

**Development of a Digital Geospatial Database to  
Support the Connecticut Water Allocation Policy  
Planning Model**

Final Report

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## 1.0 INTRODUCTION

**Project Problem and Research Objectives:** During the summer of 2005, a special workgroup of the Water Planning Council Advisory Group was organized and charged with investigating how better to address water allocations issues in Connecticut. The workgroup issued a September 16, 2005 final report titled “Water Allocation Policy Planning Model Implementation Workgroup – Basin Screening,” and recommended that a comprehensive digital geospatial database be assembled to aid and support water allocation planning and basin screening in the state. Creation of this baseline database was identified as the first step necessary for proactive water allocation planning. The lack of such a database makes it difficult, if not impossible, to effectively and accurately assess the degree to which waters currently are allocated, where current and future demands exceed water availability, and how water allocation in one watershed compares to and impacts water allocation in other watersheds. Without this comprehensive and integrated database, water allocation decisions will continue to be made on a case by case basis and the cumulative impacts of decisions will continue to be difficult to assess.

**Funding and Duration:** The project was funded for two years from 03/01/2006 – 2/28/2008 (\$25,050 in year one and \$25,163 in year two) with a no-cost extension to 9/30/08. During the second year of the project, the Institute for the Application of Geospatial Technology (IAGT), Auburn, NY, also provided \$20,000 of funding support and technical assistance and was responsible for the creation of several datasets.

**Methods:** Initial work focused on researching the availability of GIS datasets that were identified in the proposal and acquiring those datasets that were deemed appropriate. This required looking into data availability not just in Connecticut but also for those portions of New York, Massachusetts and Rhode Island that drain into the state. The upper Connecticut River Watershed in Massachusetts, Vermont and New Hampshire was not included in this work and is outside the geographic scope of our work.

Several dataset issues were identified early on in the project. These include data standards and content for datasets that cross state lines. GIS datasets produced by state agencies are typically inconsistent from one state to another. For example, land cover mapping in all four states has been done but using different protocols, source data, and classification systems. Part of our work has been to acquire available datasets and to evaluate what will be necessary to combine them into “regional” datasets that extend into the surrounding states. Datasets produced by federal agencies tend to be created based on national standards and thus avoid these state boundary problems. Part of the data assessment included a determination of what data can be used from federal sources, which must come from state sources and what level of effort will be necessary to merge state datasets together. IAGT also conducted a data consistency review of the preliminary geospatial datasets and identified problems with data from different states and made recommendations about using standardized national datasets were appropriate. IAGT personnel also developed several datasets – Strahler stream order and Strahler catchment areas.

An issue that arose early in the project was what watershed units to use for basin characterization and screening. There were two choices:

1. CT DEP subregional watersheds, which include 374 watershed units to cover the state, or
2. NRCS HUC 12 Watershed Boundary Dataset (WBD), which includes 194 units to cover the state.

The WBDs are delineated to national standards and where possible their boundaries are coincidental with CT DEP watershed units. It was decided to use the WBD because it adheres to a national standard, the DEP will in the future be required to report data to EPA based on these hydrologic units and WBDs do a better job breaking up drainage areas along the mainstems of rivers. However, it should be noted that future development of metrics for CT subregional watersheds, should such be needed, will be a relatively simple task since the region-wide GIS datasets will be in place.

## **2.0 DATABASE DEVELOPMENT**

The following section describes the GIS datasets that were collected, reviewed, created and or processed to implement a digital geospatial database to support water allocation and basin screening for the state of Connecticut. All data was compiled from federal or state sources. A list of desirable datasets for basin screening was identified by a workgroup of the Connecticut Water Planning Council. These datasets are listed in Table 1. Some of the data identified as desired or even necessary for basin screening were not available in digital format at the time of the project. Additionally, because portions of some watersheds drain into Connecticut from other states, data needed to be gathered from New York, Massachusetts, and Rhode Island. In some instances, consistent data did not exist across state boundaries. Data that were evaluated as having sufficient consistency and quality across state boundaries are listed in Table 2. Datasets that do not cover areas outside Connecticut, but may contain more robust or applicable data are also listed in Table 2. The compiled datasets were grouped into four categories of data: Water Resources; Anthropogenic Influences; Water Resource Usage; and Hydrogeologic Data. The categorized datasets are shown in Table 3. After all available data was compiled for the entire study area, watershed metrics were calculated from source and derived datasets for each basin. A list of calculated metrics is provided in Table 4.

### 3.0 SUMMARY TABLES

Table 1. Data identified by the WAPPM workgroup and project PI's as desirable for basin screening.

