

# North Branch Chicago River Watershed Workgroup

## Monitoring Strategy

*LAST REVISED January 11, 2024*

### 1 Purpose

The North Branch Watershed Workgroup (NBWW) will continue to implement a comprehensive monitoring program to document the current water quality status of the rivers and streams in the sub-watersheds of the North Branch Chicago River watershed within Lake County and Cook County, Illinois. The monitoring program emphasizes the direct assessment of biological assemblages by sampling fish and macroinvertebrates using standardized sampling and assessment methodologies. In addition to determining aquatic life status, the monitoring program also ascertains the related causes and sources associated with biological impairments by using paired chemical, physical and other stressor data and information within a systematic analytical process detailed in a comprehensive plan of study, specifically monitoring habitat and water and sediment chemistry. The Monitoring Strategy is considered a living document. The NBWW Monitoring & Water Quality Impairment Abatement Committee will use adaptive management to review the results of the monitoring program and update the Monitoring Strategy as needed. Since 2018, all 25 NBWW monitoring sites have been sampled for biological attributes sediment and water column chemistry. In 2022 the NBWW modified its sampling program to focus on the Watershed Workgroup's targeted approach for the Nutrient Assessment Reduction Plan (NARP). See Section 5 Monitoring Program for more details.

### 2 Introduction and Background

The project area (see Figure 1) consists of the North Branch Chicago River watershed, covering approximately 51 square miles in Lake County, Illinois and 44 square miles in Cook County, Illinois. Three tributary subwatersheds made up of 80.58 miles of rivers and streams make up the watershed: West Fork North Branch Chicago River (West Fork, HUC 12: 071200030103), Middle Fork North Branch Chicago River (Middle Fork, HUC 12: 071200030102 and upper portions of 071200030105) and Skokie River (HUC 12: 071200030101). Each of the three subwatersheds originate in Lake County and flow south into Cook County where they converge in Morton Grove to form the mainstem of the North Branch Chicago River. The North Branch Chicago River flows south through the Chicago River, South Branch and Sanitary and Ship Canal to join with the Des Plaines River, which is a tributary of the Illinois and Mississippi Rivers.

Portions of the North Branch Chicago River, tributaries and lakes within the watershed in Lake County and Cook County are listed as impaired by the Illinois Environmental Protection Agency (Illinois EPA) and do not meet their designated uses under the Clean Water Act. Segments are listed as impaired for pollutants including aldrin, cadmium, chromium, hexachlorobenzene, nickel, barium, chloride, copper, endrin, lead, mercury, silver, sediment/siltation, total phosphorus, bottom deposits, chlordane, Dichlorodiphenyltrichloroethane (DDT), fecal coliform, total suspended solids, dissolved oxygen (DO), and (water) temperature. Most of the impairments are being directly monitored (see Table 2). However, E. coli is being monitored for the fecal coliform impairment and Total Suspended Solids (TSS) is being monitored for the sediment/siltation and bottom deposits impairment, as well as including a robust sediment chemistry analysis in the program. The parameter "pesticides" includes analysis of aldrin, endrin, chlordane and DDT.

A North Branch Chicago River Watershed Stage 3 Total Maximum Daily Load (TMDL) Report has been approved by the U.S. EPA (April 2020) for some stream segments within the watershed for fecal coliform, DO and chloride. However, it is unclear as to whether implementation of the TMDL recommendations and the existing regulatory mechanisms will ultimately allow for the impaired waterbodies to meet Clean Water Act standards. The NBWW

brings together local stakeholders to better determine stressors to the aquatic system through a long-term water quality monitoring program to work together to preserve and enhance water quality in the North Branch Chicago River and its tributaries. The preliminary monitoring strategy was developed by the NBWW Monitoring & Water Quality Impairment Abatement Committee March 19, 2018. This version is considered a Monitoring Strategy update to reflect NBWW's current monitoring program for 2024.

### 3 NBWW Program Goals

The NBWW created and continues to implement a comprehensive monitoring program to fulfill the following goals:

- Develop and implement a comprehensive monitoring program that will include chemical, physical and biological components that will more accurately identify the quality of stream and river ecosystems as well as stressors associated with non-attainment of water quality standards and designated uses. The NBWW monitoring program will establish baseline conditions, and then measure progress towards meeting water quality standards.
- Provide a secondary benefit to NPDES permittees by meeting certain monitoring permit requirements, including monitoring requirements for upstream and downstream of Publicly Owned Treatment Works (POTWs) and Municipal Separate Storm Sewer Systems (MS4s).

