Effectiveness of and Enhancements to the New York State Adirondack Park Agency's Wetland Protection Program

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Introduction

The New York State Adirondack Park Agency (APA or the Agency) is a State land use regulatory agency within the Executive Department of New York State charged with jurisdiction over certain development activities within the Adirondack Park. The APA was created by the APA Act in 1972, which defines an Adirondack Park land use and development plan for region-wide protection of natural resources on both public and private lands. In addition, the APA Act defines wetlands, recognizes them as "Critical Resource Areas" that must be considered during review of projects, and describes activities in or near wetlands as jurisdictional triggers for APA review. Since 1975 the APA has also administered the New York State Freshwater Wetlands Act (FWA) within the Adirondack Park. Both the APA Act and the FWA seek to protect wetlands and the benefits derived from them in a context of no net loss and net gain. In place since 1980, these regulations give the Agency project review and enforcement authority over projects. The regulations require the Agency to conduct compliance checks and maintain a tracking database of past projects and enforcement cases in order to properly apply jurisdiction. Staff involved in wetlands protection work in all divisions of the Agency: Regulatory Programs, Enforcement, Legal, Planning and Resource Analysis.

The APA's strong wetlands protection program is based on several interrelated functions of the Agency: wetlands delineation, project review jurisdiction, compliance review, enforcement, wetlands mapping, and public outreach and education. The program serves to avoid, reduce, and mitigate wetland impacts to achieve the no net loss and net gain goal.

Project Summary

This project, titled "Effectiveness of and Enhancements to the Adirondack Park Agency's Wetland Protection Program", is the thirteenth of fourteen United States Environmental Protection Agency (USEPA) – funded projects focused on wetland protection awarded to the APA since 1993.

The objectives of this study were threefold:

1. Complete digital wetland and sub-watershed base maps for the Lake George/ Basin and the Saranac/Chazy River Watersheds.

With the close of this project, detailed wetland and subwatershed mapping has been completed for all seven of the major watersheds within the Adirondack Park, creating a consistent, continuous picture of wetland and surface hydrology for the region. The maps have been added to the Agency's digital spatial tracking system, the Look-Up System (see description p. 69), available for use at the desktop of all APA employees. Since 1993, the Agency has been mapping detailed (1:24,000-scale) digital wetlands and sub-watersheds with funding provided by USEPA Wetland Protection Program Grants (Appendix I). These projects have been invaluable for creating baseline wetlands data for the Park, providing a "first-cut" picture of natural resource conditions for staff before an on-site field visit takes place. The projects have also increased university research involvement in the Park, and spread public awareness of our wetland resources through outreach and data sharing. These data will continue to be of immense value for wetland resource protection in the future.

2. Develop and implement a permit compliance monitoring program.

Prior to this project, compliance inspections on Adirondack Park Agency permits were conducted primarily by project review, enforcement staff, and wetlands biologists. Burdened by a heavy workload, compliance inspections on issued permits were infrequently performed. This project formalizes an Adirondack Park Agency permit compliance program. A methodology was developed to inspect undertaken projects in a timely manner following permit issuance, offer assistance to permit holders as projects enter the construction phase and compile data based on inspection findings. A permit compliance monitoring manual was developed, allowing for institutional adoption of the program beyond the life of the grant (Appendix H).

3. Expand the Adirondack Park Agency's existing wetland, protection and enforcement tracking system.

Permit compliance data has been added to the Agency's Master Action Database (MAD) (see description, p. 67) and Look-Up System (LUS). A compliance interface in the MAD was designed to manage compliance inspection work flow, maintain notes related to site visits and advise future action necessary for given projects. All site visits were logged in the LUS, an easy to use spatial tracking system.

Enhanced MAD and LUS databases increase the ability to track and inspect permit requirements, provide transparency to the compliance process for the regulated public, and engender consistent decision making during project review and enforcement actions.

Grant monies also purchased important technological infrastructure used in the Agency's day to day operations, including laptop computers for EPA contractors, GPS units, a dedicated GIS server, and a 3D stereo workstation used to analyze stereo pairs of aerial photos for wetland photo interpretation.

Products

- 1:24,000-scale digital wetland maps of the Lake George/Lake Champlain and Saranac/Chazy watersheds
- Sub-Watershed Maps for Lake George/Lake Champlain and Saranac/Chazy watersheds
- Permit Compliance Monitoring Manual
- Master Action Database (MAD) interface for permit compliance data

Study Area

Adirondack Park

The 2.4-million ha (6-million acre) Adirondack Park (Figure 1) comprises the Adirondack Ecological Zone, encompassing the largest wilderness acreage east of the Mississippi River. Located in northern New York State the Park is predominantly forested, and contains a great deal of topographic variation. From almost sea-level in the Lake Champlain Valley on the eastern border of the Park to elevations greater than 5000 feet in the alpine zone of the central, High Peaks region, the diversity of wetlands is vast including large riverine floodplain wetlands, boreal peatland complexes, and isolated

wetlands. Five major river systems originate from the Adirondack "dome," and depending on each watershed's unique geomorphology, wetland area ranges from 7-16% of watershed area. Inside the Park boundary, there are 11,111 lakes and ponds large enough to appear on USGS topographic maps and over 30,000 miles of streams and rivers.

The Adirondack Park is a matrix of public and private lands with many different land uses. The State of New York owns approximately 46% of the Park while the remaining 54% is privately owned. The public land is constitutionally protected as "forever wild" under the state's constitution, and the private land is primarily used for forestry, agriculture, open space recreation, homes and businesses.

The biological diversity in wetlands and the wide range of land use within the Adirondack Park make it an ideal place to characterize the wetland resources on a detailed watershed basis, and to measure compliance with regulatory efforts to protect them.

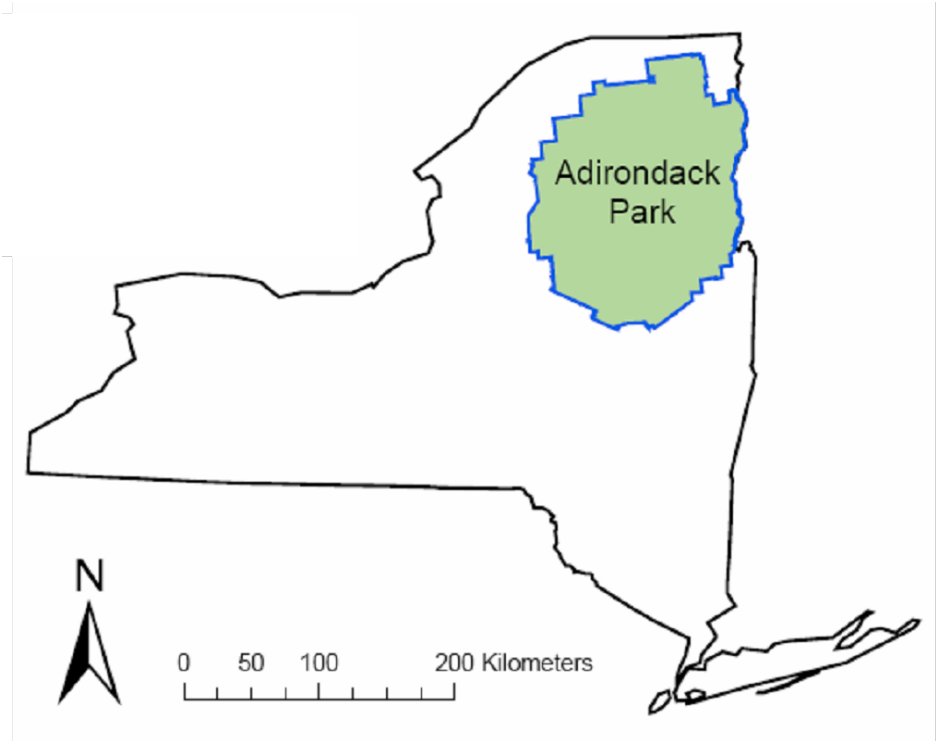

Figure 1. The Adirondack Park in New York State.

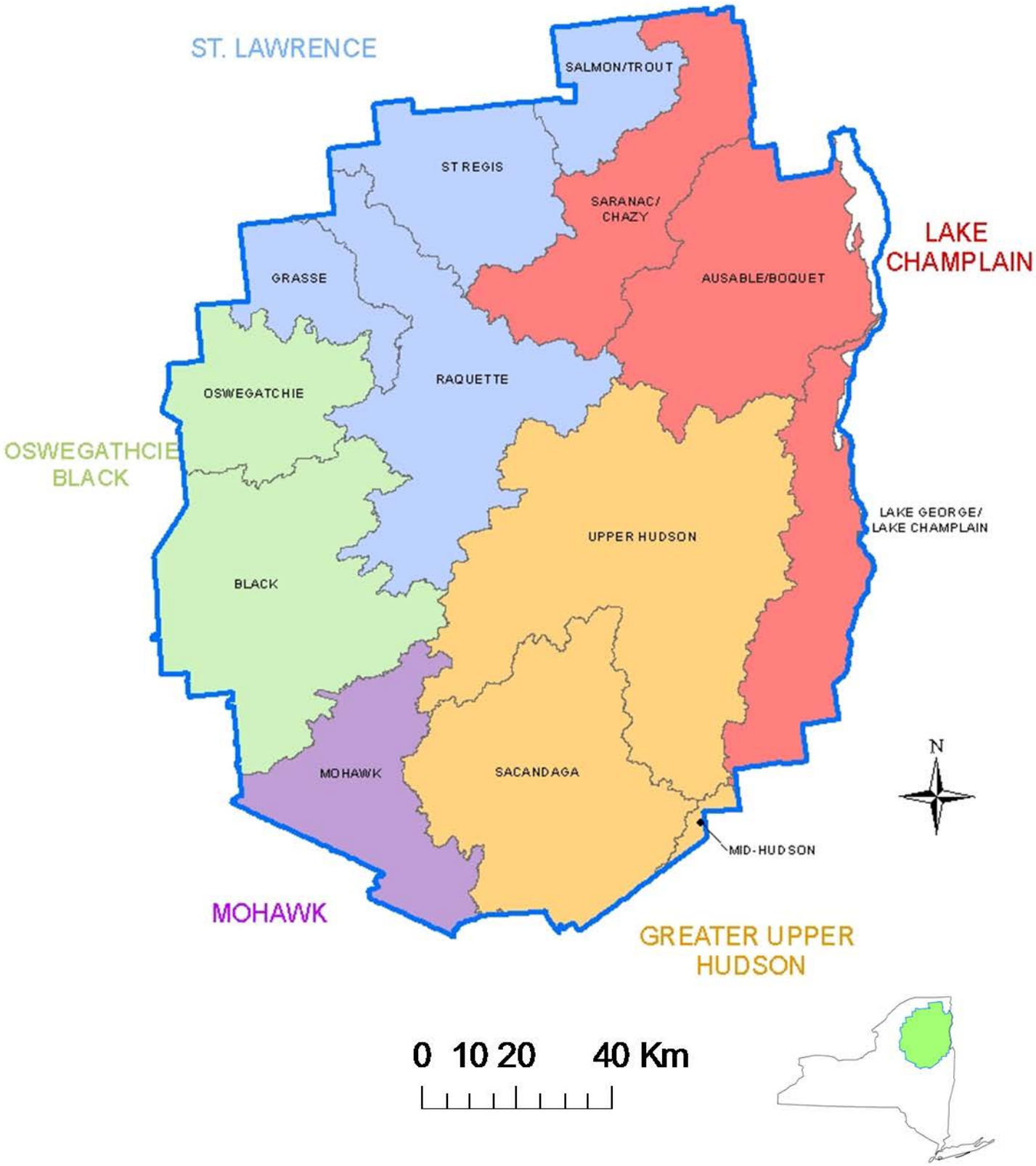

Figure 2. Major watersheds in the Adirondack Park.

11%) are wetlands. The Adirondack Park contains approximately 69% of the watershed's area. The LGW includes portions of Essex, Warren and Washington Counties and all or part of 18 towns and villages (Figure 4).

The highest elevations in the LGW are just over 790 m (2600 ft), along the eastern shore of Lake George. The lowest elevation is along the shore of Lake Champlain where the water level is, on average, 29m (99.8 ft) above sea level (Figure 4).

Approximately 38,974 hectares (96,308 acres, or 27%) of the LGW are owned by the State of New York (Table 1). Approximately 8,015 hectares (19,805 acres) are designated Wilderness under the Adirondack Park Land Use and Development Map and State Land Map. 29,390 hectares (72,625 acres) are designated as Wild Forest.

Lake George is a prominent feature of the watershed (Figure 3). At 11,526 hectares (28,482 acres), it is the largest body of water entirely within the Adirondack Park. The lake is a major recreation and vacation destination. Lake George Village sits on the southern terminus of the lake, and the historic Town of Ticonderoga is situated at the northernmost point.

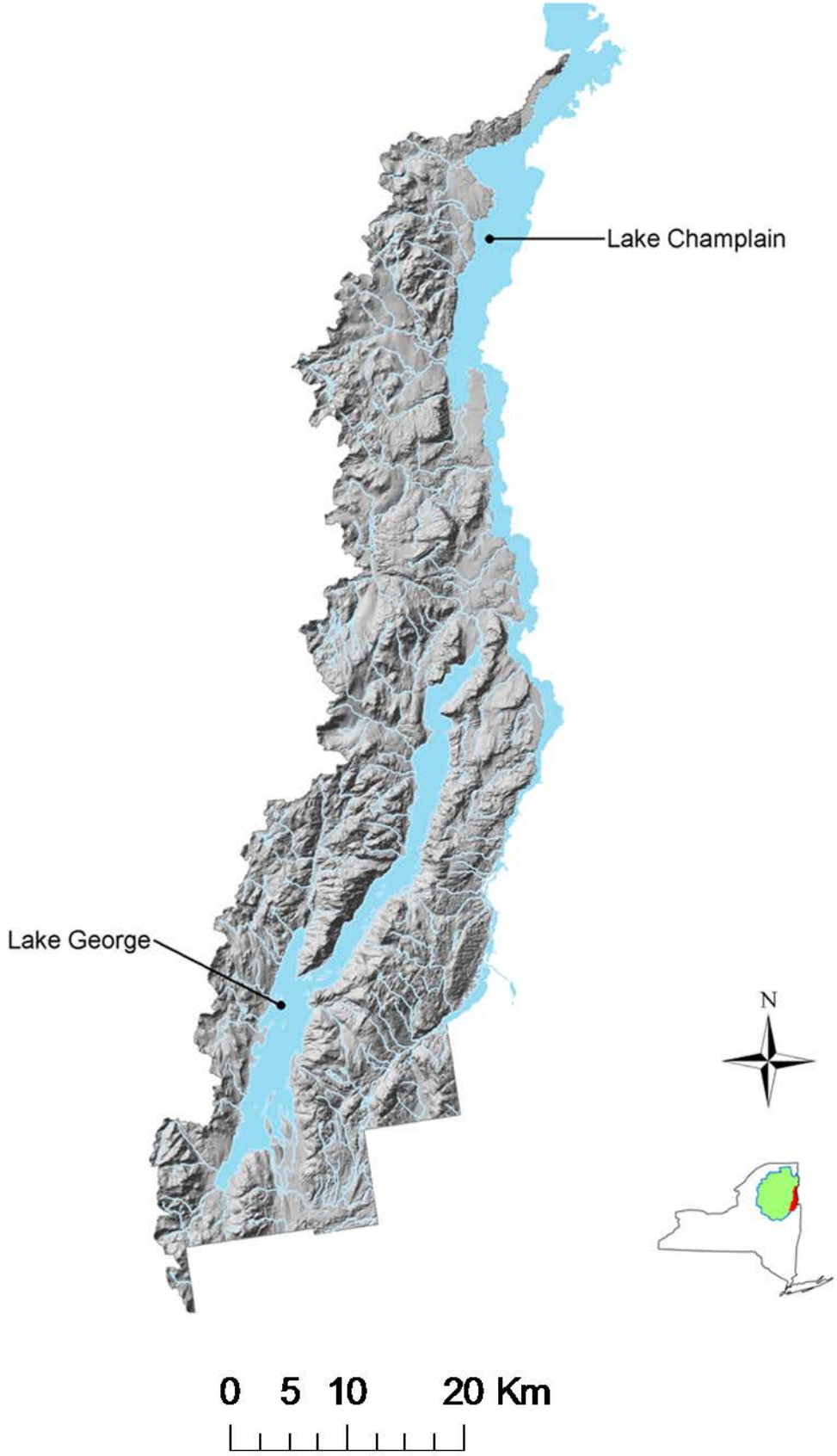

Figure 3. Major waterbodies of the Lake George/Lake Champlain watershed.

