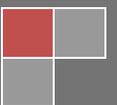


2015

River Riparian Connectivity and Habitat Section 506 Great Lakes Fishery & Ecosystem Restoration Study

Appendix H - Monitoring & Adaptive Management Plan



APPENDIX H – Monitoring & Adaptive Management Plan

December 2015

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Introduction

Section 2039 of WRDA 2007 directs the Secretary of the Army to ensure, that when conducting a feasibility study for a project (or component of a project) under the Corps ecosystem restoration mission, that the recommended project includes a monitoring plan to measure the success of the ecosystem restoration and to dictate the direction adaptive management should proceed, if needed. This monitoring and adaptive management plan shall include a description of the monitoring activities, the criteria for success, and the estimated cost and duration of the monitoring as well as specify that monitoring will continue until such time as the Secretary determines that the success criteria have been met.

Section 2039 of WRDA 2007 also directs the Corps to develop an adaptive management plan for all ecosystem restoration projects. The adaptive management plan must be appropriately scoped to the scale of the project. The information generated by the monitoring plan will be used by the District in consultation with the Federal and State resources agencies and the MSC to guide decisions on operational or structural changes that may be needed to ensure that the ecosystem restoration project meets the success criteria.

An effective monitoring program is necessary to assess the status and trends of ecological health and biota richness and abundance on a per project basis, as well as to report on regional program success within the United States. Assessing status and trends includes both spatial and temporal variations. Gathered information under this monitoring plan will provide insights into the effectiveness of current restoration projects and adaptive management strategies, and indicate where goals have been met, if actions should continue, and/or whether more aggressive management is warranted.

Monitoring the changes at a project site is not always a simple task. Ecosystems, by their very nature, are dynamic systems where populations of macroinvertebrates, fish, birds, and other organisms fluctuate with natural cycles. Water quality also varies, particularly as seasonal and annual weather patterns change. The task of tracking environmental changes can be difficult, and distinguishing the changes caused by human actions from natural variations can be even more difficult. This is why a focused monitoring protocol tied directly to the planning objectives needs to be followed.

This Monitoring and Adaptive Management Plan describes the existing habitats and monitoring methods that could be utilized to assess projects. By reporting on environmental changes, the results from this monitoring effort will be able to evaluate whether measurable results have been achieved and whether the intent of the River Riparian Restoration Project is being met.

Guidance

The following documents provide distinct Corps policy and guidance that are pertinent to developing this monitoring and adaptive management plan:

1. Section 2039 of WRDA 2007 Monitoring Ecosystem Restoration
 - (a) In General - In conducting a feasibility study for a project (or a component of a project) for ecosystem restoration, the Secretary shall ensure that the recommended project includes, as an integral part of the project, a plan for monitoring the success of the ecosystem restoration.
 - (b) Monitoring Plan - The monitoring plan shall--
 - (1) include a description of the monitoring activities to be carried out, the criteria for ecosystem restoration success, and the estimated cost and duration of the monitoring; and

- (2) specify that the monitoring shall continue until such time as the Secretary determines that the criteria for ecosystem restoration success will be met.
- (c) Cost Share - For a period of 10 years from completion of construction of a project (or a component of a project) for ecosystem restoration, the Secretary shall consider the cost of carrying out the monitoring as a project cost. If the monitoring plan under subsection (b) requires monitoring beyond the 10-year period, the cost of monitoring shall be a non-Federal responsibility.
2. USACE. 2011. Implementation Guidance for the Water resources Development Act of 2007 (WRDA 2007) – Section 5011, Great Lakes Fishery and Ecosystem Restoration Program.

States that the term "monitoring" means the activities performed, including the collection and analysis of data that are necessary to determine if predicted outputs of the project are being achieved. Monitoring plans for Section 506 projects will not be complex but the scope and duration will address the minimum monitoring actions necessary to evaluate project success. Within a period of ten years from completion of construction of an ecosystem restoration project, monitoring shall be a cost-shared project cost.
 3. USACE. 2009. Planning Memorandum. Implementation Guidance for Section 2039 of the Water Resources Development Act of 2007 (WRDA 2007) - Monitoring Ecosystem Restoration
 4. USACE. 2000. ER 1105-2-100, Guidance for Conducting Civil Works Planning Studies. Washington D.C.
 5. USACE. 2003a. ER 1105-2-404. Planning Civil Work Projects under the Environmental Operating Principles. Washington, D.C.

General Monitoring Objectives

The following are general project monitoring objectives:

- To determine and prioritize needs for ecosystem restoration
- To support adaptive management of implemented projects
- To assess and justify adaptive management expenditures
- To minimize costs and maximize benefits of future restoration projects
- To determine “ecological success”, document, and communicate it
- To advance the state of ecosystem restoration practice

Project Area Description

Detailed description of the study area may be found in the Feasibility Study, 1.4 – Study Background. River Riparian Connectivity and Habitat (referred to as River Riparian) is located in Chicago, Cook County, Illinois along the North Branch of the Chicago River (NBCR) and North Shore Channel (NSC). The River Riparian study area consists of three contiguous parks that straddle the Chicago River. All three parks are leased, maintained and managed by the Chicago Park District, but currently owned by the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC). The three parks are named Ronan Park (13-acres), River Park (30-acres) and Legion Park (50-acres), totaling over 2-miles of contiguous river. The confluence of the NBCR and the NSC occurs at River Park, which is also the location of a dam near Foster Avenue.

Habitat Trends Triggering Restoration

This project aims to remedy adverse trends of:

- Lack of passage for mussel and fish species to access habitat within the NBCR
 - Mussels depend on fish passage for dispersal, fish being glochidial (larval) hosts
- Lack of riverine (lotic/flowing) velocities and forces that riverine species require
- Lack of natural sediment (substrate) transport
 - Impaired substrate composition and sorting
 - Lack of natural macro-habitat features
 - Islands, deep pools, riffles, native aquatic vegetation, bars, undercut banks
 - Eliminated ability to naturally filter and clean water and sediments (substrates)
 - Moving water facilitates cleansing as substrates (sediment) move through the river becoming exposed to saprophytes (animals, bacteria, fungi) and oxygen
- Lack of native species richness and composition of riparian zone plant communities
 - Poor structural diversity (monotypic thickets)
 - Poor food sources from non-seed/berry producing trees and shrubs
 - Noxious chemical sources from non-native plants (i.e. Buckthorn, Garlic Mustard)
 - Poor/eliminated longitudinal (along the river) and lateral (up the bank) connectivity

Restoration Design Overview

Implementation of Alternative 4, the NER Plan, would greatly improve the ecosystem conditions of River Riparian. With the removal of the dam at Foster Avenue resulting in the reconnection of the NSC for fish and mussel dispersal and the addition of native habitat types would increase native species richness and diversity of the surrounding environment. The plan recommended in the feasibility study is the most environmentally and economically justifiable that would address the adverse trends of River Riparian. Key restoration features include restoring connectivity of the NSC, addition of in-stream fish habitat and reestablishment of native plant communities. Structural components of the project include:

- a) Removal of River Park Dam
- b) Reconnection of floodplain
- c) Installation of fish habitat
- d) Removal of invasive plant species
- e) Reestablishment of native plant community types:
 - i. Aquatic bed
 - ii. Stream bank
 - iii. Oak savanna

Monitoring Components

All monitoring components will continue to be refined as design and construction progresses. This version of the monitoring plan is based on feasibility level information.

Component 1 – Structural Sustainability

This component covers the structural sustainability of the implemented features. It is a qualitative assessment of whether each feature is retaining its physical character and project purpose. The most important information derived from this component would be to determine if adaptive management measures are needed or not. This monitoring would take place once a every other year for 10-years.

Assessments would be conducted by walking through the project and visually assessing each of the components or project features that are listed below. This is intended to be fairly quick and to notice problems before they require complete overhauls that may adversely impact other project features. Structural components are currently broken down into the following:

- 1) Riffles/Step pools
- 2) In-stream fish habitat
- 3) Graded stream banks
- 4) Plant community reestablishment
 - a) Aquatic bed
 - b) Stream bank
 - c) Oak savanna

The following is a list (living list) of parameters that would be assessed:

1. Riffles/Step pools
 - a. Presence of erosion or deposition
 - b. Structural integrity - loss of stone and significant movement of stone
2. In-stream fish habitat
 - a. Presence/absence of erosion
 - b. Structural integrity – loss or significant movement of material
3. Graded stream banks
 - a. Presence of erosion
 - b. Structural integrity – slumping, undercutting, etc.
4. Plant Community Zones
 - a. Spatial coverage
 - b. Invasive species % coverage
 - c. Predator induced damages
 - d. Hydraulic induced damages
5. Human Interference & Damages
 - a. Physical damage
 - b. Removal
 - c. Rubbish and foreign debris

Visual observations during site visits will be used to determine if structural integrity and sustainability exist within the project. Based on said site visits, adaptive management protocols may be initiated. Success of structural components, and any adaptive management triggered by observations, will be determined by the absence of structural problems at the end of 5 years.

Component 2 – Biological Response

These monitoring events would occur every other year during a 5-year monitoring period.

Fish Community

Monitoring fish community response to dam removal will be conducted using seine and electro-shock methods. Successful restoration is expected to increase fish species richness and diversity upstream of the dam once removal has been completed. Fish monitoring will occur once in the spring and again in the summer the first year after dam removal. Monitoring will then occur once during the late spring every year. In addition to monitoring fish response, the Qualitative Habitat Evaluation Index (QHEI) will be used to measure the change in physical habitat as a result of dam removal. The QHEI is described in

section 2.5.1 Qualitative Habitat Evaluation Index (QHEI) in the main report. The QHEI is correlated to fish habitat suitability such that as the QHEI score increases so should native fish species richness and abundance. The QHEI is calculated by visual inspection of the physical characteristics of the stream reach of interest. An inspection of the NSC above the dam will be conducted in order to calculate the QHEI one year after dam removal and again 5 years after dam removal. Successful restoration of fish habitat as a result of dam removal is expected to result in an increase in the QHEI. A comparison with the Future With Project Conditions (Table 1) predicted from the feasibility stage will also be used to determine success. Adaptive management measures will be triggered by decreasing trends in both the QHEI and fish species richness and abundance. Adaptive management measures may include, but are not limited to, increasing habitat diversity along the stream banks to provide different types of refuge or foraging areas, increasing number of riffles to provide more oxygenation of water and/or removal of new unanticipated environmental stressors, such as foreign debris.

Success Criteria:

1. Increases in fish richness and abundance for years 1 and 2 of monitoring. Richness and abundance may stay the same or continue to increase year 3-5 of monitoring.
2. QHEI will increase the 1st year of monitoring and remain the same or increase at the 5th year of monitoring.

Fish and QHEI data collection protocol:

Qualitative Habitat Evaluation data collection protocol is described in MEMORANDUM FOR CECW-LRD Recommendation for Regional Approval for Use of the Qualitative Habitat Evaluation Index 11 December 2014.

Plant Communities

Evaluation of plant community zones would be accomplished using the Floristic Quality Assessment Index (FQA) and native plant richness, as described in the 2.5 Plant Communities Assessment. In short, the FQA is a measure of overall environmental quality based the presence or absence of certain plant species. Plant species that are assigned a coefficient of conservatism of 5 to 10 are considered to be indicative of less human mediated disturbance and a higher level of functionality. As the area stabilizes after restoration measures are complete, the number of higher conservative plant species that become established should increase. Communities that have an average mean coefficient of conservatism of between 3 to 5 are considered to be fair quality. This is a good estimate of the future quality of the area based on the current plant community restorations and ongoing monitoring. Success will be determined by comparing FQA results with those predicted from the Future With Project Conditions (Table 2). Adaptive management measures will be taken if there is a decreasing trend of floristic quality over a period of three consecutive years. Adaptive management measures may include installation of native plant seed in areas of downward trend, more frequent fires or more intensive efforts to remove invasive species. Results from monitoring will be reported per year of monitoring efforts and project success determined and report in the final report to be completed in the 5th year of monitoring.