### 4 Budget and Timeline

The NBWW uses annual membership dues to support the comprehensive monitoring program. Qualified contractors are thoroughly screened. Preliminary annual budget (based on projected 2024 budget estimate):

- Annual Membership Dues: \$206,353.65
  - \$24,000 Administration/Management & Technical Services
  - \$1,000 Education (Workshops)
  - \$179,402.49 Monitoring Program
    - Monitoring Compilation and Statistics
    - Water Column Chemistry Monitoring
    - Nutrient Assessment Reduction Plan (NARP) Development
  - \$5,000 IPS Model Training

### 5 Monitoring Program

Previous monitoring of the North Branch Chicago River Watershed from 2018 – 2021 consisted of a bioassessment program (sampling of fish, macroinvertebrates and habitat), continuous dissolved oxygen (DO) monitoring, benthic periphyton sampling, and water column chemistry and sediment sampling to evaluate ecosystem quality and stressors. The four-year monitoring program was conducted at 25 sites throughout the North Branch Chicago River watershed within Lake County and Cook County, Illinois as shown in Figure 1 and listed in Table 1. Two reports outline the results of this work. Biological and Water Quality Assessment of the North Branch Chicago River: 2018-19. (Midwest Biodiversity Institute, 2020) and Biological and Water Quality Assessment of the North Branch Chicago River: 2020-21 (Midwest Biodiversity Institute, 2022). The results of this work are being used to evaluate the nutrient and dissolved oxygen related impairments which will help in the development of the NARP.

The NARP Workplan was submitted to the Illinois EPA in 2021 with the 2022 NBWW Monitoring Strategy document to Illinois EPA for review and approval. In 2022, water column chemistry monitoring completed five times annually at all 25 sites in the watershed with a tiered site design, as shown in Table 2. Additional weekly

water column and sediment sampling, sediment chemistry, continuous DO monitoring, benthic periphyton sampling and two months of additional nutrient water chemistry sample events will be sampled following the NARP Workplan (see the attached NBWW NARP Workplan for more details). The targeted approach NARP sampling methodology focused on data collection at 6 proposed target sites (NBWW Sites: MF-10, MF-14, WF-23, and WF:19; Illinois EPA Sites: HCCC-06 and HCCC-09) on nutrient interactions in the sediment and water column that may be contributing to persistently low dissolved oxygen levels identified in the watershed. This monitoring strategy was completed in 2022 and based on the initial results requires additional sampling at three locations in the Skokie River in 2023. 2023 additional sampling included a datasonde upstream of the lagoons and NSWRD Clavey Road discharge (SR-5), one sonde within the lagoons upstream of the Willow Road dam (SR-8), and one approximately one mile downstream of the lagoons (SR-18. This additional sampling should give NBWW more accurate data to differentiate between the effects of the Skokie Lagoons and the point source discharge of the NSWRD Clavey Rd POTW.

The next round of NBWW bioassessment program sampling, consisting of monitoring of fish, macroinvertebrates, and habitat, will be determined by Monitoring Committee. Additional biological sampling will be considered after water quality improvements have been implemented in the watershed.

### 5.1 Training and Certification

The methods and protocols used in the proposed study require implementation by adequately trained and skilled biologists, field technicians, and laboratory staff. For the bioassessment, the lead biologist(s) are well trained and experienced in all aspects of conducting the sampling, making decisions that affect quality in the field, being familiar with the study area, and knowing how to identify all species of fish and taxa of macroinvertebrates that are encountered. Biological crew leaders are knowledgeable about safety procedures for boat electrofishing and boat and water safety. All crew leaders are certified as Level 3 Qualified Data Collectors under the Ohio Credible Data Law (OCDL) or equivalent. Field personnel assigned to this project are directly supervised by the principal investigator and trained by the principal investigator in an apprenticeship format (training documentation provided upon request). Of particular importance is training in the electrofishing procedure, use of the QHEI, and the identification of external anomalies on fish. Each will follow the procedures outlined in Ohio EPA (1989, 2006) and Rankin (1989). Bioassessment laboratory practices and personnel will adhere to Illinois EPA protocols.