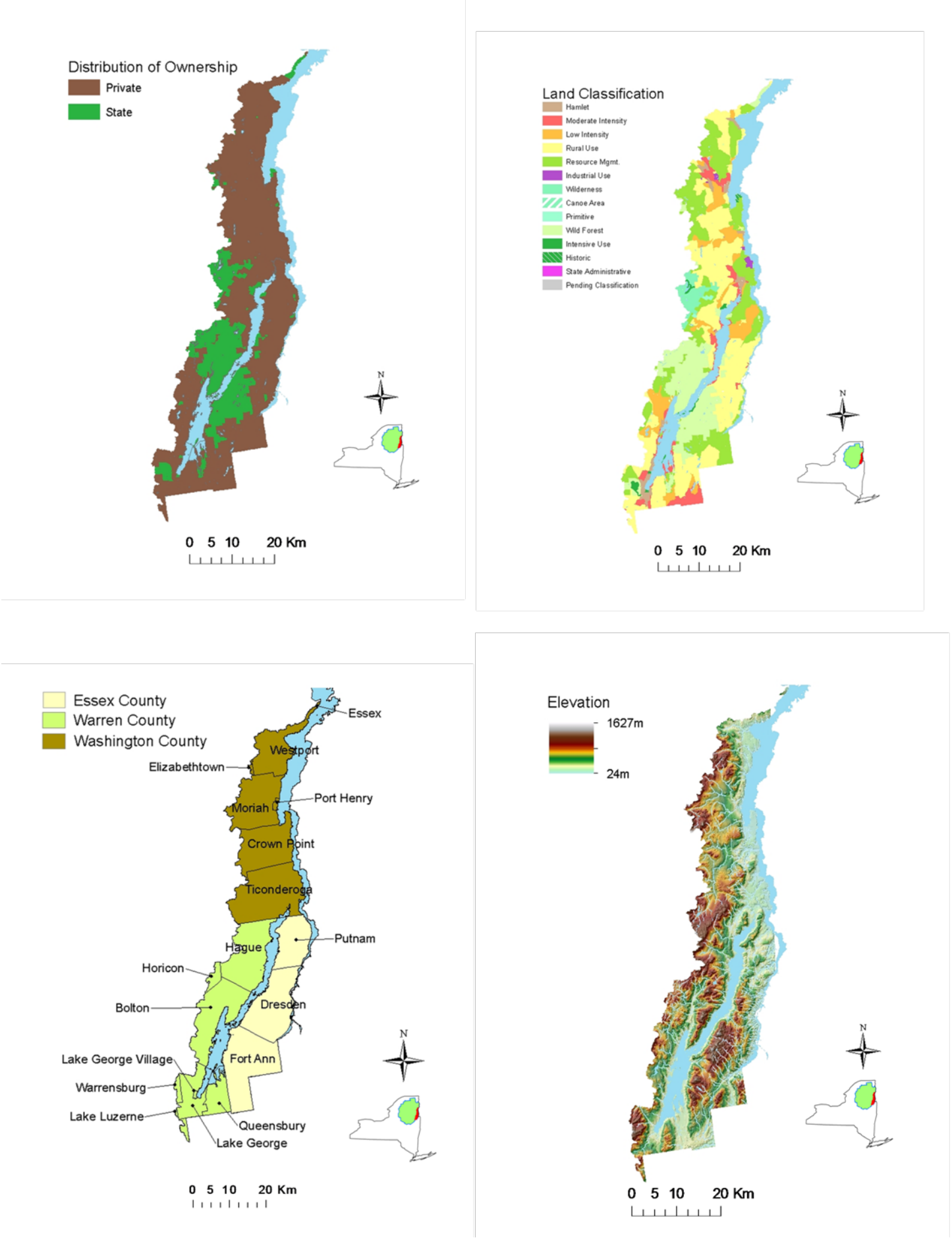

Figure 4. (Clockwise from top left) LGW ownership distribution, APA land classifications, munincipal boundaries and elevation

	Lake George/Lake Champlain Watershed		Adirondack Park	
APA Land Use Area	ha (acres)	% area	ha (acres)	% area
Hamlet	3,508.61 (8,669.96)	1.80%	21,736.51 (53,712.07)	0.92%
Moderate Intensity	8,150.88 (20,141.27)	4.17%	40,253.65 (99,468.93)	1.70%
Low Intensity	13,108.79 (32,392.51)	6.71%	108,855.48 (268,987.74)	4.59%
Rural Use	59,967.77 (148,183.58)	30.71%	408,503.34 (1,009,433.74)	17.23%
Resource Mgt	49,951.06 (123,431.75)	25.58%	614,591.25 (1,518,688.05)	25.92%
Industrial Use	593.57 (1,466.74)	0.30%	5,030.35 (12430.272)	0.21%
Wilderness	8,015.13 (19,805.82)	4.10%	443,234.65 (1,095,256.68)	18.69%
Canoe Area	0.00 (0.00)	0.00%	7,141.44 (17,646.87)	0.30%
Primitive	299.15 (739.22)	0.15%	26,751.00 (66,103.17)	1.13%
Wild Forest	29,390.31 (72,625.03)	15.05%	520,971.43 (1,287,348.44)	21.97%
Intensive Use	1,068.30 (2,639.83)	0.55%	7,995.63 (19,757.62)	0.34%
Historic	157.84 (390.02)	0.08%	214.44 (529.89)	0.01%
State Administrative	24.93 (61.59)	0.01%	678.15 (1,675.74)	0.03%
Pending Classification	18.83 (46.53)	0.01%	14,536.91 (35,921.50)	0.61%
Water	21,016.84 (51,933.73)	10.76%	150,929.57 (372,955.08)	6.36%
Totals	**195,272.00 (482,527.62)**	**99.98%**	**2,371,439.00 (5,859,953.39)**	**100.01%**

= Private Ownership (78% of land area in LGW; 135,280.68 ha (334,285.84 acres))

= State Ownership (22% of land area in LGW; 38,974.49 ha (96,308.062 acres))

Table 1. APA land classification distribution in the Lake George/Lake Champlain watershed.

Saranac/Chazy Watershed

The Saranac/Chazy watershed (SCW) (Figure 5) is located in the northeast corner of the Adirondack Park. Along with the Ausable/Boquet and LGW, it is one of three Adirondack watersheds to drain into Lake Champlain. The SCW is bordered to the southeast by the Ausable/Boquet watershed, to the southwest by the Raquette watershed (digital mapping completed under EPA grant #CD99264401), and to the northwest by the Salmon/Trout and St. Regis watersheds (digital mapping completed under EPA grant #CD99264401 and #CD99244101, respectively). The SCW is covered by all or part of 28 USGS 7.5 minute quadrangles.

The SCW within the Adirondack Park encompasses approximately 176,509 hectares (436,163 acres), of which approximately 30,226 hectares (74,688 acres, or 17%) are wetlands. The Adirondack Park contains approximately 72% of the watershed's area. The SCW includes portions of Clinton, Essex, and Franklin counties, and all or part of 17 towns and villages (Figure 6).

The highest elevation in the SCW is the 1482m (4865 ft) summit of Whiteface Mountain, along the border with the Ausable/Boquet watershed. The lowest elevations in the SCW in the Adirondack Park are between 210m and 240m (700ft and 800 ft), found in the Saranac River corridor near the Town of Saranac, as the river approaches the Adirondack Park Boundary (Figure 6).

Approximately 81,985.77 ha (202,591.25 acres or 49%) of the SCW are owned by the State of New York (Table 2). Approximately 19,178.11 hectares (47,390.14 acres) are designated Wilderness under the Adirondack Park Land Use and Development Map and State Land Map. 52,311.40 hectares (129,264.29 acres) are designated as Wild Forest.

The watershed is named for the Saranac and Chazy Rivers, which flow into Lake Champlain. The headwaters of the Saranac River are in the southwest corner of the watershed, a region containing dozens of lakes and ponds. A portion of the St. Regis Canoe Area, designated for non-motorized watercraft use, is situated in the watershed. The Chazy River has its headwaters in Chazy Lake, in the northwest portion of the

watershed. The river drains most of the northeast corner of the watershed, including much of the watershed's area outside the Adirondack Park.

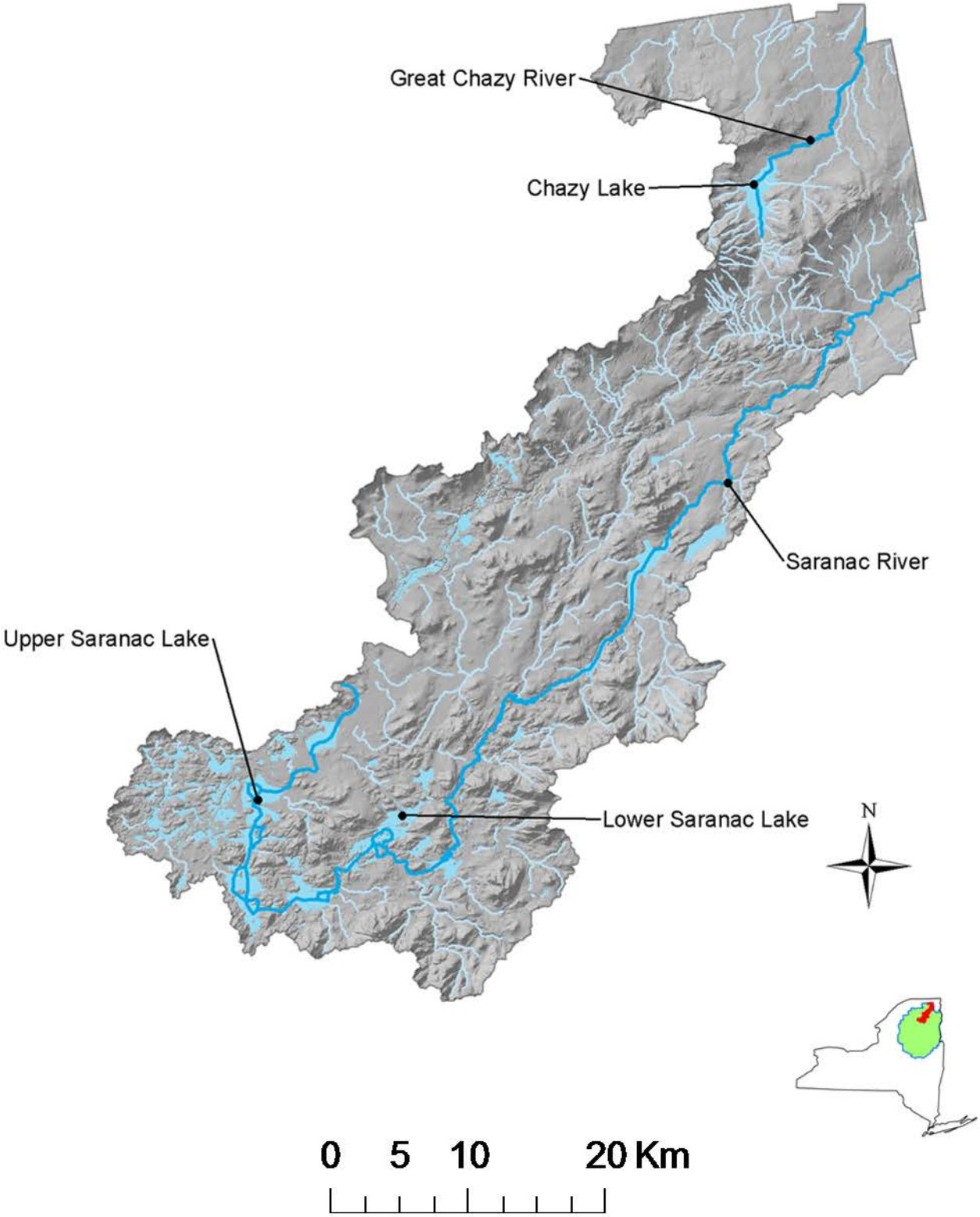

Figure 5. Major waterbodies of the Saranac/Chazy watershed.

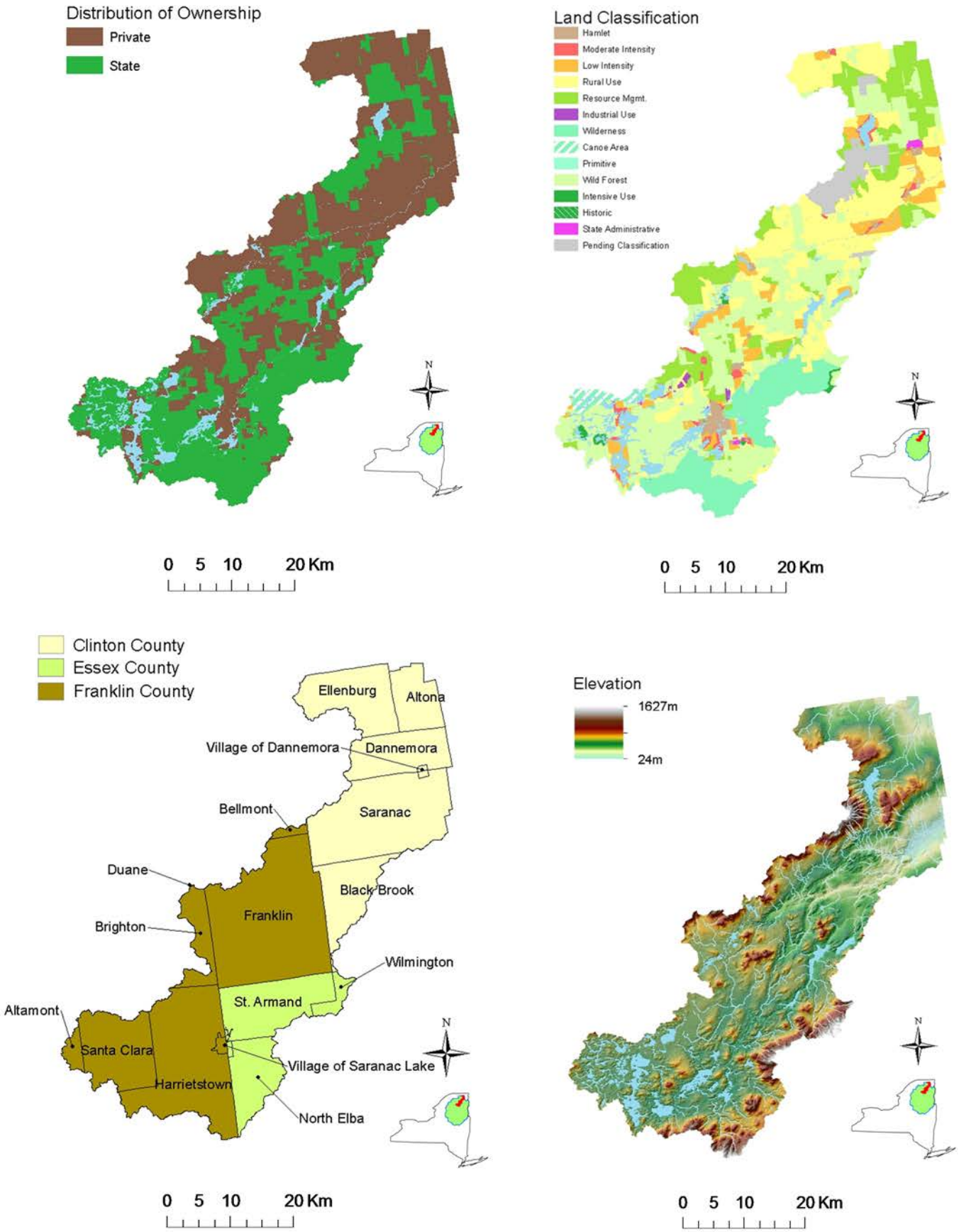

Figure 6. (Clockwise from top left) SCW ownership distribution, APA land classifications, municipal boundaries and elevation.

APA Land Use Area	ha (acres)	% area	ha (acres)	% area
Hamlet	2,677.66 (6,616.63)	1.52%	21,736.51 (53,712.07)	0.92%
Moderate Intensity	2,260.39 (5,585.56)	1.28%	40,253.65 (99,468.93)	1.70%
Low Intensity	11,575.68 (28,604.12)	6.56%	108,855.48 (268,987.74)	4.59%
Rural Use	42,343.86 (104,633.94)	23.99%	408,503.34 (1,009,433.74)	17.23%
Resource Mgt	25,259.18 (62,416.78)	14.31%	614,591.25 (1,518,688.05)	25.92%
Industrial Use	391.23 (966.74)	0.22%	5,030.35 (12430.272)	0.21%
Wilderness	19,178.11 (47,390.14)	10.87%	443,234.65 (1,095,256.68)	18.69%
Canoe Area	1,973.29 (4,876.10)	1.12%	7,141.44 (17,646.87)	0.30%
Primitive	0 (0)	0.00%	26,751.00 (66,103.17)	1.13%
Wild Forest	52,311.40 (129,264.29)	29.64%	520,971.43 (1,287,348.44)	21.97%
Intensive Use	864.01 (2,135.01)	0.49%	7,995.63 (19,757.62)	0.34%
Historic	0 (0)	0.00%	214.44 (529.89)	0.01%
State Administrative	439.24 (1,085.38)	0.25%	678.15 (1,675.74)	0.03%
Pending Classification	7,219.72 (17,840.32)	4.09%	14,536.91 (35,921.50)	0.61%
Water	10,014.64 (24,746.72)	5.67%	150,929.57 (372,955.08)	6.36%
Totals	**176,508.78 (436,162.69)**	**100.01%**	**2,371,439.00 (5,859,953.39)**	**100.01%**

= Private Ownership (51% of total land area; 84,508.00 ha (208,823.82 acres))

= State Ownership (49% of total land area; 81,985.77 ha (202,591.25 acres))

Table 2. APA land classification distribution in the Saranac/Chazy watershed.

Objective 1: Complete digital wetland and sub-watershed base maps for the Lake George Basin and the Saranac/Chazy River Watersheds.

Introduction

The Adirondack Park Agency (APA or Agency), in cooperation with the Adirondack Lakes Survey Corporation, NYS Department of Environmental Conservation (ALSC), and State University of NY at Plattsburgh Remote Sensing/Geographic Information Systems (RS/GIS) Laboratory has been delineating wetlands in regional watersheds and creating digital watershed/wetland databases through the US EPA State Wetlands Protection Program since 1993 (See appendix I). The first regional watershed, the Oswegatchie/Black, covered all or parts of 48 7.5' USGS quadrangles in the southwestern portion of the Adirondack Park. The Upper Hudson Watershed (73 quadrangles), the St. Lawrence I (St. Regis watershed, 19 quadrangles), St. Lawrence II (Raquette/Grass and Salmon/Trout watersheds, 40 quadrangles), the AuSable-Boquet River Basin (29 quadrangles) and the Mohawk River Basin (26 quadrangles, transfer by a private contractor) have been completed (Figure 2). With the conclusion of the Saranac/Chazy River Basin and Lake Champlain/Lake George project, all regional watersheds of the Adirondack Park will have been delineated using procedures, techniques, and standards developed through the Oswegatchie/Black regional watershed project.

One goal of recent wetlands mapping efforts has been to provide detailed regional data to help strengthen APA policy decision-making. The detailed digital database that results from wetland delineations is critical from both scientific and policy perspectives in assessing the relationship of wetland resources to watershed characteristics. The Oswegatchie/Black wetlands mapping was funded to help assess acid deposition impacts, to evaluate the ramifications of the 1991 Clean Air Act Amendments and the 1985 NYS Acid Deposition Control Act Standards, and to characterize wetlands and identify unique wetland areas. Detailed mapping efforts continued with the Upper Hudson, where methods of assessing cumulative impacts were examined. Both St. Lawrence Projects (St. Regis and the Raquette/Grass-Salmon/Trout River watersheds) sought to build upon

previous projects and to detail the large natural wetland complexes and low-elevation boreal communities unique to the region. The AuSable-Boquet project goal was to identify areas suitable for wetlands restoration. The Mohawk River Basin project continued the systematic production of detailed wetlands delineations with a project examining wetland invasive plant monitoring and control. The Saranac/Chazy River Basin and Lake Champlain/Lake George wetlands aerial photography interpretation and transfer completes the wetlands digital database within the Adirondack Park and enables regional watershed comparisons.

The project area is bounded by the Upper Hudson Watershed, the St. Lawrence I (St. Regis) watershed, the St. Lawrence II (Raquette/Grass and Salmon/Trout) watershed, the AuSable-Boquet River Basin watershed, and the Adirondack Park boundary (Figure 1). The boundaries of the Saranac/Chazy River Basin (Figure 7) and Lake Champlain/Lake George watershed (Figure 8) were created by merging the watershed boundaries of past regional watershed projects and the Adirondack Park boundary. The delineation, digitizing, and QA/QC techniques for the watershed (study area boundary) and sub-catchments remained essentially unchanged from previous projects except that the base products were digital topographic maps instead of hard copy maps.

Photo interpretations for all or portions of 43 7.5' USGS quadrangles were rectified and transferred to digital orthophotoquad base maps; all or portions of 7 quadrangles were transferred in previous watershed projects. Study area digitizing, wetlands data transfer, wetlands digitizing and digital labeling, and QA/QC for both the study area and wetlands digital data layers were equivalent to protocols adopted in the Oswegatchie/Black, Upper Hudson, St. Lawrence I, St. Lawrence II, and the AuSable-Boquet projects.

