.0017
DCPA	µg/L		<0.00042	<0.00042	<0.00042	<0.00042	<0.00042	<0.00042
4,4'-DDD	µg/L		<0.00051	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
4,4'-DDE	µg/L		<0.00028	<0.00028	<0.00028	<0.00028	<0.00028	<0.00028
4,4'-DDT	µg/L	880	<0.00066	<0.00065	<0.00065	<0.00065	<0.00065	<0.00065
Dieldrin	µg/L	0.24	0.0034	<0.00026	0.00086	<0.00026	<0.00026	<0.00026
Endosulfan I	µg/L		<0.00065	<0.00065	<0.00065	<0.00065	<0.00065	<0.00065
Endosulfan II	µg/L		<0.0003	<0.0003	0.0053	<0.0003	<0.0003	<0.0003
Endosulfan sulfate	µg/L		<0.00061	<0.0006	<0.0006	<0.0006	<0.0006	<0.0006
Endrin	µg/L	0.086	<0.00022	<0.00022	<0.00022	<0.00022	<0.00022	<0.00022
Endrin aldehyde	µg/L		<0.00049	<0.00049	<0.00049	<0.00049	<0.00049	<0.00049
Heptachlor	µg/L		<0.00043	<0.00043	<0.00043	<0.00043	<0.00043	<0.00043
Heptachlor epoxide	µg/L		<0.00032	<0.00032	<0.00032	<0.00032	<0.00032	<0.00032
Methoxychlor	µg/L		<0.00074	<0.00073	<0.00073	<0.00073	<0.00073	<0.00073
Mirex	µg/L		<0.00044	<0.00044	<0.00044	<0.00044	<0.00044	<0.00044
Toxaphene	µg/L	0.73	<0.047	<0.046	<0.046	<0.046	<0.046	<0.046
Metals								
Aluminum	mg/L		0.15	0.023	0.085	0.12	<0.028	0.26
Arsenic	mg/L	0.3398	0.0012	0.0015	0.00088	0.00069	0.0013	0.00075
Cadmium	mg/L	0.007-0.012	<0.00022	<0.00022	<0.00022	<0.00022	<0.00022	<0.00022

PARAMETER	UNIT	WQS[1]	MU1-E	MU2-E	MU1-W	MU2-W	RS1-W	RS2-W
Chromium	mg/L	2.58-3.88	0.004	<0.0015	0.021	<0.0015	0.0016	<0.0015
Copper	mg/L	0.023-0.037	0.0069	0.0018	X	0.0018	0.0035	0.0068
Iron	mg/L		0.079	<0.028	0.28	0.18	0.81	0.4
Iron, Dissolved	mg/L		NA	NA	0.073	0.044	0.32	0.077
Lead	mg/L	0.16-0.26	0.00039	<0.00017	<0.00017	0.0002	0.0015	0.00027
Manganese	mg/L		0.13	0.14	0.035	0.027	0.11	0.025
Nickel	mg/L	0.68-1.03	0.00082	0.00098	0.014	0.0013	0.0012	0.0019
Selenium	mg/L	0.05	<0.00074	<0.00074	<0.00074	<0.00074	<0.00074	<0.00074
Silver	mg/L	0.14	<0.00022	<0.00022	<0.00022	<0.00022	<0.00022	<0.00022
Zinc	mg/L	0.17-0.27	0.015	0.074	0.016	0.005	0.0051	<0.0029
Mercury	mg/L	1.5e-06	<0.00013	<0.00013	<0.00013	<0.00013	<0.00013	<0.00013
Hardness as CaCO3	mg/L		155	165	203	186	181	255
Alkalinity	mg/L		257	260	162	162	132	206
Ammonia-Nitrogen	mg/L	1.77-6.76	32.4	35.6	<0.088	0.1	<0.088	0.1
COD	mg/L		33.9	35.3	<9.1	23.1	44.8	41.4
pH			8	8.2	7.9	8.3	8.6	8.3
Oil and Grease	mg/L		4.1	<4.2	<4.3	<4.1	<4.1	<4.1
Total Dissolved Solids	mg/L		327	448	301	262	210	358
Total Suspended Solids	mg/L		NA	NA	3.7	6.3	21.8	7.9
Total Phosphorous	mg/L	0.007	0.082	0.085	0.22	0.2	0.23	0.31
E. Coli	--		NA	NA	Present	Present	Absent	Present

X = This result is tentatively rejected due to a serious quality control deficiency.
< = Less than. This value is less than the detection limit and cannot be quantified with certainty.
NA = Not analyzed
Red text = This result exceeds the State of Wisconsin water quality standard (Ch. NR 102 & NR 105).

[1]WQS (Water Quality Standards from State of Wisconsin) ranges indicate parameters dependent on hardness.

