DEPARTMENT OF NATURAL RESOURCES

WHAF Map Tools

Technical Reference Guide

August, 2021

Contents

Map Layout

The Interface

When you launch the WHAF web map, the map displays the "Streets" Basemap and two data layers; the DNR Major Watersheds in gray, and the DNR River Basins in blue.

The map has **three main panels of buttons**.

- The Navigation Panel (left-center)
- The Basemap Panel (bottom-center)
- The Toolbar Panel (right) and Help Menu (top-right)

In addition to the panels, there are **two informational windows**.

- The Set Location Indicator (top-left)
- The Watershed Information Indicator (bottom-left).
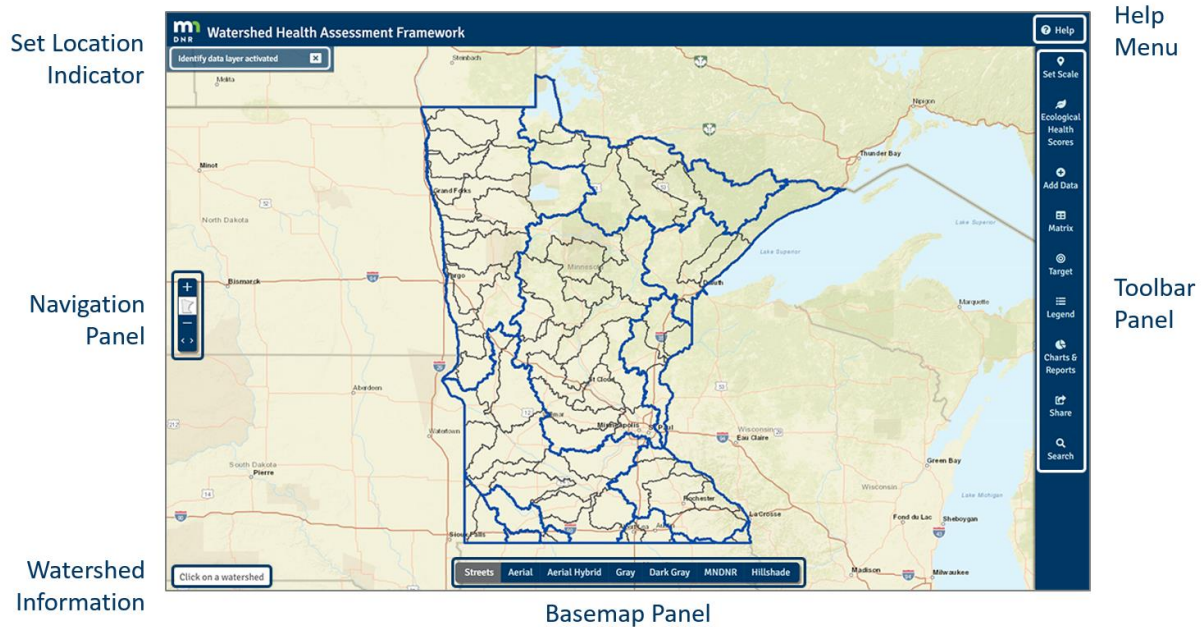
Navigation

There are **several ways to navigate in the map**, some of which are device-specific. To get the most out of your experience with the application we recommend using a desktop computer equipped with a modern web-browser.

- **Map navigation buttons**
  - **+** button to zoom in.
  - **-** button to zoom out.
  - **Minnesota** button to return to state-wide extent
  - **<** button to go to previously viewed extent.
  - **>** button to go to next extent (available only after '<' has been used)
- **The mouse**

- o Use **scroll wheel** to zoom in and out.
- o **Click and drag** the map to shift the center of focus.
- o Use **Shift + click to drag** and draw an extent frame. The map will then zoom to and center on that frame
- **Mobile/Touch screen**
  - o **Double tap** to zoom in.
  - o **Two-finger touch and draw together** to zoom in.
  - o **Two-finger touch and drag apart** to zoom out.
  - o **Touch and drag** to pan the map and shift center of focus

Set Location

Setting a location enables interaction with the watershed scales and other map tools.

