

Lower Menominee River South Channel Ogden Street Bridge Sediment Assessment Results

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Introduction:

The South Channel of the Menominee River (referred to as the S Channel herein), located in Marinette, Wisconsin, is a site within the Lower Menominee River Area of Concern (AOC) (refer to Figure 1 Vicinity Map on Page 2). Because fish and wildlife habitat in the S Channel has been degraded by invasive plant species, contaminated sediment, and excessive sedimentation, it was targeted as an area for restoration in the Lower Menominee River AOC Remedial Action Plan Update (WDNR and MDEQ, 2015). The remediation of arsenic-contaminated sediment in the Turning basin and S Channel is now complete, providing the opportunity to accelerate ecological restoration along the channel and improve the connectivity between the S Channel and Menekaunee Harbor downstream per the *2013 Fish and Wildlife Population and Habitat Management and Restoration Plan Update* (WDNR and MDEQ, 2013).

This project will create and enhance habitat in the S Channel by implementing the final design and specifications provided by Anderson Engineering to United States Fish and Wildlife Service (USFWS). In addition, the streambed elevation is designed to be lowered to 577' (NAVD 88) (NOAA, 2016) elevation under the Ogden Street Bridge (refer to Figure 1 Site Aerial on Page 2) to improve flows, fish passage, and overall stream connectivity from the S Channel into Menekaunee Harbor. Refer to Photo 2 (Page 2) for current stream conditions at Ogden Street Bridge. Material disposal will be dependent upon sediment characterization results. Dredging is limited in depth due to a sanitary line on the west side of the bridge. The sample results for this project will be viewed with the remediation-to-restoration goals in mind.

Project Objectives:

The project objective is to obtain representative samples of the fluvial material that will be disposed in conjunction with the S Channel habitat restoration project to determine appropriate disposal options, and quantify any ecological risks to benthos recovery potentially associated with the restoration construction activities.

Sediment Sampling Schedule and Collection Methods:

Mobilization for field sampling was scheduled for August 19, 2015 by Department of Natural Resources staff from the Office of Great Lakes Sediment Management Section (Bougie and Killian). *The Lower Menominee River, South Channel Ogden Street Bridge, Sediment Assessment for Material Disposal, Marinette, Wisconsin, Quality Assurance Project Plan* indicated two core

sample locations with multiple intervals would be collected and analyzed for total recoverable metals (arsenic, copper, lead, and mercury) and grain size (WDNR, 2015). Important identification numbers for this sampling effort include the following: SWIMS Station ID # 120170842, Waterbody Identification Code (WBIC) 609000, STORET # 383150.

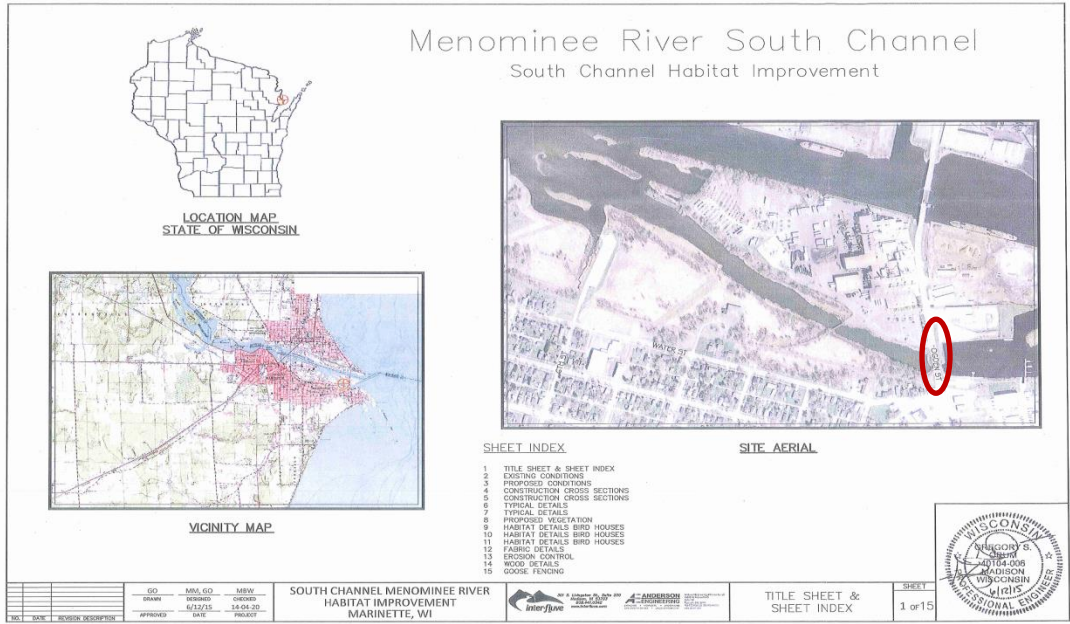


Figure 1. Vicinity Map Menominee River and South Channel - Ogden Street Bridge (Anderson Engineering, 2015)