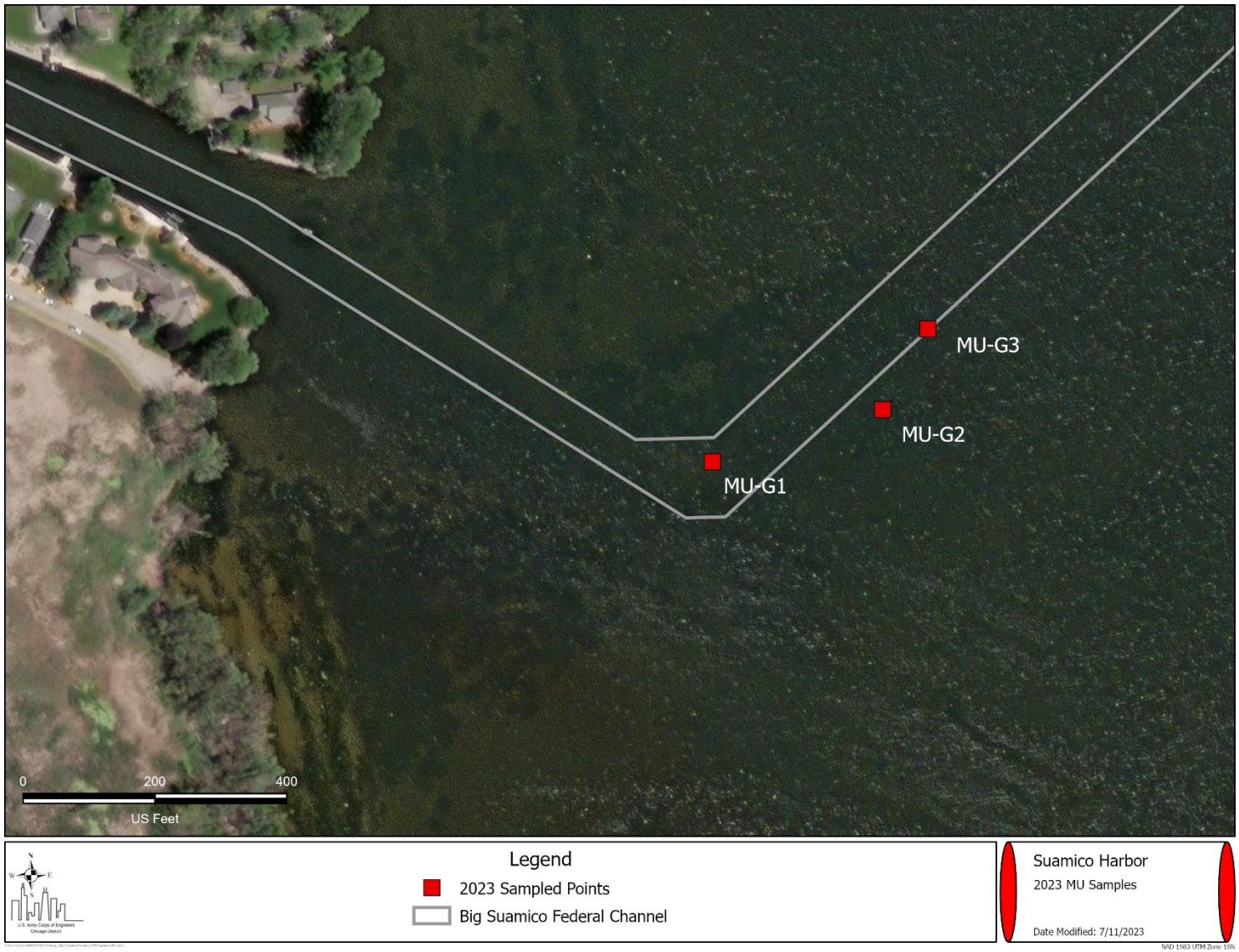


Figure 30: 2023 MU Sampling Locations

Figure 31: 2023 RS Sampling Locations

Sample ID	Collection Time	Type	GPS Coordinates		Sample Analysis	Sediment Measured Depth (ft)	Shoaling (ft)
			Latitude	Longitude			
BSH23-RS-G1	0814	Grab	44.626433	-88.005100	Bulk chemistry	5	N/A
BSH23-RS-G2	0838	Grab	44.619683	-88.004033	Bulk chemistry	4	N/A
BSH23-MU-G1	0857	Grab	44.630417	-88.006700	PAH, Grain Size	6	4
BSH23-MU-G2	0902	Grab	44.630917	-88.005367	PAH, Grain Size	7.8	2.2
BSH23-MU-G3	0908	Grab	44.630617	-88.005700	PAH, Grain Size	7.5	2.5