- Click on the map to **Set Location**.
- If the location is successfully set, **a white X** will appear where the map was clicked.
- To interact with the complete suite of WHAF tools, the location must be set within Minnesota.

Once the location is set within Minnesota, the **Watershed information panel will display the location information** including the DNR Basin, the DNR Major Watershed, and the DNR Catchment.

If desired, the **location can be locked** (and unlocked) by toggling the lock location button in the "Set Location" indicator panel (top-left). By locking your location, you can click the map without inadvertently changing your location.


Click on the lock icon to temporarily lock location

Search

The **search function** is found at the bottom of the toolbar panel. This tool can help you pinpoint a known location. In addition to a standard address search, you can search by Major watershed name or Catchment ID.

- Click the **Search Button** to open the search pane.
  - o Type an **address** or **location name** to generate a list of possible matches.

- You can **filter the search** using the dropdown arrow to limit the search by category:
  - **Major Watershed (by name)**
  - **Catchment (by number)**
 - **Address**
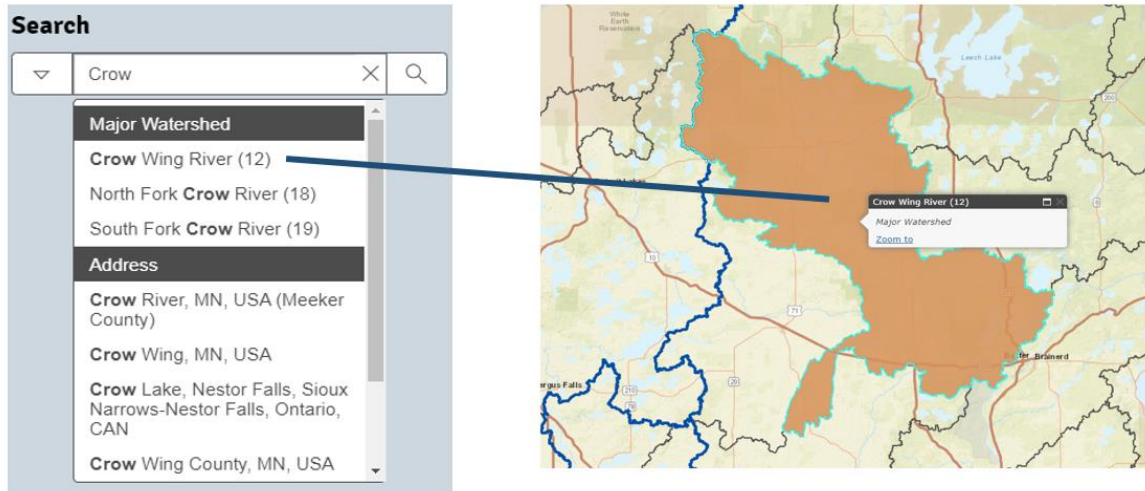
- **Click to select** your desired search result, the map will zoom to that feature and display a pop-up window with the location name.
- **Clear the highlighting** of the selected feature by clicking the 'X' in the pop-up window.

Basemaps

The available basemaps are listed by name across the basemap panel (bottom-middle of map).

- **Click on the basemap name** to change between the different options.
- The currently selected basemap button will have a gray background.
- As additional data is added to the map, it is often helpful to **change the basemap to accentuate the data of interest**.
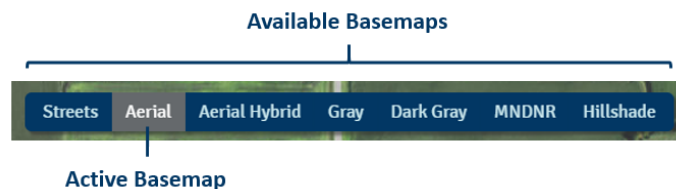
Several of the basemaps are unique to this application and warrant some additional description. The Aerial and Aerial Hybrid basemaps provide imagery collected through the National Agriculture Imagery Program (NAIP), all imagery within Minnesota was collected during the growing season of 2017. The **MNDNR basemap** is a thematic basemap highlighting Department of Natural Resources assets and features of interest (such as parks, natural areas, lakes, streams, and public water access points). The **Hillshade basemap** is a way of visualizing topography that helps users interpret the relative hill slope

and slope direction. Within Minnesota, the hillshade map is derived from high-resolution [LiDAR data](#), for all other areas the hillshade was created using the best available elevation data from the U.S. Geological Survey (USGS).

