

NNRW User Help

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NNRW User Guide

This User Guide explains the purpose of the NNRW web resource, how it can be used, and provides definitions for terms used on the website. The guide will be expanded and modified based on user feedback. If you have suggestions please [Contact Us](#).

The National Network of Reference Watersheds is a collaborative and multipurpose network of watersheds and monitoring sites that provides watershed information and water-quality data to understand the effects of land use change, water use, atmospheric deposition, and climate change on freshwater ecosystems. The purpose of this web resource is to provide users with access to land use characteristics and water-quality and discharge data (where available) for watersheds across the United States. The NNRW database contains nearly 2,500 reference watersheds.

Information about the reference criteria used by programs and networks in the NNRW database are included under the [Programs and Networks](#) section.

Webpage Descriptions

About NNRW

The About NNRW page provides basic information about the National Network of Reference Watersheds.

Today's Featured Watershed: This area of the page shows a short description of a watershed randomly selected from our database. Clicking on the watershed name will display a detailed site description and allow the user to access data for the watershed.

Watersheds Where I live: This feature returns the 10 closest watersheds to the zipcode or coordinates provided by the user and a map showing the watershed closest to the zipcode or coordinates provided. Clicking on the watershed name will display a detailed site description including a summary of selected water quality parameters if available. Only [NNRW Core Reference watersheds](#) are included in this search. This search can take a few moments.

Core Watersheds

The NNRW has defined a set of core watersheds that represent the most pristine watersheds in the network. NNRW core watersheds meet the following criteria:

Low hydrologic disturbance (dams, water withdrawal, pollutant discharge, etc.); 0% Row Crops; < 5% Pasture; 0% High Impact Development; 0% Medium Impact Development; < 10% Total Development (High + Medium + Low). These criteria are currently based on the 2006 National Land Cover Dataset, these criteria will be updated based on the 2011 NLCD during 2015.

Searches on the core watershed page do not include land use characteristics since these have been predefined by our core watershed criteria. The core watersheds are searchable based on:

1. Areas of Interest

Watersheds may be selected based on [US states and territories](#), [Environmental Protection Agency Level II Ecoregions](#), and [USGS Water Resource Regions](#).

2. Select Sites by Group

Watersheds may be selected based on the Agency or Partner responsible for the site and/or the program or network to which the site belongs; watersheds may belong to more than one network or program. This search function is particularly useful for the agencies that contribute watersheds to the network to access their own watersheds quickly.

3. Water Quality Data

Water quality data are delivered by linking to the [National Water Quality Monitoring Council's Water Quality Portal](#). The data retrieved from the portal are limited by the site selection criteria specified by the user, [the selected water quality characteristic groups](#), and time period. Water quality characteristic groups are defined by the Water Quality Portal, not by NNRW. The primary water quality data sources for the Water Quality Portal are the [USGS National Water Information System](#) database and the [EPA STORET](#) (storage and retrieval) database. For more information about those water quality data sources and data quality click on the links provided.

4. Proximity to NADP Station

Limit the selected watersheds to those within a certain distance to a [National Atmospheric Deposition Program](#) station. Selecting a distance of zero kilometers includes only those watersheds with an NADP station within its boundary.

5. Watershed Area and Elevation

Allows the user to specify the range in watershed areas desired and/or the range in elevation at the watershed outlet.

The "Submit" button must be clicked on whenever the search parameters are changed.

The "Download Water Quality" button send a query to the NWQMC Water Quality Portal and retrieves available data for the sites, water quality parameter groups, and date range selected.

The "Cumulative Frequency Chart" button plots the selected watersheds in relation to all watersheds in the NNRW database in terms of land use disturbance using the [NNRW land use disturbance metric](#)

As new watersheds are added to the network those that meet the Core Watersheds criteria will be added to the Core Watersheds list.

Watershed Search

The Watershed Search page allows users to search a database of nearly 2,500 reference watersheds. Currently, the majority of those watersheds are from the [U.S. Geological Survey GAGESII](#) dataset. Several hundred EPA watersheds are also included, additional watersheds will be added to the network as the network expands.

Search Parameters

1. Areas of Interest

Watersheds may be selected based on [US states and territories](#), [Environmental Protection Agency Level II Ecoregions](#), and [USGS Water Resource Regions](#).