Success criteria will be set to measure the success of the restored plant communities. Criteria are set after a baseline study of existing vegetation is completed, usually the last year of construction. The following standards will considered as part of the 5 year monitoring plan:

1. By the end of the third growing season, at least 75% of the vegetative coverage (as measured by aerial coverage) will consist of seeded/planted species. The planted area shall exhibit at least the following at the end of each growing season: Year 1 – 25%, Year 2 – 50%, Year 3 – 75%

2. By the end of the fifth growing season, at least 95% of the planted areas must contain native, non-invasive perennial species as measured by aerial coverage. The planted area shall exhibit at least the following at the end of each growing season: Year 1 through 3 – 25%, Year 3 through 6 – 60%, Year 6 through 10 – 95%
3. None of the three most dominate species within the planted areas shall be invasive or non-native species, including but not limited to: Cattail (*Typha* spp.), Reed Canary Grass (*Phalaris arundinacea*), Purple Loosestrife (*Lythrum salicaria*), Common Reed (*Phragmites australis*), Canada Thistle (*Cirsium arvense*), Sandbar Willow (*Salix exigua*), Kentucky Blue Grass (*Poa pratensis*), and Sweet Clover (*Melilotus* spp.)
4. 100% of the planted trees and shrubs shall be alive, in healthy condition, and representative of the individual species at the end of each growing season.

Floristic Data Gathering Protocol:

Data collection will follow the Standard Vegetation Monitoring Protocols for Grasslands and Prairie for herbaceous vegetation. Formal line transect surveys will be conducted yearly. In general, surveys will be conducted in summer/early fall during the course of the monitoring period. Transects will be laid out to include all habitats and restoration measures. Vegetation community composition (identification of plant species and estimated coverage of each) within quadrats will be made along each transect in 10 meter intervals. The first and last 10 meters within each transect will be skipped. Because transect data may not provide information needed to evaluate overall herbicide efficacies (or plant establishment efforts), meander surveys will be conducted at the same time as line transect surveys to supplement transect data, with focuses on plant response to herbicide applications, prescribed burns, volunteer plant species occurrences, and survival, growth, and spread of planted species.

Avian Community

The monitoring for this community will be implemented; however, at this point in the study/project, it is unknown if the USACE, Chicago Park District volunteers or Audubon Chicago Region would take on this role. The metric for avian communities will be a species count. The goal will be to document habitat specific species within each vegetation community. For instance, in a grassland community we would expect to see at least three grassland species utilizing the habitat. The use of the habitat via community specific species is a great indicator that the habitat is functioning appropriately. Failure to meet these criteria will result in the implementation of adaptive management. Adaptive management measures will include, but are not limited to, increasing fruit bearing shrubs/trees, removal of invasive plant species, increasing nesting areas by installing features specific to the species of concern (e.g., nesting boxes, nesting platforms, etc.).

Success Criteria:

1. Increase in wetland shorebirds above the dam after removal
2. Increase in migratory birds associated with woodland edges, savannas and shrublands.

Bird Data Collection Protocols:

Data will be collected following the Standardized North American Marsh Bird Monitoring Protocol, published by the U.S. Geological Survey, which covers emergent and forested wetlands. Point counts will be conducted during the spring migration and summer breeding seasons once per year of monitoring. The amount of points will be determined by site conditions at the of the construction contract. Point counts must be at least 50 meters apart.

Other Communities

Ancillary data will be collected on other assemblages as well. During fish monitoring, effort would be spent observing wildlife utilizing the habitats, including terrestrial insects, amphibians, reptiles and mammals.

Component 3 – Planning Goal & Objectives

The goal of this proposed project is to restore connectivity, native riparian corridor and create a more complex ecosystem to benefit fish, plants, amphibians, reptiles, mammals, and migratory birds. Specific planning objectives for this study are as follows:

- *Objective 1 – Reestablish Quality and Connectivity of Riverine Habitats*
- *Objective 2 – Reestablish Quality and Connectivity of Riparian Habitats*

These objectives pertain to the following concepts:

- Restore hydrologic and habitat connectivity
- Increase native fish habitat
- Increase native conservative plant species richness of aquatic bed, stream bank and Oak savanna communities
- Reduce and/or eradicate invasive species
- Reduce steepness of stream banks and restore native plant communities

These objectives would be assessed the same way as the FWOP and FWP project benefits were modeled as described in the Main Report, Section 2.5 – Habitat Quality Forecasting. If the following specific targets are not achieved, the non-Federal sponsor would need to implement necessary measures to bring the quality of the habitat types up to the functional levels expected from restoration activities:

Stream

| Habitat Type | Acre | QHEI | AAHSI | AAHU | NetAAHU |
|-------------------|------|------|-------|--------|---------|
| Stream Direct* | 1 | 80 | .80 | .8 | .8 |
| Stream Indirect** | 356 | 44 | .44 | 156.64 | 156.4 |

*monitors restoration of the concrete to natural substrate restoration

**monitors the passage and habitat use by fishes and mussels

Plant Communities

| Community Type | Acres | Mean C | AAHSI | AAHUs | NetAAHU |
|------------------|-------|--------|-------|-------|---------|
| Aquatic Bed | 5.3 | 5.91 | 0.58 | 3.07 | 3.07 |
| River Bank | 14.2 | 4.30 | 0.42 | 6.02 | 3.87 |
| Riparian Savanna | 29.2 | 6.20 | 0.61 | 17.73 | 10.78 |

Monitoring Responsibilities

The USACE and the Chicago Park District will currently be responsible for implementing all three Monitoring Components as described above. Coordination with partner agencies and organizations to discuss future monitoring responsibilities is planned.

Monitoring Costs & Funding Schedule

Table 3: Schedule of Monitoring Costs

| Tasks | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Total |
|--------------|--------|--------|--------|--------|--------|-------|
| Component 1 | ■ | ■ | ■ | ■ | ■ | ■ |
| Component 2 | ■ | ■ | ■ | ■ | ■ | ■ |
| Component 3 | ■ | ■ | ■ | ■ | ■ | ■ |
| Final Report | ■ | ■ | ■ | ■ | ■ | ■ |
| Total | ■ | ■ | ■ | ■ | ■ | ■ |

Reporting Results

A yearly monitoring summary report would be drafted by the USACE that briefly summarizes the data collected and determines if adaptive management is needed. A final monitoring report would be drafted that details the progress and outcomes of the restoration project.

Adaptive Management

Adaptive management measures are currently not allowed according to the GLFER Implementation Guidance, which is non-policy compliant; however, should this stipulation change in the near future, a brief discussion of potential adaptive management features follow:

Adaptive management measures are not the same as typical operation and maintenance activities described in the following section. These measures are technically response actions to changes that adversely affect how the system was predicted to respond. In so being adaptive, there are no absolute measures that can be defined prior to issue arising. The primary concerns for this project are restoration and establishment of native plant communities. Descriptions of adaptive managements below are brief and will be further detailed once a complete set of plans and specifications are drafted. This is necessary since the adaptive management measures will need to be based upon contracting bid items, final feature designs and predicted adverse responses. It is also noted that these measures have relatively low costs to regain lasting benefits.

Fish Habitat – Failure of habitat to support the expected species would primarily result from stability issues within the channel. Conditions unforeseen, such as unexpected floods or other human activities could cause these issues to arise. Adaptive management actions would be undertaken to offset these instability issues, such as adding stone, adjusting orientation of the structures, varying dimensions of structures, etc.

Bird Habitat – Migrating bird species are predominantly searching for food and refuge from predators on their way to either their breeding or wintering grounds. Different bird species require different food resources. Failure to attract migrating birds may be due to low resources. Adaptive management actions will be to increase the abundance and diversity of resources available during different times of the growing season in order to attract the greatest variety of migrating bird species. Actions can include, but are not limited to, increasing the number and diversity of fruit bearing trees and shrubs, increasing the diversity of flowering tree and herbaceous species in order to attract different insect species, etc.

Native Plantings – The risk of large scale plant failure is low, mostly due to the species selection of those adapted to the conditions found within River Riparian. Most of the requirements for native plant communities are covered under routine operation and maintenance. If for some reason extensive patches

of native plant community begin to fail, the cause would need to be determined in order to design and implement repair measures. Accidental or intentional human induced instances have damaged or removed native plantings in the past as well. No matter what the solution would be for the cause of the problem, it would certainly be coupled with reestablishing native plant patches by replanting. It may be that other thriving areas would be able to have live plants and seed transferred to the damaged patch. Or it may be that plants and seed would need to be repurchased. Actions would include, but not limited to, installing native seed over the winter months, installation live plugs, adding in soil amendments to reduce available nutrients in order to increase the soil suitability for native plant species, etc.

Operation & Maintenance

The O&M costs of the project are estimated to an average annual cost of \$62,858 over 50 years. A detailed O&M Manual containing all the duties will be provided to the non-Federal sponsor after construction is closed out. The O&M for Chicago District ecosystem projects are practical and minimal due to initial project design efforts and design targets for sustainability. Mostly if not all of the O&M activities are no different than the specific activities that take place during construction. The O&M described here is not the same as the Adaptive Management measures described in the previous section.

| TASK | Annual Frequency | Acres Treated | Cost/Acre | Total AACost |
|-------------------------------|------------------|---------------|-----------|--------------|
| Burning | 0.33 | 15 | | |
| Mowing | 0.33 | 5 | | |
| Invasive Control (herbaceous) | 0.5 | 22 | | |
| Invasive Control (woody) | 1 | 7 | | |
| Seeding | 0.25 | 40 | | |
| Stream | 0.33 | 1 | | |
| TOTAL | | | | |

Invasive Plant Species Control – The maintenance activity is probably the most important to conduct. Preventing the establishment of invasive species and weedy vegetation prevents the need for large scale herbicide or physical eradication and replanting efforts. An annual maintenance plan should be drafted in conjunction with input from the Chicago Park District taking into account the types of invasive and non-native species to be treated and the acreage of the treatment area. Problematic areas will include the bank transition and emergent marsh zones. Species such as white and yellow sweet clover, cut-leaved teasel, reed canary grass, common reed, buckthorn, honeysuckle, are known invasive species which will need to be kept at bay.

Precautions should be taken to ensure that any long term herbicide application is appropriately dispensed to remove non-native plants and invasive species while avoiding native plant communities.

Native Plant Community Maintenance – It will be required to maintain the species richness, abundance and structure of the restored plant communities within River Riparian. Aside from minor re-plantings, it will be important to continue to protect plant communities from external changes by man’s daily activities, whether single incidents or chronic stressors. These can cause native plant communities to experience significant species richness declines even to the point of becoming monotypic stands. The best operational measure to quickly identify and rectify external stressors is vigilance. Routine inspections by the non-Federal sponsor’s qualified stewards are imperative to notice adverse change quickly. The long term monitoring plan provided above will not catch quick change as would routine inspection by site stewards.

Precautions should be taken to ensure Chicago Park District staff understands the limits of native plant communities and how those areas should be maintained. Buffers around aquatic resources and native plants which border mowed turf grass areas should be avoided when routine mowing occurs.

Plan Formulation Habitat Analysis for CE/ICA

EX/FWDP



Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 44

Stream & Location: North Branch Chicago River

RM: 333.7 **Date:** 09/03/06

EX Conditions = FWDP

Scorers Full Name & Affiliation: F.M. Verabli USAACE Chicago

River Code: - - **STORET #:** - **Lat./ Long.:** (NAD 83 - decimal) - **18** **Office verified location**

1] SUBSTRATE Check ONLY Two substrate TYPE BOXES; estimate % or note every type present

| | | | | | |
|--|--------------------|--|--------------------|---|--|
| BEST TYPES | POOL RIFFLE | OTHER TYPES | POOL RIFFLE | ORIGIN | QUALITY |
| <input type="checkbox"/> BLDR /SLABS [10] | _____ | <input type="checkbox"/> HARDPAN [4] | _____ | <input type="checkbox"/> LIMESTONE [1] | <input type="checkbox"/> HEAVY [-2] |
| <input type="checkbox"/> BOULDER [9] | _____ | <input type="checkbox"/> DETRITUS [3] | _____ | <input type="checkbox"/> TILLS [1] | <input type="checkbox"/> MODERATE [-1] |
| <input type="checkbox"/> COBBLE [8] | _____ | <input type="checkbox"/> MUCK [2] | _____ | <input type="checkbox"/> WETLANDS [0] | <input checked="" type="checkbox"/> NORMAL [0] |
| <input checked="" type="checkbox"/> GRAVEL [7] | 15 | <input type="checkbox"/> SILT [2] | _____ | <input type="checkbox"/> HARDPAN [0] | <input type="checkbox"/> FREE [1] |
| <input type="checkbox"/> SAND [6] | 10 | <input checked="" type="checkbox"/> ARTIFICIAL [0] | 100 75 | <input type="checkbox"/> SANDSTONE [0] | <input type="checkbox"/> EXTENSIVE [-2] |
| <input type="checkbox"/> BEDROCK [5] | _____ | (Score natural substrates; ignore sludge from point-sources) | | <input checked="" type="checkbox"/> RIP/RAP [0] | <input type="checkbox"/> MODERATE [-1] |

NUMBER OF BEST TYPES: 4 or more [2] 3 or less [0]

Comments: Concrete channel w/ minor alluvial deposition.