Figure 32: MU-G1 sediment

Figure 33: MU-G2 sediment

Figure 34: MU-G3 sediment

Figure 35: RS-G1 sediment

Figure 36: RS-G2 Sediment

Table 10: 2023 Sediment Chemistry Results

PARAMETER	UNIT	TEC[1]	PEC[2]	MU-G1	MU-G2	MU-G3	RS-G1	RS-G2
Detected PAHs								
Total PAHs	mg/kg	1.61-12.3	22.8-175	0.0837	0.1001	0.0271	<0.02155	<0.02167
Anthracene	mg/kg	0.0572-0.44	0.845-6.5	0.0027	0.0028	<0.0013	<0.0011	<0.0011
Benzo[a]anthracene	mg/kg	0.10-0.83	1.05-8.07	0.0069	0.0091	0.0027	<0.0018	<0.0019
Benzo[b]fluoranthene	mg/kg	0.24-1.84	13.4-103	0.0055	0.008	0.0033	<0.001	<0.001
Benzo[k]fluoranthene	mg/kg	0.24-1.84	13.4-103	0.0021	0.0045	<0.0015	<0.0012	<0.0012
Benzo[g,h,i]perylene	mg/kg	0.17-1.31	3.2-24.6	0.0029	0.0049	0.0026	<0.00088	<0.00089
Benzo[a]pyrene	mg/kg	0.15-1.15	1.45-11.1	0.0063	0.0071	0.0022	<0.0018	<0.0018
Chrysene	mg/kg	0.16-1.27	1.29-9.92	0.0086	0.011	0.0036	<0.0023	<0.0023
Dibenz(a,h)anthracene	mg/kg	0.03-0.25	0.135-1.03	<0.0033	<0.0029	<0.0032	<0.0026	<0.0026
Fluoranthene	mg/kg	0.42-3.25	2.23-17.1	0.016	0.016	0.0057	<0.0011	<0.0011
Fluorene	mg/kg	0.077-0.59	0.536-4.12	0.0013	<0.00089	<0.00097	<0.0008	<0.00081
Indeno[1,2,3-cd]pyrene	mg/kg	0.2-1.53	3.2-24.6	<0.003	0.0038	<0.0025	<0.002	<0.002
Phenanthrene	mg/kg	0.2-1.56	1.17-9	0.0063	0.0048	<0.0013	<0.0011	<0.0011
Pyrene	mg/kg	0.19-1.5	1.52-11.6	0.018	0.021	0.007	<0.00097	<0.00097
Acenapthene	mg/kg	0.0067-0.051	0.089-0.684	0.0039	0.0042	<0.0014	<0.0012	<0.0012
Acenapthylene	mg/kg	0.0059-0.045	0.128-0.984	0.0032	0.0029	<0.0011	<0.0009	<0.0009
Naphthalene	mg/kg	0.17-1.35	0.561-4.31	<0.0012	<0.00088	<0.00096	<0.0008	<0.0008
Metals								
Aluminum	mg/kg			NA	NA	NA	1700	2100
Arsenic	mg/kg	9.8	33	NA	NA	NA	0.81	1.1
Cadmium	mg/kg	0.99	5	NA	NA	NA	0.049	<0.049
Chromium	mg/kg	43	110	NA	NA	NA	4.5	3.8
Copper	mg/kg	32	150	NA	NA	NA	1	1.2
Iron	mg/kg	20000	40000	NA	NA	NA	2300	3900
Silver	mg/kg	36	130	NA	NA	NA	<0.048	<0.05
Manganese	mg/kg	460	1100	NA	NA	NA	71	110
Nickel	mg/kg	23	36	NA	NA	NA	2.1	1.8

PARAMETER	UNIT	TEC[1]	PEC[2]	MU-G1	MU-G2	MU-G3	RS-G1	RS-G2
Lead	mg/kg	36	130	NA	NA	NA	1.1	1.9
Selenium	mg/kg	1.6	2.2	NA	NA	NA	<0.12	<0.12
Zinc	mg/kg	120	460	NA	NA	NA	<0.48	6.3
Mercury	mg/kg	0.18	1.1	NA	NA	NA	<0.024	<0.024
Total Phosphorus as P	mg/kg			NA	NA	NA	83	140
Ammonia, distilled	mg/kg			NA	NA	NA	<7.5	<6.1
Oil & Grease (HEM)	mg/kg			NA	NA	NA	<91	110
Total Organic Carbon	mg/kg			NA	NA	NA	1300	1600
Total Volatile Solids	%			NA	NA	NA	<0.5	0.54
Total Solids	%			NA	NA	NA	77	75
COD	mg/kg			NA	NA	NA	77000	93000
Percent Moisture	%			44.3	27.4	32.7	19.1	19.2

Bolded = Value exceeded TEC (Threshold Effect Concentration) (WDNR, 2003).
Red text = Value exceeded PEC (Probable Effect Concentration) (WDNR, 2003).
< = Less than. This value is less than the detection limit and cannot be quantified with certainty.
NA = Not Analyzed

[1]Ranges indicate parameters for which TEC is dependent on TOC.
[2]Ranges indicate parameters for which PEC is dependent on TOC.

Table 11: 2023 Sediment Grain Size

PARAMETER	UNIT	MU-G1	MU-G2	MU-G3	RS-G1	RS-G2
Gravel	%	0	0.3	0	0	0
Sand	%	53.9	100.8	85.4	92.5	86
Coarse Sand	%	0	0.8	0.3	0	0
Medium Sand	%	0.9	14.6	7.5	2	0.7
Fine Sand	%	53	85.4	77.6	90.5	85.3
Silt	%	36.8	-6.9	6.9	3	10.7
Clay	%	9.3	5.8	7.7	4.5	3.3

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Appendix A: Sediment Results

Appendix B: Historic Sediment Results

Appendix C: 2022 Sampling Scope of Work

Appendix D: 2023 Sampling Scope of Work