<b>Data Identified by WAPPM Workgroup as Desirable for Basin Screening</b>
Aquifer Protection Areas
Census Block Data
Culverts
Dams and Impoundments
Discharges – permitted vs. actual
Diversion Withdrawals
Endangered Species
Ground Water Quality Classifications
Land Cover Data
Native Fish Habitat
Political Boundaries
Roads
Soils
Stocked Streams
Surface Water Quality Classifications
Surficial Materials
USGS Gaging Stations
Wild and Scenic River Designations
303D and 305B Water Quality Limited Streams
<b>Additional Data Identified by Project PI's as Desirable for Basin Screening</b>
Areas Experiencing or Anticipating Significant Growth
Committed Open Space
Estimates of Streamflow
Hydrography
Impervious Surfaces
Orthoimagery
Population Density
Potential Future Water Supplies
Precipitation
Safe Yield Calculations
Topography
Watershed Boundaries
Water Company Interconnections and Sales of Existing Water
Water Use
Water Utility Service Areas

Table 2: Data acquired for project. Includes data consistent across entire study area and those limited only to Connecticut.

<b>Data Acquired for Entire Study Area (Consistent across CT, NY, MA, RI)</b>
Average Annual Precipitation (PRISM)
Basin Stream Order
Census Blocks
Protected Open Space Areas
Dams (NID)
EPA Permit Compliance System Sites (Including Sewage Treatment Plants)
National Elevation Dataset 30m
National Hydrography Dataset (NHD) Rivers, Waterbodies, and Flowline
National Land Cover Data (2001)
Political Boundaries
Roads (TeleAtlas)
SSURGO Soils
Stream Order
USGS Gaging Sites
Watershed Boundaries (Watershed Boundary Dataset HUC 12, HUC 10, HUC 8)
<b>Derived Datasets for Entire Study Area</b>
Forested Areas
Impervious Surface
Population Density
Stream Crossings
Urbanized Areas
<b>Data Available Only for Connecticut</b>
Aquifer Protection Areas
Aquifer Protection Area Wells
Groundwater Quality
Leachate Wastewater Disposal Sites (Including Sewage Treatment Plants)
Permitted Water Diversion Locations
Public Water Supply Reservoirs
Registered Water Diversion Locations
Sewer Service Areas
Surficial Materials
Surface Water Quality
Water Service Areas
303D and 305B Water Quality Limited Streams

Table 3: Data categories for basin screening.

<b>Water Resources</b>	<b>Water Resource Use</b>
WBD HUC12 Watershed Boundaries	Aquifer Protection Area Wells
WBD HUC10 Watershed Boundaries	Aquifer Protection Areas
WBD HUC 8 Watershed Boundaries	EPA Compliance System Sites
NHD Flowlines (High Resolution)	Leachate Wastewater Disposal Sites
NHD Waterbodies (High Resolution)	Registered Water Diversions
NHD Rivers (High Resolution)	Permitted Water Diversions
Stream Order (derived from WRAPHydro)	Public Water Supply Reservoirs
<b>Hydrogeologic Data</b>	<b>Anthropogenic Influences</b>
Average Annual Precipitation	Census Blocks (Population Density)
Basin Stream Order	Protected Open Space
Ground Water Quality	Dams
National Elevation Dataset	Impervious Surface
SSURGO Soils	National Land Cover Data
Surface Water Quality	Political Boundaries
Surficial Materials	Roads
USGS Gaging Stations	Sewer Service Areas
303D and 305B Water Quality Limited Streams	Stream Crossings
	Water Service Areas

