Maps contain a wealth of information that can contribute to the data used in a Natural Resources Inventory (see Chapter 4), provide the basis for map analysis used in biodiversity assessment (see Appendix E), and enable remote analysis of project sites for environmental review. When using map and air photo resources, it’s important to recognize their limitations. Make note of the publication date; it is usually printed in the legend or in a margin. Depending on when it was created, it’s possible that changes on the landscape are not reflected on the map. Also check the scale of the map. Several of the maps discussed below are produced at a 1:24,000 scale; this indicates that one inch on the map equals 24,000 inches, or 2,000 feet on land. Being mindful of the scale at which the map was produced and the inherent inaccuracies of maps will help to prevent over-interpretation of the information they contain. (See Chapter 3 for more information on map scale.)

The following maps, which are widely available, are described below:

- **USGS Topographic Maps**
- **NRCS County Soil Survey Maps**
- **National Wetlands Inventory Maps**
- **Aerial Photographs.**

Use of these maps, and complementary sources like the NYS Freshwater Wetlands map, is also discussed in the Soils, Wetlands, and Wetland Habitat sections of Chapter 4. A summary of how to obtain paper copies of these maps and air photos is contained in Table D-1.

### USGS Topographic Maps

USGS topographic maps (see Figure D-1) convey information about physical and ecological features of the landscape, including elevation, landscape contours, surface water features, significant cultural features, general forest cover, and some wetlands. Topographic maps have a relatively high level of accuracy (depending on when published), are low cost (or free), and readily available.

Topographic maps may be purchased from many bookstores and outdoor supply stores, by calling 1-888-ASK-USGS, or through the website, [http://store.usgs.gov](http://store.usgs.gov). To order or purchase topographic maps, determine the name(s) of the quadrangles in the study area using an index of topographic maps from the USGS, available from the toll free number or website given above. Note that it may be necessary to obtain several adjacent maps to ensure coverage of the whole study area.

USGS topographic maps are also available digitally for free through the USGS website at [http://nationalmap.gov/ustopo/](http://nationalmap.gov/ustopo/). Some advantages of this digital data are:

- maps may be seamlessly joined for a selected study area
- scale may be adjusted to match the scale of other maps used in the inventory
- features identified on the topographic map may be translated into coordinates that can be used in GIS applications
- other features available as GIS data can be shown as overlays on a topographic base map.

### Table D-1. Commonly used paper map resources and air photos and contact information for obtaining copies.

<table>
<thead>
<tr>
<th>Map</th>
<th>How to Obtain</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.5 minute Topographic Quadrangles</td>
<td>United States Geological Survey <a href="http://store.usgs.gov">store.usgs.gov</a></td>
</tr>
<tr>
<td></td>
<td>County Soil and Water Conservation District offices; USGS distribution centers; certain local book, map, or outfitting stores</td>
</tr>
<tr>
<td>County Soil Surveys</td>
<td>County soil and water conservation district offices</td>
</tr>
<tr>
<td>National Wetland Inventory (NWI) Maps</td>
<td>Institute for Resource Information Systems (607) 255-6520</td>
</tr>
<tr>
<td>New York State Freshwater Wetlands</td>
<td>Syracuse Blue Print Company (315) 476-4084</td>
</tr>
</tbody>
</table>

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Topographic Quadrangles
The US Geological Survey (USGS) uses the geographic grid to determine the position of individual map sheets in a series. A single map sheet, or quadrangle, is bounded on the right and left hand margins by meridians, and on the top and bottom by parallels which are a specified number of minutes or degrees apart. In this way, individual map sheets can be fitted together to form unified groups.

Most municipalities span several USGS topographic quadrangles. All of the quadrangles including portions of the municipality (or study area) should be obtained and matched to make a composite topographic map of the whole town. NOTE: This step is unnecessary if using seamless digital data.

Topographic maps are a useful resource for biodiversity assessment (see Appendix E), and can help to identify steep slopes, intermittent streams, wetlands, small waterbodies, and groundwater seepage areas, among other features that are often absent from other publicly available map resources. When analyzing topo quads, it is useful to note the map scale, year, contour interval, and the date of any revisions. Historic topographic maps, some dating back to the 1880s, are available at http://ngmdb.usgs.gov/maps/TopoView/ and at http://docs.unh.edu/nhtopos/NewYorkList.htm. They can be useful for identifying changes in land use over time.