The Saranac/Chazy River Basin and Lake Champlain/Lake George wetlands transfer project comes at an interesting time in the development of GIS and Remote Sensing. We are witnessing the migration from analog aerial photography to digital products and had to assess whether the technology is ready for our adoption in the production of digital wetlands data layers. For this project we evaluated methods of

directly producing digital products from the aerial photo wetland delineation overlays, instead of creating multiple interim hard copy overlays. Wetland delineation and digital map production had been completed for seven 7.5' quadrangles within the Saranac/Chazy River Basin project using the imagery to be employed during the Photo Interpretation project (Contract ID Number: S200609). Using Leica Geosystems ERDAS IMAGINE and the ERDAS ArcGIS extensions (Spatial Analysis, Stereo Analyst), we evaluated various methods for accuracy, ease of use, time expenditure, and quality control as compared to the techniques used in the previous watershed/wetland grants. Techniques and protocols were developed to produce the Saranac/Chazy River and Lake Champlain/Lake George digital wetlands files at the same or better quality based upon a comparison between digital transfer methods and the already completed analog transfer results. The end products of the entire Saranac/Chazy River and Lake Champlain/Lake George Digital Wetlands Map Production project for the Agency are: an index of study area 7.5' quadrangles; a single study area boundary polygon each for the Saranac/Chazy River Basin and Lake Champlain/Lake George Basin; a coverage of sub-catchment polygons, a polygon shapefile of nested polygons showing watershed flows, and a single digital wetlands coverage for each of the two study areas; and detailed metadata for the digital index, boundary, and wetland files.

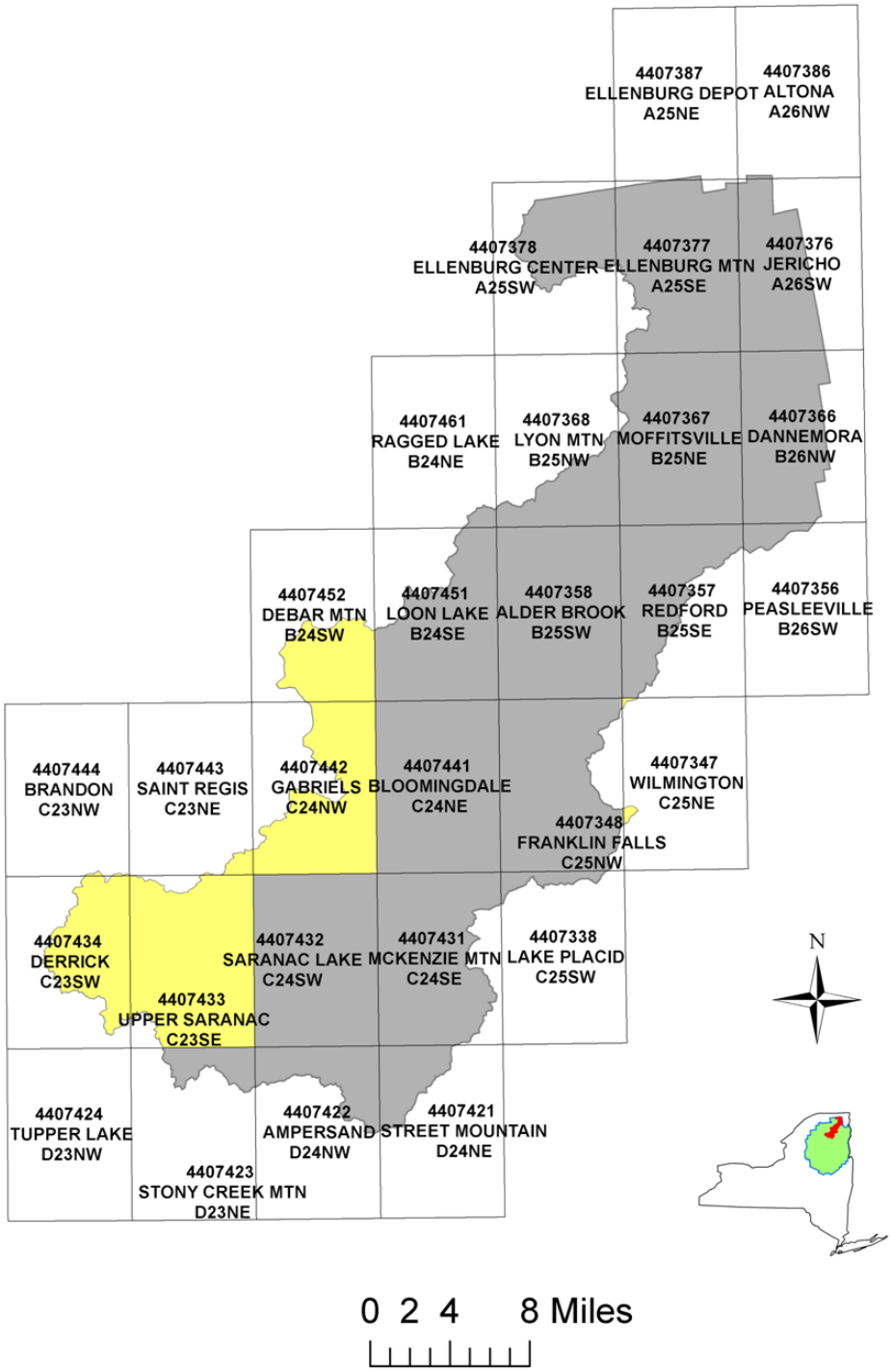

Figure 7. Saranac/Chazy River Basin. Names indicate 7.5' quadrangles within the project area. The seven quadrangles within the study area where the digital wetlands files have been created using methods from previous regional watershed projects are shown in yellow.

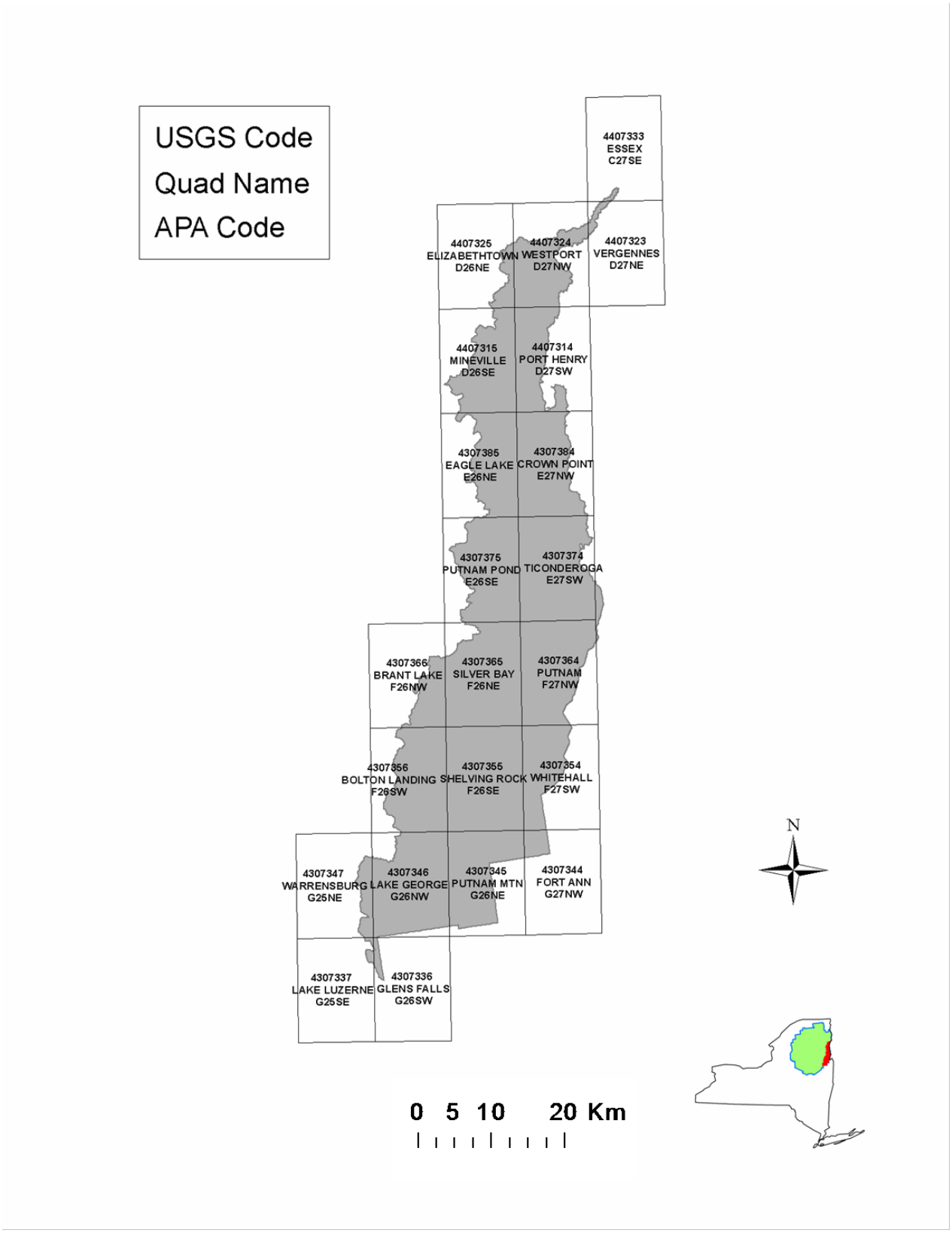

Figure 8. Lake George/Lake Champlain. Names indicate 7.5' quadrangles within the project area.

Methods

Watersheds

The outer boundary of both study areas were created from the boundaries of previous project outer watershed boundaries. Polygon shapefiles were created from the previous project coverages in UTM Zone 18N NAD27, and merged using the UNION command in ArcGIS Toolbox. Each study area polygon was isolated and converted into both a polygon shapefile and a coverage in UTM Zone 18N NAD 83. The Saranac/Chazy outer boundary was created by using the St. Regis River (St. Lawrence I), Salmon-Trout/Grasse-Raquette (St. Lawrence II), and the AuSable-Boquet River boundaries. The Lake Champlain/Lake George was created from the Adirondack Park boundary (Blue Line), the AuSable-Boquet River boundaries, and the Upper Hudson River project boundary. These watershed boundaries were used throughout the project as clipping polygons and the study area limit for both sub-catchment identification and wetland file creation.

Sub-catchment delineation methods were the same as those used for previous US EPA/NYS Adirondack Park Agency watershed projects except that interpretation was conducted directly on 7.5' USGS DRG GeoTIFF images of 1:24000-scale topographic maps instead of the hard copy 7.5' maps. Collarless maps in UTM Zone 18N NAD83 were downloaded from the Cornell University Geospatial Information Repository (CUGIR). Two independent interpreters at the NYS Adirondack Park Agency delineated watersheds in both the Lake Champlain/Lake George and Saranac/Chazy watersheds. Watersheds were shared with SUNY Plattsburgh as polyline shapefiles in UTM Zone 18N NAD83. In resolving the difference between the two interpretations, it was found that many watershed boundaries were incomplete, some incorrect, and pour point identification was inconsistent.

SUNY Plattsburgh received the ALSC point file of pond locations from the NYS Adirondack Park Agency. This file is a compilation of unique pond identification numbers assigned by the Adirondack Lake Survey Corporation (ALSC) and the New York State DEC Bureau of Fisheries (BOF). The file was subset by the two study area polygons and then merged with a polygon shapefile created from the polyline shapefiles received from the

NYS Adirondack Park Agency. Points were systematically checked to identify and correct those that did not fall on the appropriate watershed polygon based on tabular attributes such as name and unique pond number, those that identified transient ponds no longer in existence, or multiple points in a watershed and to delineate new watershed boundaries as appropriate. In addition to the ALSC points, several riverine systems were also identified.

Each sub-catchment received a 'Flow-To' arrow (line shapefile, with direction) indicating the downstream direction at the pour point based on topographic map interpretation. Where watershed boundaries or 'Flow-To' directions were unclear, multiple flow directions were suspected, or internally draining watersheds identified, the Adirondack Lakes Survey Field Data Volumes 1-18 and 1:40000 color infrared NAPP aerial photo transparencies were consulted. Field checking was conducted for a few watersheds.

Watershed polygons were given a THIS_NO, a unique numeric value derived from the feature ID. An ArcInfo AML developed by the NYS Adirondack Park Agency for a previous watershed project was modified to assist in tabulating all sub-catchments (coverage format) flowing into a particular pour point. The AML assigned each sub-catchment a unique number in the THIS_POND field. A second field contained the unique number of the receiving sub-catchment polygon in FLOWTO_NO. The table created by the AML was joined to the coverage by the THIS_NO attribute. However, the AML had to be run multiple times. Watershed flow directions and numbers were verified in ArcGIS ArcMap by visually checking that the FLOWTO_NO field was the THIS_NO value of the receiving body. Internally draining ponds had an identical FLOWTO_NO and THIS_NO. A new polygon shapefile was created that sequentially merged polygons and their inflows into an overlapping polygon file.

ALSC point numbers and names were retained for each sub-catchment. Ponds flowing in two directions, those internally draining, substantial ponds without an ALSC number, and riverine watersheds were all given unique identifiers. Where ALSC points were removed, points were retained in a separate file and justification of removal was made in a comment field. Separate point files were made to show all ALSC points within

each watershed, ALSC points removed (with justification in a comment field), ponds with no ALSC point, and internally draining ponds. Land areas that flowed directly out of the watershed were given a FLOWTO_NO of 99999. In all, 371 subcatchments were identified in the Saranac/Chazy watershed with a total area of 183902 ha. In the Lake Champlain/Lake George watershed, 376 subcatchments were identified with a total area of 152225 ha. The final products for each of the two major watersheds in this project are a polygon coverage of individual sub-catchments, a polygon shapefile of sub-catchments merged by total inflow area to each pour point, and an outer watershed boundary file for the Saranac/Chazy and Lake Champlain/Lake George watersheds.

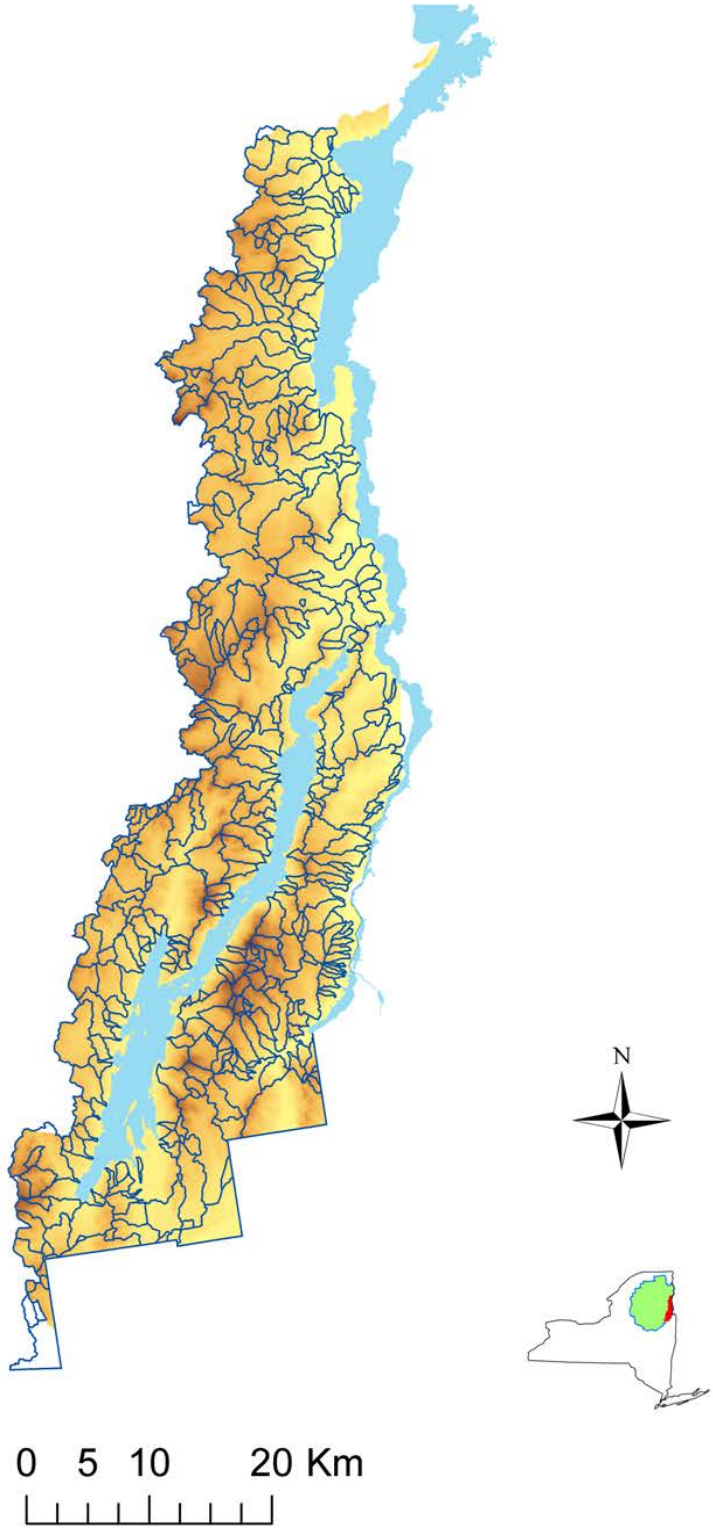

Figure 9. Subcatchments within the Lake George/Lake Champlain watershed.

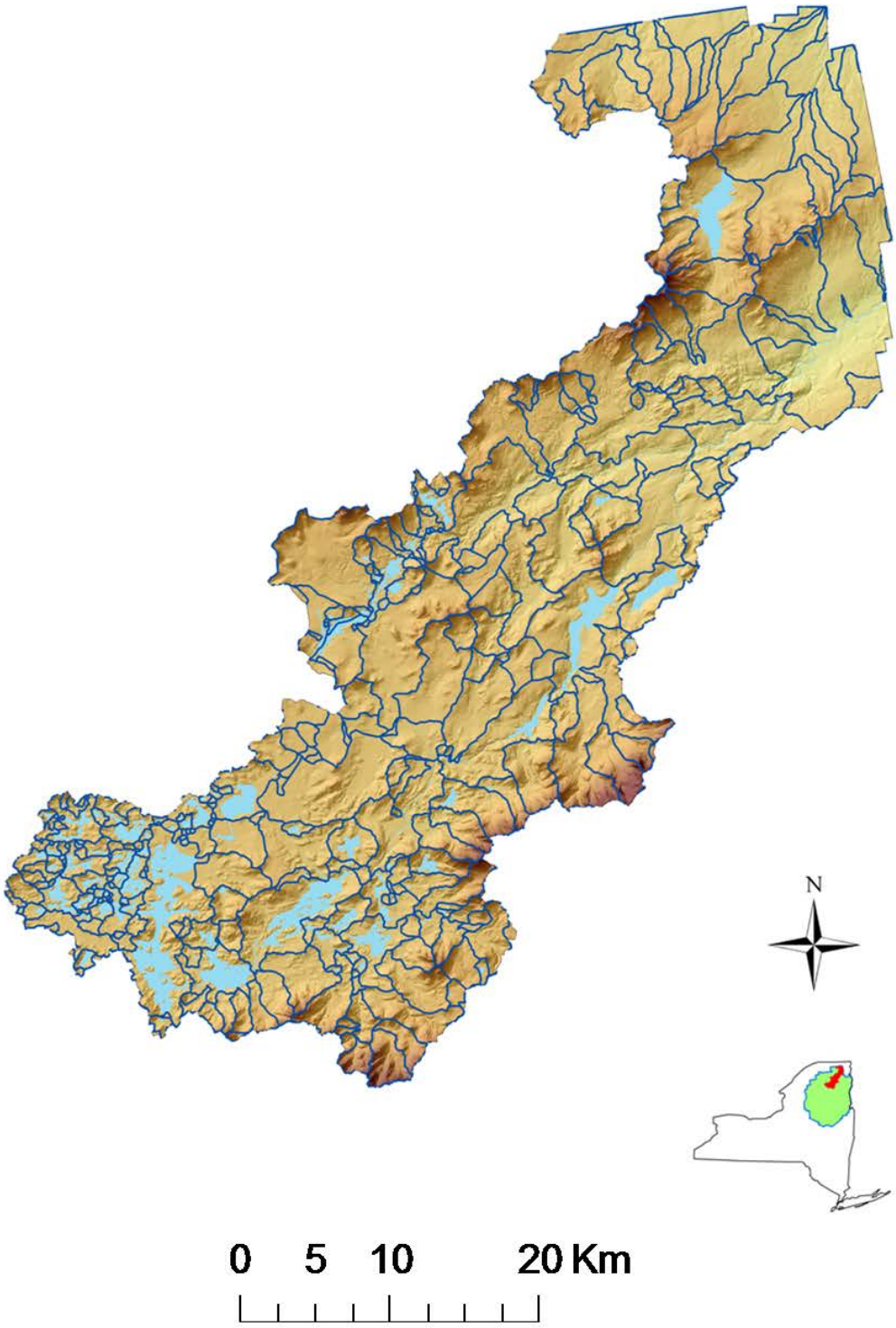

Figure 10. Subcatchments within the Saranac/Chazy watershed.