2. Agency(s)/Partner(s)

Watersheds may be selected based on the Agency and/or program that contributed the watersheds to the network. This search function is particularly useful for the agencies that contribute watersheds to the network to access their own watersheds quickly.

3. Watershed Characteristics

This is the area to define the characteristics of the watersheds of interest. [Watershed Area](#) - input the range in watershed areas desired or leave blank to include all watersheds.

[Elevation at outlet](#) - the elevation is determined at the outlet of each watershed. Users may input a range in elevations or leave the field blank to return all watersheds.

[Land Use Classification](#) - Land use classification are based on the percent of area for each land use classification in each watershed. Users may specify greater than or equal to or less than or equal to the percentage chosen for each characteristic. Leave a field blank to include all watersheds.

[Disturbances Allowed](#) - Users are allowed to select whether 3 different types of flow alterations are allowed.

[Flow Alterations](#) indicate the presence of dams within the watershed as determined using the U.S. Army Corps of Engineers National Inventory of Dams.

[Pollutant Discharge](#) was determined based on the density of NPDES (National Pollutant Discharge Elimination System) "major" point locations in watershed; number per 100 km². Major locations are defined by an EPA-assigned major flag. From download of NPDES national database summer 2006.

[Water Withdrawals](#) are based on freshwater withdrawal in megaliters (1000 cubic meters) per year per sq km, from 1995-2000 from county-level estimates. All watersheds include some amount of water withdrawal based on this estimate so this disturbance must be checked in order to obtain any results.

Land Use Disturbance Metric - The NNRW Land Use Disturbance Metric was developed to rank the level of land use disturbance of all watershed in the network in relation to one another. The metric is unitless and scaled from 0 to 100 with 0 being undisturbed and 100 being most disturbed. The NNRW Land Use Disturbance Metric is calculated as:
% Agricultural Land Use + % Developed Land Use – Natural Land Use
This calculation produces a metric with a scale of -100 to 100. The metric is then divided by 2 and 50 is added to scale the metric from 0 to 100.

4. Water Quality Data Criteria

Water quality data are delivered by linking to the [National Water Quality Monitoring Council's Water Quality Portal](#). The data retrieved from the portal are limited by the site selection criteria specified by the user and by the [water quality characteristic groups](#) and time period selected. Water quality characteristic groups are defined by the Water Quality Portal, not by NNRW. Water quality data for individual watersheds can be downloaded for statistical analyses and interpretation. The primary water quality data sources for the Water Quality Portal are the [USGS National Water Information System](#) database and the [EPA STORET](#) (storage and retrieval) database. For more information about those water quality data sources and data quality click on the links provided.

Optional Map Layers

National Atmospheric Deposition Program Stations: selecting the "NADP Stations" checkbox will display all National Atmospheric Deposition Program stations on the Core Watershed map. All NADP stations have been associated with the closest watershed. Some of the NADP stations are located within NNRW watersheds, others in close proximity to an NNRW watershed. NADP stations have been associated with NNRW watersheds to allow users to easily link atmospheric deposition data with surface water-quality data from nearby watersheds.

Level II Ecoregions: selecting the "Level II Ecoregions" checkbox will display the 50 EPA Level II Ecoregions on the Core Watershed map. Level II Ecoregions denote areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources.

Water Resource Regions: selecting the "Water Resource Regions" checkbox will display the 21 USGS water resource regions on the Core Watershed map. The USGS water resource regions are geographic areas that contain either the drainage area of a major river or the combined drainage areas of a series of rivers.

Cooperators

The Cooperators page lists members of the National Water Quality Monitoring Council's Reference Watershed Executive Committee and the current list of network participants and funding sources.

Acronyms

ACWI: Advisory Council on Water Information

ESRI: ESRI is an international supplier of Geographic Information System software

NADP: The National Atmospheric Deposition Program

NNRW: The National Network of Reference Watersheds

NWQMC: National Water Quality Monitoring Council

U.S. EPA: United States Environmental Protection Agency

USGS: United States Geological Survey

Definitions

Reference Watershed: The NNRW defines a reference watershed as a watershed minimally disturbed by human activity preferably in an area protected from human-induced changes.