Substrate
Maximum 20
7

2] INSTREAM COVER Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

| | | | |
|---|------------------------------------|--|---|
| <input type="0"/> UNDERCUT BANKS [1] | <input type="0"/> POOLS > 70cm [2] | <input type="0"/> OXBOWS, BACKWATERS [1] | AMOUNT |
| <input type="2"/> OVERHANGING VEGETATION [1] | <input type="2"/> ROOTWADS [1] | <input type="0"/> AQUATIC MACROPHYTES [1] | Check ONE (Or 2 & average) |
| <input type="1"/> SHALLOW (IN SLOW WATER) [1] | <input type="0"/> BOULDERS [1] | <input type="2"/> LOGS OR WOODY DEBRIS [1] | <input type="checkbox"/> EXTENSIVE >75% [11] |
| <input type="1"/> ROOTMATS [1] | | | <input type="checkbox"/> MODERATE 25-75% [7] |
| | | | <input checked="" type="checkbox"/> SPARSE 5-<25% [3] |
| | | | <input type="checkbox"/> NEARLY ABSENT <5% [1] |

Comments:

Cover
Maximum 20
8

3] CHANNEL MORPHOLOGY Check ONE in each category (Or 2 & average)

| | | | |
|--|--|---|--|
| SINUOSITY | DEVELOPMENT | CHANNELIZATION | STABILITY |
| <input type="checkbox"/> HIGH [4] | <input type="checkbox"/> EXCELLENT [7] | <input type="checkbox"/> NONE [6] | <input checked="" type="checkbox"/> HIGH [3] |
| <input type="checkbox"/> MODERATE [3] | <input checked="" type="checkbox"/> GOOD [5] | <input type="checkbox"/> RECOVERED [4] | <input type="checkbox"/> MODERATE [2] |
| <input type="checkbox"/> LOW [2] | <input type="checkbox"/> FAIR [3] | <input type="checkbox"/> RECOVERING [3] | <input type="checkbox"/> LOW [1] |
| <input checked="" type="checkbox"/> NONE [1] | <input type="checkbox"/> POOR [1] | <input checked="" type="checkbox"/> RECENT OR NO RECOVERY [1] | |

Comments:

Channel
Maximum 20
10

4] BANK EROSION AND RIPARIAN ZONE Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

| | | |
|---|--|--|
| EROSION | RIPARIAN WIDTH | FLOOD PLAIN QUALITY |
| <input checked="" type="checkbox"/> NONE / LITTLE [3] | <input type="checkbox"/> WIDE > 50m [4] | <input type="checkbox"/> FOREST, SWAMP [3] |
| <input type="checkbox"/> MODERATE [2] | <input type="checkbox"/> MODERATE 10-50m [3] | <input type="checkbox"/> SHRUB OR OLD FIELD [2] |
| <input type="checkbox"/> HEAVY / SEVERE [1] | <input type="checkbox"/> NARROW 5-10m [2] | <input checked="" type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1] |
| | <input checked="" type="checkbox"/> VERY NARROW < 5m [1] | <input type="checkbox"/> FENCED PASTURE [1] |
| | <input type="checkbox"/> NONE [0] | <input type="checkbox"/> OPEN PASTURE, ROWCROP [0] |

Comments:

Riparian
Maximum 10
5

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

| | | | |
|---|---|--|--|
| MAXIMUM DEPTH | CHANNEL WIDTH | CURRENT VELOCITY | Recreation Potential Primary Contact Secondary Contact (circle one and comment on back) |
| Check ONE (ONLY!) | Check ONE (Or 2 & average) | Check ALL that apply | |
| <input type="checkbox"/> > 1m [6] | <input type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2] | <input type="checkbox"/> TORRENTIAL [-1] | Pool / Current Maximum 12 6 |
| <input type="checkbox"/> 0.7-<1m [4] | <input checked="" type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1] | <input checked="" type="checkbox"/> SLOW [1] | |
| <input type="checkbox"/> 0.4-<0.7m [2] | <input type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [0] | <input type="checkbox"/> INTERSTITIAL [-1] | |
| <input checked="" type="checkbox"/> 0.2-<0.4m [1] | | <input checked="" type="checkbox"/> FAST [1] | |
| <input type="checkbox"/> < 0.2m [0] | | <input checked="" type="checkbox"/> MODERATE [1] | |

Comments:

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: Check ONE (Or 2 & average). NO RIFFLE [metric=0]

| | | | |
|---|--|--|--|
| RIFFLE DEPTH | RUN DEPTH | RIFFLE / RUN SUBSTRATE | RIFFLE / RUN EMBEDDEDNESS |
| <input type="checkbox"/> BEST AREAS > 10cm [2] | <input type="checkbox"/> MAXIMUM > 50cm [2] | <input checked="" type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2] | <input type="checkbox"/> NONE [2] |
| <input checked="" type="checkbox"/> BEST AREAS 5-10cm [1] | <input checked="" type="checkbox"/> MAXIMUM < 50cm [1] | <input type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1] | <input type="checkbox"/> LOW [1] |
| <input type="checkbox"/> BEST AREAS < 5cm [metric=0] | | <input type="checkbox"/> UNSTABLE (e.g., Fine Gravel, Sand) [0] | <input checked="" type="checkbox"/> MODERATE [0] |
| | | | <input type="checkbox"/> EXTENSIVE [-1] |

Comments:

Riffle / Run
Maximum 8
4

6] GRADIENT (.09 ft/mi) VERY LOW - LOW [2-4] **4**

DRAINAGE AREA (113 mi²) MODERATE [6-10] HIGH - VERY HIGH [10-6]

% POOL: 25 **% GLIDE:** 5 **% RUN:** 20 **% RIFFLE:** 50

Comments:

Gradient
Maximum 10
4

AJ SAMPLED REACH

Check ALL that apply

METHOD

- BOAT
 - WADE
 - L. LINE
 - OTHER
- STAGE**
- HIGH
 - UP
 - NORMAL
 - LOW
 - DRY
- 1st-sample pass-- 2nd

CLARITY

- < 20 cm
- 20-<40 cm
- 40-<70 cm
- > 70 cm/CTB
- SECCHI DEPTH

CANOPY

- > 85%- OPEN
- 55%-<85%
- 30%-<55%
- 10%-<30%
- <10%- CLOSED

CJ RECREATION

AREA DEPTH
POOL: >100ft² >3ft

BJAESTHETICS

- NUISANCE ALGAE
- INVASIVE MACROPHYTES
- EXCESS TURBIDITY
- DISCOLORATION
- FOAM / SCUM
- OIL SHEEN
- TRASH / LITTER
- NUISANCE ODOR
- SLUDGE DEPOSITS
- CSOs/ISSOs/OUTFALLS

DJ MAINTENANCE

- PUBLIC / PRIVATE / BOTH / NA
- ACTIVE / HISTORIC / BOTH / NA
- YOUNG-SUCCESSION-OLD
- SPRAY-/SNAG / REMOVED
- MODIFIED / DIPPED OUT / NA
- LEVEED-/ONE SIDED
- RELOCATED / CUTOFFS
- MOVING-BEDLOAD-STABLE
- ARMoured / SLUMPS
- ISLANDS / SCoured
- IMPOUNDED / DESICCATED
- FLOOD CONTROL / DRAINAGE

Circle some & COMMENT

EJ ISSUES

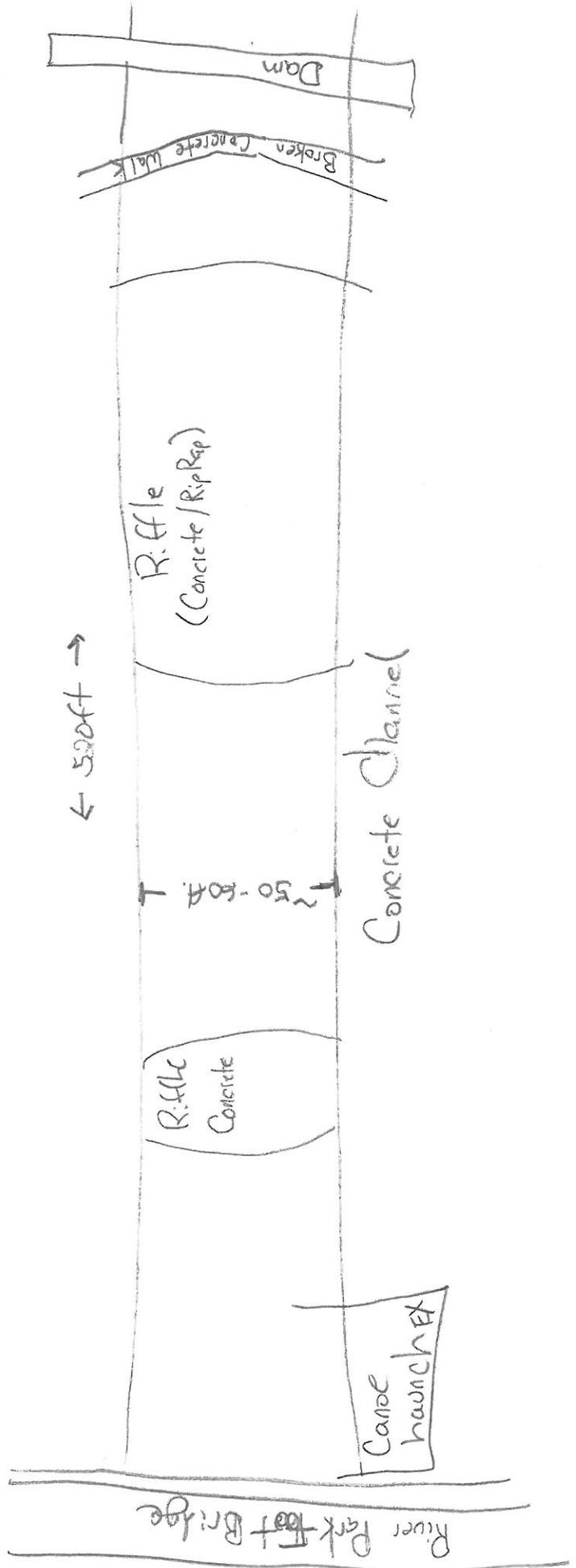
- WWTP, L.CSO, NPDES / INDUSTRY
- HARDENED / URBAN / DIRT & GRIME
- CONTAMINATED / LANDFILL
- BMPs-CONSTRUCTION-SEDIMENT
- LOGGING / IRRIGATION / COOLING
- BANK / EROSION / SURFACE
- FALSE BANK / MANURE / LAGOON
- WASH H₂O / TILE / H₂O TABLE
- ACID / MINE / QUARRY / FLOW
- NATURAL / WETLAND / STAGNANT
- PARK / GOLF / LAWN / HOME
- ATMOSPHERE / DATA PAUCITY

FJ MEASUREMENTS

- \bar{x} width
- \bar{x} depth
- max. depth
- \bar{x} bankfull width
- bankfull \bar{x} depth
- W/D ratio
- bankfull max. depth
- floodprone \bar{x}^2 width
- entrench. ratio

Legacy Tree:

Stream Drawing:





Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 82

Stream & Location: North Branch Chicago River **RM:** 333.7 **Date:** 09/29/2015

FWP Conditions based on Option A **Scorers Full Name & Affiliation:** FHV USACE LRC

River Code: - **STORET #:** - **Lat./ Long.:** 18 Office verified location

1] SUBSTRATE Check **ONLY** Two substrate **TYPE** BOXES; estimate % or note every type present

| | | | | | |
|---|--------------------|---|--------------------|---|--|
| BEST TYPES | POOL RIFFLE | OTHER TYPES | POOL RIFFLE | ORIGIN | QUALITY |
| <input type="checkbox"/> BLDR / SLABS [10] | <u>5</u> | <input type="checkbox"/> HARDPAN [4] | | <input type="checkbox"/> LIMESTONE [1] | <input type="checkbox"/> HEAVY [-2] |
| <input checked="" type="checkbox"/> BOULDER [9] | <u>30</u> | <input type="checkbox"/> DETRITUS [3] | <u>10</u> | <input checked="" type="checkbox"/> TILLS [1] | <input type="checkbox"/> MODERATE [-1] |
| <input checked="" type="checkbox"/> COBBLE [8] | <u>50</u> | <input type="checkbox"/> MUCK [2] | <u>10</u> | <input type="checkbox"/> WETLANDS [0] | <input checked="" type="checkbox"/> NORMAL [0] |
| <input type="checkbox"/> GRAVEL [7] | <u>25</u> | <input type="checkbox"/> SILT [2] | <u>5</u> | <input type="checkbox"/> HARDPAN [0] | <input checked="" type="checkbox"/> FREE [1] |
| <input type="checkbox"/> SAND [6] | <u>50</u> | <input type="checkbox"/> ARTIFICIAL [0] | | <input type="checkbox"/> SANDSTONE [0] | <input type="checkbox"/> EXTENSIVE [-2] |
| <input type="checkbox"/> BEDROCK [5] | | | | <input type="checkbox"/> RIP/RAP [0] | <input type="checkbox"/> MODERATE [-1] |

NUMBER OF BEST TYPES: 4 or more [2] 3 or less [0]

Comments: SCA will restore proper substrates + sizes. Removal concrete + riprap.