Map Tools

Set Scale

The Set Scale tool is found at the top of the Toolbar Panel (top-right of map). Set Scale tools display watershed boundaries on the map. Each watershed scale can be displayed on its own, or in combination with other scales to provide the hydrologic context of the landscape at your set location. The Set Scale window also provides the area[1] and name of each watershed scale, corresponding with the current set location. To learn more about what a watershed is and why it is important to natural resource management, visit *What is a Watershed?*.

Note: In order for these tools to work, you must first set a location on the map.

- Click the **Set Scale button** to open the panel.
  - For each scale, **click on one or more buttons to Mask, Fill, or Outline** the corresponding watershed scale.
  - Click **Zoom** to change your scale of interest.
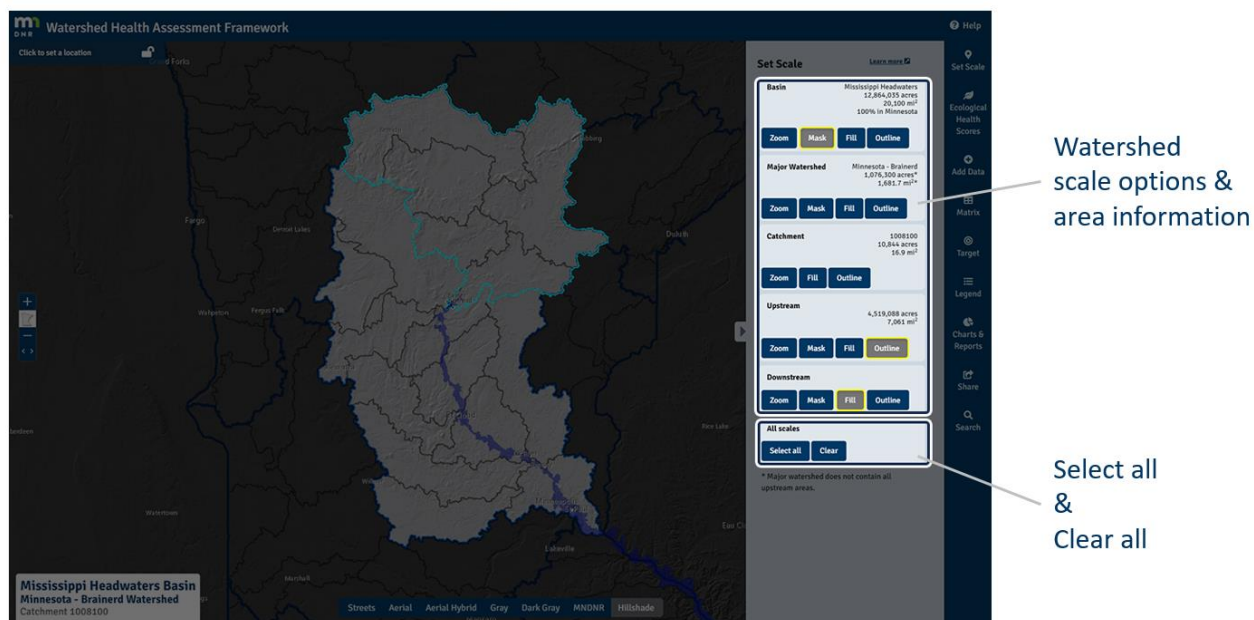
You can quickly display a combination of the five scales using the **Select all** button, and you can remove all watershed scales with the **Clear** button.

If you click on the map to change your location, the watershed boundaries and location information will automatically redraw using your selected symbols.