Photo 1. Ogden Street Bridge South Channel Menominee River – Facing East (WDNR, 2012)

Sediment Sample Collection and Field Notes:

Field staff made many attempts at locating measurable deposits of soft sediment under the bridge. Large riprap was moved to locate the streambed. A metal sounding pole was used to determine substrate type and water depths. Water levels were elevated due to seiche from the Bay of Green Bay, making it difficult to manually remove some riprap. Once the riprap was removed, coarse sand and gravel could be detected. The sounding pole was used to advance through the top layer of material; however, full penetration was unsuccessful as the material was highly compacted. As evident in Photo 2 (below), material compaction along both stream banks was likely caused by bridge reconstruction activities and placement of large pieces of broken concrete from deconstruction of the former bridge in 1993. Compaction and coarse sand and gravel consistency made retrieval of a representative sample difficult. Once retrieved, the sample was composited and placed in appropriate sample containers provided by the Wisconsin State Laboratory of Hygiene (SLOH) for chemical and physical analysis. The samples were labeled *OGDEN15_SED_1A*, then placed in a cooler with ice and personally delivered to the SLOH for analysis. The sample was analyzed for arsenic, copper, lead, mercury, grain size, and percent solids.

The Global Positioning System (GPS) Trimble Pro-XRS-RTD© unit could not receive a signal under the concrete bridge, therefore, latitude and longitude readings were taken at all four bridge corners along with taped measurements in feet from each near corner to the sampling point. Computed geographic coordinates of the sample location are: Latitude 45.092052°N, Longitude -87.598238°W, WRS84 Datum



Photo 2. Ogden Street Bridge South Channel Menominee River Sediment Sampling Location – Facing East (WDNR, 2015)

Stream flow direction is generally west to east from the South Channel Menominee River into Menekaunee Harbor. However, seiche effect was also observed on the surface of the water where floating debris (plastic water bottle) flowed east to west at times. Seiche effect is common on the Menominee River due to changes in wind direction pushing the surface water to the east into the river and harbor areas. Note that the surface flow in the channel can be reversed at times resulting in water elevations to change (usually increase). Floating debris can also be transported into other areas and deposited during seiche periods.

Weather on August 19, 2015: overcast day, 70 °F, eventually it rained during the sampling event, totaling 0.42 inches of precipitation (US Climate Data, 2016).

Three river transects were selected at Ogden Street Bridge to record water depth and distance from the south wall of the bridge to north shoreline (shown in Photo 3 below). This information was transformed into cross section diagrams to be used for debris removal as part of the South Channel Habitat Restoration Specifications and Drawings (Anderson, 2015). The restoration goal is to remove streambed material to the 577' (NAVD 88) elevation to improve flow, fish passage and overall water quality. Refer to Figure 2 for the transect streambed elevations on Page 5.