2] INSTREAM COVER Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.)

| | | | |
|-------------------------------------|----------------------------|---------------------------------|---|
| UNDERCUT BANKS [1] | POOLS > 70cm [2] | OXBOWS, BACKWATERS [1] | AMOUNT |
| <u>0</u> | <u>2</u> | <u>0</u> | <input checked="" type="checkbox"/> EXTENSIVE >75% [11] |
| OVERHANGING VEGETATION [1] | ROOTWADS [1] | AQUATIC MACROPHYTES [1] | <input type="checkbox"/> MODERATE 25-75% [7] |
| <u>2</u> | <u>2</u> | <u>1</u> | <input type="checkbox"/> SPARSE 5-<25% [3] |
| SHALLOWS (IN SLOW WATER) [1] | BOULDERS [1] | LOGS OR WOODY DEBRIS [1] | <input type="checkbox"/> NEARLY ABSENT <5% [1] |
| <u>1</u> | <u>3</u> | <u>2</u> | |
| ROOTMATS [1] | | | |
| <u>3</u> | | | |

Comments: SCA will provide much improved + extensive cover.

3] CHANNEL MORPHOLOGY Check ONE in each category (Or 2 & average)

| | | | |
|--|---|---|--|
| SINUOSITY | DEVELOPMENT | CHANNELIZATION | STABILITY |
| <input type="checkbox"/> HIGH [4] | <input checked="" type="checkbox"/> EXCELLENT [7] | <input type="checkbox"/> NONE [6] | <input checked="" type="checkbox"/> HIGH [3] |
| <input type="checkbox"/> MODERATE [3] | <input type="checkbox"/> GOOD [5] | <input type="checkbox"/> RECOVERED [4] | <input type="checkbox"/> MODERATE [2] |
| <input type="checkbox"/> LOW [2] | <input type="checkbox"/> FAIR [3] | <input type="checkbox"/> RECOVERING [3] | <input type="checkbox"/> LOW [1] |
| <input checked="" type="checkbox"/> NONE [1] | <input type="checkbox"/> POOR [1] | <input checked="" type="checkbox"/> RECENT OR NO RECOVERY [1] | |

Comments: SCA would only change Riffle / Pool morphology.

4] BANK EROSION AND RIPARIAN ZONE Check ONE in each category for EACH BANK (Or 2 per bank & average)

| | | |
|---|--|---|
| EROSION | RIPARIAN WIDTH | FLOOD PLAIN QUALITY |
| <input checked="" type="checkbox"/> NONE / LITTLE [3] | <input type="checkbox"/> WIDE > 50m [4] | <input checked="" type="checkbox"/> FOREST, SWAMP [3] |
| <input type="checkbox"/> MODERATE [2] | <input type="checkbox"/> MODERATE 10-50m [3] | <input type="checkbox"/> SHRUB OR OLD FIELD [2] |
| <input type="checkbox"/> HEAVY / SEVERE [1] | <input type="checkbox"/> NARROW 5-10m [2] | <input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1] |
| | <input checked="" type="checkbox"/> VERY NARROW < 5m [1] | <input type="checkbox"/> FENCED PASTURE [1] |
| | <input type="checkbox"/> NONE [0] | <input type="checkbox"/> OPEN PASTURE, ROWCROP [0] |

Comments: SCA would only affect the floodplain quality through veg restoration via RB+RS

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

| | | | |
|---|---|---|----------------------------------|
| MAXIMUM DEPTH | CHANNEL WIDTH | CURRENT VELOCITY | Recreation Potential |
| <input checked="" type="checkbox"/> > 1m [6] | <input checked="" type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2] | <input checked="" type="checkbox"/> TORRENTIAL [-1] | Primary Contact |
| <input type="checkbox"/> 0.7-<1m [4] | <input type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1] | <input checked="" type="checkbox"/> VERY FAST [1] | Secondary Contact |
| <input checked="" type="checkbox"/> 0.4-<0.7m [2] | <input type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [0] | <input checked="" type="checkbox"/> FAST [1] | (circle one and comment on bank) |
| <input type="checkbox"/> 0.2-<0.4m [1] | | <input type="checkbox"/> MODERATE [1] | |
| <input type="checkbox"/> < 0.2m [0] | | <input type="checkbox"/> INTERSTITIAL [-1] | |

Comments: SCA concrete removal allows for riffle morphology improvement

6] GRADIENT (Δ ft/mi) VERY LOW - LOW [2-4] MODERATE [6-10] HIGH - VERY HIGH [10-6]

DRAINAGE AREA (/ 3 mi²)

% POOL: 30 **% GLIDE:** 10 **% RUN:** 30 **% RIFFLE:** 30

Comments: due to dam + concrete removal, which increase gradient

AJ SAMPLED REACH

Check ALL that apply

METHOD

- BOAT
 - WADE
 - L. LINE
 - OTHER
- STAGE**
- 1st-sample pass-- 2nd
- HIGH
 - UP
 - NORMAL
 - LOW
 - DRY
- DISTANCE**
- 0.5 Km
 - 0.2 Km
 - 0.15 Km
 - 0.12 Km
 - OTHER

CLARITY

- < 20 cm
- 20-<40 cm
- 40-70 cm
- > 70 cm/CTB
- SECCHI DEPTH

CANOPY

- > 85%- OPEN
- 55%-<85%
- 30%-<55%
- 10%-<30%
- <10%- CLOSED

CJ RECREATION

- POOL: >100ft² >3ft

BJAESTHETICS

- NUISANCE ALGAE
- INVASIVE MACROPHYTES
- EXCESS TURBIDITY
- DISCOLORATION
- FOAM / SCUM
- OIL SHEEN
- TRASH / LITTER
- NUISANCE ODOR
- SLUDGE DEPOSITS
- CSOs/SSOs/OUTFALLS

DJ MAINTENANCE

- PUBLIC / PRIVATE / BOTH / NA
- ACTIVE / HISTORIC / BOTH / NA
- YOUNG-SUCCESSION-OLD
- SPRAY / SNAG / REMOVED
- MODIFIED / DIPPED OUT / NA
- LEVEED / ONE SIDED
- RELOCATED / CUTOFFS
- MOVING-BEDLOAD-STABLE
- ARMoured / SLUMPS
- ISLANDS / SCoured
- IMPOUNDED / DESICCATED
- FLOOD CONTROL / DRAINAGE

EJ ISSUES

- WWTP / CSO / NPDES / INDUSTRY
- HARDENED / URBAN / DIRT&GRIME
- CONTAMINATED / LANDFILL
- BMPs-CONSTRUCTION-SEDIMENT
- LOGGING / IRRIGATION / COOLING
- BANK / EROSION / SURFACE
- FALSE BANK / MANURE / LAGOON
- WASH H₂O / TILE / H₂O TABLE
- ACID / MINE / QUARRY / FLOW
- NATURAL / WETLAND / STAGNANT
- PARK / GOLF / LAWN / HOME
- ATMOSPHERE / DATA PAUCITY

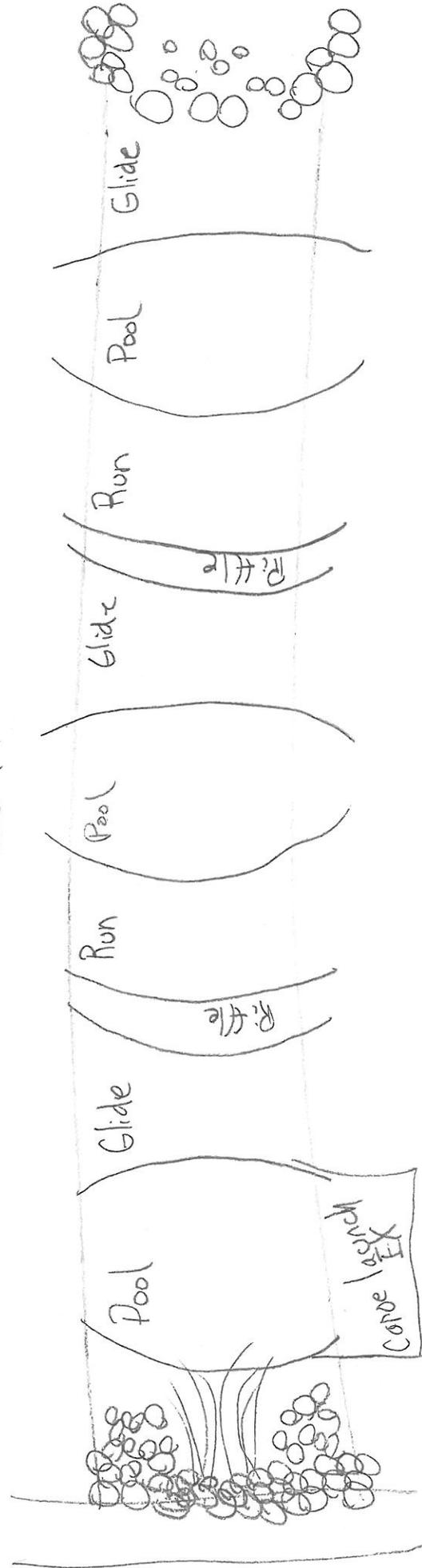
FJ MEASUREMENTS

- \bar{x} width
- \bar{x} depth
- max. depth
- \bar{x} bankfull width
- bankfull \bar{x} depth
- WID ratio
- bankfull max. depth
- floodprone \bar{x}^2 width
- entrench. ratio

Legacy Tree:

Stream Drawing: Sca FWP

← 520 ft →



Comment RE: Reach consistency/Is reach typical of stream?, Recreation/Observed - Inferred, Other/Sampling observations, Concerns, Access directions, etc.

FWP = SCB



Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 64

Stream & Location: North Branch Chicago River **RM:** **Date:** / / 06

FWP Conditions based on: Option B **Scorers Full Name & Affiliation:** FMV USAEC, LLC

River Code: **STORET #:** **Lat./ Long.:** **18** Office verified location

1) SUBSTRATE Check ONLY Two substrate TYPE BOXES; estimate % or note every type present

| | | | | | |
|---|---------------------|---|---------------------|---|--|
| BEST TYPES | POOL RIFFLE | OTHER TYPES | POOL RIFFLE | ORIGIN | QUALITY |
| <input type="checkbox"/> BLDR / SLABS [10] | <u> </u> <u> </u> | <input type="checkbox"/> HARDPAN [4] | <u> </u> <u> </u> | <input type="checkbox"/> LIMESTONE [1] | <input type="checkbox"/> HEAVY [-2] |
| <input checked="" type="checkbox"/> BOULDER [9] | <u> </u> <u>20</u> | <input type="checkbox"/> DETRITUS [3] | <u> </u> <u> </u> | <input checked="" type="checkbox"/> TILLS [1] | <input type="checkbox"/> MODERATE [-1] |
| <input type="checkbox"/> COBBLE [8] | <u>25</u> <u>50</u> | <input type="checkbox"/> MUCK [2] | <u> </u> <u> </u> | <input type="checkbox"/> WETLANDS [0] | <input checked="" type="checkbox"/> NORMAL [0] |
| <input type="checkbox"/> GRAVEL [7] | <u>70</u> <u>25</u> | <input type="checkbox"/> SILT [2] | <u> </u> <u> </u> | <input type="checkbox"/> HARDPAN [0] | <input type="checkbox"/> FREE [1] |
| <input type="checkbox"/> SAND [6] | <u> </u> <u> </u> | <input type="checkbox"/> ARTIFICIAL [0] | <u>50</u> <u>25</u> | <input type="checkbox"/> SANDSTONE [0] | <input type="checkbox"/> EXTENSIVE [-2] |
| <input type="checkbox"/> BEDROCK [5] | <u> </u> <u> </u> | <small>(Score natural substrates; ignore sludge from point-sources)</small> | | <input type="checkbox"/> RIP/RAP [0] | <input type="checkbox"/> MODERATE [-1] |

NUMBER OF BEST TYPES: 4 or more [2] 3 or less [0]

Comments: SCB will restore substrates over concrete. Minimal removal of concrete/rip rap, natural subs placed on top.