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[1] The watershed area is calculated using NAD83 UTM15N projection. The values correspond with the area highlighted by the scale button.
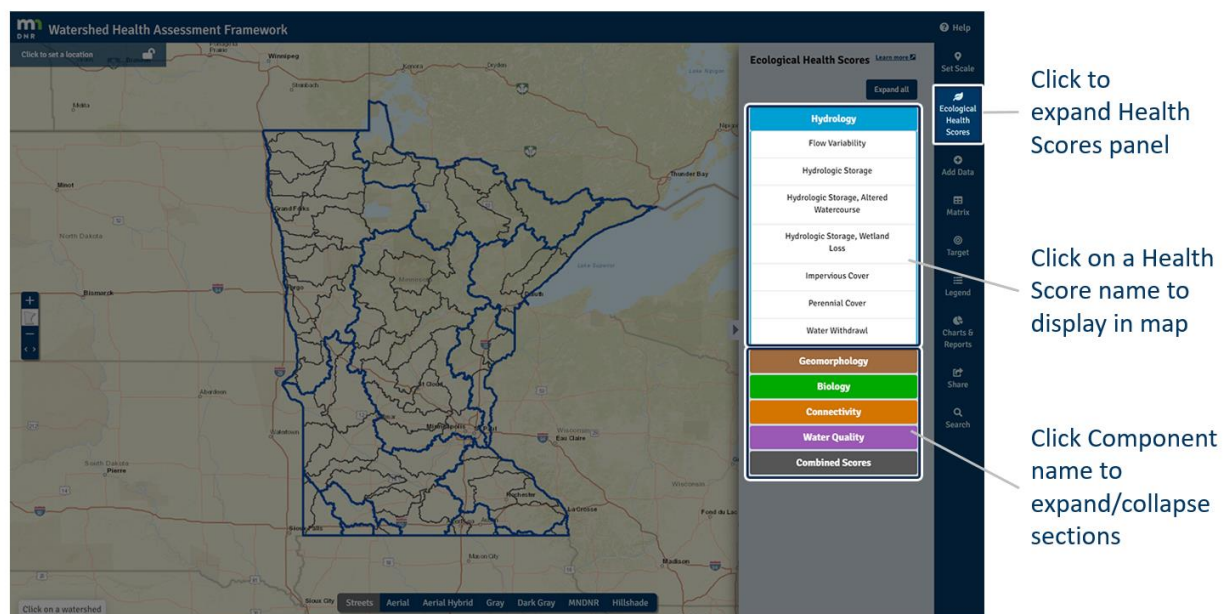
Ecological Health Scores

The Ecological Health Scores are a set of statewide scores that describe the ecological conditions of watersheds. These scores to make it easier to bring a wide range of considerations into an investigation or resource management decision.

The **Health Scores are organized within five components** (i.e., categories) of ecological health: Hydrology, Biology, Geomorphology, Connectivity, and Water Quality. Every health score has a potential **range of values from 0 to 100**, where **0 is a poor condition** and **100 is a good condition**. For more information, including a detailed description with data and methods, go to the Watershed Health Scores webpage.
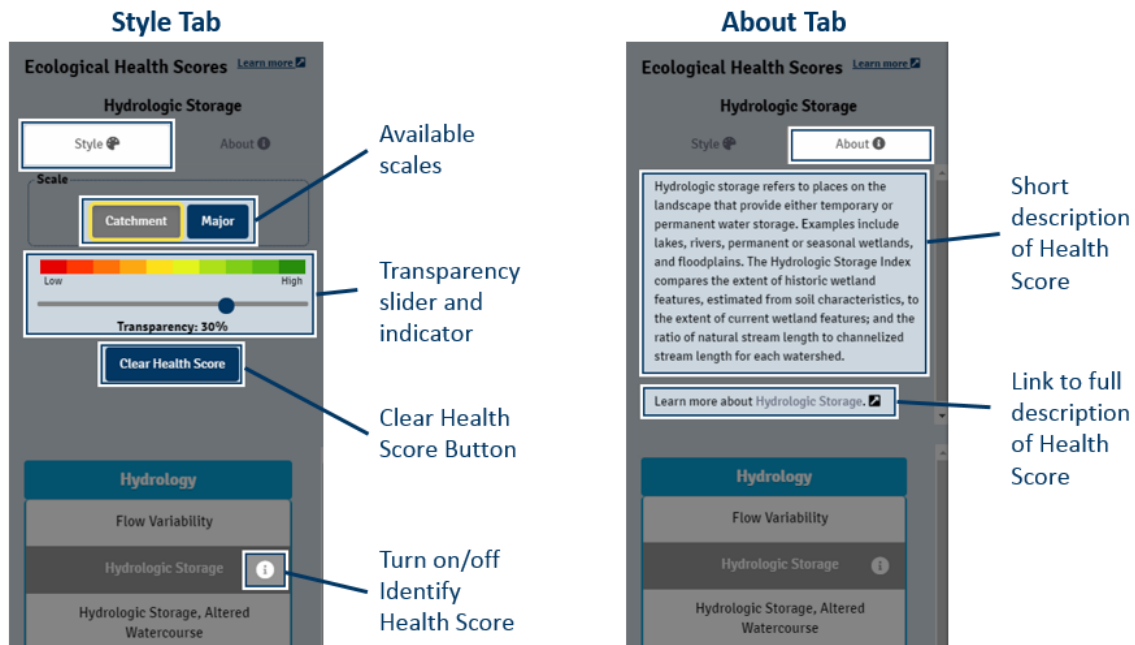
To access health scores in the map,