Wetlands

Wetlands - Data transfer to digital files

In the previous cooperative watershed/wetland regional projects between the APA and the RS/GIS Laboratory, a long analog process of photo-to-orthophoto transfer and rectification of wetland delineations was employed. The process was necessary because of software and hardware limitations, limited availability of digital orthophotoquads, standard remote sensing practices and equipment, and the need for clear QA/QC procedures. Photo overlays were transferred onto orthophoto overlays and orthophoto overlays were traced in preparation for scanning or hand digitizing. A separate orthophoto label overlay was prepared as an aid to ensure that all photo polygons and linears were transferred to the wetland overlay and to use as a wetland labeling guide.

Recent advances in GIS software and hardware and the wide availability of digital orthophotoquads made this a propitious time to explore other methods for photo-to-orthophoto transfer. Streamlining the process significantly decreased the number of times wetland overlays were created and thereby reduced both the time needed for transfer and the opportunities to introduce error. In the AuSable-Boquet transfer project, improved computer hardware, ArcInfo and R2V (vectorizing) software updates, and the development of an on-screen attribution menu resulted in time saving protocols. In the Saranac River/Chazy River Basin and Lake Champlain/Lake George project, we tested several digital imagery mapping techniques using Leica's ERDAS IMAGINE and ArcGIS with the ERDAS Stereo Analyst and Image Analysis extensions for transferring wetland data from analog air photo overlays to digital orthophotoquad base maps.

Seven 7.5' minute quadrangles (note the Saranac/Chazy River Basin quadrangles shown in yellow in Figure 7) had been transferred using the older analog methods. In this project we chose portions of 2 quadrangles (Derrick and Upper Saranac Lake) and compared digital methodologies against the existing digital files created through analog methods. The test quadrangles exhibited a wide variety of land cover, man-made features, topography, and wetland types that allowed a reasonable test of digital transfer techniques.

Wetlands – Analog transfer methods

Seven quadrangles within the study area were created using methods from previous regional watershed projects: Debar Mountain, Brandon, St. Regis, Gabriels, Derrick, Upper Saranac, and Wilmington. For these quadrangles, transfers of wetland polygons were made onto 1:24000 hard copy orthophotoquad mylar overlays using an Image Interpretation Systems Zoom StereoScope and 0.5mm film lead. For each 7.5' quadrangle, three mylar overlays were registered with the orthophoto hard copy mylar transparency using a brass pin registration system at the Agency . The overlays were used for labels, polygons transferred from the photo overlay, and a QA/QC check page. Wetland delineations were traced once in the transfer process and one more time to enable efficient scanning.

The primary reasons for wetland photo overlay transfer to orthophotoquads are to remove displacements caused by inherent camera lens geometry, scale changes caused by aircraft movements (roll, pitch, and altitude), scale changes due to ground elevation changes, and to provide a consistent organization and scale for map products (1:24000 7.5' USGS maps). To transfer the photo overlay wetland delineations to the orthophoto, the researcher analyses the stereo photo model and judges what regions are likely to be displaced in a similar manner. Using the Stereo Zoom TransferScope, the researcher can view the air photo pair as a stereo model and stretch, rotate, and change air photo scale to match the hard copy orthophoto as seen through a complex set of lenses. Since ground control is limited, features on the ground such as streams, ponds, individual trees or rock outcrops, and forest edges become important for aligning wetlands in small areas. However in past projects, orthoimagery dates were frequently different from the aerial imagery (often by nearly 20 years). Consequently, features used to align wetlands delineations could change significantly because of beaver activity, changes in land use, and forest growth and cutting. In addition, differences in imagery types, growing conditions (particularly leaf-out), light conditions (such as sun spots), and ground conditions (surface moisture and snow cover) can obscure potential ground control in either the aerial photographs or the orthophotos. High relief areas were particularly

problematic, especially if orthoimagery had poor contrast or exhibited leaf-out, since control is so scarce and the relief changes (and consequently scale changes and radial displacements) are so great.

Following wetland polygon and linear transfer, a hard copy wetland label overlay was created. Wetland photo overlays were photocopied and labels added to the 1:24000 mylar wetland overlay using a Kargl Reflecting Projector (optical reducer/enlarger). Photocopying wetland overlays produced a backup delineation, prevented heat damage to the photo overlay from the Kargl projector, and eliminated the need to remove the acetate overlay from the imagery for labeling purposes.

Creating a separate label overlay was critical for two reasons. First, a separate label overlay was important for digitizing wetland polygons because labels and leaders would obscure detailed wetland boundaries on polygon overlays. Scanned wetland labels would result in tremendous editing efforts to convert into file attributes. A separate overlay also aided the digital addition of wetland labels. Secondly, the label overlay provided a critical QA/QC step since it was a direct check of the photo overlay. Labels were assigned to polygons and linears with surety and a direct visual check of all polygons and linears could be made and lines either missed or added during the transfer observed. In addition, it was necessary to use abbreviated NWI labels on photo overlays while a 1:24000 overlay employed labels conforming to the NWI conventions as modified for the Adirondack Park.

Wetlands – Digital file creation using analog transfer methods

The seven wetland line/polygon orthophoto overlays that were created during previous projects were scanned using the RS/GIS Laboratory HP 815mfp large format scanner in black and white at 400 dpi into a tiff format. Tic marks were placed on the overlays corresponding to the orthophoto quadrangle corners and were digitized as tics for coverage georeferencing. Scanned files were vectorized using R2V raster to vector software. Vector files were transferred to ArcInfo as gen files and coverages were created with GENERATE. A series of steps converted the coverage into ground coordinates with the quadrangle and watershed boundaries, wetland features were clipped to those

boundaries, and fields were added in the arc and polygon attribute tables to receive the wetland labels.

The wetland polygon files were transformed into the quadrangle files subset from the Northern Forest Lands digital quadrangle file and in UTM Zone 18 NAD27 projection. Edits and digitizing were conducted in ArcInfo with a maximum 0.003 RMS tolerance and 20 meter snap tolerance. Digital files were cleaned with 1.219 meter fuzzy and 0.00 dangle node tolerances.

After line edits were made, labels were added as individual components using a tablet digitizer menu and an on-screen menu. These menus allowed enough flexibility to accommodate virtually any possible NWI label but reduced typographical errors significantly. Digital labels were somewhat different than standard NWI conventions. To permit potential analysis, class designations were always used. For example, a concatenated label reads PFO4/FO1E instead of PFO4/IE. As labels are added to the digital wetland file, photo-based label problems (missing labels, incomplete labels, improper labels, adjacent polygons with identical labels) and delineation problems (missing lines, extra lines) were resolved by consulting the aerial photography. After labels were added and concatenated, a hard copy plot was made of wetland polygons and arcs and all of their associated labels. Each label was checked against the mylar orthophotoquad overlay and label problems resolved.

After wetland quadrangle files were checked individually, another check was made of wetland labels in ArcMap to verify matches across quadrangle borders. EDGEMATCH was used to ensure spatial integrity of wetland delineations between quadrangles. Digital files were appended, wetland labels checked once again, and any sliver polygons corrected along quadrangle boundaries.

Wetlands – Digital transfer method

For the digital transfer method, a similar physical check of wetland polygons, linears, and labels was adopted as that used in previous projects. Digital orthophoto quadrangles are available for the study area at the NYS GIS Clearinghouse web site. Fortunately, these orthophotos were developed from the same National Aerial

Photography Program air photos that were used in the Saranac/Chazy River Basin and Lake Champlain/Lake George wetland delineation project. This means that control features such as shorelines, individual trees, rock outcrops, and forest edges were reliable even in remote and topographically varied locations.

It should be noted that the wetland photo overlays cannot simply be scanned and automatically vectorized because abbreviated NWI labels are included on the overlays and linear wetlands are represented as dashed lines. Considerable editing has to be done on the scanned overlays, regardless of what software is used or what methods are employed in either vectorizing or attributing. Editing includes removing NWI labels as scanned features, representing dashed lines as single connected arcs, and other edits inherent in developing a digital file from hand-drawn delineations. In addition, the original hard copy aerial photos and overlays need to be frequently consulted using a stereoscope during editing and attributing to clarify wetland interpretations.

Step 1. Scan aerial photos

The NYS Adirondack Park Agency supplied aerial photography with acetate overlays of wetlands and the stereo pairs to the mapped imagery. Aerial photos were 9” x 9” color infrared transparencies NAPP imagery at 1:40000 scale. The NAPP photo series is often referred to as quarter-quad imagery, since 4 images need to be mapped for each 7.5’ USGS quadrangle. With the stereo pairs, 10 images are needed to map a whole quadrangle. Imagery was scanned using an Epson Expression XL 10000 large format scanner with a transparency adapter. Mapped photos were carefully checked to ensure that the wetland overlay had not shifted and that fiducial marks were not obscured. All imagery was scanned as positive film 24-bit color TIFF files at 2000 dpi resolution (12.7 µm; approximately 0.5 m raster ground resolution).

Xerox copies of the acetate photo overlays were made to allow notations during wetland delineation transfers to digital files. The overlay copies were scanned as 400 dpi jpg files with a Dell 926 printer/scanner. The overlay scans were georeferenced and used as backdrops to attribute digital wetland files and quality control steps.

Step 2. Aerial photo geocorrection

To geocorrect scanned aerial photos, both the cameral calibration report and a digital elevation file are required. USGS publishes a Report of Calibration of Aerial Mapping Camera for specific camera and lens combination serial numbers used in their projects. Most reports are available at the USGS web site (http://calval.cr.usgs.gov/osl/naap_project.php), although some had to be obtained through the aerial photography contractor web sites when the USGS site was not functioning. Each report supplied the calibrated focal length, the calibrated principal point, and fiducial mark coordinates used in the camera model correction.

Digital elevation (DEM) files were downloaded from the Cornell University Geospatial Information Repository (CUGIR) as individual quadrangle files in UTM Zone 18N NAD27 floating point 32 bit files. New elevation files had to be created for each 7.5' quadrangle in the study area because the DEM format was incompatible with ArcGIS. Using ArcGIS Arc Toolbox, DEMs were exported to 16-bit unsigned IMG files. The IMG files were re-projected in ArcToolbox using the NAD27 to NAD83 NADCON tool and cubic convolution. Elevation IMG files were merged into 9-quadrangle files with the target quadrangle in the center using ERDAS IMAGINE. These files were then subset with a generous border around the target quadrangle to ensure that most of each aerial image was geocorrected.

Scanned aerial photo transparencies were geocorrected using the ERDAS Image Analysis ArcGIS extension. Raw scanned imagery was loaded into the ArcGIS Table of Contents and then the map was set to UTM Zone18 NAD 83 projection. Using the Camera Model Type, the scanned image was readied for geocorrection by identifying the merged digital elevation file and accounting for the earth's curvature, and the Camera file (a text file listing the cameral focal length and the fiducial coordinates). Eight Fiducial marks were entered for each image and then links established with the 1994/1995 orthoimagery downloaded from the NYS GIS Clearinghouse. Fortunately, the orthoimagery was derived from the same imagery used to delineate wetlands. Consequently, links could be established using features such as individual shrubs, rock piles, and beaver lodges. Usually, about 12 links were established for each scanned

image. After camera information and links were accepted, the imagery file was saved so that the geocorrection parameters could be applied.

Step 3. Transfer

A variety of software program combinations were tried and the results compared to determine the most efficient and accurate methods for analog-to-digital transfer of wetlands. Wetland delineations from aerial photo overlays were digitized into a file geodatabase of 3D line shapefiles using ArcGIS and ERDAS Stereo Analyst extension. Work was done viewing geocorrected stereo air photos with a Stereographics Crystal Eyes3 and E-2 emitter. Stereo imagery was displayed on the CRT monitor in 3-pane mode so that the cursor could be seen on each image of the stereo pair (Figure 11). The ArcMap window was displayed on the LCD monitor and was set to draw the image with the wetland overlay (Figure 12). This allowed quick scale changes, wetland label checks, and checks against the digital orthoimagephotoquads without losing your 'place' during the transfer.

Wetland delineations were traced as 3D line files in the stereo window. A 3D terrain-following cursor based on the digital elevation file was used. Data entry was conducted using a system mouse with the Z motion disabled. The left mouse button was used for feature collection, while the middle button was assigned a Save function. The stereo image was displayed at either 1:5000 or 1:7500 while the map view was displayed at 1:10000.

All 3-D line files in the file geodatabase were converted to 2-D files in a new file geodatabase. The 2-D files were appended, the watershed boundaries and quadrangle boundaries added, and the file converted to coverage format. Coverage format was ideal for editing and attributing because ArcInfo has true topology. This means that dangle nodes, polygons with missing labels, and other error conditions can be detected. Most importantly, coverage allows both polygons and lines to exist in the same file. Consequently, dangles representing linear wetlands that do not form polygons are allowed. In addition, linear wetlands that form the boundary between polygons are always edited with the polygons, with no chance of separate representations for the

linear wetland and polygon boundary. This is particularly important in complex riverine wetland areas.

Prior to attribution, 7.5' quadrangle areas were extracted from the coverage and carefully examined in ArcInfo for inappropriate dangles, open polygons and other problems. A scanned version of the wetland overlay was used as a backdrop to look for missing lines and polygons, or lines that were intended to connect but did not.

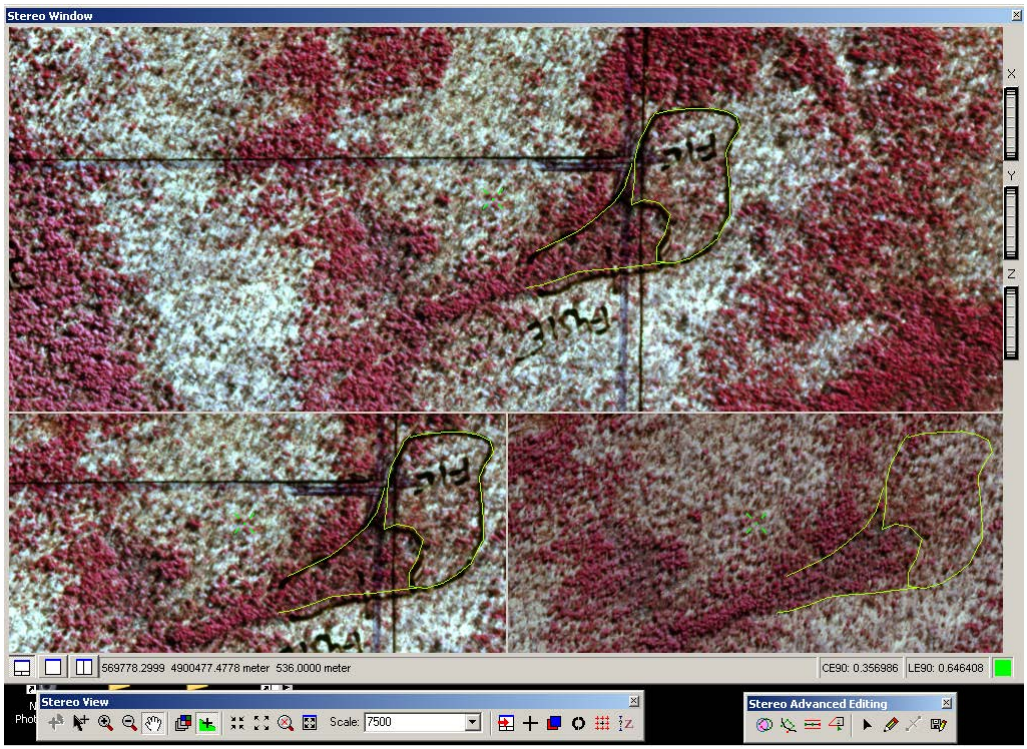

Figure 11. Stereo viewing window in 3-pane mode generated by the ERDAS ArcGIS Stereo Analyst extension. The left eye image is shown in the lower left and the right eye image is in the lower right. Stereo viewing is accomplished using a Stereographics Crystal Eyes3 and E-2 emitter active shutter system and a large CRT monitor.

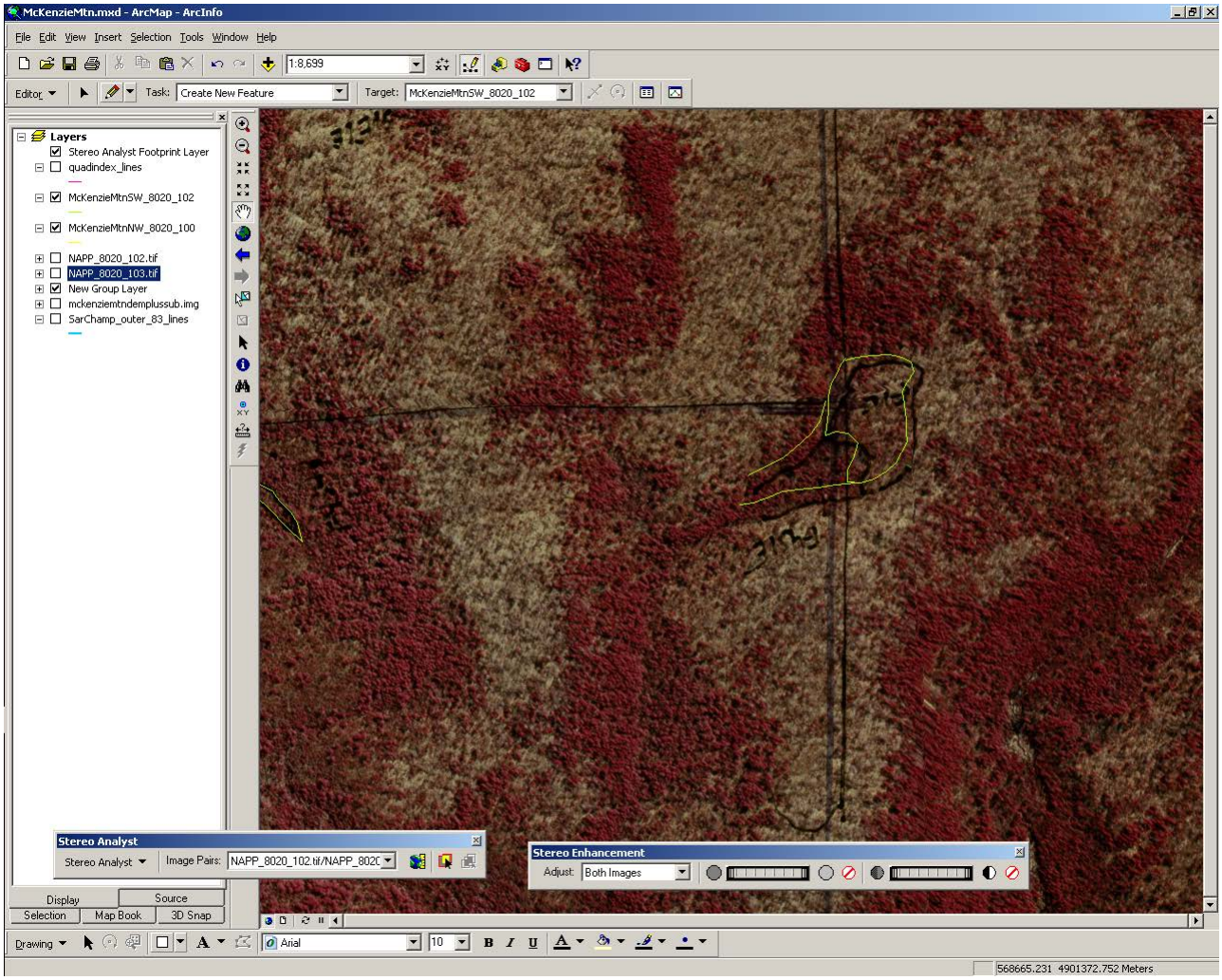

Figure 12. ArcMap window showing same area as Figure 11.