Table 4: Calculated watershed metrics

<b>Water Resources</b>	<b>Water Resource Use</b>
Area (acres) Area (square miles) Streams (miles) Stream Density (miles/square mile)	Number of Aquifer Protection Area Wells Number of Public Water Supply Reservoirs Total Capacity of Public Water Supply Reservoirs (MG) Use Capacity of Public Water Supply Reservoirs (MG) Number of Sewage Treatment Plants STP Flow Rate (MGD) STP Normalized Flow Rate (MGD/square mile) Registered Water Diversions Permitted Water Diversions Total Water Diversions Normalized Water Diversions (diversions/square mile)
<b>Hydrogeologic Data</b>	<b>Anthropogenic Influences</b>
Minimum Annual Precipitation (inches/year) Maximum Annual Precipitation (inches/year) Average Annual Precipitation (inches/year) % of Watershed Draining to 1° Stream % of Watershed Draining to 2° Stream % of Watershed Draining to 3° Stream % of Watershed Draining to 4° Stream  % of Watershed Draining to 5° Stream  % of Watershed Draining to 6° Stream % of Watershed Draining to 7° Stream	Roads (miles) Road Density (miles/square mile) Number of Stream Crossings Stream Crossing Density (number/square mile) Total Population Population Density (people/square mile) % Urbanization (Low, Medium, High Impact Development NLCD classes) % Forestation (Deciduous, Evergreen, Mixed Forest NLCD classes) % Impervious Surface (NLCD) % Open Water % Developed Open Space % Low Impact Development % Medium Impact Development % High Impact Development % Barren Land % Deciduous Forest % Evergreen Forest % Mixed Forest % Scrub Shrub % Grassland/Herbaceous % Pasture/Hay % Cultivated Cropland % Woody Wetland % Emergent Herbaceous Wetland Protected Open Space (square miles) % Protected Open Space Total Number of People with Sewer Service % of Watershed with Sewer Service Total Number of People with Water Service % of Watershed with Water Service



## 4.0 DESCRIPTIONS OF DATA

This section provides descriptions for each dataset, including data source, map scale and and assessment of multi-state consistency. The datasets are listed by category in alphabetical order.

### Water Resources

#### ***Watershed Boundary Dataset (WBD) HUC12, HUC10, HUC8***

Source: Natural Resources Conservation Service

The Subbasin (HUC8), Watershed (HUC10), and Subwatershed (HUC 12) hydrologic unit boundaries provide a uniquely identified and uniform method of subdividing large drainage areas. The selection and delineation of hydrologic boundaries are determined solely upon science-based hydrologic principles, not favoring any administrative or special projects nor particular program or agency. At a minimum, they were delineated and georeferenced to the USGS 1:24,000 scale topographic base map meeting National Map Accuracy Standards (NMAS). This data sets are intended to be used as a tool for water-resource management and planning activities, particularly for site-specific and localized studies requiring a level of detail provided by large-scale map information. Additionally, the WBD datasets that cover Connecticut are part of a larger seamless nationally consistent geospatial watershed database.

HUC 12 Subwatersheds – 216 watersheds; average size = 30.8 square miles

HUC 10 Watersheds – 53 watersheds; average size = 125.5 square miles

HUC 8 Subbasins – 10 watersheds; average size = 664.9 square miles

\* These datasets are consistent across the entire study area.

#### ***National Hydrography Dataset (NHD) High Resolution Flowlines, Waterbodies, and Rivers***

Source: US Geological Survey

The National Hydrography Dataset (NHD) is a comprehensive set of digital spatial data that contains information about surface water features such as lakes, ponds, streams, rivers, springs and wells. Within the NHD, surface water features are combined to form "reaches," which provide the framework for linking water-related data to the NHD surface water drainage network. These linkages enable the analysis and display of these water-related data in upstream and downstream order. The NHD is based upon the content of USGS Digital Line Graph (DLG) hydrography data integrated with reach-related information from the EPA Reach File Version 3 (RF3). The NHD supersedes DLG and RF3 by incorporating them, not by replacing them. NHD data was originally developed at 1:100,000-scale and exists at that scale for the whole country. This high-

resolution NHD, obtained for this project, generally developed at 1:24,000/1:12,000 scale, adds detail to the original 1:100,000-scale NHD.

\* This dataset is consistent across the entire study area.

### ***Stream Order***

Source: Developed using the NHD by the Institute for the Application of Geospatial Technology (IAGT) for the University of Connecticut

This is a 1:24,000 scale stream network. Strahler Stream Orders have been assigned to each stream reach using an ArcView 3x extension. Source data was high-resolution NHD Flowlines. This datasets serves as the base data for development of the basin stream order dataset.

\* This dataset is consistent across the entire study area.

### **Water Resource Use**

#### ***Aquifer Protection Area Wells***

Source: Connecticut Department of Environmental Protection

This is a 1:24,000 scale data layer that includes point locations of aquifer protection area wellheads. The data contains identification information for water supply wells owned by regulated utilities. There is no information related to water quantity and it is unclear whether the aquifer protection areas refer to community and/or non-community regulated public water supplies.

\* This dataset is not consistent across the entire study area. Data is limited to CT only.

#### ***Aquifer Protection Areas***

Source: Connecticut Department of Environmental Protection

This is a 1:24,000 scale data layer that includes all Preliminary (Level B) and Final (Level A) aquifer protection areas. These are polygon areas delineated by the water utilities and represent the area of groundwater contribution for active public water supply wells or well fields serving more than 1,000 people that are set in stratified drift deposits. Preliminary (Level B) APAs were initially mapped for all the well fields using available data and only provide a rough estimate of the area contributing groundwater to well fields. The Final (Level A) APAs are based upon extensive site-specific data collection and detailed modeling of the groundwater flow system.