- Click the **Ecological Health Scores button** to expand the Health Score panel.
- Click the Component headings to **expand or collapse the list of health scores.**
- Click a **Health Score name to add it to the map**.
  Note: Only one health score can be displayed at a time.

- After selecting a Health score **additional options** will appear at the top of the Ecological Health Scores Panel. Options are split into two tabs: Style and About.
  - **Style tab**
    - Switch between the **Catchment and Major scales** (Note: not all Health Scores are available at both scales).
    - Adjust **transparency** using the transparency slider.
    - Remove the active Health score with the **Clear Health Score** button.
  - **About tab**,
    - **Read a short description** of the currently displayed Health score.
    - **Link to the detailed health score description**.

Style Tab / **About Tab**

Available scales

Transparency slider and indicator

Clear Health Score Button

Short description of Health Score

Link to full description of Health Score

Turn on/off Identify Health Score

- When a Health score is active, an **identify icon** will appear next to the name.
  - Click the 'I' icon; it will turn blue. The indicator text box (upper-left) will show 'Identify health score activated'.
  - With the tool active, **click on the map**.
  - The **Watershed Information Indicator** (text box, lower-left) **will display the score** for the watershed at that location.

Add Data

The web map delivers over 150 additional spatial data layers to support your exploration of watershed conditions. The Add Data panel allows you to filter data by category or search by dataset name.

- Click **Add Data** to expand the Add Data panel.
- The top of the panel displays the **Active Data Layers**. To interact with these layers:
  - Select the on/off switch to toggle the layer on or off.
  - Select and drag a layer to change the **drawing order of the layers.** Layers at the top of the list will draw on top of layers at the bottom of the list.
  - The **Hillshade Topography** layer is always in the list, and has the additional option of allowing the user to adjust transparency. Drag the transparency slider to make a change.
  - To activate the **identify function**,
    - **Click on a layer name** in the Active Data Layers list.
    - When active, the layer name will turn blue and the Set Location Indicator (upper-left) will show 'Identify data layer activated.'
    - Click on a feature in the map to **display information attributes.**
    - **Turn off identify** by clicking on the highlighted layer name or, use the **X** button in the Set Location Indicator window (upper-left).

Add Data

Active Data Layers

All (available) Data Layers

Active Data Layers

Turn layer On/Off

Remove layer from Active Data Layer list

Click on layer name to turn on identify

- The bottom panel provides access to **All Data Layers.**
  - To **filter the list by name, category or both**:
    - Type in the **Search data layers** field to find matching names.
    - Select a **topic category** from the drop-down menu.
  - To **add and remove data** layers in the map:
    - **Click on a layer name** to add it to the top Active Data Layers list.
    - That layer name will be shaded gray, and the **+** symbol next to the name will change to a **−**
    - Click the name again in the bottom list, and the layer will be removed from Active Layers and return to the All Data Layers list, or
    - Click the 'X' in the Active Data Layers list to remove a data layer.