Step 4. Attribution

Coverage files for individual quadrangle areas were prepared for attribution by running a script developed in previous projects that added appropriate columns for NWI label components. The wetland delineation overlay from the aerial photos was roughly georeferenced and used as a backdrop. Attributes were added to individual quadrangle coverages using the Edit ArcTools in ArcInfo and a customized screen menu developed for previous projects (Figure 13). This process allowed a further check of both spatial and attribute values.

Wetland label components (SYSTEM, CLASS1, CLASS2, REGIME, SPECIAL1, SPECIAL2, and SPECIAL3) were concatenated into NWILABEL using ArcInfo Info for both

arcs and label points. Polygon and arc NWILABEL attributes were displayed in ArcMap, facilitating the identification of illegal or illogical labels.

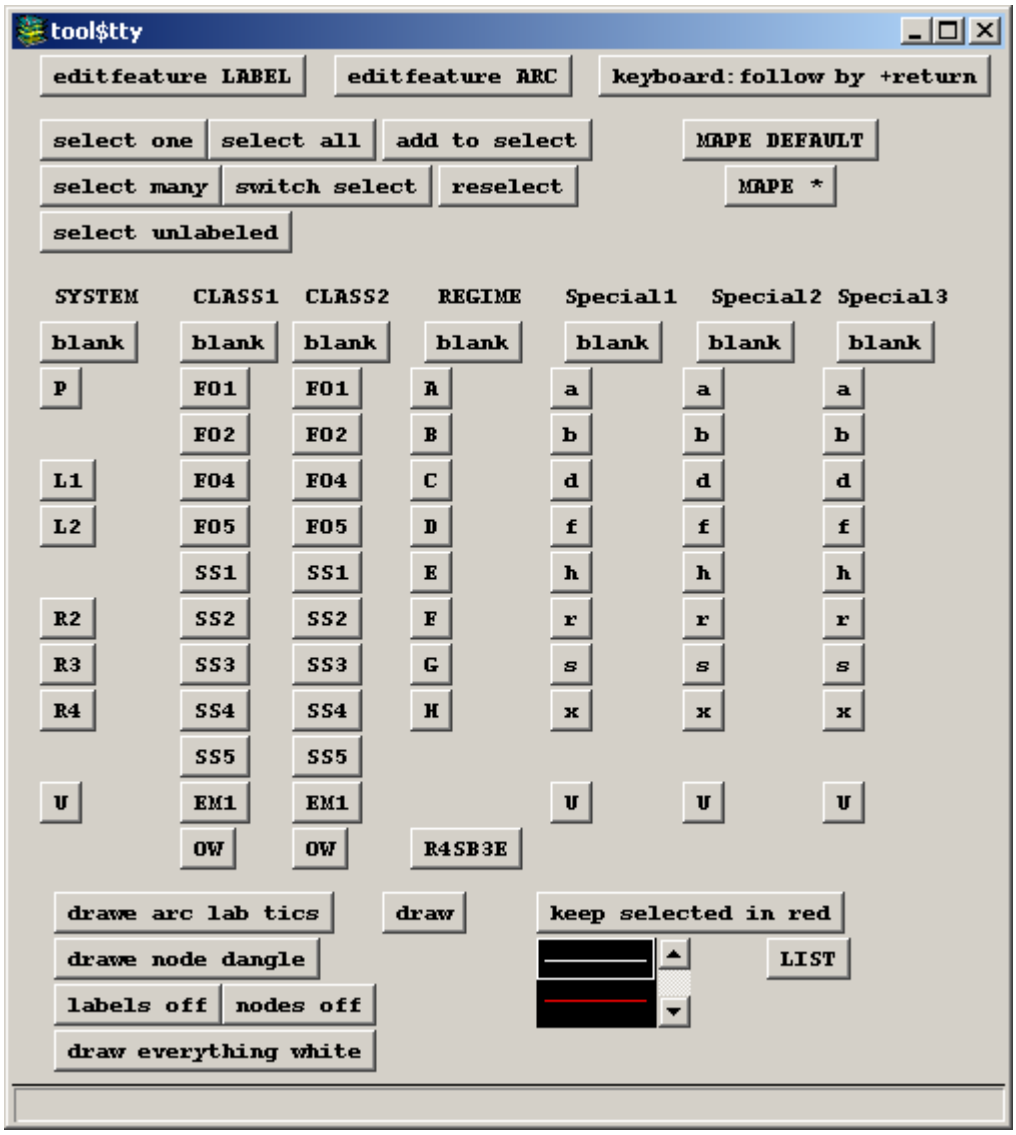

Figure 13. Customized menu developed for NWI label attributions.

Step 5. Append wetland delineations from former projects

Wetland delineations for the Debar Mountain, Brandon, St. Regis, Gabriels, Derrick, and Upper Saranac quadrangles were completed and digital files created in the St. Regis (St. Lawrence I) Watershed project, while the Wilmington quadrangle had been completed in the AuSable-Boquet project. Files were in UTM Zone 18N NAD27 coverage format. In ArcInfo, the coverages were re-projected to UTM Zone 18N NAD83 and items in both the polygon and arc attribute tables modified to fit with the Saranac/Chazy watershed files. While wetlands were delineated on the same image series as those used for the Saranac/Chazy project, they were transferred to orthoimagery 1:24000 transparencies created from imagery dated May 13, 1976. Only the Debar Mountain quadrangle used imagery and orthoimagery from the same date (May 14, 1994). In addition, a different interpreter mapped wetlands for this region. Some of the resultant difficulties are outlined in the Problems section.

Step 6. Final Wetlands File

Individual quadrangle coverages were merged into a unified wetland coverage for the study area. Again, adjoining quadrangle boundaries were checked to ensure that wetland delineations and labels matched across boundaries and then quadrangle boundary arcs were removed. All arc and polygon wetland labels (NWILABEL) were listed to check for unlabeled polygons and either illegal or illogical wetland labels. The entire wetland coverage for each watershed was carefully examined once again in ArcMap to discover wetland spatial and attribute problems. In addition, wetland coverages were perused over orthophotos (SID format in ArcGIS, convert SID files into merged IMG files for ArcInfo) at a scale of 1:5000 and spatial errors corrected to ensure reasonable delineations at a scale of 1:24000. Edit changes were made in ArcInfo with ArcTools edit tools and the customized on-screen attribute menu.

Wetland File Quality Assurance/Quality Control

During either the analog or digital transfer process, Quality Assurance/Quality Control (QA/QC) of photo delineations becomes an important component because of the highly detailed wetlands delineations, and the amount of judgment used during the transfer process. QA/QC protocols were developed for previous watershed/wetland projects and were followed for the Saranac/Chazy and Lake Champlain/Lake George watersheds project. The following problems are often encountered during the transfer, digitizing, and labeling process even though careful QA/QC has been conducted on the air photo wetlands overlay:

- Wetlands not delineated at all or delineated incompletely.
- Imprecise wetland delineations. Problems from poor delineations may be compounded because of the differing dates between flight lines and between the orthophotoquad and color infrared transparency. Poor pen quality can cause imprecise delineations.
- Ponded waters not delineated or delineated incompletely (it is exceedingly difficult to notice black ink on ponded waters since water is black on color infrared transparencies).
- Streams not delineated or delineated incompletely.
- Streams not delineated through complex wetlands.
- Missing or incomplete wetland labels or labels that do not match NWI conventions as modified for the Adirondack Park.
- Illegible wetland labels.
- Adjacent wetland polygons with the same wetlands cover-type label but no intervening wetland linear.
- Problems arising from edge matching between the four photos used to map the quadrangle or along quadrangle boundaries.
- Wetlands not delineated because of incorrect delineation of the study area boundary on air photo overlays.

An overall perusal of the wetlands digital files was conducted to check for:

- missing, incomplete, or improper NWI wetland labels;
- adjoining wetland polygons with identical labels;
- linear wetlands that do not connect to other wetlands;
- missing stream segments and linear wetlands that appear to connect wetlands in different watersheds;
- details such as wetlands being broken for major roads as per NWI protocol; and,
- linear wetlands, especially small ones, that are missing an NWI label.

While some of these apparent problems may have been legitimate, they were still checked against the original imagery.

During the transfer process, the watershed boundary is also noted on the orthophotoquad overlay. This boundary is compared to the digital watershed boundary to ensure that the entire watershed area was mapped for wetlands. A few small areas were missed on the aerial photo wetland delineations in this project, and were mapped during the digitizing process.

To discover further problems with the wetland digital file, the following QA/QC measures were taken after the initial label check and the merging of individual quadrangle files:

- Compare watershed boundaries on geocorrected imagery and the final outer watershed boundary files for areas in the watershed that may not have been mapped for wetlands.
- Digitally edge match arcs along coverage boundaries.
- Check the Arcvalue attribute to ensure that quadrangle boundaries and the outer watershed boundary have correctly designated values. Also check interior arcs to verify that attributes designating quadrangle boundaries or the study area boundary are not assigned improperly. After digital wetland files have been appended, remove quadrangle boundary arcs and duplicate polygon labels that result.
- Check for polygons with no label points or more than one label point.

- Check all wetlands less than 500 square meters since these may be indicative of digitizing problems.
- Digitally check that the quadrangle boundary file and the wetland file edges match. This step ensures that no sliver polygons will appear between quadrangles when wetland files are appended.
- Ensure that polygon and linear wetland labels match across quadrangle boundaries.
- Check that adjacent polygons have the same NWI label only if separated by a labeled linear wetland. This step will compare the digital wetland coverage to a coverage dissolved by the NWI label.
- All polygons within the study area MUST have a label in the System column and therefore a NWI label. Upland areas will receive a NWI label of U. This is the only way to avoid unlabeled polygons, particularly in complex wetland areas. Polygons outside the study area have a blank System value.
- A frequency table of all concatenated wetland labels was made to ensure that all labels follow the modified NWI standards for this project.

The QA/QC process is extensive in both time and detail. During photo to orthophotoquad base map transfer, interior quadrangle (between photo) wetland delineations and label differences must be resolved. Following initial wetland quadrangle digital file attribution, within-quadrangle checks were completed and problems corrected. As groups of quadrangles were completed, edge matching was done for wetland delineations and attributes between adjoining quadrangles. Finally, when all wetland files were appended, additional spatial and attribution problems occurred. All of these steps required frequent air photo and wetland delineation consultations.

Problems

As expected with such complicated interpretations and GIS files, numerous problems were found. Some areas on the imagery that were overexposed or had heavy shadows proved problematic for both interpretation and transfer. Most problems were

the same as those that occurred in previous projects and were largely addressed by the QA/QC measured developed during those projects and outlined above. It was surprising that even with careful geocorrection of imagery, the use of digital elevation models, and tracing of wetland delineations in a stereo model, edge matching between quadrangles was not automatic. For example, in Figure 14, we see part of the northwest corner of the Street Mountain quadrangle delineation in blue and the McKenzie Mountain southwest delineation in yellow. While this was relatively easy to resolve, it illustrates that edge matching between quadrangles and between photos in the same quadrangle are important. In a few areas, imagery was flown at different dates and proved to be problematic for resolving delineations.

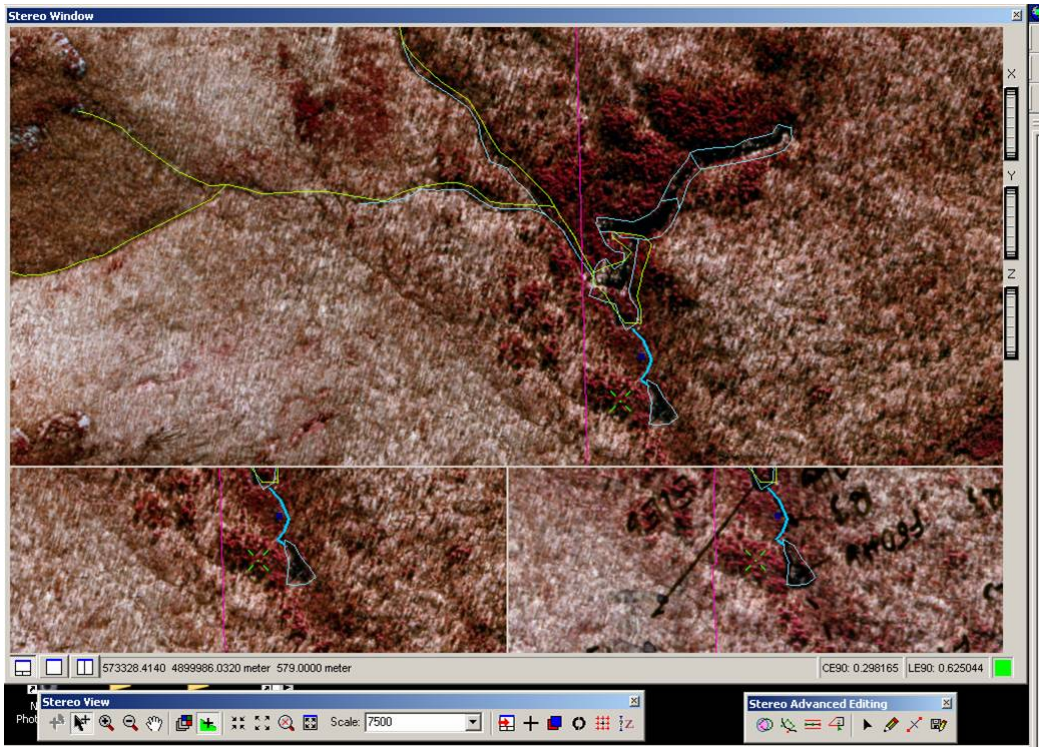

Figure 14. Section of the Street Mountain stereo viewing window showing the wetland delineation of Street Mountain in blue and of McKenzie Mountain in yellow. Care was taken in all steps of the geocorrection and transfer processes yet positional errors remained and were corrected.

Another issue was where digital wetland files from previous projects had to be merged with the Saranac/Chazy Watershed. Figure 15 shows a portion of the Gabriels (in blue) and Bloomingdale (in red) border. This was resolved by both photo checks and by choosing the larger wetland interpretation done on Bloomingdale image (Figure 16). Only arcs are shown here, but polygons had similar problems as shown in Figure 17, again along the Gabriels/Bloomingdale border, and again resolved by examining the aerial photography.

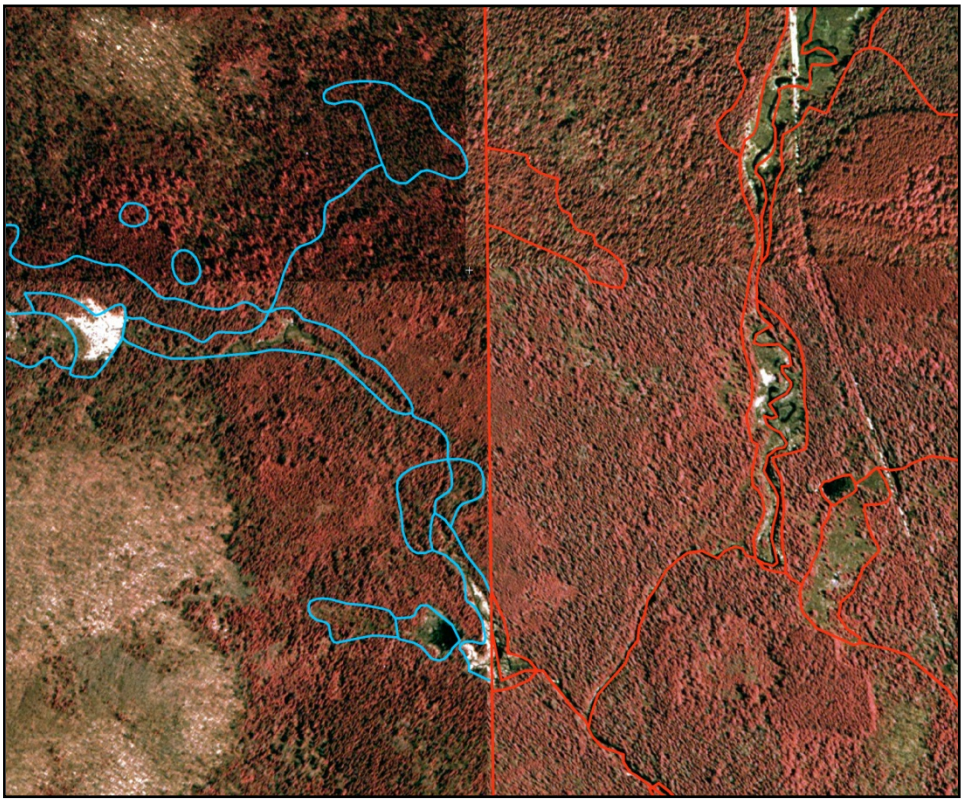

Figure 15. The Gabriels wetland delineation is in blue and the Bloomingdale is in red with an orthoimage backdrop. Gabriels was mapped for a previous project. Notice the delineation differences along the border.