\* This dataset is not consistent across the entire study area. Data is limited to CT only.

### ***EPA Permit Compliance System Sites***

Source: US Environmental Protection Agency

The EPA's Permit Compliance System (PCS) is a national computerized management information system that automates entry, updating, and retrieval of National Pollutant Discharge Elimination System (NPDES) data and tracks permit issuance, permit limits and monitoring data, and other data pertaining to facilities regulated under NPDES. PCS records water-discharge permit data on more than 75,000 facilities nationwide. These data are represented in the GIS as point data.

The NPDES permit program regulates direct discharges from municipal and industrial wastewater treatment facilities that discharge into the navigable waters of the United States. Wastewater treatment facilities are issued NPDES permits regulating their discharge. A separate data layer has been created from the PCS sites representing only sewage treatment plants within the study area.

\* This dataset is consistent across the entire study area.

### ***Leachate Wastewater Disposal Sites***

Source: Connecticut Department of Environmental Protection

This is a 1:50,000 scale datalayer that includes point locations digitized from Leachate and Wastewater Discharge Source maps and point locations digitized on-screen from DEP sources. It is a point layer that represents waste source locations. The information contained in the data layer may not be complete or current. The data layer locates surface and groundwater discharges that (1) have received a wastewater discharge permit from the state or (2) are historic and now defunct waste sites or (3) are locations of accidental spills, leaks, or discharges of a variety of liquid or solid wastes. A separate data layer has been created from the LWDS points to represent only sewage treatment plants within the study area.

\* This dataset is not consistent across the entire study area. Data is limited to CT only.

### ***Registered Water Diversions***

Source: Connecticut Department of Environmental Protection

This is a point layer describing the location of registered water diversion sites in Connecticut. The CT DEP should be consulted before using any quantitative information regarding volumes or rates associated with both registered and permitted diversions.

\* This dataset is not consistent across the entire study area. Data is limited to CT only.

### ***Permitted Water Diversions***

Source: Connecticut Department of Environmental Protection

This is a point layer describing the location of registered water diversion sites in Connecticut. The CT DEP should be consulted before using any quantitative information regarding volumes or rates associated with both registered and permitted diversions.

\* This dataset is not consistent across the entire study area. Data is limited to CT only.

### ***Public Water Supply Reservoirs***

Source: Connecticut Department of Environmental Protection

This is a polygon layer describing public water supply reservoirs in the state of Connecticut. Descriptive information for each site includes: PWS status, function, total capacity, and capacity.

\* This dataset is not consistent across the entire study area. Data is limited to CT only.

### **Hydrogeologic Data**

#### ***Annual Precipitation***

Source: Parameter-elevation Regressions on Independent Slopes Model (PRISM)

PRISM is an analytical model that uses point data and digital elevation models to generate gridded estimates of annual, monthly and event based climatic parameters. The data has been converted to a vector format and contains information about average minimum, maximum, and average precipitation for the climatological period 1961-1990.

\* This dataset is consistent across the entire study area.

#### ***Basin Stream Order***

Source: Developed using the NHD and WRAPHydro Toolset for ArcGIS by the Institute for the Application of Geospatial Technology (IAGT) for the University of Connecticut

This is a stream reach-based catchment dataset built on the WRAP Flowlines data layer (developed using the high resolution NHD). Each catchment polygon has been assigned a Strahler Stream Order and represents the surface area flowing into 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup>, 6<sup>th</sup>, or 7<sup>th</sup> order streams.

\* This dataset is consistent across the entire study area.

### ***Ground Water Quality***

Source: Connecticut Department of Environmental Protection

Ground water quality classifications is a polygon feature-based layer compiled at 1:24,000 scale that includes water quality classification information for ground waters for all areas of Connecticut. Ground waters mean waters flowing through earth materials beneath the ground surface and the ground water quality classification is a designation of the use of these ground waters. The classification is based primarily on the Adopted Water Quality Classifications map sheets with information collected and compiled from 1986 to 1997 by major drainage basin. The data layer does not include water quality classifications for ground waters below surface waterbodies. Ground water quality classes are GA, GAA, GAAs, GB and GC. Classes GAA and GA designate areas of existing or potential drinking water. All ground waters not otherwise classified are considered as Class GA. Class GAAs is for ground water that is tributary to a public water supply reservoir. Class GC is used for assimilation of permitted discharges.