All Data Layers

Type in search form to filter layers by name

Clear filter settings

Select option from drop-down to filter by category

Click on layer name to add to Active Data Layers

+/- indictor tells you if the data is in the Active Layers list

- Click on the **Learn More** link at the top of the Add Data panel to open the [GIS Data Sources](#) webpage, with **detailed descriptions of each dataset and links to the source data and metadata**.

Legend

The legend panel will open the map's dynamically changing legend. The panel displays the key for each data layer in the Active Data Layers list that is turned on. It will also display a key for the health score if there is one displayed in the map.

Share Map

The Share tool allows the user to create and share custom map views. When the tool is activated, a snapshot of the current map settings are recorded and embedded into the URL. Whenever that URL is re-opened, the original saved WHAF map will be displayed.

- Configure the map that you want to share.
- Click on the Share button to capture the map settings and configure the custom URL.
    - Click on the **Copy link to clipboard** button to temporarily save the URL to your computer's clipboard. Use the keyboard shortcut Ctrl+V (or Cmd+V on Mac) to paste the URL into another document.
    - Click on the **Share link via email** button and your default email application will open with the link copied into a new email.
- To create another URL based on different map settings, simply click on the Share button again, each time the panel opens it will reflect the current map settings.

The Share Map URL stores:

- Zoom level and extent
- Basemap
- Current Set Location
- Active Watershed Scales
- Ecological Health Score
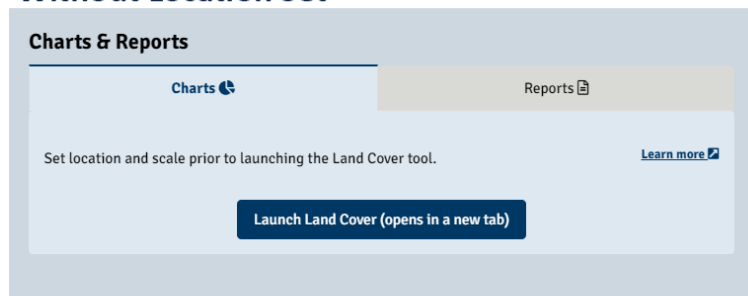- Add Data Layers
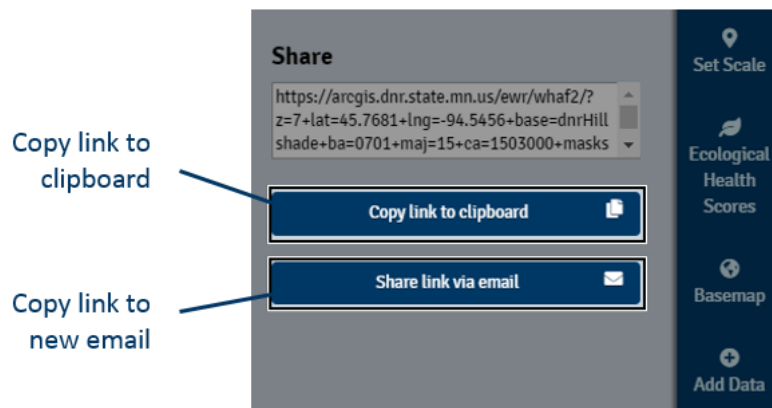
Charts and Reports

