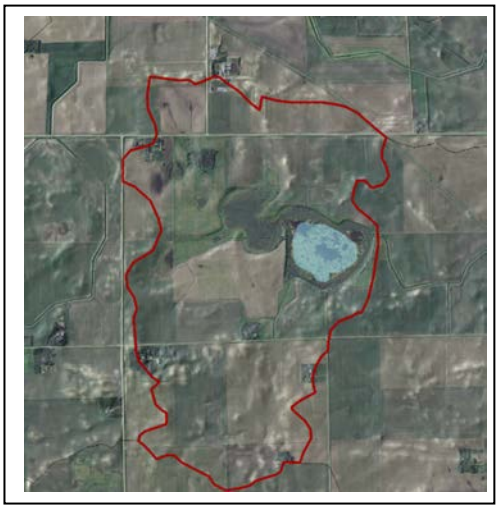
# Watershed Health Assessment Framework

## Glossary of Terms

**Watershed**: A 'true' watershed contains all the land and water features that drain excess surface water to a specific location on the landscape. In other words, standing on the land and looking around, everything uphill from that position routes water to that point and falls within its watershed.



Watershed boundary in red shows land that drains to the highlighted water body.

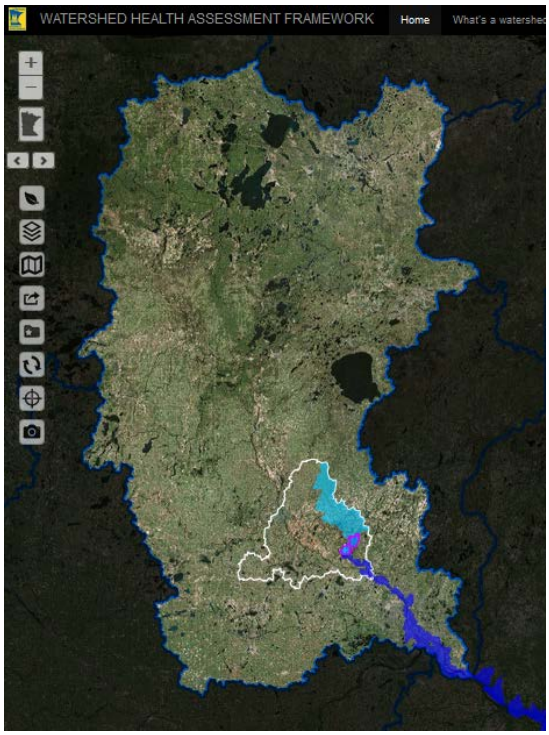
**MN DNR Catchment:** The MN DNR Catchment is a small sub-basin delineation of surface water divides and direction. There are more than 10,000 Catchments in Minnesota. Other watershed delineations in the WHAF build upon the Catchment delineation. This is also one of the spatial scales used to deliver WHAF health scores. (Pink outline in lower image)

**Major Watershed:** This administrative boundary is used for management and assessment of resources. This watershed scale is very similar to the HUC8 (Hydrologic Unit Code) watershed delineations. There are 81 Major Watersheds in Minnesota. In many cases a Major Watershed is not a 'true' watershed but rather a delineated boundary within a larger watershed. Major Watershed boundaries are built upon a collection of MN DNR Catchments. This is another spatial scale used to deliver WHAF health scores. (White outline)

**Upstream:** The true watershed for each MN DNR Catchment is referred to as its 'upstream area'. Based on each catchment's hydrologic position, its true watershed. (Bright blue fill)

**Major River Basin:** A group of Major Watersheds that contribute to the same major river system are referred to as a Major River Basin. This scale can be used to compare and contrast watersheds that are hydrologically connected by the same surface water network. Minnesota holds the headwaters to four distinct major river basins; Red River of the North, Mississippi River, Lake Superior, and Missouri River. (Large area mask)

**Downstream:** This delineation highlights the catchments that receive surface water flow from a selected catchment location. This is not a watershed boundary but rather a trace of surface water directionality and connection. (Dark blue fill)




Nested watershed scales build upon the Catchment scale: Basin (mask), Major Watershed (white outline), Upstream (bright blue), Catchment (pink outline), Downstream (dark blue).