\* This dataset is not consistent across the entire study area. Data is limited to CT only.

### ***National Elevation Dataset***

Source: US Geological Survey, EROS Data Center

The US Geological Survey has developed a 30 meter National Elevation Dataset (NED) representing a seamless mosaic of best-available elevation data. The 7.5 minute elevation data for the conterminous United States are the primary source data. The data was created to be utilized by the scientific and resource management communities for global change research, hydrologic modeling, resource monitoring, mapping, and visualization applications.

\* This dataset is consistent across the entire study area.

### ***SSURGO and STATSGO2 Soils***

Source: Natural Resources Conservation Service

The NRCS Soils Survey Geographic (SSURGO) Database was created using national standard field mapping methods. Mapping scales generally range from 1:12,000 to 1:63,360. SSURGO is the most detailed level of soil mapping done by the NRCS and meets the national map accuracy standards. SSURGO can be linked to a National Soil Information System (NASIS) attribute database. The attribute database gives the proportionate extent of the component soils and their properties for each map unit. Examples of information that can be queried from the database are: available water capacity, soil reaction, electrical conductivity and flooding, etc.

The NRCS National Cartography and Geospatial Center has archived and distributed the State Soils Geographic (STATSGO) Database. The STATSGO spatial and tabular data were updated in 2006 and renamed to the US General Soil Map (STATSGO2). STATSGO2 consists of general soil association units. It consists of a broad-based inventory of soils and non-soil areas that occur in a repeatable pattern on the landscape and that can be cartographically shown at the scale mapped.

\* These datasets are consistent across the entire study area.

### ***Surface Water Quality***

Source: Connecticut Department of Environmental Protection

This is a 1:24,000 scale data layer of Surface Water Quality Classifications for Connecticut. It is comprised of line features which represent surface water quality classifications for streams and rivers. Each line is assigned a surface water quality class.

\* This dataset is not consistent across the entire study area. Data is limited to CT only.

### ***Surficial Materials***

Source: Connecticut Department of Environmental Protection

This is a 1:24,000 scale data layer of surficial materials for Connecticut. It is a polygon dataset that includes one polygon for each surficial material unity. Surficial material units describe textures of unconsolidated glacial and post-glacial materials including gravel, sand, fines, till, alluvium, and swamp deposits. Glacial melt water deposits (stratified deposits) are described in terms of their vertical distribution of textures as well as their areal extent. The data layer is based on the Surficial Materials Map of Connecticut, Stone and others, 1992, published at a 1:125,000 scale. The surficial materials data layer was digitized from 1:24,000 scale compilation sheets for the 1:125,000 scale map.

\* This dataset is not consistent across the entire study area. Data is limited to CT only.

### ***USGS Gaging Stations***

Source: US Geological Survey; Medium Resolution NHD

The locations of current and historical USGS stream gages have been snapped to the medium resolution (1:100,000 scale) National Hydrography Dataset (NHD). The locations were reviewed by local USGS personnel to ensure that stream gages were snapped to the correct NHD reaches. The dataset contains the latitude and longitude coordinates of the point on the NHD to which the stream gage is snapped and the location of the gage house for each stream gage. Flow characteristics were computed from the daily stream flow data recorded at each stream gage for the period of record. The flow characteristics associated with each stream gage include: First and last date of stream

flow data; number of days of stream flow data; number of days of non-zero stream flow data; minimum and maximum daily flow for the period of record; percentiles of daily flow for the period of record; average and SD of daily flow for the period of record. Mean annual base-flow index computed for the period of record; year-to-year SD of the annual base-flow index computed for the period of record; number of years of data used to compute the base flow index. The stream flow data used to compute flow characteristics were copied from the NWIS-web historical daily discharge archive on June 15, 2005. The flow characteristics tied to each of the stream gages will greatly facilitate hydrologic analysis and can be used to develop regional statistical models of stream flow at ungaged locations.

\* This dataset is consistent across the entire study area

### **Anthropogenic Influences**

#### ***Census Blocks (Population Density)***

Source: US Census Bureau

Population data were downloaded from the US Census Bureau at the block level and converted to population and population density for the entire study area. Census block grounds generally contain between 600 and 3,000 people, with an optimum size of 1,500 people.

\* This dataset is consistent across the entire study area

#### ***Protected Open Space***

Source: Connecticut Department of Environmental Protection, Massachusetts Executive Office of Energy and Environmental Affairs, RI Department of Environmental Management

This is a compiled data layer of committed open space areas for the states of Connecticut, Massachusetts, and Rhode Island. Areas are represented as polygons and depict state and federal protected open space. The state of New York is not represented due to data access limitations.