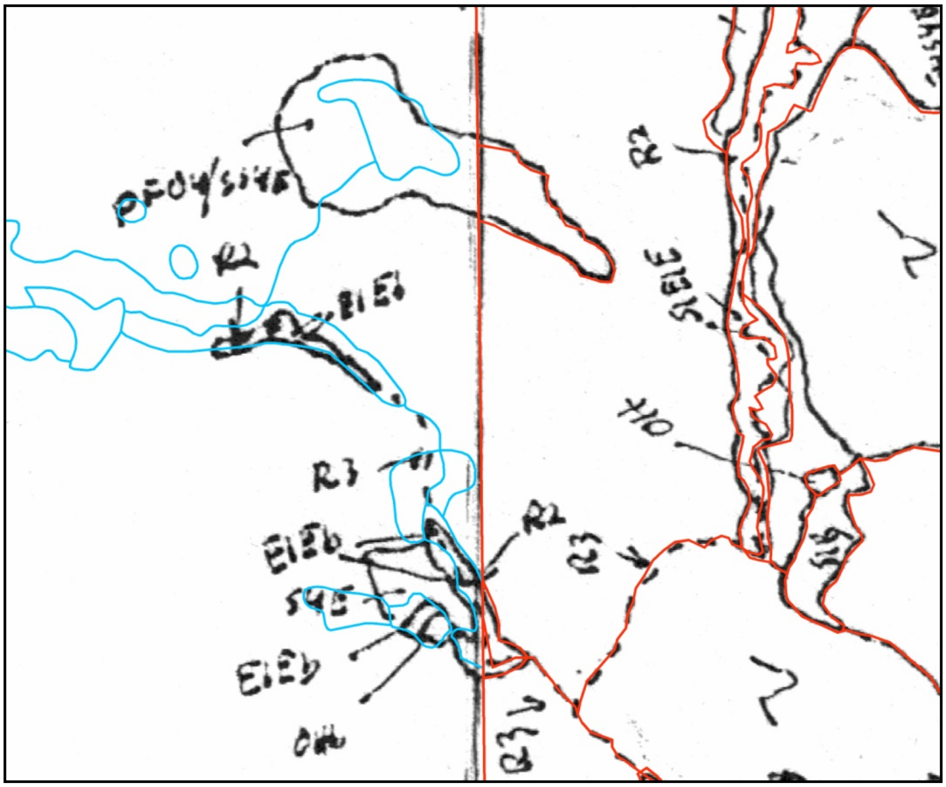

Figure 16. The Gabriels wetland delineation is in blue and the Bloomingdale is in red. Here, the backdrop is the georeferenced acetate image overlay.

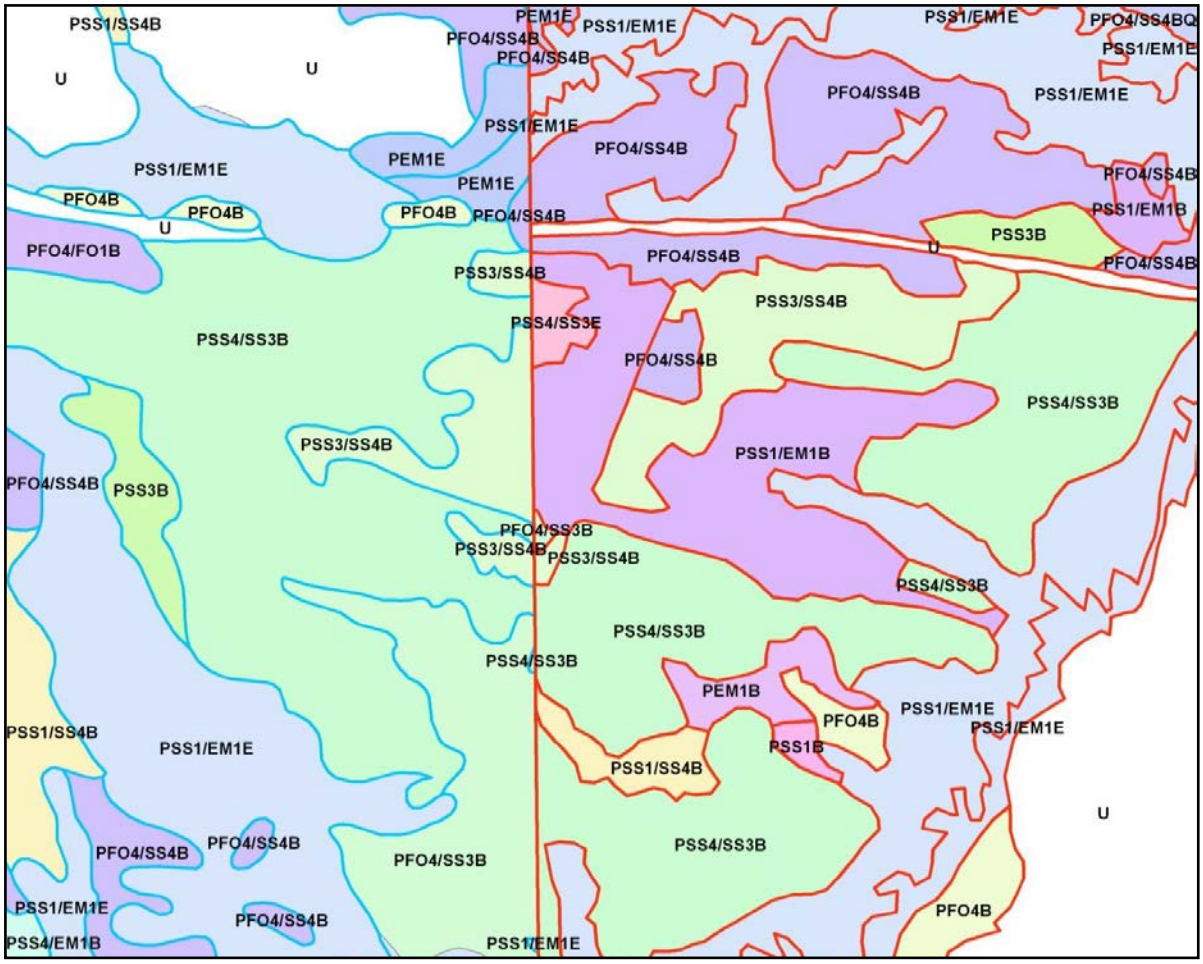

Figure 17. Another section of the Gabriels/Bloomingdale border. Note the polygon label differences between the two files.

In parts of the Port Henry and Crown Point quadrangles (Lake Champlain/Lake George watershed), lake levels had changed between imagery dates. For example, the southeast corner of the Port Henry quadrangle was mapped using May 04, 1994 imagery while the orthoimagery was created from May 07, 1995 imagery when water levels were lower. Examples are shown in Figures 18-21.

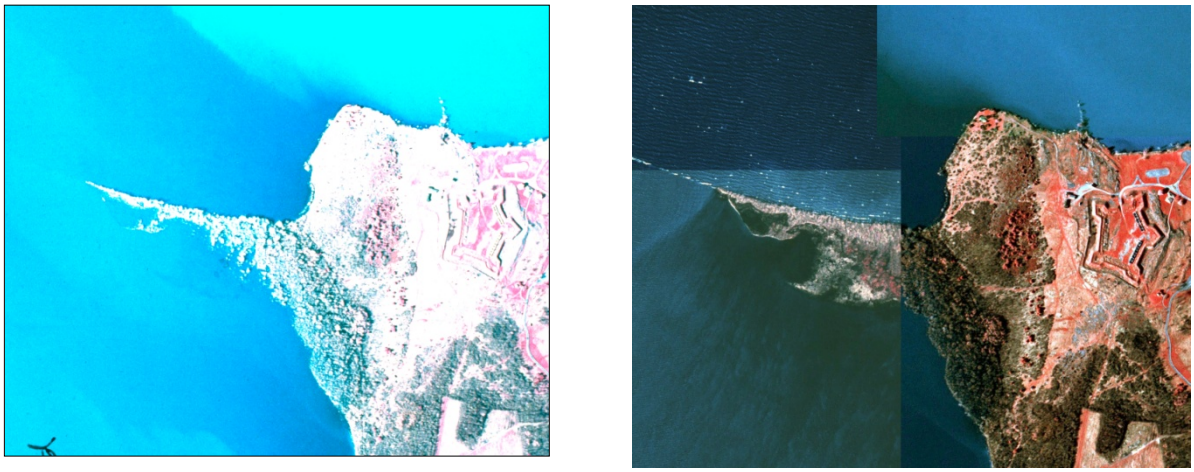

Figure 18. A portion of the Port Henry quadrangle. Notice the difference in wetland appearance and water levels on the scanned imagery on the left (May 04, 1994), and the orthoimage on the right (May 07, 1995).

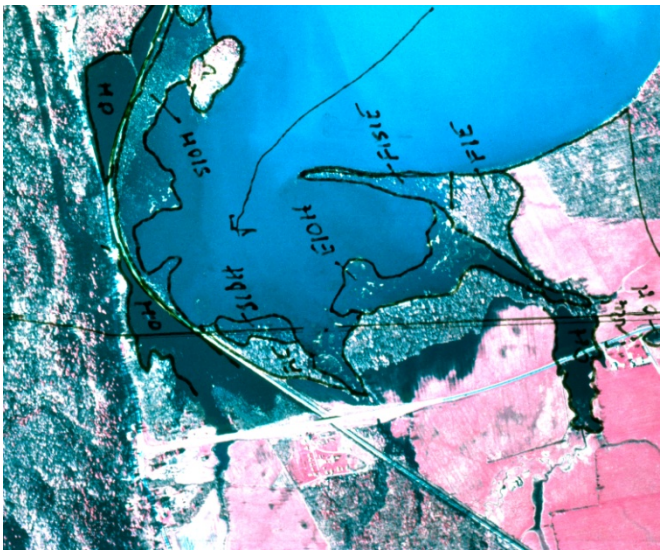

Figure 19. Scanned imagery with the mapped overlay for a portion of the southwest Port Henry quadrangle. NAPP image 8016-33 dated May 04, 1994.

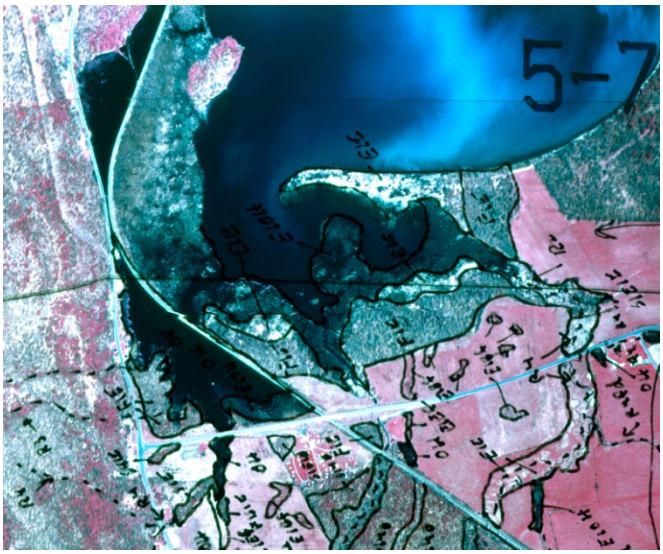

Figure 20. Scanned imagery with the mapped overlay for a portion of the northeast Crown Point quadrangle. NAPP image 8767-60 dated May 05, 1995.

Figure 21. Orthoimage showing the boundary area between a portion of the southwest Port Henry quadrangle and the northeast Crown Point quadrangle.

Despite carefully geocorrected scanned imagery, use of DEMs, heads-up digitizing on stereo imagery, and detailed imagery delineations, some arcs were apparently misplaced. Consequently, quick perusals of all transfers were made with an orthoimagery backdrop at a scale of 1:5000 in ArcMap. Necessary changes were made to arc and label positions in ArcInfo with orthoimagery that had been merged and transformed into IMG files. An example of displacement problems is shown from Ellenburg Mountain in Figure 22. In some areas, notably parts of the Lake George and the Upper Saranac quadrangle, some orthoimagery files downloaded from the NYS GIS Clearinghouse were invalid raster files and were not able to be reviewed.

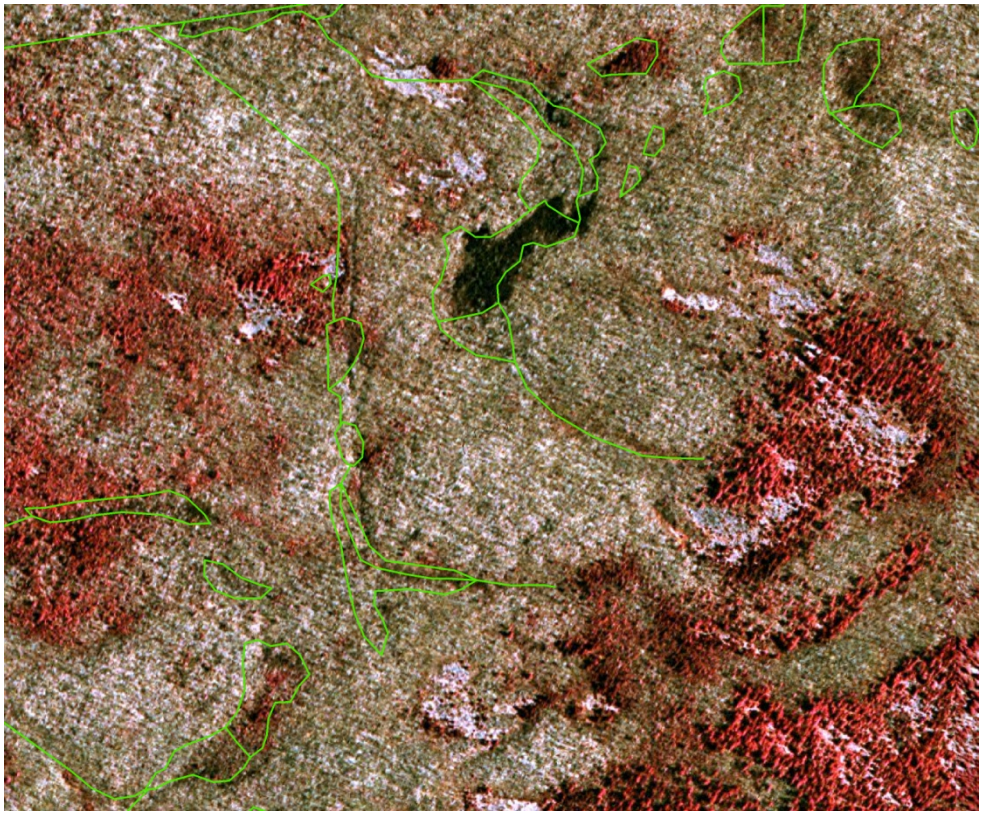

Figure 22. A portion of the Ellenburg Mountain orthopoto image with the transferred wetland arcs. Notice the apparent misalignments.

Throughout much of the study area DEM files were available from CUGIR. Even though DEM files are critical to both the stereo viewing and the creation of wetland digital files, no attempt was made to ascertain DEM file accuracy. It is suspected that some of the positioning problems for wetland delineations compared to the final orthoimage files may have been due in part to DEM file problems. DEM files from Vermont were necessary to transfer the eastern portion of the Ticonderoga quadrangle. However, the resultant merged DEM files were unsatisfactory. Fortunately, the needed DEMS were either along lake shore or in areas with very good control points and transfer of wetlands from imagery to orthoimage was conducted with heads-up digitizing on the orthoimage.

Wetland Characterizations

For complete wetland characterizations, see appendices B, C, D and E.

Wetland Classification	NWI Label	Representative Plant Species
Open Water	OW	Pondweed, milfoil, eelgrass, or none
Broad-leaved deciduous scrub shrub	SS1	Speckled alder, willow
Persistent leaved emergent	EM1	Cattail, grasses, sedges
Needle-leaved evergreen forested	FO4	Balsam fir, red and black spruce, hemlock, white cedar
Needle-leaved evergreen scrub shrub	SS4	Stunted or young black spruce or balsam fir
Broad-leaved deciduous forested	FO1	Red maple, silver maple, black/green ash
Dead forested	FO5	Standing dead trees
Broad-leaved evergreen scrub shrub	SS3	Leatherleaf
Rooted vascular aquatic bed	AB3	Submerged aquatic vegetation
Dead scrub shrub	SS5	Dead shrubs
Needle-leaved deciduous forested	FO2	Eastern larch
Needle-leaved deciduous scrub shrub	SS2	Stunted or young eastern larch

Table 3. Major wetland covertypes of the Saranac/Chazy and Lake George/Lake Champlain watersheds.

NWI Label	Hectares	Acres	%
OW	3,179.41	7,856.49	25.19
SS1	3,030.79	7,489.25	24.01
EM1	2,545.14	6,289.17	20.16
FO4	1,256.01	3,103.67	9.95
SS4	1,123.32	2,775.77	8.90
FO1	640.92	1,583.75	5.08
FO5	518.91	1,282.26	4.11
SS3	152.64	377.19	1.21
AB3	121.70	300.74	0.96
SS5	54.55	134.81	0.43

Table 4. Distribution of wetland covertypes in the Lake George/Lake Champlain watershed.

NWI Label	Hectares	Acres	%
OW	11,691.49	28,890.31	26.75
FO4	10,102.14	24,962.93	22.53
SS4	8,344.42	20,619.51	18.61
SS1	5,351.86	13,224.73	11.94
EM1	4,993.24	12,338.57	11.14
SS3	2,355.22	5,819.89	5.25
FO1	995.07	2,458.86	2.21
FO5	412.26	1,018.72	0.92
FO2	390.55	965.07	0.87
SS2	151.96	375.50	0.34
SS5	50.29	124.27	0.11

Table 5. Distribution of wetland covertypes in the Saranac/Chazy watershed

Conclusion

This project completes the initial watershed/wetland mapping for the entire Adirondack Park using methodologies developed for and adapted from previous EPA-funded Wetland Protection Program Development grant projects. While files were created with the intention of being consistent, the software and hardware, imagery, standard mapping methods, and some nomenclature has changed since the previous projects. Perhaps the greatest difference in the watershed mapping projects is that the previous projects employed available base color infrared imagery of varying dates.

It is recommended that all watershed/wetland projects be transformed from coverage format (which will gradually become obsolete) to a geodatabase format that mimics coverage topology. While shapefiles are easy for many end users, it is important that the arcs and polygons be inextricably tied together. Some tabular changes in both the polygon and arc attribute tables will have to be made to enable the merging of project files, but this is not a big stumbling block. In addition, quadrangle boundaries should be removed from previous projects. This is a bit more problematic and, at this time, cannot be done automatically. Merging files would also enable another perusal of wetland delineations and attributes that are much easier to conduct now than in the early projects and would enable a higher quality database for the entire Adirondack Park.

We are on the cusp of some significant changes in hardware that will make stereo viewing of digital imagery easier and less expensive. The system used in this project relied on a Stereographics Crystal Eyes3 and E-2 emitter active shutter system and a large CRT monitor. Unfortunately, CRT monitors are no longer produced and Stereographics does not have desktop LCD solution for this system. Other systems, costing several thousand dollars, employ dual LCD monitors. Inexpensive systems with anaglyph glasses (blue/red) are inappropriate to use for wetlands interpretation and cannot be employed for extended periods of time. Newer monitors and viewing systems are being developed that should enable bright stereo imagery with active eyewear that results in minimal eye strain and is useable with widely available hardware at a reasonable cost.

Another significant change will be the availability of standard geocorrected digital imagery. It is time consuming and inefficient for each project to scan aerial imagery and geocorrect it, unless it is for extensive historical analyses. If minimal line work needs to be transferred, analog transfer methods are still more appropriate now. However, New York State's orthoimagery program is currently producing geocorrected imagery and orthoimagery that will enable immediate stereo viewing with current software products. The combination of newer hardware and better digital imagery will result in future mapping projects using digital stereoscopy within a few years.

Objective 2: Develop and Implement a Permit Compliance Program

Introduction

The purpose of the Adirondack Park Agency Act is to "insure optimum overall conservation, protection, preservation, development and use of the unique scenic, aesthetic, wildlife, recreational, open space, historic, ecological and natural resources of the Adirondack Park". The Act establishes use restrictions for lands within the six million acre Park. New land use and development subject to APA jurisdiction requires a permit. The permit review process is managed by the Agency's Regulatory Programs Division, which provides project guidance and assessment, and applies review standards for submitted permit applications. In addition to these functions, the Regulatory Programs Division shares responsibility with other Agency units for ensuring compliance with the laws the Agency administers and the permits it issues.