For the water column and sediment investigation, all laboratory staff utilizing the methods and protocols addressed in this study meet or exceed the educational requirements outlined in the NBWW & NSWRD's Quality Assurance Project Plan (QAPP). For each analysis, the analyst must demonstrate proficiency for each individual analysis. The proficiency requirements are typically defined in the specific method, within the U.S. EPA program for which the work is performed, within the National Environmental Laboratory Accreditation Program (NELAP) requirements and North Shore Water Reclamation District's (NSWRD) & NBWW QAPP. The NSWRD Laboratory and its sub-contractors are NELAP accredited. Field technicians assigned to this project, for the purpose of collecting samples and performing the analyses that are required to be completed in the field, have received adequate training from trained and experienced personnel. Field technicians operate under the guidance and supervision of the Laboratory Supervisor. The field technicians are trained to be compliant with the requirements set forth by NELAP, U.S. EPA, and NBWW & NSWRD's QAPP where applicable.

### 5.2 Monitoring Sites

25 monitoring sites are located on the North Branch Chicago River and the three branches (Skokie River, Middle Fork and West Fork) that flow into and form the North Branch Chicago River. The two publicly owned treatment works (POTWs) located in the watershed (Village of Deerfield POTW and NSWRD – Clavey Road Facility) are

bracketed to determine to what effect effluent impacts the receiving waters. Sites were also selected based on influences of tributary streams.

### 5.3 Water Column Chemistry Monitoring

The water column chemistry sampling consists of on-site field measurements and water samples which are analyzed within the laboratory. On-site monitoring is conducted using water quality instruments to measure dissolved oxygen, pH, specific conductance, and temperature. Detection and measurement of additional parameters for water and sediment testing is conducted in the laboratory. Equipment necessary to complete the water column chemistry monitoring is provided by the contractor and may include buckets, collection bottles and gloves. The sampling parameters are listed in the NBWW QAPP. Water chemistry is monitored five times February through September. Samples are collected using grab samples at the monitoring station unless otherwise noted in site description maps. If high pollutant loads are detected, follow up sampling at a refined scale may be undertaken to further determine the cause. Table 2 shows the parameters and summarizes the frequency of sampling described below for water column chemistry monitoring.

## 6 Quality Assurance Project Plan (QAPP)

All monitoring is conducted under an Illinois EPA approved North Branch Chicago River Watershed QAPP (approved April 2019). Illinois EPA requires the development of a QAPP for any grant activity involving the collection and analysis of environmental data. A QAPP presents the policies and procedures, organization, objectives, quality assurance requirements and quality control activities designed to achieve the type and quality of environmental data necessary to support project or program objectives. It is the policy of Illinois EPA that no data collection or analyses will occur without an approved QAPP. All in-house and external environmental data collection activities are subject to this requirement. All contracts must address quality assurance requirements (e.g., data quality and reporting requirements) when those contracts pertain to, or have an impact on, data collection or analysis activities. Additionally, all grants and contracts need to address quality assurance requirements specified in applicable state acquisition or procurement regulations. The North Branch Chicago River QAPP follows the U.S. and Illinois EPA guidance for the development of a project specific QAPP.