\* This dataset is consistent across the entire study area (with the exception of NY).

#### ***Dams***

Source: US Army Corps of Engineers, National Inventory of Dams (NID)

The National Inventory of Dams (NID) contains information on approximately 79,000 dams throughout the US that are more than 25 feet high, hold more than 50 acre-feet of

water, or are considered a significant hazard if they fail. Data attributes in the layer include: dam name, height, type, purpose, year constructed, and owner. There are 988 dam locations within the entire study area.

\* This dataset is consistent across the entire study area

### ***Impervious Surface***

Source: US Geological Survey, US Environmental Protection Agency

This data layer was created from the 2001 National Land Cover Dataset. The NLCD distinguishes 16 different land cover classes at a 30m pixel resolution. The impervious surface data classifies each pixel into 101 possible values ranging from 0% - 100% imperviousness.

\* This dataset is consistent across the entire study area

### ***National Land Cover Data***

Source: US Geological Survey, US Environmental Protection Agency

The U.S. Geological Survey (USGS), in cooperation with the U.S. Environmental Protection Agency, has produced a land cover dataset for the conterminous United States on the basis of 2001 Landsat thematic mapper imagery and supplemental data. The National Land Cover Dataset (NLCD) is a component of the USGS Land Cover Characterization Program. The seamless NLCD contains 16 categories of land cover information suitable for a variety of State and regional applications, including landscape analysis, land management, and modeling nutrient and pesticide runoff. The NLCD is distributed by State as 30-meter resolution raster images.

\* This dataset is consistent across the entire study area

### ***Political Boundaries***

Source: Connecticut Department of Environmental Protection

State and municipal boundaries mapped at a 1:24,000 scale were collected from the CT Department of Environmental Protection. The data layers are based on information that appears on the US Geological Survey 7.5 minute topographic quadrangle maps published between 1969 and 1984.

\* This dataset is consistent across the entire study area



## ***Roads***

Source: TeleAtlas North America, Inc.

This data set represents all roadways, streets, and major highways within the entire study area, in a digital, vector based geographic database format. Streets in this data set contain address information such as postal codes, street names and address ranges, and other routing attributes which may be used for geocoding or route finding. It is the most updated and complete dataset available.

\* This dataset is consistent across the entire study area

## ***Sewer Service Areas***

Source: Connecticut Department of Environmental Protection

This is a 1:24,000 scale data layer of sanitary waste water service areas in Connecticut. It is a polygon data layer than generally outlines areas where sewer service is provided. Sanitary wastewater from homes and businesses in these areas is piped into a sewer system where it is later treated at sewage treatment plants. These areas were mapped on 7.5 minute US Geological Survey topographic quadrangle maps.

\* This dataset is not consistent across the entire study area. Data is limited to CT only.

## ***Stream Crossings***

Source: National Hydrography Dataset (NHD), TeleAtlas Roads

This is a derived dataset that was created in ArcGIS using the National Hydrography Dataset Flowlines and the TeleAtlas road network. The data layer contains point locations where roads intersect flowlines.

\* This dataset is consistent across the entire study area

## ***Water Service Areas***

Source: Connecticut Department of Environmental Protection

This is a 1:24,000 scale data layer of water service areas in Connecticut. It is a polygon data layer than generally outlines areas where water service is provided. These areas were mapped on 7.5 minute US Geological Survey topographic quadrangle maps.

\* This dataset is not consistent across the entire study area. Data is limited to CT only.