Prior to this project, the heavy workload of incoming permit applications (400-500 annually) largely diverted staff attention from conducting compliance reviews following permit issuance. While it was generally assumed APA permits were effective tools in protecting natural resources, there had been no formalized effort to document the regulated public's compliance with these permits. This project formalizes an Adirondack Park Agency permit compliance program and adopts a methodology to inspect undertaken projects in a timely manner following permit issuance, offer assistance to permit holders as projects enter the construction phase and compile data based on inspection findings.

Development of procedure

In January, 2007, three independent contractors were hired as Permit Compliance Monitors (PCM's) to begin the process of developing and implementing an APA permit compliance program. Compliance measures from agencies in other states were reviewed as a starting point, but the most useful model was found very close by. The New York State Department of Environmental Conservation (DEC) issues wetland related permits outside of the Adirondack Park and has developed a compliance program for these

permits. Field compliance inspection sheets developed by DEC provided an initial template for APA compliance checklists. This checklist evolved as the program progressed and a clearer sense of APA project review needs developed (Appendix H).

Keeping with the intentions of the grant, the initial permit reviews focused solely on permits involving wetlands and shorelines. This enabled the PCM's to examine basic compliance trends, and determine how much wetland and shoreline was damaged or lost due to non-compliance with Agency permits. The historical permit review provided a workspace to create a methodology as the project moved forward. In 2008, once the historical permit reviews were complete, the program was expanded to include review of all newly issued permits for all conditions contained therein.

Selection of Historical Permits for Initial Review

Permits involving wetlands and shorelines that were issued between 2000 and 2007 were selected for the initial historical permit review. The Master Action Database (MAD), the Agency's digital record of all APA actions since 1971, was mined for such permits. Then each permit was reviewed to determine if a compliance check was warranted. Permits which had conditions applicable only during the construction phase of the project (i.e. temporary erosion control) or had no new land use associated were omitted from review.

Historical permits were reviewed to determine wetland compliance rates to fulfill the purposes of the EPA grant. This program was not developed to find new enforcement cases. Beginning in January of 2008, all newly issued permits were reviewed for compliance, regardless of their wetland or shoreline status.

Permit Holder Contact Procedure

By standard permit condition, the Agency may conduct on-site investigations, examinations, tests and evaluations as it deems necessary to ensure compliance with the terms and conditions of issued permits. Inspections must take place at reasonable times and upon advance notice where possible. To this end, a procedure was created to streamline permit holder contacts prior to compliance review (Appendix H).

Historical Permits

For historical permits, a certified letter of introduction and purpose (Appendix H) was sent to current permit holders. Since the properties could have been conveyed since permit issuance, tax map numbers were checked for current ownership information. It was possible that the current landowner was not the individual who applied for the permit and thus was not aware of its existence. If ownership of the property had changed since permit issuance, it was often necessary to explain the role of the APA, furnish a copy of the permit and outline permit conditions to the current owner.

Newly Issued Permits

After every two month period, holders of newly issued permits were contacted by mail to inform them of the compliance program and offer assistance in understanding permit conditions. Permit holders were asked to respond with project status updates, which in turn were used by compliance staff to compile an appropriate schedule of site visits. Also included was a reminder of the conditions concerning their permit's expiration date and of the need to record the permit in the office of their County Clerk. The two month interval between mailings ensured new permit holders were reminded of recording requirements during the 60 day window allotted to do so.

Site Visits

Following each mailing, site visits were arranged as necessary. Permit holders responded to the mailing with a flurry of phone calls and emails in the two week period after it was sent. During these communications, project status was determined and it was decided whether a site visit was warranted. Permit holders were invited to join the PCM for the site visit, but were not obligated to do so. If the permit holder did not wish to accompany the PCM, they were notified of the scheduled date, when possible, of the site visit. If any red flags were raised during initial contact, such as landowner refusal to allow the PCM on the property, regulatory program staff was notified.

Review Procedures

Historical Permits

The initial review of historical permits focused solely on wetland and shoreline related permit conditions. Review measures addressed only wetland and shoreline conditions as expressed in the permits. These measures included inspection of the following:

- shoreline and wetland related vegetative cutting restrictions;
- placement of development in regard to shoreline and wetland setbacks;
- placement of onsite wastewater treatment systems in regard to shoreline and wetlands setbacks;
- erosion control devices (silt fence, turbidity curtains) in regard to wetland and water body protection;
- stabilization of disturbed areas as required by the permit;
- adherence to storm water management plans, where applicable;
- wetland mitigation measures required by projects;
- wetland and water body crossings (culverts, bridges and permitted wetland fill);
- vegetative screening plans in regard to shoreline visibility issues; and,
- integrity of wetland areas, shorelines and streambanks.

Newly Issued Permits

Beginning in January of 2008, all newly issued permits were monitored for all conditions contained therein. In addition to those listed above, the following items were commonly inspected for newly issued permits:

- proper placement of development as shown on the approved site plan, regardless of wetland or shoreline involvement;
- proper size of development (building height and footprint, etc. as defined in the permit);

- adherence to clearing limitations, as shown on the approved site plan;
- vegetative screening plans in regard to roadway visibility issues;
- proper building color (as defined in the permit); and,
- verification that the permit was recorded in the appropriate County Clerk's Office.

Follow Up with Permit Holders

Photographs and other documentation were brought back to the APA offices for further determination upon completion of the site visit. Project statuses were noted in the Agency's Master Action Database (MAD), described in greater detail in the next section. The following procedures were followed for the circumstances outlined below:

Project in Compliance, Compliance Case Closed

- If the project was completed and in compliance, no further inspection was necessary. The project case was noted as compliant and closed in the Master Action Database.

Project in Compliance, Compliance Re-inspection Required

- Some projects were in compliance, but required additional review at a later date. Incomplete projects or projects not yet undertaken were included in this category. For these projects, a suggested re-inspection date was noted, and the project's MAD record was marked as "compliant" with "re-inspection needed".

Project Not in Compliance

- Documentation from the site visit was brought to the Project Review Officer who originally worked with the permit holder and wrote the permit (or to the Deputy Director of Regulatory Programs if the original Project Review Officer was not available). The matter of non-compliance was discussed, and possible solutions were explored. Possible outcomes of this discussion included:

- Casual resolution through discussion with the permit holder: In most cases, a letter was sent to the landowner describing the specific nature of the non-compliance and the steps required by APA to bring the project into compliance. The letter was often drafted by contract compliance staff, but was signed by the appropriate Project Review Staff. Final authority must come from the Agency, not an independent contractor.
- Resolution through permit amendment or letter of compliance: In cases where the non-compliance was not particularly egregious, and the actions taken by the landowner would have been permitted had they been incorporated in the original permit, a permit amendment was processed, permitting the activity while providing specific conditions, and bringing the project into compliance. Similarly, a letter of compliance could be written, acknowledging the matter and officially stating the activity as compliant.
- Opening of an enforcement case, and subsequent transfer of the matter to the Enforcement Division: Violations deemed to be severe or blatant were directed to the Enforcement Division for resolution. All materials from the compliance case were handed over, under cover of an official "Potential Violation Report" form and a memo describing the non-compliance in detail. Enforcement staff made contact with the parties involved and attempted resolution through a legally binding settlement agreement.

Field Visit Examples

These photos provide a sample of field visit findings, highlighting potential outcomes based on the project's level of compliance.

Compliant

The permitted project depicted in figure 23 involved the building of a new single family dwelling and garage, and installation of a water well and onsite wastewater treatment system. The project was located within one quarter mile of a river designated to be studied for inclusion in the NYS Wild, Scenic, and Recreational Rivers System. Items to review for this project included:

- Verify the required 75 foot setback of the development from the mean high water mark of the river
- Verify the integrity and proper placement of silt fencing at the top of the slope above the river

This project was determined to be in compliance, but additional inspections were necessary to document the final stabilization of the project site. The setback from the river was adequate, and silt fencing was properly installed. The current status of the project is compliant with a revisit needed.

Figure 23. Project in compliance.

Non-Compliant (Resolved through Discussion with Permit Holder)

The permitted project depicted in figure 24 involved construction of a boardwalk and a dock involving wetlands. Because the project involved the establishment of a structure greater than 100 square feet in size (the boardwalk) within the applicable 75

foot shoreline structure setback restriction, a variance from the Adirondack Park Agency Act was also required.

This project was determined to be non-compliant. The boardwalk was required to be at least 18 inches above the surface of the wetland, with one inch gaps between planks. This configuration was intended to allow sunlight to reach vegetation beneath the structure, enabling its continued survival. Upon inspection, it was discovered that the decking was several inches too low. The site was documented, and the permit holder was informed of the non-compliance. Fortunately the work was still in progress, and the problem was rectified. The issue was handled through informal discussion.

Figure 24. Non-compliant project.

Non-Compliant (Enforcement Case)

The activity depicted in figure 25 was not authorized by APA permit. The permit on the property authorized the construction of a single family dwelling, but did not authorize construction of a deck within close proximity to wetlands or shoreline. Moreover, the structure was greater than 100 feet in size, a violation of shoreline setback restrictions.

The non-compliant activity was thoroughly documented, and the matter was discussed with project review staff. Since the activity was outside the scope of the permit and hence constituted a violation, the matter was turned over to the Enforcement Division. Enforcement officers worked with the permit holder to negotiate a settlement. Eventually, the structure was reduced in size to limit the visual aesthetic impact from the lake.

Figure 25. Non-compliant project, transferred to the Enforcement Division.

Objective 3: Expanding the APA's Existing Wetland, Protection and Enforcement Tracking System

Master Action Database (MAD)

The Master Action Database (MAD) is a PC-based digital database available at the desk of every APA employee. It contains records of all Agency actions since 1971 including jurisdictional inquiries, project pre-application records, project records, enforcement cases, variances, wetland delineation site visits, and referrals from other regulatory agencies. There are approximately 45,000 action records in the system. The database can be queried, and data arrayed and analyzed.

To keep track of compliance review cases, the compliance section of the MAD was created. A custom designed interface (Figure 26) provides access to data pertaining to all compliance reviews, opened or closed, and offers a convenient means of keeping tabs on open cases, and maintaining a schedule for upcoming visits.

A new record was made for each site visit. In the case of a permit involving a subdivision, records were made for each individual lot involving new land use and development. Each record was assigned a unique number using the formula C (for compliance record) + permit number + lot number + letter tie breaker. For example, C2000-0001-001-B indicates the second visit (B) to lot one of APA permit 2000-0001.

The MAD can be queried by any of the features in the interface. The resulting output can be exported to Excel format and sorted in more detail. This was convenient for creating a schedule of upcoming site visits based on suggested re-inspection dates, or clustering visits on a given day based on watershed or town name.

All photographs and digital documentation relating to permit compliance reviews were compiled in a series of linked folders, accessible through a link on each MAD entry.

For more details on use of the MAD, consult the Permit Compliance Manual, Appendix H.

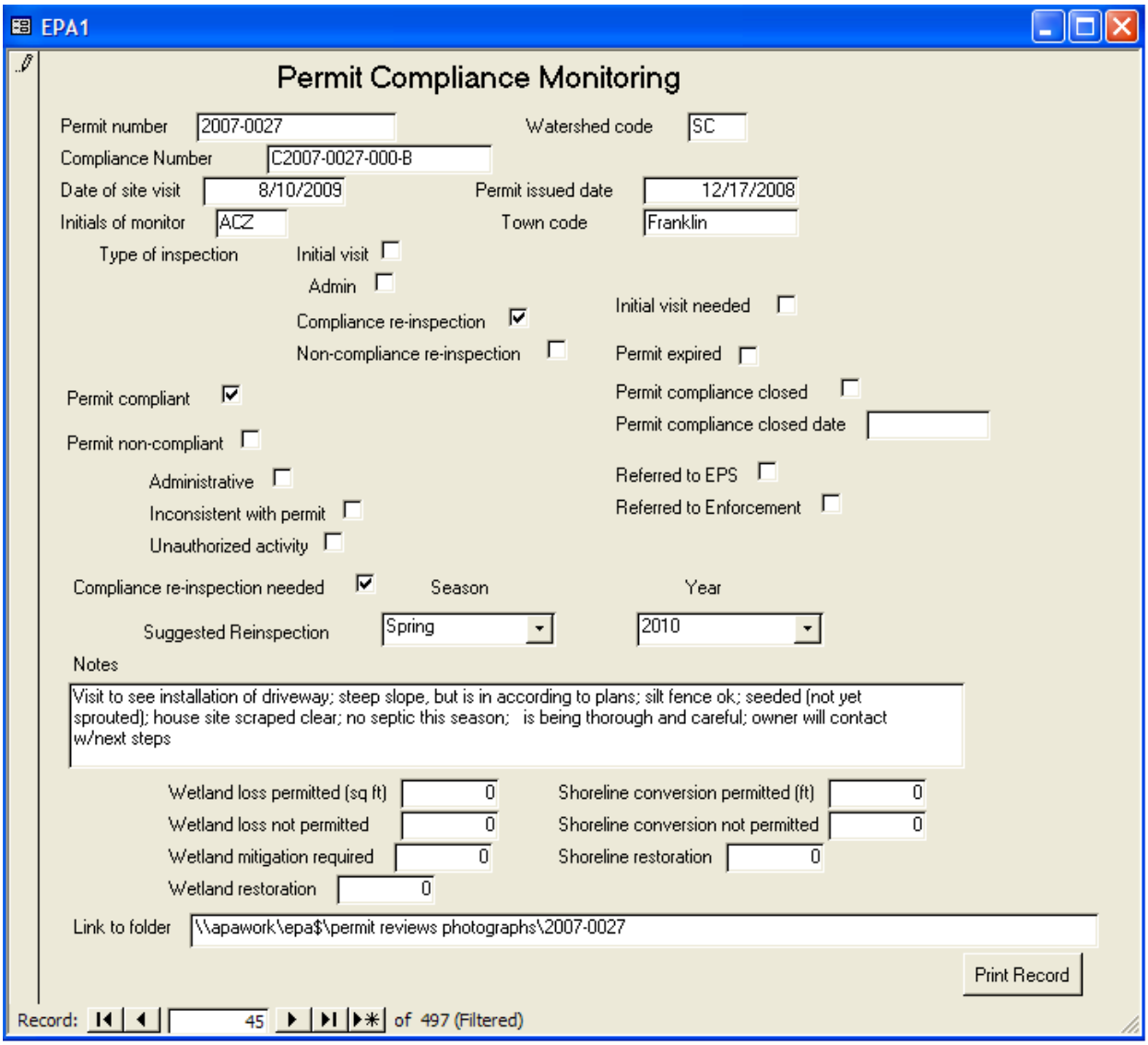

Figure 26. MAD interface for permit compliance monitoring data.

Lookup System (LUS)

Site visits were also logged into the Agency's Lookup System (LUS) (Figure 27). This spatial tracking system is an easy-to-use GIS database that enables all staff to retrieve natural resource and ownership information through a simple, customized menu system. The LUS is hyper-linked to the MAD and to scanned, site-specific project map schematics. System features include: searchable ownership and tax map data, APA project site boundaries, jurisdictional inquiry locations, wetland delineation sites, enforcement sites, NWI, Regulatory, and EPA-funded cover type wetlands maps, significant biological element occurrences, and many more physical and cultural feature layers. The LUS is a tool that does not replace a site visit, but provides staff with a first-cut view of conditions to be aware of when reviewing projects, potential violations, or delineating wetlands. The LUS and the MAD taken together are a *digital institutional memory*.

The addition of compliance site visit data to the LUS ensures that any future investigator of a given project site will be aware of any compliance review associated with the site.

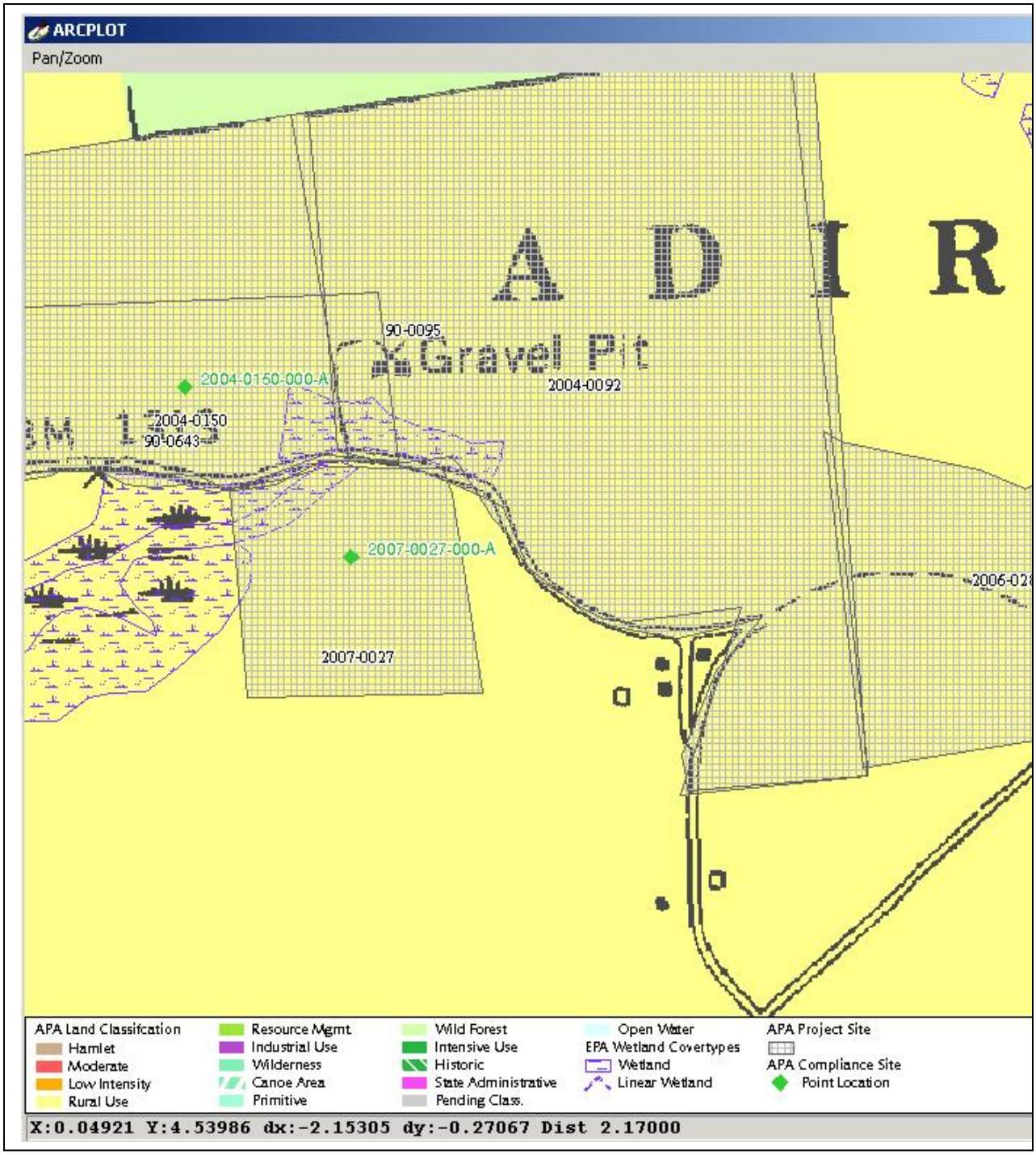

Figure 27. Lookup system map showing location (green diamond) of a compliance site visit.