**Nested Watershed Scales:** Each watershed scale 'nests' inside other smaller and larger scale delineations. In the WHAF, there are 4 scales that are pre-calculated and delivered. DNR Catchment, Upstream, Major Watershed and Major River Basin. There is also a 'Downstream' scale that selects catchments that receive surface water flow.

**Health Index:** A health index is a range of values (scaled from 0-100) that compare important ecological conditions across the state of Minnesota. Each index must represent an ecologically meaningful relationship, the data used in the calculation must be consistently available statewide, and the data is likely to be collected over time.

**Health Metric:** A health metric must meet the same criteria as a Health Index, but its value is calculated for a subset of data inputs. Each metric is related to a specific Health Index but not all indices have underlying metrics.

The health score summary table (pdf) displays more detail about the data sources and scoring for each index and metric.

**Component:** This term describes different parts of the natural system. It is an arbitrary separation of the system to allow analysis from multiple viewpoints. The WHAF uses 5 components to measure and compare watershed systems; Hydrology, Geomorphology, Biology, Connectivity and Water Quality

## HEALTH SCORES BY COMPONENT

**Hydrology:** The inter-relationships and interactions between water and its environment in the hydrological cycle.

**Health Index and Metric List:**

- Perennial Cover (Amount of permanent vegetation covering the landscape),
- Impervious Surface (Amount of hard surface that doesn't allow water to penetrate),
- Water Withdrawal (Amount of water permitted to be used for homes, manufacturing and agriculture compared to available water runoff)
- Hydrologic Storage (Loss of places that hold water and allow it to soak in.)
    - Loss of areas that historically held water, replaced by other land uses
    - Altered watercourses that no longer meander or have natural channels
- Stream Flow Variability (High and low stream flows, flooding and drought, "flashiness" or rapid change in flow level that are more extreme than expected)

**Geomorphology:** The study of landscape features; from their origin and evolution to the processes that continue to shape them.

**Health Index List:**

- Vulnerability to soil erosion (Steepness of slopes and ease of soil type to wash or weathered away)
- Groundwater Susceptibility to Contamination (Ease with which surface contaminants may reach ground water)
- Climate Vulnerability (The historic water balance between precipitation and evaporation; areas prone too much or too little moisture.)

**Biology:** The study of life. The biological systems that encompass and include the plant and animal species present in the stream, riparian lands, and contributing watershed.

**Health Index and Metric List:**

- Terrestrial Habitat Quality (The presence of habitat in sufficient size, shape and location to meet the needs of animals dependent on specific habitat types.

- Stream Species Quality (The health of populations of fish, invertebrates and mussels found in the streams)
    - Fish IBI
    - Aquatic Macroinvertbrate IBI
    - Mussel Site Quality
- Species Richness (The number of fish, mussels, birds and invertebrate species that can be found)
- At-Risk Species Richness (The number of rare species of fish, mussels and birds found)

**Connectivity:** The maintenance of pathways that move organisms, energy, and matter throughout the watershed.

**Health Index List:**

- Terrestrial Habitat Connectivity (Land cover and habitat configuration that allows animals to move between different patches of habitat)
- Aquatic Connectivity (The presence of structures that inhibit the ability of water, organisms and energy to flow freely through rivers and streams)
- Riparian Connectivity (Land uses that inhibit access of water and organisms to utilize floodplain and other land areas adjacent to water bodies.)

**Water Quality:** The chemical, biological, and physical characteristics of water; the current condition and future susceptibility of surface water and groundwater to degradation.

Health Index and Metric List

- Non-Point Sources (Distributed activities on the landscape that release sediment and contaminants that can reach water)
    - Phosphorus Risk
- Localized Sources (Density of known locations that discharge contaminants into the waterways)
    - Feedlot Animal Units
    - Potential Contaminants
    - Superfund Sites
    - Wastewater Treatment Plants
    - Open Pit Mines
    - Septic Systems
- Assessments (Percent of lakes and streams studied and found to have contaminants or conditions that do not meet EPA water quality standards)
    - Aquatic Life
    - Aquatic Recreation
    - Aquatic Consumption