NNRW Core Reference Watersheds: The goal of the NNRW Core Reference watersheds is to define a group of watersheds that are the most pristine of the watersheds in our database. These watersheds are selected based on land use characteristics NNRW core watersheds meet the following criteria:

Low hydrologic disturbance (dams, water withdrawal, pollutant discharge, etc.); 0% Row Crops; < 5% Pasture; 0% High Impact Development; 0% Medium Impact Development; < 10% Total Development (High + Medium + Low); Natural vegetation + Barren Land > 75%. These criteria are currently based on the 2006 National Land Cover Dataset.

There are currently 529 NNRW Core watersheds, as new watersheds are added to the network those that meet the Core Watersheds criteria will be added to the Core Watersheds list.

NNRW Land Use Disturbance Metric: The NNRW Land Use Disturbance Metric was developed to rank the level of land use disturbance of all watersheds in the network in relation to one another. The metric is unitless and scaled from 0 to 100 with 0 being undisturbed and 100 being most disturbed. The metric can be also be used to put user search results into context with a larger population by plotting selected watersheds on a disturbance metric cumulative frequency diagram with all of the watersheds included in our database. The metric can also be used to identify the level of land use disturbance for a variety of uses. We strove to create a metric that can be calculated with readily accessible data, is easily understood, and has physical meaning.

The NNRW Land Use Disturbance Metric is calculated as:
 $\% \text{ Agricultural Land Use} + \% \text{ Developed Land Use} - \text{Natural Land Use}$

This calculation produces a metric with a scale of -100 to 100. The metric is then divided by 2 and 50 is added to scale the metric from 0 to 100.

Watershed percent "Developed", NLCD 2006. Sum of classes 21, 22, 23, and 24 (all urban classes)

Watershed percent "agriculture", NLCD 2006. Sum of classes 81 and 82 (pasture/hay + row crops)

Watershed percent "natural vegetation", NLCD 2006. Sum of classes 31 (natural barren), 41 - 43 (forest), 51 - 52 (shrubland), 71-74 (grasslands /herbaceous), and 90-95 (wetlands)

Agencies/Partners

NPS: National Park Service

U.S. EPA: United States Environmental Protection Agency

USFS: United States Forest Service

USGS: United States Geological Survey

California Department of Fish and Wildlife

Programs/Networks

U.S. EPA Long-Term Monitoring Network - The U.S. EPA LTM watersheds were selected based on land use. The primary objective of LTM is to detect long-term trends in acid/base status of lakes and streams across a gradient of acidic deposition. The LTM network consists of a subset lakes and streams that are particularly sensitive to acidity with most site records extending back to the early 1980s.

U.S. Geological Survey GAGES II Dataset - The GAGESII (Geospatial Attributes of Gages for Evaluating Streamflow) reference watershed designation is based on an evaluation of hydrologic disturbance. Reference and non-reference groups were determined using a hydrologic disturbance index, visual inspection of aerial imagery, and local knowledge of the watersheds. The methodology is described in detail in: Falcone and others, 2010, Quantifying human disturbance in watersheds: Variable selection and performance of a GIS-based disturbance index for predicting the biological condition of perennial streams. Ecological Indicators. 10, p. 264-273.

U.S. Geological Survey Hydro-Climatic Data Network - The U.S. Geological Survey's (USGS) Hydro-Climatic Data Network - 2009 (HCDN-2009) is an updated listing of streamgaging stations where discharge primarily reflects prevailing meteorological conditions. The stations have been screened to exclude those where human activities, such as artificial diversions, storage, and other activities in or near the stream channel, affect the natural flow of the watercourse. The purpose of the network is to provide a streamflow data set suitable for analyzing hydrologic variations and trends in a climatic context. HCDN-2009 is a subset of the USGS GAGES-II Reference stations.

U.S. Geological Survey Hydrologic Benchmark Network - The Hydrologic Benchmark Network (HBN) consists of 37 watersheds that provide long-term measurements of streamflow and water quality in areas that are minimally affected by human activities.

U.S. Geological Survey National Streamflow Informational Program (NSIP) - The mission of the NSIP is to provide streamflow information and the understanding required to meet local, State, regional, and national needs.

U.S. Geological Survey National Water Quality Assessment Reference Watersheds - NAWQA provides an understanding of national water-quality conditions; whether conditions are getting better or worse over time; and how natural features and human activities affect those conditions.