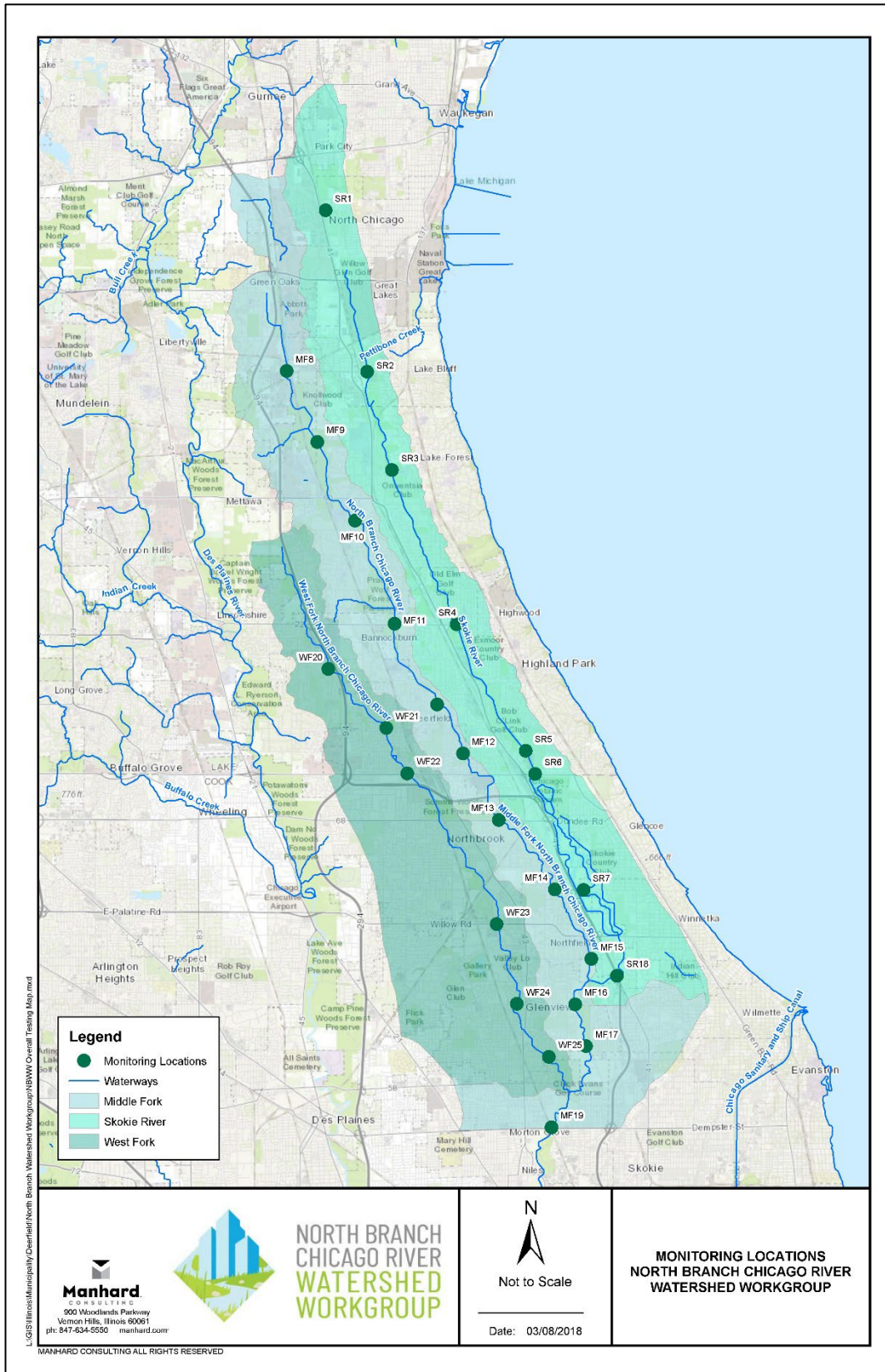
## 7 Data and Reporting

Following analysis, the laboratory contractor will send all data via email to the NBWW in one final report in .pdf format. In addition, the laboratory will send an Excel spreadsheet summarizing all sites and parameters after each sampling event. NBWW staff will take this data and format it to fit the STORage and RETrieval Data Warehouse (STORET) preferred by the Illinois EPA. The bioassessment contractor will also complete a final report after every biennial sampling year, analyzing the results of the water column and sediment chemistry as well as the fish, habitat and macroinvertebrate, habitat and field water chemistry data. Interpretative statistics, such as long-term central tendencies, are based on all available data within the database, developed over time, including past data collection efforts. Once the NBWW Monitoring & Water Quality Impairment Abatement Committee and Executive Board have reviewed and approved the final report, it will be submitted to the Illinois EPA for approval.

## 8 References

Midwest Biodiversity Institute (MBI). 2020. Biological and Water Quality Assessment of the North Branch Chicago River: 2018-19. Cook County and Lake County, Illinois. Technical Report MBI/2020-8-12. Columbus, OH 43221-0561. 79 pp. + appendices.