## 5.0 CONCLUSION

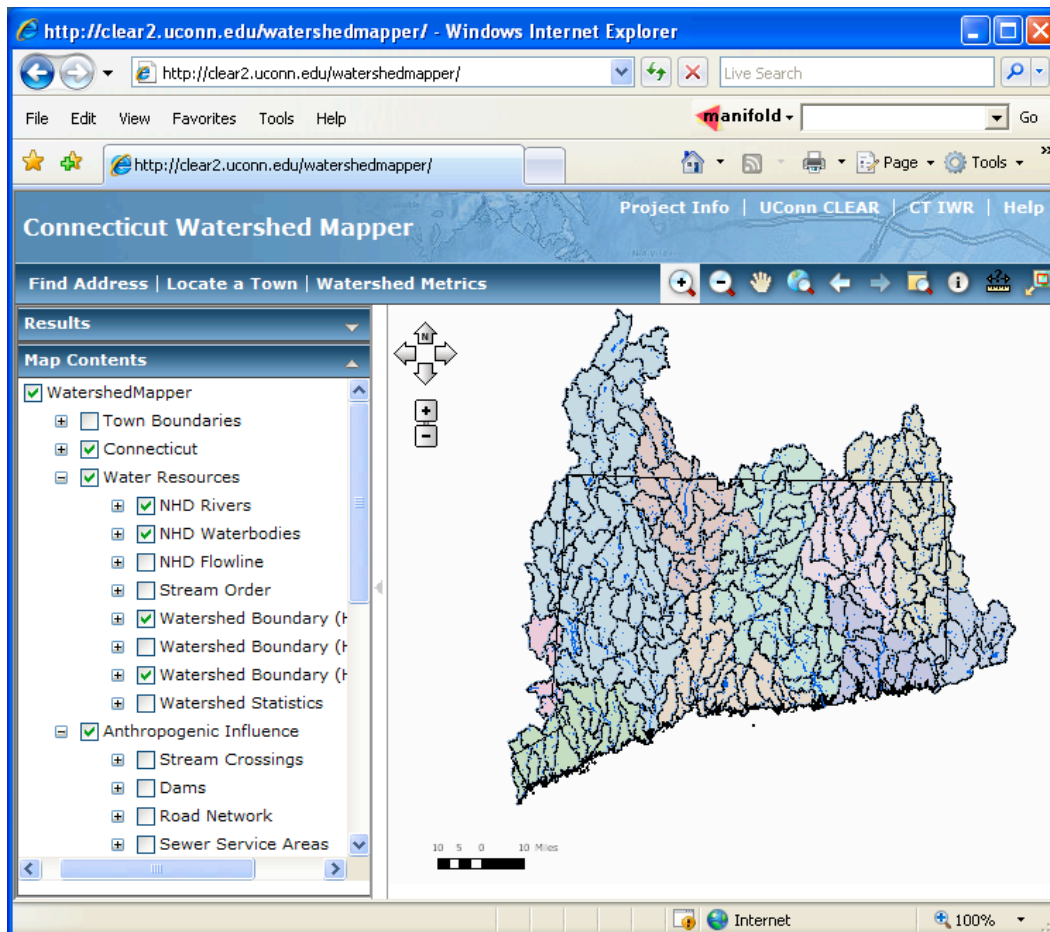
This document describes the GIS datasets that were collected, reviewed and developed to create a digital geospatial database for water allocation and basin screening for the state of Connecticut. Many of the datasets that were identified by the Connecticut Water Planning Council workgroup and the project PI's were available in digital geospatial format. In some cases however, data were not available for the entire study area, which reached into portions of New York, Massachusetts, and Rhode Island. In some cases, data for Connecticut was of higher spatial detail, so the data quality may have been reduced or a decision was made to defer to a national dataset in lieu of more detailed state data in order to provide consistency across all other states. In other cases, desired datasets were only available for the state of Connecticut and therefore may present a problem when watershed characteristics are compared between state bound basins and those watersheds that span state boundaries.

The compiled dataset was used to explore various options for creating specific and relevant metrics to assess basin characteristics to support water allocation planning. Given the quality and consistency of the data that was available for both Connecticut and the surrounding states, we feel that additional work may need to be completed to compile new data as it becomes available in order to improve existing metrics and to create additional effective and defensible metrics to support the screening process. This initial effort however has been a good first step in developing consistent data for future integration in the water allocation planning process for the state.

## 6.0 ONLINE DATA VIEWER

As part of the project, a prototype online ArcGIS Server mapping website was created to provide access to project datasets and derived basin metrics. The application also demonstrated the ease of online access to non-GIS users. Users can identify and zoom into a particular watershed, click on data layers and retrieve attribute values for particular features, and turn layers on and off. While the website is still active, it has not been advertised as there are some homeland security issues.