Substrate
17
Maximum 20

2) INSTREAM COVER Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep/fast water, or deep, well-defined, functional pools.

| | | | |
|--|---|---|---|
| <input type="checkbox"/> UNDERCUT BANKS [1] | <input type="checkbox"/> POOLS > 70cm [2] | <input type="checkbox"/> OXBOWS, BACKWATERS [1] | <input checked="" type="checkbox"/> EXTENSIVE >75% [11] |
| <input type="2"/> OVERHANGING VEGETATION [1] | <input type="0"/> ROOTWADS [1] | <input type="0"/> AQUATIC MACROPHYTES [1] | <input checked="" type="checkbox"/> MODERATE 25-75% [7] |
| <input type="1"/> SHALLOWS (IN SLOW WATER) [1] | <input type="2"/> BOULDERS [1] | <input type="2"/> LOGS OR WOODY DEBRIS [1] | <input type="checkbox"/> SPARSE 5-<25% [3] |
| <input type="2"/> ROOTMATS [1] | | | <input type="checkbox"/> NEARLY ABSENT <5% [1] |

Comments: SCB will provide improved + moderate cover limited by remaining concrete.

Cover
Maximum 20
12

3) CHANNEL MORPHOLOGY Check ONE in each category (Or 2 & average)

| | | | |
|--|--|---|--|
| SINUOSITY | DEVELOPMENT | CHANNELIZATION | STABILITY |
| <input type="checkbox"/> HIGH [4] | <input type="checkbox"/> EXCELLENT [7] | <input type="checkbox"/> NONE [6] | <input checked="" type="checkbox"/> HIGH [3] |
| <input type="checkbox"/> MODERATE [3] | <input checked="" type="checkbox"/> GOOD [5] | <input type="checkbox"/> RECOVERED [4] | <input type="checkbox"/> MODERATE [2] |
| <input type="checkbox"/> LOW [2] | <input type="checkbox"/> FAIR [3] | <input type="checkbox"/> RECOVERING [3] | <input type="checkbox"/> LOW [1] |
| <input checked="" type="checkbox"/> NONE [1] | <input type="checkbox"/> POOR [1] | <input checked="" type="checkbox"/> RECENT OR NO RECOVERY [1] | |

Comments: SCB would only change Riffle/Pool morphology.

Channel
Maximum 20
10

4) BANK EROSION AND RIPARIAN ZONE Check ONE in each category for EACH BANK (Or 2 per bank & average)

| | | | |
|---|--|---|--|
| EROSION | RIPARIAN WIDTH | FLOOD PLAIN QUALITY | CONSERVATION TILLAGE |
| <input checked="" type="checkbox"/> NONE / LITTLE [3] | <input type="checkbox"/> WIDE > 50m [4] | <input checked="" type="checkbox"/> FOREST, SWAMP [3] | <input type="checkbox"/> URBAN OR INDUSTRIAL [0] |
| <input type="checkbox"/> MODERATE [2] | <input type="checkbox"/> MODERATE 10-50m [3] | <input type="checkbox"/> SHRUB OR OLD FIELD [2] | <input type="checkbox"/> MINING / CONSTRUCTION [0] |
| <input type="checkbox"/> HEAVY / SEVERE [1] | <input type="checkbox"/> NARROW 5-10m [2] | <input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1] | |
| | <input checked="" type="checkbox"/> VERY NARROW < 5m [1] | <input type="checkbox"/> FENCED PASTURE [1] | |
| | <input type="checkbox"/> NONE [0] | <input type="checkbox"/> OPEN PASTURE, ROWCROP [0] | |

Comments: SCB would only affect flood plain quality via RB + RS.

Riparian
Maximum 10
7

5) POOL / GLIDE AND RIFFLE / RUN QUALITY

| | | | |
|---|---|---|---|
| MAXIMUM DEPTH | CHANNEL WIDTH | CURRENT VELOCITY | Recreation Potential |
| Check ONE (ONLY!) | Check ONE (Or 2 & average) | Check ALL that apply | Primary Contact |
| <input type="checkbox"/> > 1m [6] | <input type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2] | <input type="checkbox"/> TORRENTIAL [-1] | Secondary Contact |
| <input type="checkbox"/> 0.7-<1m [4] | <input checked="" type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1] | <input checked="" type="checkbox"/> VERY FAST [1] | <small>(circle one and comment on back)</small> |
| <input type="checkbox"/> 0.4-<0.7m [2] | <input type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [0] | <input checked="" type="checkbox"/> FAST [1] | |
| <input checked="" type="checkbox"/> 0.2-<0.4m [1] | | <input type="checkbox"/> INTERSTITIAL [-1] | |
| <input type="checkbox"/> < 0.2m [0] | | <input type="checkbox"/> INTERMITTENT [-2] | |
| | | <input checked="" type="checkbox"/> MODERATE [1] | |
| | | <input type="checkbox"/> EDDIES [1] | |

Comments: SCB partial concrete removal does not allow for riffle morph improvement.

Pool / Current
Maximum 12
6

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: NO RIFFLE [metric=0]

| | | | |
|---|--|--|---|
| RIFFLE DEPTH | RUN DEPTH | RIFFLE / RUN SUBSTRATE | RIFFLE / RUN EMBEDDEDNESS |
| <input checked="" type="checkbox"/> BEST AREAS > 10cm [2] | <input type="checkbox"/> MAXIMUM > 50cm [2] | <input checked="" type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2] | <input type="checkbox"/> NONE [2] |
| <input type="checkbox"/> BEST AREAS 5-10cm [1] | <input checked="" type="checkbox"/> MAXIMUM < 50cm [1] | <input type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1] | <input checked="" type="checkbox"/> LOW [1] |
| <input type="checkbox"/> BEST AREAS < 5cm [metric=0] | | <input type="checkbox"/> UNSTABLE (e.g., Fine Gravel, Sand) [0] | <input type="checkbox"/> MODERATE [0] |
| | | | <input type="checkbox"/> EXTENSIVE [-1] |

Comments: SCB partial concrete removal does not allow for riffle morph improvement.

Riffle / Run
Maximum 8
6

6) GRADIENT (ft/mi) VERY LOW - LOW [2-4] MODERATE [6-10] HIGH - VERY HIGH [10-6]

DRAINAGE AREA (113 mi²)

% POOL: 30 **% GLIDE:** 10

% RUN: 30 **% RIFFLE:** 30

Gradient
Maximum 10
6

due to dam + limited concrete removal.

Comment RE: Reach consistency/ Is reach typical of stream?, Recreation/ Observed - Inferred, Other/ Sampling observations, Concerns, Access directions, etc.

AJ SAMPLED REACH

Check ALL that apply

METHOD

- BOAT
- WADE
- L. LINE
- OTHER

STAGE

- 1st--sample pass-- 2nd
- HIGH
- UP
- NORMAL
- LOW
- DRY

DISTANCE

- 0.5 Km
- 0.2 Km
- 0.15 Km
- 0.12 Km
- OTHER

CLARITY

- 1st --sample pass-- 2nd
- < 20 cm
- 20-<40 cm
- 40-70 cm
- > 70 cm/ CTB
- SECCHI DEPTH

meters

CANOPY

- > 85%- OPEN
- 55%-<85%
- 30%-<55%
- 10%-<30%
- <10%- CLOSED

CJ RECREATION

AREA DEPTH
POOL: >100ft² >3ft

BJ AESTHETICS

- NUISANCE ALGAE
- INVASIVE MACROPHYTES
- EXCESS TURBIDITY
- DISCOLORATION
- FOAM/ SCUM
- OIL SHEEN
- TRASH / LITTER
- NUISANCE ODOR
- SLUDGE DEPOSITS
- CSOs/SSOs/OUTFALLS

DJ MAINTENANCE

- PUBLIC / PRIVATE / BOTH / NA
- ACTIVE / HISTORIC / BOTH / NA
- YOUNG-SUCCESSION-OLD
- SPRAY / SNAG / REMOVED
- MODIFIED / DIPPED OUT / NA
- LEVEEED / ONE SIDED
- RELOCATED / CUTOFFS
- MOVING-BEDLOAD-STABLE
- ARMoured / SLUMPS
- ISLANDS / SCOURED
- IMPOUNDED / DESICCATED
- FLOOD CONTROL / DRAINAGE

EJ ISSUES

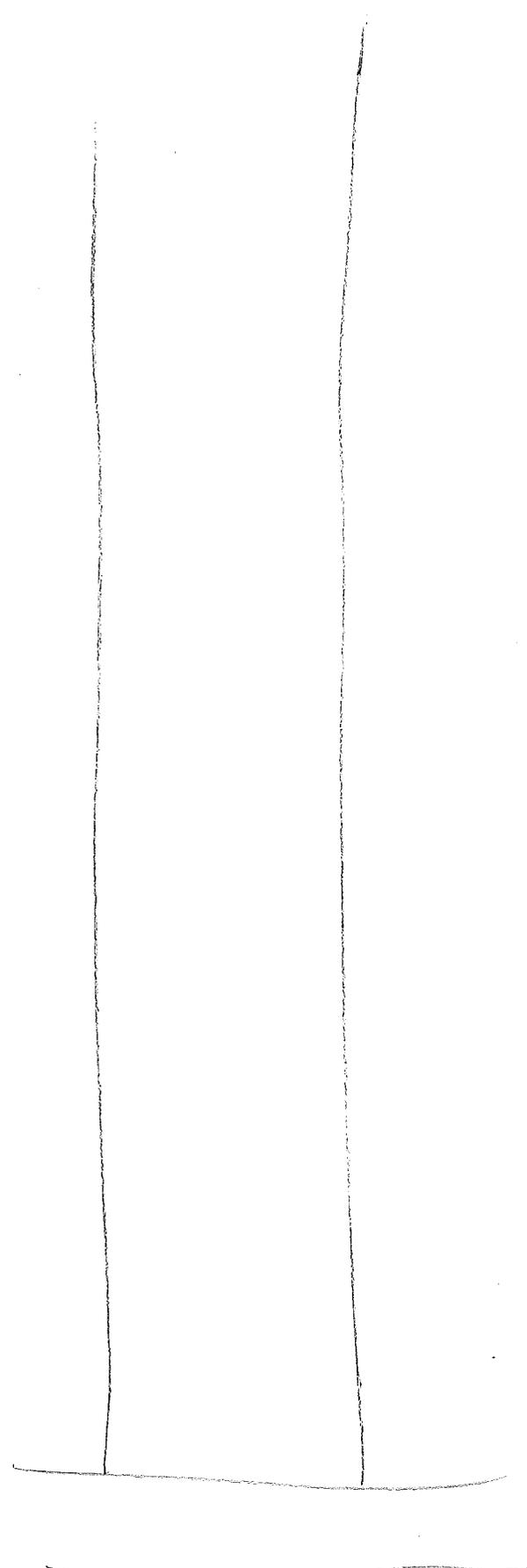
- WWTP / CSO / NPDES / INDUSTRY
- HARDENED / URBAN / DIRT&GRIME
- CONTAMINATED / LANDFILL
- BMPs-CONSTRUCTION-SEDIMENT
- LOGGING / IRRIGATION / COOLING
- BANK / EROSION / SURFACE
- FALSE BANK / MANURE / LAGOON
- WASH H₂O / TILE / H₂O TABLE
- ACID / MINE / QUARRY / FLOW
- NATURAL / WETLAND / STAGNANT
- PARK / GOLF / LAWN / HOME
- ATMOSPHERE / DATA PAUCITY

FJ MEASUREMENTS

- \bar{x} width
- \bar{x} depth
- max. depth
- \bar{x} bankfull width
- bankfull \bar{x} depth
- W/D ratio
- bankfull max. depth
- floodprone \bar{x}^2 width
- entrench. ratio

Legacy Tree:

Stream Drawing: See Sca FWP



SITE: River Riparian
LOCALE: Streambank EX & FWOP
BY: Zylka
NOTES:

| CONSERVATISM-BASEDMETRICS | | ADDITIONALMETRICS | |
|---------------------------|-------|-------------------|-------|
| MEAN C(NATIVE SPECIES) | 2.21 | SPECIES RICHNES | 41 |
| MEAN C(ALL SPECIES) | 1.51 | SPECIES RICHNES | 28 |
| MEAN C(NATIVE TREES) | 1.89 | % NON-NATIVE | 0.32 |
| MEAN C(NATIVE SHRUBS) | 1.00 | WET INDICATOR(| -0.07 |
| MEAN C(NATIVEHERBACEOUS) | 2.53 | WET INDICATOR(| -0.39 |
| FQAI(NATIVE SPECIES) | 11.72 | % HYDROPHYTE(| 0.71 |
| FQAI(ALL SPECIES) | 9.68 | % NATIVEPERENN | 0.59 |
| ADJUSTED FQAI | 18.30 | % NATIVE ANNU(| 0.10 |
| % C VALUE 0 | 0.41 | % ANNUAL | 0.10 |
| % C VALUE 1-3 | 0.41 | % PERENNIAL | 0.88 |
| % C VALUE 4-6 | 0.17 | | |
| % C VALUE 7-10 | 0.00 | | |

| SPECIES NAME | SPECIES(SYNONYM) | COMMONNAME | C VALUE | WETINDICATOR | WET FACTOR | HABIT | DURATION | NATIVITY |
|--------------------------------|--|------------------------|---------|--------------|------------|-------|-----------|-----------|
| Acer negundo | Acer negundo var. violaceum | Ash-Leaf Maple | 0 | FAC | 0 | Tree | Perennial | Native |
| Acer saccharinum | Acer saccharinum | Silver Maple | 0 | FACW | -1 | Tree | Perennial | Native |
| Acer saccharum | Acer saccharum | Sugar Maple | 3 | FACU | 1 | Tree | Perennial | Native |
| Ailanthus altissima | AILANTHUS ALTISSIMA | Tree-of-Heaven | 0 | FACU | 1 | Tree | Perennial | Adventive |
| Alnus glutinosa | ALNUS GLUTINOSA | European Alder | 0 | FACW | -1 | Tree | Perennial | Adventive |
| Bidens frondosa | Bidens frondosa | Devil's-Pitchfork | 1 | FACW | -1 | Forb | Annual | Native |
| Calystegia sepium | Convolvulus sepium | Hedge False Bindweed | 1 | FAC | 0 | Forb | Perennial | Native |
| Carex blanda | Carex blanda | Eastern Woodland Sedge | 1 | FAC | 0 | Sedge | Perennial | Native |
| Cichorium intybus | CICHORIUM INTYBUS | Chicory | 0 | FACU | 1 | Forb | Perennial | Adventive |
| Crataegus mollis | Crataegus mollis | Downy Hawthorn | 2 | FAC | 0 | Tree | Perennial | Native |
| Elymus virginicus | Elymus virginicus | Virginia Wild Rye | 4 | FACW | -1 | Grass | Perennial | Native |
| Fraxinus pennsylvanica | Fraxinus pennsylvanica subintegerrima | Green Ash | 1 | FACW | -1 | Tree | Perennial | Native |
| Geum laciniatum | Geum laciniatum | Rough Avens | 2 | FACW | -1 | Forb | Perennial | Native |
| Gleditsia triacanthos | Gleditsia triacanthos | Honey-Locust | 2 | FACU | 1 | Tree | Perennial | Native |
| Helenium autumnale | Helenium autumnale | Fall Sneezeweed | 5 | FACW | -1 | Forb | Perennial | Native |
| Impatiens capensis | Impatiens capensis | Spotted Touch-Me-Not | 3 | FACW | -1 | Forb | Annual | Native |
| Leersia oryzoides | Leersia oryzoides | Rice Cut Grass | 4 | OBL | -2 | Grass | Perennial | Native |
| Lysimachia nummularia | LYSIMACHIA NUMMULARIA | Creeping-Jenny | 0 | FACW | -1 | Forb | Perennial | Adventive |
| Maclura pomifera | MACLURA POMIFERA | Osage-Orange | 0 | FACU | 1 | Tree | Perennial | Adventive |
| Malus toringa | MALUS SIEBOLDII | Japanese Crab Apple | 0 | UPL | 2 | Tree | Perennial | Adventive |
| Melilotus albus | MELILOTUS ALBA | White Sweet-Clover | 0 | UPL | 2 | Forb | Biennial | Adventive |
| Morus alba | MORUS ALBA | White Mulberry | 0 | FAC | 0 | Tree | Perennial | Adventive |
| Parthenocissus quinquefolia | Parthenocissus quinquefolia | Virginia-Creeper | 2 | FACU | 1 | Vine | Perennial | Native |
| Persicaria lapathifolia | Polygonum lapathifolium; POLYGONUM SCABRUM | Dock-Leaf Smartweed | 0 | FACW | -1 | Forb | Annual | Native |
| Persicaria virginiana | Polygonum virginianum | Jumpseed | 2 | FAC | 0 | Forb | Perennial | Native |
| Plantago rugelii | Plantago rugelii | Black-Seed Plantain | 0 | FAC | 0 | Forb | Annual | Native |
| Populus deltoides | Populus deltoides | Eastern Cottonwood | 2 | FAC | 0 | Tree | Perennial | Native |
| Rhamnus cathartica | RHAMNUS CATHARTICA | European Buckthorn | 0 | FAC | 0 | Shrub | Perennial | Adventive |
| Rudbeckia laciniata | Rudbeckia laciniata | Green-Head Coneflower | 5 | FACW | -1 | Forb | Perennial | Native |
| Salix nigra | Salix nigra | Black Willow | 4 | OBL | -2 | Tree | Perennial | Native |
| Sambucus nigra ssp. canadensis | Sambucus canadensis | Black Elder | 1 | FACW | -1 | Shrub | Perennial | Native |
| Solanum dulcamara | SOLANUM DULCAMARA | Climbing Nightshade | 0 | FAC | 0 | Vine | Perennial | Adventive |
| Solidago canadensis | Solidago canadensis | Canadian Goldenrod | 1 | FACU | 1 | Forb | Perennial | Native |
| Solidago ulmifolia | Solidago ulmifolia | Elm-Leaf Goldenrod | 5 | UPL | 2 | Forb | Perennial | Native |
| Symphyotrichum lateriflorum | Aster lateriflorus | Farewell-Summer | 4 | FACW | -1 | Forb | Perennial | Native |
| Taraxacum officinale | TARAXACUM OFFICINALE | Common Dandelion | 0 | FACU | 1 | Forb | Perennial | Adventive |
| Toxicodendron radicans | Rhus radicans | Eastern Poison-Ivy | 2 | FAC | 0 | Vine | Perennial | Native |
| Ulmus americana | Ulmus americana | American Elm | 3 | FACW | -1 | Tree | Perennial | Native |
| Ulmus pumila | ULMUS PUMILA | Siberian Elm | 0 | UPL | 2 | Tree | Perennial | Adventive |
| Viburnum opulus var. opulus | VIBURNUM OPULUS | Highbush-Cranberry | 0 | FAC | 0 | Shrub | Perennial | Adventive |
| Vitis riparia | Vitis riparia | River-Bank Grape | 2 | FACW | -1 | Vine | Perennial | Native |

SITE: River Riparian EX & FWOP
LOCALE: Savanna
BY: Zylka
NOTES:

| CONSERVATISM-BASEDMETRICS | | ADDITIONALMETRICS | |
|---------------------------|-------|--------------------------|------|
| MEAN C(NATIVE SPECIES) | 4.07 | SPECIES RICHNESS(ALL) | 24 |
| MEAN C(ALL SPECIES) | 2.38 | SPECIES RICHNESS(NATIVE) | 14 |
| MEAN C(NATIVE TREES) | 0.00 | % NON-NATIVE | 0.42 |
| MEAN C(NATIVE SHRUBS) | 0.00 | WET INDICATOR(ALL) | 0.71 |
| MEAN C(NATIVEHERBACEOUS) | 4.07 | WET INDICATOR(NATIVE) | 0.57 |
| FQAI(NATIVE SPECIES) | 15.23 | % HYDROPHYTE(MIDWEST) | 0.33 |
| FQAI(ALL SPECIES) | 11.64 | % NATIVEPERENNIAL | 0.46 |
| ADJUSTED FQAI | 31.10 | % NATIVE ANNUAL | 0.13 |
| % C VALUE 0 | 0.46 | % ANNUAL | 0.13 |
| % C VALUE 1-3 | 0.13 | % PERENNIAL | 0.79 |
| % C VALUE 4-6 | 0.38 | | |
| % C VALUE 7-10 | 0.04 | | |

| SPECIES NAME | SPECIES(SYNONYM) | COMMONNAME | C VALUE | WETINDICATOR | WET FACTOR | HABIT | DURATION | NATIVITY |
|---------------------------------------|-------------------------|---------------------|---------|--------------|------------|---------|-----------|-----------|
| <i>Alnus glutinosa</i> | ALNUS GLUTINOSA | European Alder | | 0 FACW | | -1 Tree | Perennial | Adventive |
| <i>Andropogon gerardii</i> | Andropogon gerardii | Big Bluestem | | 5 FAC | | 0 Grass | Perennial | Native |
| <i>Baptisia alba var. macrophylla</i> | Baptisia leucantha | White Wild Indigo | | 8 FACU | | 1 Forb | Perennial | Native |
| <i>Chamaecrista fasciculata</i> | Cassia fasciculata | Sleepingplant | | 5 FACU | | 1 Forb | Annual | Native |
| <i>Cirsium arvense</i> | CIRSIUM ARVENSE | Canadian Thistle | | 0 FACU | | 1 Forb | Perennial | Adventive |
| <i>Cirsium vulgare</i> | CIRSIUM VULGARE | Bull Thistle | | 0 FACU | | 1 Forb | Biennial | Adventive |
| <i>Elaeagnus umbellata</i> | ELAEAGNUS UMBELLATA | Autumn-Olive | | 0 UPL | | 2 Shrub | Perennial | Adventive |
| <i>Lonicera maackii</i> | LONICERA MAACKII | Amur Honeysuckle | | 0 UPL | | 2 Shrub | Perennial | Adventive |
| <i>Mellilotus albus</i> | MELILOTUS ALBA | White Sweet-Clover | | 0 UPL | | 2 Forb | Biennial | Adventive |
| <i>Monarda fistulosa</i> | Monarda fistulosa | Oswego-Tea | | 4 FACU | | 1 Forb | Perennial | Native |
| <i>Panicum virgatum</i> | Panicum virgatum | Wand Panic Grass | | 5 FAC | | 0 Grass | Perennial | Native |
| <i>Persicaria pensylvanica</i> | Polygonum pensylvanicum | Pinkweed | | 0 FACW | | -1 Forb | Annual | Native |
| <i>Phleum pratense</i> | PHLEUM PRATENSE | Common Timothy | | 0 FACU | | 1 Grass | Perennial | Adventive |
| <i>Physostegia virginiana</i> | Physostegia virginiana | Obedient-Plant | | 6 FACW | | -1 Forb | Perennial | Native |
| <i>Phytolacca americana</i> | Phytolacca americana | American Pokeweed | | 1 FACU | | 1 Forb | Perennial | Native |
| <i>Poa pratensis</i> | POA PRATENSIS | Kentucky Blue Grass | | 0 FAC | | 0 Grass | Perennial | Adventive |
| <i>Ratibida pinnata</i> | Ratibida pinnata | Yellow Coneflower | | 4 UPL | | 2 Forb | Perennial | Native |
| <i>Rhamnus cathartica</i> | RHAMNUS CATHARTICA | European Buckthorn | | 0 FAC | | 0 Shrub | Perennial | Adventive |
| <i>Rudbeckia hirta</i> | Rudbeckia hirta | Black-Eyed-Susan | | 1 FACU | | 1 Forb | Perennial | Native |
| <i>Rudbeckia triloba</i> | Rudbeckia triloba | Brown-Eyed-Susan | | 3 FACU | | 1 Forb | Annual | Native |
| <i>Silphium laciniatum</i> | Silphium laciniatum | Compass-Plant | | 5 UPL | | 2 Forb | Perennial | Native |
| <i>Sorghastrum nutans</i> | Sorghastrum nutans | Yellow Indian Grass | | 5 FACU | | 1 Grass | Perennial | Native |
| <i>Taraxacum officinale</i> | TARAXACUM OFFICINALE | Common Dandelion | | 0 FACU | | 1 Forb | Perennial | Adventive |
| <i>Vernonia fasciculata</i> | Vernonia fasciculata | Prairie Ironweed | | 5 FACW | | -1 Forb | Perennial | Native |