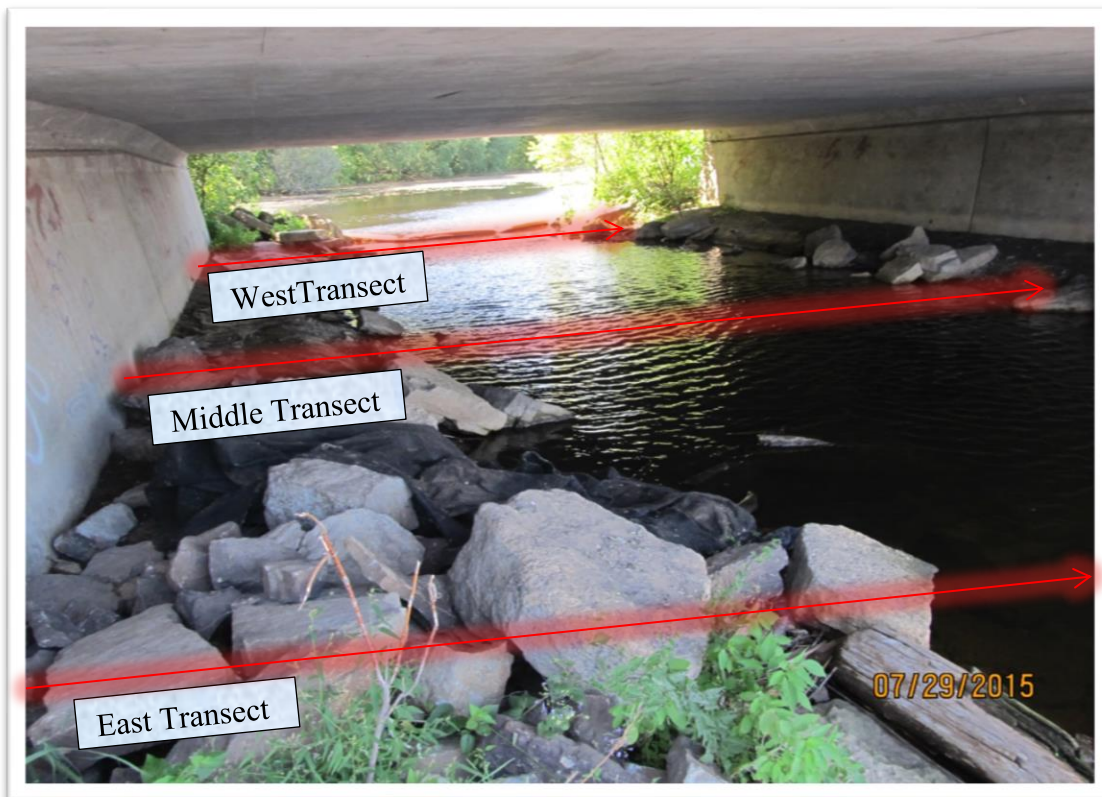
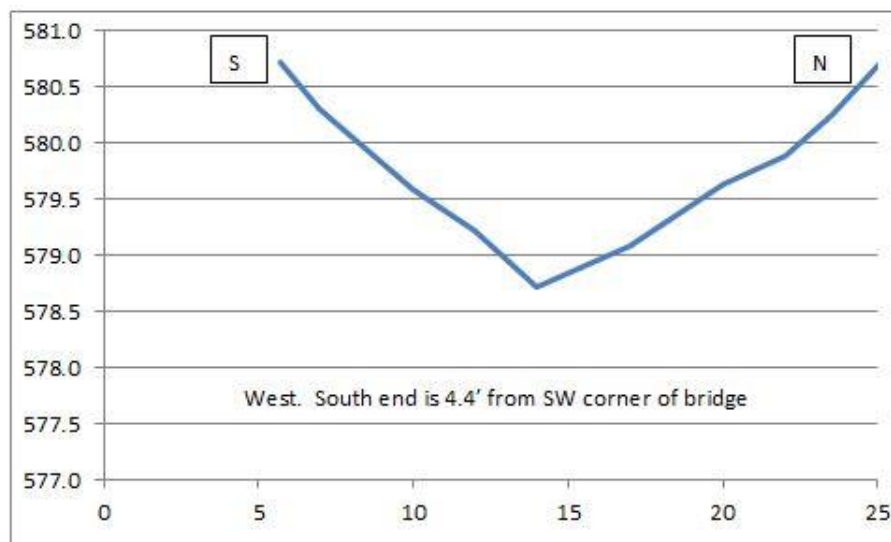
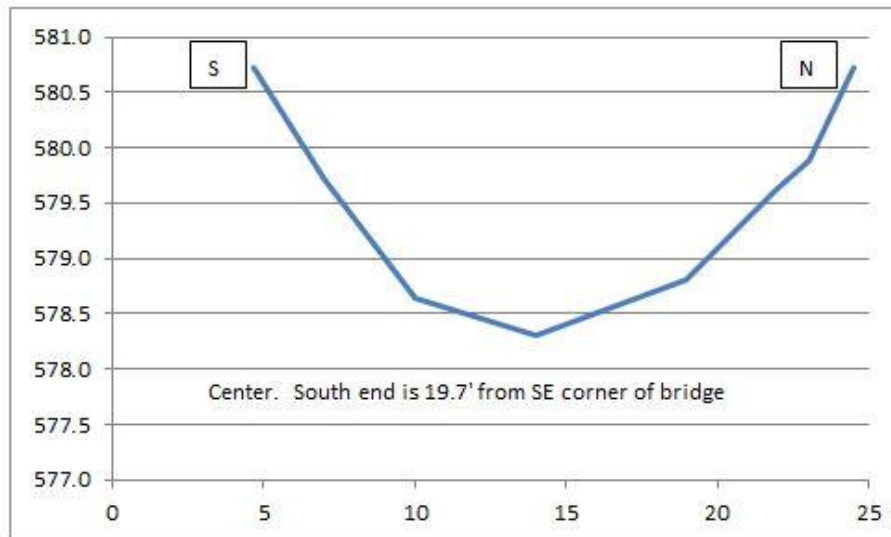
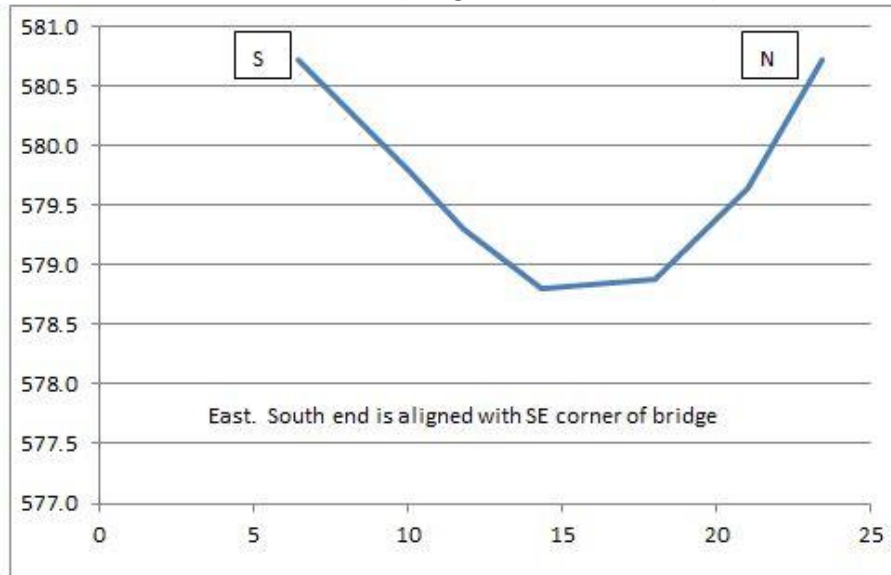