The Charts & Reports panel provides access to PDF reports created for each Major watershed, and the portal to launch the WHAF Land Cover application in a separate browser tab. The Major watershed reports include the **Watershed Health Report Card**, the **Watershed Context Report**, and the **Climate Summary for Watersheds**. The **WHAF Land Cover application** provides data and chart summaries that describe land cover patterns for each watershed at each watershed scale. The data that is being summarized includes general land classes (NLCD), detailed crop classes (Cropland Data Layer), long-term crop history (USDA-NASS County Crop Surveys), and permitted water withdrawals (MN DNR Water Appropriations Permits).
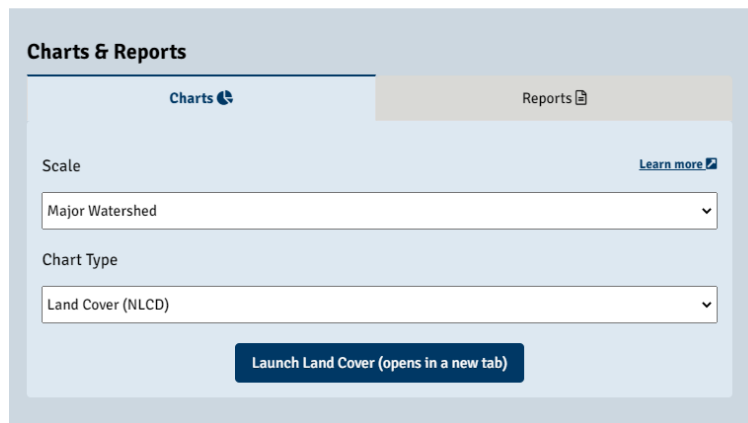
- Click on the **Charts & Reports** button to expand the panel.
- There are two tabs within the panel, one for Charts and one for Reports. When you first open the panel the **Charts tab** will be active.
  - If you open the panel **without location set**, there will be one button available: Launch Land Cover (opens in a new tab). Once opened, you can set scale and location from the Land Cover application menus.
  - If your **location is set** in the map, there will be two menu options: **scale** and **chart type**. Choose between the available watershed scales or counties, and select a chart type to begin viewing.
  - For instructions on using the Land Cover Application, refer to the Land Cover Use Guide.

Without Location Set

Charts & Reports	
Charts ◔	Reports 🖹

Set location and scale prior to launching the Land Cover tool.   Learn more ⬏

[Launch Land Cover (opens in a new tab)]

With Location Set

Charts & Reports	
Charts ◔	Reports 🖹

Scale   Learn more ⬏

[Major Watershed ⌄]

Chart Type

[Land Cover (NLCD) ⌄]

[Launch Land Cover (opens in a new tab)]

- The **Reports Tab** provides access to the Major Watershed reports, and the instructions and base data required to create a Google Earth flyover for a major watershed.
    - Select the Major watershed of interest from the menu. By default, the Major watershed of the current set location will be used. Once the watershed is selected, click on one of the report buttons to open or download the appropriate PDF file.
    - **Report card:** WHAF health scores summarizing the Catchment and Major watershed scores associated with the location.
    - **Context report:** Summary of the Major watershed's context; including the patterns of land form, habitat, and anthropogenic use that influence and inform the health patterns on the landscape.
    - **Climate summary:** Summary of historic climate data for each major watershed.
    - The **Google Earth Flyover** button downloads a .kmz file containing the geometry of the main river channel within the Major watershed. This file can be used with Google Earth desktop software to create an animated flyover of the main-stem river within each Major Watershed. Refer to the WHAF Google Earth Flyover Instructions for further details on how to build a flyover.


Matrix

The Matrix provides a table of all catchment-scale ecological health scores for your current location. The catchment scale corresponds to the single catchment value where your location is set. All other scales (upstream, major, and basin) are an average of the catchments that are contained within that scale boundary.

- Select the **Matrix button** to expand the panel.

- o If you have a location set in the map, the panel will be fully populated as displayed in the example image below.
- o If you do not have a location set, the matrix panel will be empty. Click on the map to set your location and populate the matrix. Each time you change your location, the matrix will refresh to reflect your new location.
- o The **watershed IDs** for your current location **are displayed at the top** of the panel.
- o Click the **Download table** button to download a table (.csv) of the health score values.
- o By default, the table of ecological health scores is sorted alphabetically on the health score name. Click on the other column headers to sort on the numeric fields.
- o Low health score **values of 40 and below are indicated in red text**.
- o Values of 'N/A' are present where no catchment scores are present (or group of catchments).