SITE: River Riparian
LOCALE: Canal to Aquatic Bed FWP
BY: Zylka
NOTES: Proposed Planting List

| CONSERVATISM-BASED METRICS | | ADDITIONAL METRICS | |
|----------------------------|-------|--------------------------|-------|
| MEAN C(NATIVE SPECIES) | 5.91 | SPECIES RICHNESS(ALL) | 23 |
| MEAN C(ALL SPECIES) | 5.91 | SPECIES RICHNESS(NATIVE) | 23 |
| MEAN C(NATIVE TREES) | n/a | % NON-NATIVE | 0.00 |
| MEAN C(NATIVE SHRUBS) | 8.00 | WET INDICATOR(ALL) | -1.96 |
| MEAN C(NATIVE HERBACEOUS) | 5.82 | WET INDICATOR(NATIVE) | -1.96 |
| FQAI(NATIVE SPECIES) | 28.36 | % HYDROPHYTE(MIDWEST) | 1.00 |
| FQAI(ALL SPECIES) | 28.36 | % NATIVE PERENNIAL | 1.00 |
| ADJUSTED FQAI | 59.13 | % NATIVE ANNUAL | 0.00 |
| % C VALUE 0 | 0.00 | % ANNUAL | 0.00 |
| % C VALUE 1-3 | 0.04 | % PERENNIAL | 1.00 |
| % C VALUE 4-6 | 0.65 | | |
| % C VALUE 7-10 | 0.30 | | |

| SPECIES NAME | SPECIES(SYNONYM) | COMMON NAME | C VALUE | WET INDICATOR | WET FACTOR | HABIT | DURATION | NATIVITY |
|---------------------------------------|---------------------------------|-------------------------|---------|---------------|------------|----------|-----------|----------|
| <i>Acorus americanus</i> | <i>Acorus americanus</i> | Several-Vein Sweetflag | 7 | OBL | | -2 Forb | Perennial | Native |
| <i>Alisma subcordatum</i> | <i>Alisma subcordatum</i> | American Water-Plantain | 4 | OBL | | -2 Forb | Perennial | Native |
| <i>Calamagrostis canadensis</i> | <i>Calamagrostis canadensis</i> | Bluejoint | 3 | OBL | | -2 Grass | Perennial | Native |
| <i>Carex aquatilis</i> | <i>Carex aquatilis altior</i> | Leafy Tussock Sedge | 5 | OBL | | -2 Sedge | Perennial | Native |
| <i>Carex emoryi</i> | <i>Carex emoryi</i> | Emory's Sedge | 6 | OBL | | -2 Sedge | Perennial | Native |
| <i>Carex lacustris</i> | <i>Carex lacustris</i> | Lakebank Sedge | 6 | OBL | | -2 Sedge | Perennial | Native |
| <i>Decodon verticillatus</i> | <i>Decodon verticillatus</i> | Swamp-Loosestrife | 8 | OBL | | -2 Shrub | Perennial | Native |
| <i>Glyceria striata</i> | <i>Glyceria striata</i> | Fowl Manna Grass | 4 | OBL | | -2 Grass | Perennial | Native |
| <i>Heteranthera dubia</i> | <i>Heteranthera dubia</i> | Grass-Leaf Mud-Plantain | 8 | OBL | | -2 Forb | Perennial | Native |
| <i>Justicia americana</i> | <i>Justicia americana</i> | American Water-Willow | 6 | OBL | | -2 Forb | Perennial | Native |
| <i>Leersia oryzoides</i> | <i>Leersia oryzoides</i> | Rice Cut Grass | 4 | OBL | | -2 Grass | Perennial | Native |
| <i>Mimulus ringens</i> | <i>Mimulus ringens</i> | Allegheny Monkey-Flower | 6 | OBL | | -2 Forb | Perennial | Native |
| <i>Pontederia cordata</i> | <i>Pontederia cordata</i> | Pickereelweed | 10 | OBL | | -2 Forb | Perennial | Native |
| <i>Potamogeton foliosus</i> | <i>Potamogeton foliosus</i> | Leafy Pondweed | 7 | OBL | | -2 Forb | Perennial | Native |
| <i>Rumex verticillatus</i> | <i>Rumex verticillatus</i> | Swamp Dock | 6 | OBL | | -2 Forb | Perennial | Native |
| <i>Sagittaria latifolia</i> | <i>Sagittaria latifolia</i> | Duck-Potato | 4 | OBL | | -2 Forb | Perennial | Native |
| <i>Saururus cernuus</i> | <i>Saururus cernuus</i> | Lizard's-Tail | 9 | OBL | | -2 Forb | Perennial | Native |
| <i>Schoenoplectus acutus</i> | <i>Scirpus acutus</i> | Hard-Stem Club-Rush | 6 | OBL | | -2 Sedge | Perennial | Native |
| <i>Schoenoplectus pungens</i> | <i>Scirpus pungens</i> | Three-Square | 5 | OBL | | -2 Sedge | Perennial | Native |
| <i>Schoenoplectus tabernaemontani</i> | <i>Scirpus validus creber</i> | Soft-Stem Club-Rush | 5 | OBL | | -2 Sedge | Perennial | Native |
| <i>Sparganium eurycarpum</i> | <i>Sparganium eurycarpum</i> | Broad-Fruit Burr-Reed | 6 | OBL | | -2 Forb | Perennial | Native |
| <i>Spartina pectinata</i> | <i>Spartina pectinata</i> | Freshwater Cord Grass | 4 | FACW | | -1 Grass | Perennial | Native |
| <i>Vallisneria americana</i> | <i>Vallisneria americana</i> | American Eel-Grass | 7 | OBL | | -2 Forb | Perennial | Native |

SITE: River Riparian
LOCALE: River Bank FWP
BY: Zylka
NOTES:

| CONSERVATISM-BASEDMETRICS | | ADDITIONALMETRICS | |
|---------------------------|-------|--------------------------|-------|
| MEAN C(NATIVE SPECIES) | 4.30 | SPECIES RICHNESS(ALL) | 53 |
| MEAN C(ALL SPECIES) | 4.30 | SPECIES RICHNESS(NATIVE) | 53 |
| MEAN C(NATIVE TREES) | 3.47 | % NON-NATIVE | 0.00 |
| MEAN C(NATIVE SHRUBS) | 5.33 | WET INDICATOR(ALL) | -0.04 |
| MEAN C(NATIVEHERBACEOUS) | 4.76 | WET INDICATOR(NATIVE) | -0.04 |
| FQAI(NATIVE SPECIES) | 31.32 | % HYDROPHYTE(MIDWEST) | 0.62 |
| FQAI(ALL SPECIES) | 31.32 | % NATIVEPERENNIAL | 0.92 |
| ADJUSTED FQAI | 43.02 | % NATIVE ANNUAL | 0.08 |
| % C VALUE 0 | 0.04 | % ANNUAL | 0.08 |
| % C VALUE 1-3 | 0.34 | % PERENNIAL | 0.92 |
| % C VALUE 4-6 | 0.47 | | |
| % C VALUE 7-10 | 0.15 | | |

| SPECIES NAME | SPECIES(SYNONYM) | COMMONNAME | C VALUE | WETINDICATOR | WETFACOR | HABIT | DURATION | NATIVITY |
|--------------------------------|---------------------------------------|-------------------------------|---------|--------------|----------|----------|-----------|----------|
| Acer negundo | Acer negundo var. violaceum | Ash-Leaf Maple | | 0 FAC | | 0 Tree | Perennial | Native |
| Acer saccharinum | Acer saccharinum | Silver Maple | | 0 FACW | | -1 Tree | Perennial | Native |
| Acer saccharum | Acer saccharum | Sugar Maple | | 3 FACU | | 1 Tree | Perennial | Native |
| Amelanchier sanguinea | Amelanchier sanguinea | Round-Leaf Service-Berry | | 10 UPL | | 2 Shrub | Perennial | Native |
| Amorpha fruticosa | Amorpha fruticosa | False Indigo-Bush | | 6 FACW | | -1 Shrub | Perennial | Native |
| Asarum canadense | Asarum canadense | Canadian Wild Ginger | | 7 FACU | | 1 Forb | Perennial | Native |
| Bidens frondosa | Bidens frondosa | Devil's-Pitchfork | | 1 FACW | | -1 Forb | Annual | Native |
| Bromus pubescens | Bromus pubescens | Hairy Woodland Brome | | 5 FACU | | 1 Grass | Perennial | Native |
| Calystegia sepium | Convolvulus sepium | Hedge False Bindweed | | 1 FAC | | 0 Forb | Perennial | Native |
| Carex blanda | Carex blanda | Eastern Woodland Sedge | | 1 FAC | | 0 Sedge | Perennial | Native |
| Carex emoryi | Carex emoryi | Emory's Sedge | | 6 OBL | | -2 Sedge | Perennial | Native |
| Carex pensylvanica | Carex pensylvanica | Pennsylvania Sedge | | 5 UPL | | 2 Sedge | Perennial | Native |
| Carya cordiformis | Carya cordiformis | Bitter-Nut Hickory | | 7 FACU | | 1 Tree | Perennial | Native |
| Carya ovata | Carya ovata | Shag-Bark Hickory | | 5 FACU | | 1 Tree | Perennial | Native |
| Cinna arundinacea | Cinna arundinacea | Sweet Wood-Reed | | 5 FACW | | -1 Grass | Perennial | Native |
| Collinsia verna | Collinsia verna | Spring Blue-Eyed Mary | | 10 FACU | | 1 Forb | Annual | Native |
| Corvus americana | Corvus americana | American Hazelnut | | 5 FACU | | 1 Shrub | Perennial | Native |
| Crataegus mollis | Crataegus mollis | Downy Hawthorn | | 2 FAC | | 0 Tree | Perennial | Native |
| Cryptotaenia canadensis | Cryptotaenia canadensis | Canadian Honewort | | 2 FAC | | 0 Forb | Perennial | Native |
| Dicentra cucullaria | Dicentra cucullaria | Dutchman's-Breeches | | 6 UPL | | 2 Forb | Perennial | Native |
| Elvms virginicus | Elvms virginicus | Virginia Wild Rye | | 4 FACW | | -1 Grass | Perennial | Native |
| Fraxinus pennsylvanica | Fraxinus pennsylvanica subintegerrima | Green Ash | | 1 FACW | | -1 Tree | Perennial | Native |
| Geranium maculatum | Geranium maculatum | Spotted Crane's-Bill | | 4 FACU | | 1 Forb | Perennial | Native |
| Geum laciniatum | Geum laciniatum | Rough Avens | | 2 FACW | | -1 Forb | Perennial | Native |
| Gleditsia triacanthos | Gleditsia triacanthos | Honey-Locust | | 2 FACU | | 1 Tree | Perennial | Native |
| Glyceria grandis | Glyceria grandis | American Manna Grass | | 10 OBL | | -2 Grass | Perennial | Native |
| Helenium autumnale | Helenium autumnale | Fall Sneezeweed | | 5 FACW | | -1 Forb | Perennial | Native |
| Hypericum ascyron | Hypericum pyramidatum | Great St. John's-Wort | | 10 FAC | | 0 Forb | Perennial | Native |
| Impatiens capensis | Impatiens capensis | Spotted Touch-Me-Not | | 3 FACW | | -1 Forb | Annual | Native |
| Leersia oryzoides | Leersia oryzoides | Rice Cut Grass | | 4 OBL | | -2 Grass | Perennial | Native |
| Maianthemum racemosum | Smilacina racemosa | Feathery False Solomon's-Seal | | 3 FACU | | 1 Forb | Perennial | Native |
| Maianthemum stellatum | Smilacina stellata | Starry False Solomon's-Seal | | 5 FAC | | 0 Forb | Perennial | Native |
| Mertensia virginica | Mertensia virginica | Virginia Bluebells | | 5 FACW | | -1 Forb | Perennial | Native |
| Parthenocissus quinquefolia | Parthenocissus quinquefolia | Virginia-Creeper | | 2 FACU | | 1 Vine | Perennial | Native |
| Phryma leptostachya | Phryma leptostachya | Lopseed | | 4 UPL | | 2 Forb | Perennial | Native |
| Populus deltoides | Populus deltoides | Eastern Cottonwood | | 2 FAC | | 0 Tree | Perennial | Native |
| Quercus alba | Quercus alba | Northern White Oak | | 5 FACU | | 1 Tree | Perennial | Native |
| Quercus bicolor | Quercus bicolor | Swamp White Oak | | 6 FACW | | -1 Tree | Perennial | Native |
| Quercus macrocarpa | Quercus macrocarpa | Burr Oak | | 5 FAC | | 0 Tree | Perennial | Native |
| Quercus rubra | Quercus rubra | Northern Red Oak | | 7 FACU | | 1 Tree | Perennial | Native |
| Rudbeckia laciniata | Rudbeckia laciniata | Green-Head Coneflower | | 5 FACW | | -1 Forb | Perennial | Native |
| Salix nigra | Salix nigra | Black Willow | | 4 OBL | | -2 Tree | Perennial | Native |
| Sambucus nigra ssp. canadensis | Sambucus canadensis | Black Elder | | 1 FACW | | -1 Shrub | Perennial | Native |
| Solidago canadensis | Solidago canadensis | Canadian Goldenrod | | 1 FACU | | 1 Forb | Perennial | Native |
| Solidago ulmifolia | Solidago ulmifolia | Elm-Leaf Goldenrod | | 5 UPL | | 2 Forb | Perennial | Native |
| Symphotrichum lateriflorum | Aster lateriflorus | Farewell-Summer | | 4 FACW | | -1 Forb | Perennial | Native |
| Toxicodendron radicans | Rhus radicans | Eastern Poison-Ivy | | 2 FAC | | 0 Vine | Perennial | Native |
| Ulmus americana | Ulmus americana | American Elm | | 3 FACW | | -1 Tree | Perennial | Native |
| Verbena alternifolia | Actinomeris alternifolia | Wingstem | | 5 FACW | | -1 Forb | Perennial | Native |
| Viburnum lentago | Viburnum lentago | Nanny-Berry | | 5 FAC | | 0 Shrub | Perennial | Native |
| Viburnum prunifolium | Viburnum prunifolium | Smooth Blackhaw | | 5 FACU | | 1 Shrub | Perennial | Native |
| Vitis riparia | Vitis riparia | River-Bank Grape | | 2 FACW | | -1 Vine | Perennial | Native |
| Zizania aquatica | Zizania aquatica | Indian Wild Rice | | 10 OBL | | -2 Grass | Annual | Native |