Photo 3. Ogden Street Bridge River Transects – Facing West (WDNR, 2015)

Figure 2. Menominee River South Channel Transects at Ogden Street Bridge 8/19/15 Elevations in Feet – NAVD 88 (Bougie and Killian, WDNR)



Sediment Results:

The State Laboratory of Hygiene reported the sediment data via STORET and SWIMS systems on November 2, 2015.

Concentrations of all total recoverable metals (arsenic, copper, lead and mercury) analyzed were reported below the Threshold Effect Concentration (TEC), as defined in the Department's Consensus-Based Sediment Quality Guidelines (CBSQG) (WDNR, 2003). The CBSQG was developed to determine effect levels at which toxicity to benthic dwelling organisms may be predicted. The lower TEC classification is the point when the benthos (macroinvertebrates) begins to have negative impacts (reductions in survival, reproduction and growth) due to toxic effects. Concentrations for all parameters of concern are well below the TEC values and, therefore, the material can be considered "clean" sediment. The sample consisted of 90% solids sand and 5% solids clay and 5% solids silt. Refer to Table 2 for analytical results.

Table 2. South Channel Menominee River Sediment Analyses Results
Site: **OGDEN15_SED_1A**

Parameter	Concentration mg/kg	TEC mg/kg
Arsenic	2.74	9.8
Copper	9.45	32.0
Lead	8.07	36.0
Mercury	ND (LOD 0.0145) (LOQ 0.0434)	0.18
Grain Size Analysis (Percent Solids)		
% Clay	5%	-
% Sand	90%	-
% Silt	5%	-

ND = No Detect

BOLD = Analyzed past the 28 days hold time

Conclusion:

As a result of the transects and field observations, it was determined that in order to achieve the desired 577' (NAVD 88) streambed elevation at the Ogden Street Bridge, any action will primarily consist of a rock and debris removal process, and not a dredging event as originally thought. Based on the transect data, the streambed elevations are within 2' of the desired target elevation. The streambed consists mainly of large riprap, rock and other debris (wood) with hard compacted material underlying the rock. Numerous attempts were made before one streambed sediment sample was obtained and analyzed by the State Laboratory of Hygiene. The sediment analyzed consisted of primarily sand (90%) with small amounts of clay (5%) and silt (5%). The analytical results indicated concentrations of total recoverable metals arsenic, copper, lead and mercury all below the TEC values as compared to the WDNR's Consensus-Based Sediment Quality Guidelines. Therefore, if streambed material below the rock and other debris needs to be removed to meet the 577' (NAVD 88) target elevation, it can be deemed as

“clean” sediment and does not require disposal at a landfill; however, it will need to be placed appropriately.

References:

Anderson Engineering, 2015. *South Channel Habitat Improvement Menominee River, Marinette WI Design Drawings and Specifications.*

NOAA, 2016. National Oceanic Atmospheric Administration Vertical Datum website:
<http://www.ngs.noaa.gov/datums/vertical/>

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WDNR, 2012 and 2015. Department of Natural Resources File Photos.

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WDNR and MDEQ, 2015. *2014 Remedial Action Plan Update for the Lower Menominee River Area of Concern.*
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<http://dnr.wi.gov/topic/greatlakes/documents/Menominee2013FishAndWildlifePlan.pdf>

US Climate Data, 2016. Marinette Weather Data via US Climate Data website:
<http://www.usclimatedata.com/climate/marinette/wisconsin/united-states/uswi0422/2015/8>