USGS topographic maps are also used by the StreamStats Tool, available on the USGS website at http://water.usgs.gov/osw/streamstats/new_york.html. This program can help identify and delineate subwatersheds below the 12-digit HUC level and calculate estimated stream flows via a statewide interactive map. Note that field inspections are important to determine the accuracy of computer-generated watershed delineations, which are defined strictly by topography and are unable to detect alterations to natural drainage areas like stormwater diversions (e.g., ditches) and infrastructure (e.g., pipes). Instructions for how to use StreamStats are available at http://water.usgs.gov/osw/streamstats/UserInstructions-20120427.pdf.

NRCS County Soil Survey Maps
The USDA Natural Resources Conservation Service (NRCS) has mapped the soils for each of New York’s counties at various times. Published soil surveys include maps and detailed information about the types of soils found in the survey area, and the uses and limitations associated with each soil type. They provide valuable information to farm and forest landowners, developers, planners, and natural resource managers.

To classify soils, soil scientists study the landscape and dig test holes to expose and compare soil profiles. A soil profile is a sequence of natural layers referred to as horizons. These differ from one another because of physical, chemical, and biological properties and the effects of weathering and human activity. Soil horizons extend from the surface to the parent material, a zone that hasn’t been altered by leaching or the action of plant roots.

Soil maps classify soils into series, types, and phases. Soil series delineates soils originating from the same parent materials and having relatively uniform structural engineering properties except for texture. Each soil series is named for a town or geographic feature near the place where it was first observed and mapped. Soil series is the main unit of a county’s detailed soil survey. Within a series, differing soils are broken down into soil phase categories according to slope and other properties. The polygons or map units displayed on the soil maps are differentiated at the phase level.

The soil survey map (see Figure D-2) uses 2-3 letter codes to differentiate soil mapping unit locations. Slope is indicated by the last upper case letter in the soil symbol, and ranges from gentle slopes (“A”) to the steepest slopes (“F”). For example, soils mapped with the code “SkD” in the Dutchess County soil survey belong to the Stockbridge soil series and have slopes that are strongly sloping to steep or hilly, ranging between 15 and 20 percent.

Paper copies of county soil survey maps can be purchased from the county soil and water conservation district and show the relative location of a soil series overlaid onto black-and-white aerial photographic base maps. Digital soil survey data are also available through the NRCS SSURGO database website at http://datagateway.nrcs.usda.gov and can be viewed online using the Web Soil Survey tool. An example of a soil survey map follows.

Figure D-2: Sample of soils map.
National Wetlands Inventory Maps

The following information about National Wetlands Inventory maps was compiled from a number of sources including, “Open Space Lands, A Community Resource,” Jeanie McIntyre, Upper Valley Land Trust, and “Classification of Wetland and Deepwater Habitats of the United States,” Lewis Cowardin, US Fish and Wildlife Service.

In the mid-1970s, the US Fish and Wildlife Service (USFWS) undertook the National Wetland Inventory (NWI) to map all the wetlands in the United States. NWI maps are produced on a USGS topographic base at a scale of 1:24,000 (Figure D-3). These maps provide information about the wetland vegetation classes, flooding regime, and location in the landscape.

In New York State, the Cornell University Institute for Resource Information Sciences (IRIS) is the official distribution center for hard copy maps generated through the inventory program, which may be purchased for a relatively low cost. The maps are identified by their corresponding USGS quadrangle name. Digital NWI data are available for free for much of the state through the USFWS website, http://www.fws.gov/wetlands. You can also view wetlands data on the site using the Wetlands Mapper.

National Wetlands Inventory (NWI) maps for New York were developed by USFWS using small-scale color infrared aerial photography taken from 1974 forward. From these aerial photographs, preliminary maps were then randomly field checked for accuracy. NWI maps show wetlands of all sizes, but some wetlands are missing and boundaries are often inaccurate.