<http://clear2.uconn.edu/watershedmapper/>

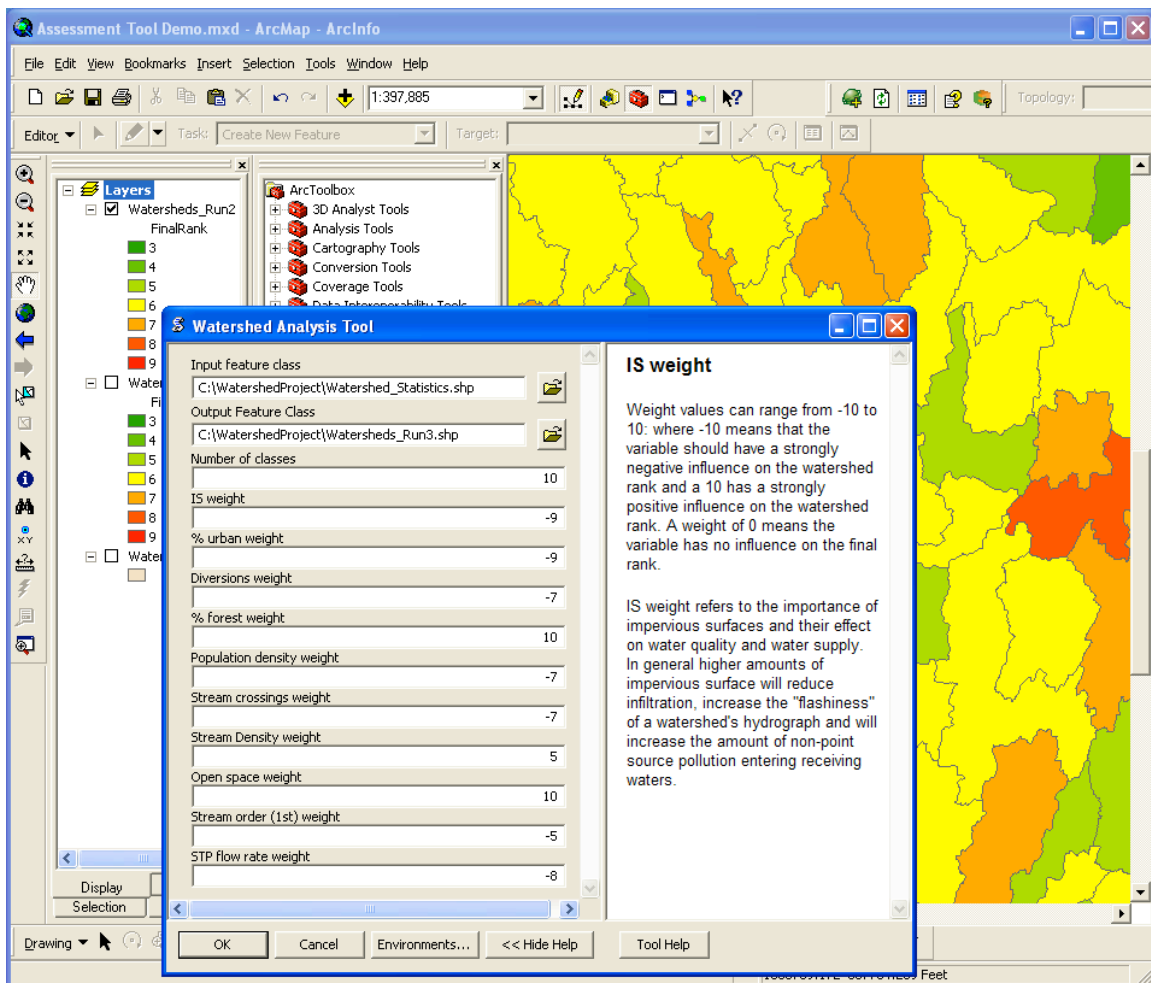


## 7.0 WATERSHED ASSESSMENT TOOL

The project team created a prototype Watershed Assessment Tool (WAT) that runs inside of ArcGIS as a script in ArcToolBox. The tool was designed to demonstrate how a set of watershed metrics could be analyzed and used to rank watersheds relative to each other. Output from the tool is for demonstration purposes only and is not intended to be used to perform actual rankings or assessments.

The WAT utilizes 10 metrics that can be ranked from -10 to 10. Negative weights have a negative influence and positive weights have a positive influence on the final watershed rank. The idea behind the WAT was to allow users to apply their own weights to each metric in order to compare how the weights affect watershed ranking. For example, if assessing water quality and wanting to identify watersheds with a high potential for NPS, then a user might want to rank those metrics that influence NPS (i.e. Impervious Surface, % area of the watershed that is urbanized, population density, etc.) with high weights and everything else with low or zero weights. All metrics are normalized by basin area.

The images below show the WAT and sample output produced from it.



The Watershed Assessment tool was demonstrated to members of the Water Planning Council in July 2008. There was discussion of how the tool could be modified to better meet the needs of water resource managers and planners. One option that generated considerable interest was to modify the tool to let the user select the metrics to use in an analysis. The prototype WAT used a static subset of 10 metrics taken from a set of more than 50 metrics. Consideration should be given to future funding to further research and develop a functional WAT.