SITE: River Riparian
 LOCALE: Park to Riparian Savanna FWP
 BY: Zylka
 NOTES:

| CONSERVATISM-BASED METRICS | | ADDITIONAL METRICS | |
|----------------------------|-------|--------------------------|------|
| MEAN CN(NATIVE SPECIES) | 6.02 | SPECIES RICHNESS(ALL) | 52 |
| MEAN C(ALL SPECIES) | 6.02 | SPECIES RICHNESS(NATIVE) | 52 |
| MEAN CN(NATIVE TREES) | n/a | % NON-NATIVE | 0.00 |
| MEAN CN(NATIVE SHRUBS) | 6.00 | WET INDICATOR(ALL) | 0.90 |
| MEAN CN(NATIVE HERBACEOUS) | 6.02 | WET INDICATOR(NATIVE) | 0.90 |
| FQAI(NATIVE SPECIES) | 43.41 | % HYDROPHYTE(MIDWEST) | 0.33 |
| FQAI(ALL SPECIES) | 43.41 | % NATIVE PERENNIAL | 0.94 |
| ADJUSTED FQAI | 60.19 | % NATIVE ANNUAL | 0.06 |
| % C VALUE 0 | 0.02 | % ANNUAL | 0.06 |
| % C VALUE 1-3 | 0.10 | % PERENNIAL | 0.94 |
| % C VALUE 4-6 | 0.48 | | |
| % C VALUE 7-10 | 0.40 | | |

| SPECIES NAME | SPECIES(SYNONYM) | COMMONNAME | C VALUE | WETINDICATOR | WETFACOR | HABIT | DURATION | NATIVITY |
|--|---|-----------------------------|---------|--------------|----------|----------|-----------|----------|
| <i>Andropogon gerardii</i> | <i>Andropogon gerardii</i> | Big Bluestem | | 5 FAC | | 0 Grass | Perennial | Native |
| <i>Bouteloua plantagineum</i> | <i>Caalia plantaginea</i> | Groove-Stem Indian-Plantain | | 10 FAC | | 0 Forb | Perennial | Native |
| <i>Asclepias sullivantii</i> | <i>Asclepias sullivantii</i> | Prairie Milkweed | | 3 UPL | | 2 Forb | Perennial | Native |
| <i>Asclepias syriaca</i> | <i>Asclepias syriaca</i> | Common Milkweed | | 0 FACU | | 1 Forb | Perennial | Native |
| <i>Baptisia alba var. macrophylla</i> | <i>Baptisia leucantha</i> | White Wild Indigo | | 8 FACU | | 1 Forb | Perennial | Native |
| <i>Bouteloua curtipendula</i> | <i>Bouteloua curtipendula</i> | Side-Oats Grama | | 8 UPL | | 2 Grass | Perennial | Native |
| <i>Brickellia eupatorioides var. corymbulosa</i> | <i>Kuhnia eupatorioides corymbulosa</i> | False Boneset | | 6 UPL | | 2 Forb | Perennial | Native |
| <i>Camassia scilloides</i> | <i>Camassia scilloides</i> | Atlantic Camas | | 6 FAC | | 0 Forb | Perennial | Native |
| <i>Carex bicknellii</i> | <i>Carex bicknellii</i> | Bicknell's Sedge | | 10 FACU | | 1 Sedge | Perennial | Native |
| <i>Carex brevior</i> | <i>Carex brevior</i> | Short-Beak Sedge | | 4 FAC | | 0 Sedge | Perennial | Native |
| <i>Carex gravida</i> | <i>Carex gravida</i> | Heavy Sedge | | 4 FACU | | 1 Sedge | Perennial | Native |
| <i>Carex molesta</i> | <i>Carex molesta</i> | Troublesome Sedge | | 2 FAC | | 0 Sedge | Perennial | Native |
| <i>Castilleja coccinea</i> | <i>Castilleja coccinea</i> | Scarlet Indian-Paintbrush | | 10 FAC | | 0 Forb | Annual | Native |
| <i>Ceanothus americanus</i> | <i>Ceanothus americanus</i> | New Jersey Tea | | 6 UPL | | 2 Shrub | Perennial | Native |
| <i>Chamaecrista fasciculata</i> | <i>Cassia fasciculata</i> | Sleepingplant | | 5 FACU | | 1 Forb | Annual | Native |
| <i>Coreopsis palmata</i> | <i>Coreopsis palmata</i> | Prairie Tickseed | | 6 UPL | | 2 Forb | Perennial | Native |
| <i>Coreopsis tripteris</i> | <i>Coreopsis tripteris</i> | Tall Tickseed | | 5 FAC | | 0 Forb | Perennial | Native |
| <i>Dalea candida</i> | <i>Petalostemum candidum</i> | White Prairie-Clover | | 9 UPL | | 2 Forb | Perennial | Native |
| <i>Dalea purpurea</i> | <i>Petalostemum purpureum</i> | Purple Prairie-Clover | | 9 UPL | | 2 Forb | Perennial | Native |
| <i>Desmodium illinoense</i> | <i>Desmodium illinoense</i> | Illinois Tick-Trefoil | | 6 UPL | | 2 Forb | Perennial | Native |
| <i>Echinacea pallida</i> | <i>Echinacea pallida</i> | Pale Coneflower | | 8 UPL | | 2 Forb | Perennial | Native |
| <i>Elymus canadensis</i> | <i>Elymus canadensis</i> | Nodding Wild Rye | | 4 FACU | | 1 Grass | Perennial | Native |
| <i>Elymus virginicus</i> | <i>Elymus virginicus</i> | Virginia Wild Rye | | 4 FACW | | -1 Grass | Perennial | Native |
| <i>Fragaria virginiana</i> | <i>Fragaria virginiana</i> | Virginia Strawberry | | 1 FACU | | 1 Forb | Perennial | Native |
| <i>Gentiana alba</i> | <i>Gentiana flavida</i> | Yellow Gentian | | 9 FACU | | 1 Forb | Perennial | Native |
| <i>Helopsis helianthoides</i> | <i>Helopsis helianthoides</i> | Smooth Oxeye | | 5 FACU | | 1 Forb | Perennial | Native |
| <i>Hesperis richardsonii</i> | <i>Hesperis richardsonii</i> | Richardson's Alumroot | | 8 FACU | | 1 Forb | Perennial | Native |
| <i>Hypoxis hirta</i> | <i>Hypoxis hirta</i> | Eastern Yellow Star-Grass | | 9 FAC | | 0 Forb | Perennial | Native |
| <i>Liatis aspera</i> | <i>Liatis aspera</i> | Rough Gayfeather | | 6 UPL | | 2 Forb | Perennial | Native |
| <i>Liatis pycnostachya</i> | <i>Liatis pycnostachya</i> | Cat-Tail Gayfeather | | 8 FAC | | 0 Forb | Perennial | Native |
| <i>Monarda fistulosa</i> | <i>Monarda fistulosa</i> | Oswego-Tea | | 4 FACU | | 1 Forb | Perennial | Native |
| <i>Panicum virgatum</i> | <i>Panicum virgatum</i> | Wand Panic Grass | | 5 FAC | | 0 Grass | Perennial | Native |
| <i>Pedicularis canadensis</i> | <i>Pedicularis canadensis</i> | Canadian Lousewort | | 9 FACU | | 1 Forb | Perennial | Native |
| <i>Physostegia virginiana</i> | <i>Physostegia virginiana</i> | Obedient-Plant | | 6 FACW | | -1 Forb | Perennial | Native |
| <i>Phytolacca americana</i> | <i>Phytolacca americana</i> | American Pokeweed | | 1 FACU | | 1 Forb | Perennial | Native |
| <i>Ratibida pinnata</i> | <i>Ratibida pinnata</i> | Yellow Coneflower | | 4 UPL | | 2 Forb | Perennial | Native |
| <i>Rudbeckia hirta</i> | <i>Rudbeckia hirta</i> | Black-Eyed-Susan | | 1 FACU | | 1 Forb | Perennial | Native |
| <i>Rudbeckia triloba</i> | <i>Rudbeckia triloba</i> | Brown-Eyed-Susan | | 3 FACU | | 1 Forb | Annual | Native |
| <i>Silene regia</i> | <i>Silene regia</i> | Royal Catchfly | | 10 UPL | | 2 Forb | Perennial | Native |
| <i>Silphium integrifolium</i> | <i>Silphium integrifolium deamii</i> | Entire-Leaf Rosinweed | | 3 UPL | | 2 Forb | Perennial | Native |
| <i>Silphium laciniatum</i> | <i>Silphium laciniatum</i> | Compass-Plant | | 5 UPL | | 2 Forb | Perennial | Native |
| <i>Silphium terebinthinaceum</i> | <i>Silphium terebinthinaceum</i> | Prairie Dock | | 5 FAC | | 0 Forb | Perennial | Native |
| <i>Sisyrinchium albidum</i> | <i>Sisyrinchium albidum</i> | White Blue-Eyed-Grass | | 7 FACU | | 1 Forb | Perennial | Native |
| <i>Sorghastrum nutans</i> | <i>Sorghastrum nutans</i> | Yellow Indian Grass | | 5 FACU | | 1 Grass | Perennial | Native |
| <i>Symphoricarum ericoides</i> | <i>Aster ericoides</i> | White Heath American-Aster | | 5 FACU | | 1 Forb | Perennial | Native |
| <i>Symphoricarum laeve</i> | <i>Aster laevis</i> | Smooth Blue American-Aster | | 9 FACU | | 1 Forb | Perennial | Native |
| <i>Symphoricarum novae-angliae</i> | <i>Aster novae-angliae</i> | New England American-Aster | | 4 FACW | | -1 Forb | Perennial | Native |
| <i>Symphoricarum oolentangiense</i> | <i>Aster azureus</i> | Azure Aster | | 8 UPL | | 2 Forb | Perennial | Native |
| <i>Vernonia fasciculata</i> | <i>Vernonia fasciculata</i> | Prairie Ironweed | | 5 FACW | | -1 Forb | Perennial | Native |
| <i>Veronicastrum virginicum</i> | <i>Veronicastrum virginicum</i> | Culver's-Root | | 7 FAC | | 0 Forb | Perennial | Native |
| <i>Viola pedata</i> | <i>Viola pedata lineariloba</i> | Bird-Foot Violet | | 9 UPL | | 2 Forb | Perennial | Native |
| <i>Zizia aurea</i> | <i>Zizia aurea</i> | Golden Alexanders | | 7 FAC | | 0 Forb | Perennial | Native |