The USFWS classifies wetlands using a hierarchical method of classification that combines plant, soil, and frequency of flooding information. This method classifies wetlands by System, Subsystem, Class, Subclass, and Dominance Type. System and Subsystem are the most general levels of classification. Class, Subclass, and Dominance Types are very specific.

Wetlands on NWI maps are grouped into five major Systems: Marine, Estuarine, Riverine, Lacustrine, and Palustrine. The Marine System is comprised of open ocean areas with salinities in excess of 30%. Estuarine System areas are semi-enclosed by land, have sporadic or obstructed access to the open ocean, and salinities ranging from 30% to 0.5%. Riverine Systems are associated with all freshwater rivers and streams. Lacustrine Systems are primarily associated with lakes and include bodies of open water that are greater than 20 acres with depths exceeding 6.6 feet. Palustrine Systems are non-tidal marsh and swamp associated wetlands dominated by trees, shrubs, or persistent emergent herbaceous plants.

The Subsystem level is next. All but the Palustrine System have Subsystems. Subsystem defines whether the wetlands system is tidal or nontidal, perennial or intermittent, limnetic (deepwater), or littoral (shallow).

The Class level describes the general appearance of the wetland habitat in terms of either the dominant life-form of the vegetation or the nature of the substrate underlying the wetland. Vegetation is used to define the Class level if it covers 30% or more of the substrate.

Subclass is identified for some Classes when additional detail is desirable and can be determined accurately. Subclass is usually noted for only forested and scrub-shrub classes.

Water Regime describes the frequency and duration of water on each wetland.

Special Modifiers are sometimes added to the classification to describe certain circumstances that are pertinent to the description of the wetland. For example, the modifiers “excavated” or “partially drained” denote impacts to the wetland System.

Example: The classification information about each wetland is abbreviated and displayed on NWI maps according to the hierarchical order described. Figure D-3 provides an example of an NWI wetlands map from the USFWS Wetlands Mapper. If for example, a wetland is coded as PEM1E, the legend would indicate that the classification is as follows: Palustrine (System), EMergent (Class), 1 broad-leaved deciduous (Subclass), E seasonally saturated (Water Regime).

Figure D-3: Sample of NWI map from the USFWS Wetlands Mapper.
Aerial Photographs

Aerial photographs are useful for verifying or updating maps generated from other sources. Comparison of older photographs with more recent images can provide a visual overview of land use changes, such as land clearance, development, beaver activity, or forest regrowth.

Digital orthophotography, or orthoimagery, refers to aerial photography that has been geometrically corrected (“orthorectified”) to remove distortion caused by camera optics, camera tilt, and differences in elevation. The resulting scale is uniform and the images can be overlain onto maps. Thus, orthoimagery can be used as a base map in GIS and displayed with other digital data sources.

New York State’s first set of 1-meter statewide digital orthoimagery was produced from 1994-1999 through a partnership between the USGS National Aerial Photography Program (NAPP) and DEC. The NAPP series contains color-infrared imagery, which is particularly useful for predicting the occurrence of habitats in biodiversity assessment (see Appendix E). The New York Statewide Digital Orthoimagery Program (DOP) has been producing orthoimagery since 2001. High-resolution, 1-2 foot 4-band orthoimagery is available statewide outside of New York City. The 4-band imagery contains both color and infrared bands. Many counties have multiple years of DOP coverage. The program’s goal is to continue obtaining imagery for the entire state on a 4 to 5 year cycle. All digital orthoimagery is available for download from the NYS GIS Clearinghouse, and may be viewed using the NYS Orthos Online website.

In addition to digital orthoimagery, statewide aerial photographic coverage is available for New York at about ten year intervals starting in the 1950s through the US Department of Agriculture National Agriculture Imagery Program (NAIP). Digital or print imagery can be obtained through Farm Service Agency offices or the Farm Service Agency website. NAIP imagery products are available either as digital ortho quarter quad tiles (DOQQs) or as compressed county mosaics (CCM), or in print reproduction on paper sizes that range from 10 inches by 10 inches to 38 inches by 38 inches.