Location information

Download table button

Matrix button

Health score matrix
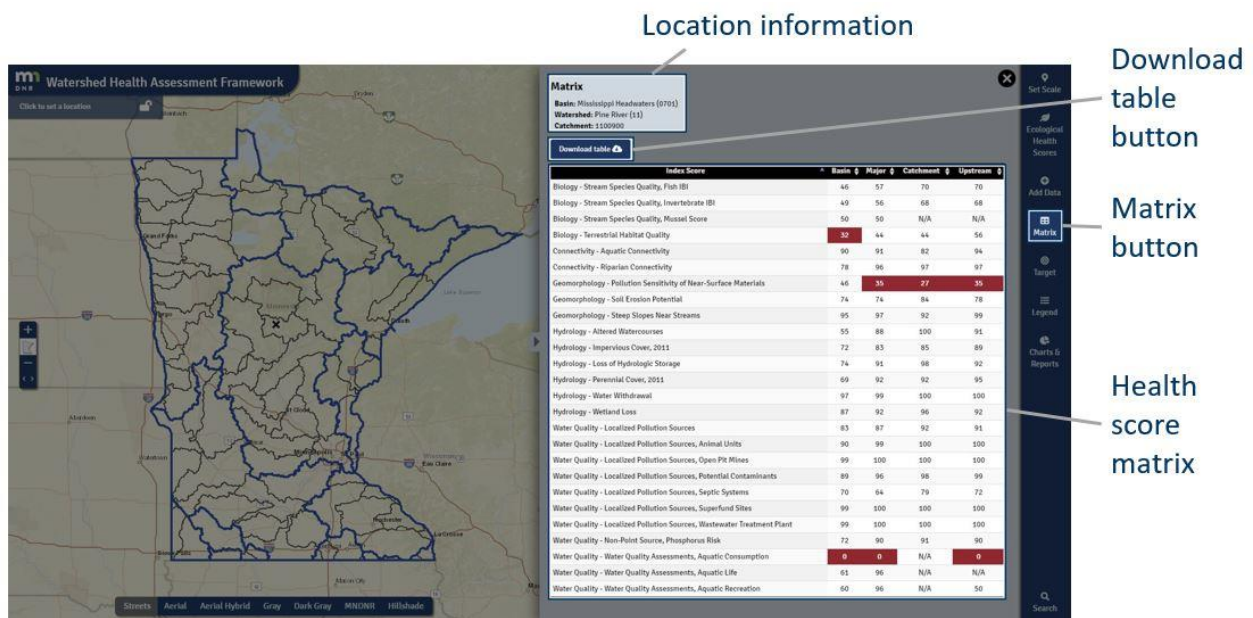
Target Catchments

The Target catchments tool was developed to serve DNR hydrologists that are tasked with identifying candidate sites for stream restorations.

The Targeting catchments tool includes a table of the catchments located within the selected Major watershed. A subset of eight ecological health scores is used to calculate a mean health score (i.e., the geomorphology triage score). Using the table and tools, you can compare catchment conditions through a consistent and repeatable process.

- • Click the **Target catchments** button to expand the panel.
  - o If you have a location set in the map, the panel will be fully populated as displayed in the example image below.
  - o If you do not have a location set, the Target panel will be empty. Click on the map to set your location and populate the table. Each time you change your location, the table will refresh to reflect your new location.

- The **watershed IDs** for your current location **are displayed at the top** of the panel.
- Click the **Download table** button to download a table (.csv) of the table values.
- The **Mean score**, i.e. Geomorphology triage score, can be added as a map layer from the Ecological health scores tool (under the Combined scores group).
- By default, the table is sorted on the Mean score from highest to lowest. Click on the other column headers to sort on any of the other fields.
- The **Tools column** provides three functions.
    - Click on the **Map button** to highlight the catchment that corresponds to the record in the table.
    - Click on the **Zoom button** to zoom to the catchment.
    - Click on the **Chart button** to open a graphical representation of the Geomorphology triage score. The graph compares the score at the catchment scale to the distribution of scores for the upstream, major, basin and statewide scales.
- Type into the **Search window** to filter the table records based on matching text, this feature is typically used to locate a record by the Catchment ID.

Location information   Zoom to Major button   Download table button   Search table   Target button   Target catchments table

Additional Resources

The **WHAF webpages** contain additional information about the key concepts that the application is designed around, as well as detailed descriptions of all of the Ecological Health Scores and additional data layers.

For questions and guidance on managing for watershed health, or for information on the WHAF application, **contact the WHAF team** at **whaf.dnr@state.mn.us**.