Figure 1: NBWW Sampling Locations



Tables

Table 1: Sampling Locations

| Monitoring Locations       | Street   | NBWW Station IDs | Illinois EPA Station IDs | Illinois EPA AUIDs |
|----------------------------|--|------------------|--------------------------|--------------------|
| Skokie River               | Northern Boundary of the Foss Park Golf Course                       | SR1              | HCCD-12                  | IL_HCCD            |
| Skokie River               | Rockland Road, Lake Bluff  | SR2              | HCCD-07                  | IL_HCCD-01         |
| Skokie River               | W. Deerpath Road, Lake Forest  | SR3              | HCCD-11                  | IL_HCCD-01         |
| Skokie River               | Half Day Road, Highland Park   | SR4              | HCCD-06                  | IL_HCCD-01         |
| Skokie River               | Clavey Road, Highland Park   | SR5              | HCCD-02                  | IL_HCCD-01         |
| Skokie River               | Lake Cook Road, north of Skokie Lagoons                              | SR6              | HCCD-01                  | IL_HCCD-01         |
| Skokie River               | Tower Road, crosses the Skokie Lagoons, Winnetka                     | SR7              | HCCD-04                  | IL_RHJ             |
| Middle Fork                | Route 176, Green Oaks  | MF8              | HCCC-16                  | IL_HCCC-02         |
| Middle Fork                | Middlefork Savanna Forest Preserve                                   | MF9              | HCCC-15                  | IL_HCCC-02         |
| Middle Fork                | Middlefork Trail & Greenway, W. Westleigh Road                       | MF10             | HCCC-14                  | IL_HCCC-02         |
| Middle Fork                | Half Day Road, near Del Mar Woods                                    | MF11             | HCCC-13                  | IL_HCCC-02         |
| Middle Fork                | Carriage Way, south of Tea Tree Park, north of Briarwood Nature Area | MF12             | HCCC-12                  | IL_HCCC-02         |
| Middle Fork                | Dundee Road, South of Somme Woods Forest Preserve                    | MF13             | HCCC-11                  | IL_HCCC-02         |
| Middle Fork                | Sunset Drive, Northfield   | MF14             | HCCC-10                  | IL_HCCC-02         |
| Middle Fork                | Winnetka Road, Northfield  | MF15             | HCCC-03                  | IL_HCCC-02         |
| Middle Fork                | E. Lake Ave., Glenview/North of Blue Star Memorial Woods             | MF16             | HCCC-08                  | IL_HCCC-04         |
| Middle Fork                | South of Glenview Road, on the Forest Preserve Trail                 | MF17             | HCCC-09                  | IL_HCCC-02         |
| Skokie River               | W. Frontage, west of I-94  | SR18             | HCCD-10                  | IL_RHJ             |
| North Branch Chicago River | Dempster St., southernmost point of the watershed                    | MF19             | HCC-10                   | IL_HCC-07          |
| West Fork                  | South of Duffy Lane Bridge, off Saunders                             | WF20             | HCCB-07                  | IL_HCCB-05         |
| West Fork                  | South of Deerfield Road - Central Ave. in Deerfield                  | WF21             | HCCB-06                  | IL_HCCB-05         |
| West Fork                  | Lake Cook Road, Deerfield  | WF22             | HCCB-03                  | IL_HCCB-05         |
| West Fork                  | Willow Road, southern end of Willow Hill Golf Course                 | WF23             | HCCB – 12                | IL_HCCB-05         |
| West Fork                  | E. Lake Ave., Glenview   | WF24             | HCCB-11                  | IL_HCCB-05         |
| West Fork                  | Long Valley Road, North of Glen View Club                            | WF25             | HCCB-01                  | IL_HCCB-05         |

Table 2: 2024 Water Column Sampling Parameters and Frequency

| Parameter  | NBWW Routine Sampling Frequency | Number of Sample Events |
|--|---------------------------------|-------------------------|
| <b>General Water Quality Parameters</b>            |                                 |                         |
| Chloride   | Feb, May, July, Aug, Sept       | 5                       |
| Conductivity                                       | Feb, May, July, Aug, Sept       | 5                       |
| pH   | Feb, May, July, Aug, Sept       | 5                       |
| TSS  | Feb, May, July, Aug, Sept       | 5                       |
| DO   | Feb, May, July, Aug, Sept       | 5                       |
| Temperature  | Feb, May, July, Aug, Sept       | 5                       |
| BOD5   | Feb, May, July, Aug, Sept       | 5                       |
| <b>Nutrients</b>                                   |                                 |                         |
| Ammonia  | Feb, May, July, Aug, Sept       | 5                       |
| Total Nitrates (NO <sub>2</sub> +NO <sub>3</sub> ) | Feb, May, July, Aug, Sept       | 5                       |
| TKN  | Feb, May, July, Aug, Sept       | 5                       |
| Total phosphorus                                   | Feb, May, July, Aug, Sept       | 5                       |
| Dissolved Reactive Phosphorus                      | Sampled under the NARP Workplan |                         |
| Chlorophyll a - Sestonic                           | Sampled under the NARP Workplan |                         |
| <b>Bacteria</b>                                    |                                 |                         |
| E. coli  | May, July, Aug, Sept            | 4                       |
|  |                                 |                         |