Results

Compliance Statistics

Compliance rates were compiled based on closed cases with final determinations. Projects requiring additional inspections remain open, and are not included in these statistics. Non-compliant projects transferred to the Enforcement division are considered closed. Individual permits may have multiple compliance records (ie, multiple lot subdivisions with unassociated development). For non-compliant cases, "referred to PRO" means the case was handled through mediation between the permit holder and the Project Review Officer who originally wrote the permit. Usually, compliance staff managed this interaction. Two sets of compliance statistics are provided, showing first the compliance rates for historic wetland and shoreline permit review (figure 28), and then cumulative statistics for the entire project (figure 29).

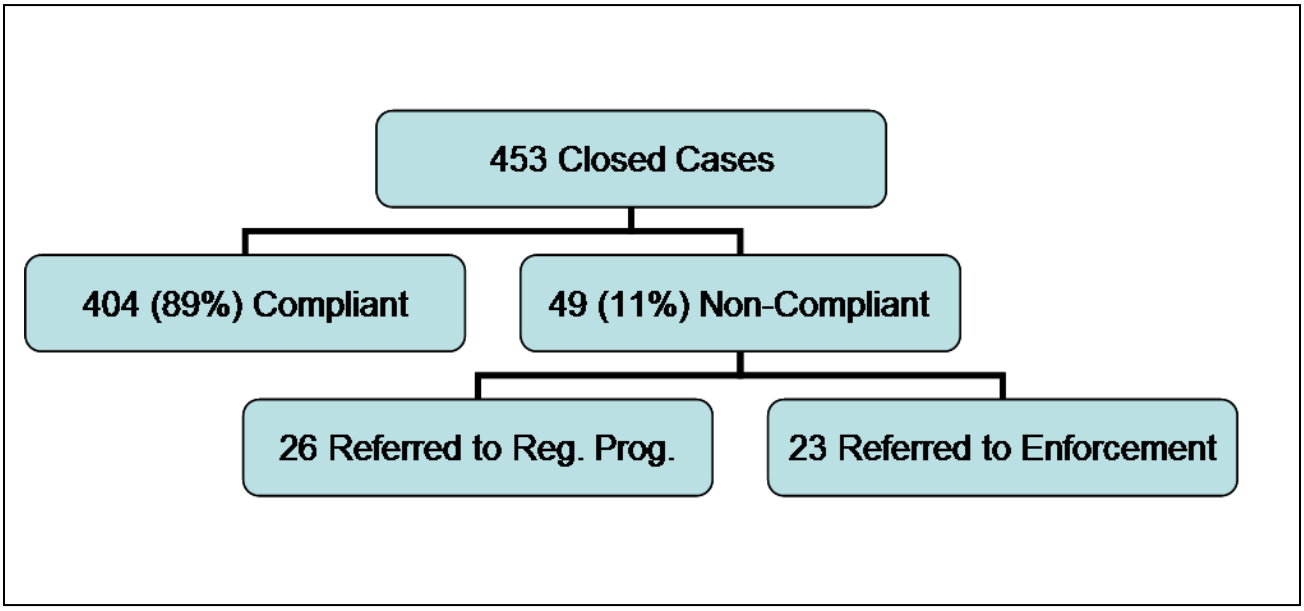

Figure 28. Compliance statistics for historic review of wetland and shoreline related permits (permits issued 2000-2007

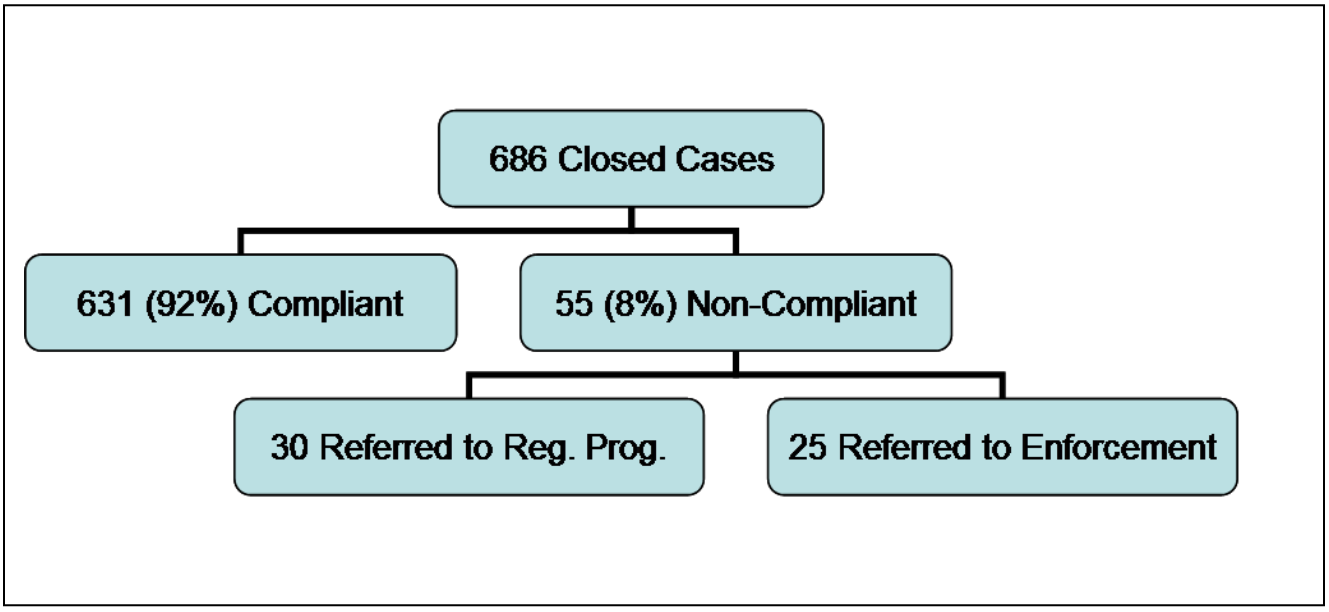

Figure 29. Cumulative compliance statistics for the project. Includes reviews of newly issued permits from 2008-2010.

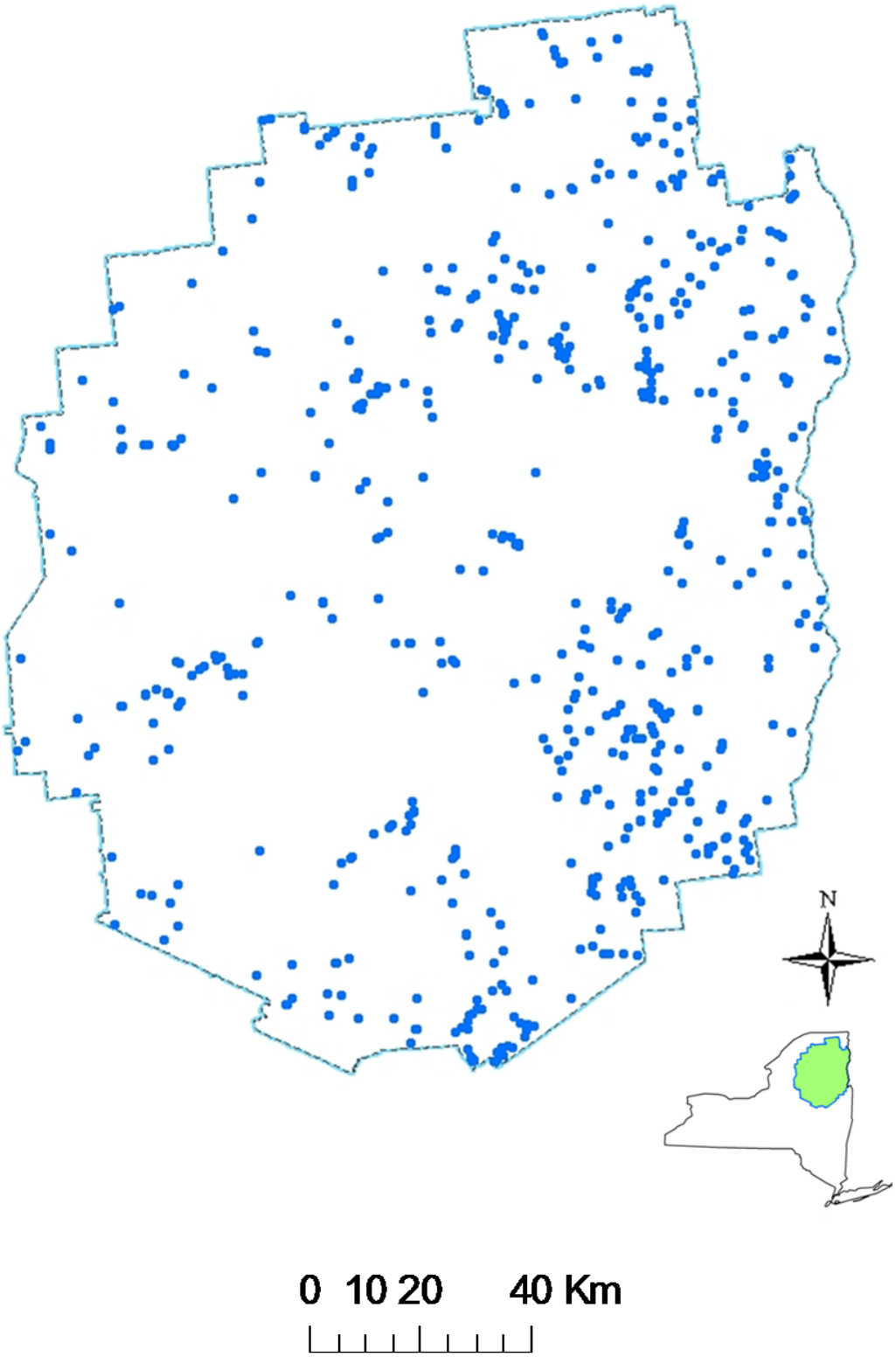

Figure 30. Geographic distribution of permit compliance site visits. Cumulative for project.

Wetland and Shoreline Loss and Gain

These statistics were compiled primarily from language contained in the permits themselves. All listed conditions, except for non-permitted activity, reflect the specific permit restrictions outlines in the project description of each permit. Statistics for "Wetland Loss Not Permitted" and "Shoreline Conversion Not Permitted" were recorded during field visits, and reflect non-compliant conditions.

Condition	Area ft^2 (acres)
Wetland Loss Permitted	446,595.42 (10.25)
Wetland Loss Not Permitted	9,439.00 (.22)
Wetland Mitigation Required	274,348.35 (6.30)
Wetland Restoration	32,709.24 (.75)
NET	-148,976.83 (-3.42)
Condition	**Linear ft**
Shoreline Conversion Permitted	1,874.50
Shoreline Conversion Not Permitted	523.00
Shoreline Restoration	0.00
NET	-2,397.5

Table 6. Tabulation of wetland and shoreline loss and gain. Derived from APA permits issued 2000-2007.

Wetland Impacts Related to General Permits

EPA contractors conducted an analysis of the Agency's general permits to tally the total area of unmitigated wetland impacts allotted in the general permitting process. Wetland related general permits are designed to expedite projects involving less than 300 square feet of wetland impact, but it was of some concern that there were no data documenting the cumulative wetland impacts they allowed. Analysis of 68 permit project

files revealed 3,583.6 ft^2 of permanent wetland impacts and 5,436.8ft^2 of temporary wetland impacts associated with general permits issued between 2003 and 2008.

Condition	Area ft^2 (acres)
Temporary Wetland Impacts	5,436.8 (.12)
Permanent Wetland Impacts	3,583.6 (.08)
TOTAL IMPACTS	9,020.40 (.20)

Table 7. Results of general permit wetland impacts survey. 68 general permits issued between 2003 and 2008 were reviewed.

Discussion, Objectives 2 and 3

Compliance

Prior to this project, general compliance rates were unknown, based primarily on anecdotal observation. This is the first thorough review of permit holder compliance following issuance of a permit and during initiation of development. Permit compliance statistics reveal very high rates of compliance among permit holders. Many non-compliant cases were inadvertent, requiring only minor remediation to resolve. By and large, permit holders tend to abide by the conditions of their issued permits.

Several factors are at work here. Perhaps foremost is the deep involvement of the APA permitting process itself. Project sponsors work closely with regulatory programs staff to navigate the process. It can at times be a long, complicated journey from project proposal to final issuance of a permit. Regulatory programs staff provide suggestions, guidelines and support to help develop a project that is, in the end, permissible according to statute and regulation. Since project sponsors are so involved in the process, they are, in most cases, clearly aware of the restrictions contained in their permits. It doesn't make sense, following the sometimes arduous process, that permit holders would abandon everything they'd worked for by intentionally violating their permit, subjecting themselves to an enforcement case.

Another factor involved in the high compliance rates is the tendency for many landowners to be in agreement with some permit conditions. For example, vegetative cutting restrictions put in place to screen development from roads are often desirable to protect homeowner privacy. Maintenance of existing shoreline vegetation provides a desirable natural landscape. Permit applicants are often aware of the reasons for permit restrictions, and enter the permitting process fully intending to comply with them.

There is a history of tension between the Adirondack Park Agency and the regulated public that has varied in intensity during the time since the APA's inception. One added benefit of the compliance program has been the increased contact between the APA and permit holders, offering an opportunity for landowners and permit-holders to interact face-to-face with the Agency and learn more about how the regulatory program

is implemented. This outreach provides an added layer of contact, allowing permit holders to ask questions about their permits as they move forward into construction, and for the Agency to catch permit violations before they occur, limiting damaging effects and enabling correctable measures to be made more easily.

Permit Compliance Monitors encountered numerous permit holders who were eager to share the final product of their projects. Landowners take have pride in their property and their work, and are pleased to demonstrate how they've completed their projects in compliance with the permit. In addition, a final compliance check to document a project site can provide the permit holder with a sense of closure, knowing that they've navigated and completed the permitting process successfully.

Clearly, these results indicate that APA permit holders are generally adhering to their permits. Provided these permits are well designed and adequately addressing resource protection needs appropriate to the project site, it is reasonable to assume that threats to the resources of the Adirondack Park are coming primarily from unpermitted activities. These activities are handled through the Agency's Enforcement Division.

Integration with Existing Agency Divisions and Programs

Comparison of compliance data from the historical wetland and shoreline reviews and the cumulative final statistics reveals the evolution of the compliance program as the project progressed. Initially, non-compliant cases referred to regulatory programs staff were noted as non-compliant in the Master Action Database, and the case was closed. As the project progressed, the compliance program became more integrated with existing APA programs and a workflow was established, these cases became more streamlined. Compliance staff became the mediator between the permit holder and regulatory programs staff, helping to bring the case into compliance. This resulted in fewer cases being closed as non-compliant cases, and created a resulting increase in compliance rates.

This integration was intentional. The permit compliance program was designed to be merged with existing APA workflows. Prior to each bi-monthly compliance notification mailing, APA staff members were given an opportunity to review the permits on the

mailing list. Staff members were asked to provide pertinent background information on permits with which they were familiar. They provided details about complicated projects and projects with delicate or complicated histories. In many cases, staff members were able to provide details regarding a landowner's intentions regarding their projects. Given the size of each compliance mailing (some included more than 100 individual permits), this background information was valuable preparation for compliance monitors prior to initiating contact with permit holders.

Regulatory programs staff were generally pleased to see the results of the compliance review procedure. Site visit photos provided staff an opportunity to see the final product of the permits on which they worked. Documentation of site conditions offered verification that protective measures they'd required in their permits were adequately followed. In addition, many permits contain conditions requiring the permit holder to provide additional deliverables following permit issuance. These might include a planting plan, wetland mitigation reports, revised construction plans or septic system installation certifications. Regulatory programs staff are proficient at staying on top of these matters, but an additional layer of oversight from compliance staff was usually welcome.

Wetland Data Measurement

Wetland protection is a primary regulatory program for the Agency and one of the main predicates of jurisdiction in all land use areas. All proposed projects submitted to the Agency for review and approval must meet certain minimal standards of wetland protection. These include strict adherence to the mitigation hierarchy (avoid, minimize and compensate for wetland losses), discretionary compensatory mitigation, storm water management plans, erosion and sediment prevention and control plans, invasive species colonization prevention and management plans and sewage system setbacks. Strict adherence to these standards during project review is the Agency's commitment to no net loss and net gain goals.

Compliance project staff initially set out to measure the amount and rate of change in wetland acreage and function in the Adirondack Park in relation to the

standards of the no net less and net gain goals. But this proved difficult to quantify. Acreage of wetland damaged due to non-compliance with permits could be measured, but it was much more difficult to measure acreage of wetlands protected as a result of compliance with permit conditions. Is the entire area of a wetland protected by regulating development adjacent to a small portion of it? Is a wetland protected by the permit itself, or by the application process? Often, wetlands protection is accomplished before a permit is issued, as regulatory programs staff guide landowners to develop their projects to avoid wetland impacts, making specific wetland permit conditions unnecessary.

To get a sense of how the no net loss and net gain goals were progressing, it was decided to gather the data directly from the permits themselves. Project plans involving wetland loss in area or function and compensatory mitigation or restoration are described and quantified in most permits. These values were compiled from historical permits. Unauthorized wetland losses discovered during site inspection of non-compliant permits was also included. As shown above (Table 6), a net loss of 148,976.83 ft^2 (3.42003 acres) was calculated.

Similarly, wetland loss associated with APA general permits was analyzed. Wetland related general permits are designed to expedite projects involving less than 300 square feet of wetland impact, but it was of some concern that there were no figures documenting the cumulative wetland impacts they authorized. As noted in table 7, 5,436.8 ft^2 (.12 acre) of temporary wetland impacts and 3,583.6 ft^2 (.08 acre) of permanent wetland impacts were identified.

It should be noted that not all permitted wetland losses require compensatory mitigation. Mitigation requirements are considered on a case to case basis. For example, in some instances minor wetland fills are unavoidable. Minimization of wetland impacts on the project site as a whole may be considered adequate compensation. Also, permits granted to the State of New York or various Park munincipalities which use public funds, may not always be required to carry out elaborate and expensive compensatory wetland mitigation. Here again, it is important to recognize the value of the permitting process in avoiding substantial wetland impacts in the project design phase.

These data indicate minimal cumulative wetland losses among permitted projects issued during the period of time examined. Coupled with high compliance rates with APA permits and the wetlands related conditions contained therein, it can be implied that the APA's wetland protection program as managed by the permitting process is successfully avoiding substantive impacts to wetlands within the Adirondack Park.

Shoreline Data Measurement

Shoreline data were compiled in much the same manner as wetland data, using specific measurements from the permits themselves. Shoreline conversion was defined as any activity that changes the natural shoreline character, such as dock and boat construction, sea wall construction and rip-rap installation. Total linear feet of shoreline conversion as indicated in the project description was recorded. Shoreline rehabilitation was not a requirement of any of the permits researched. Note that jurisdictional fringe wetlands are not compiled in this tally. The Agency strives to avoid wetland loss in approval of shoreline conversion activities.

Future Projects

Development of the Permit Compliance Monitoring Manual (Appendix H) ensures that this program may be continued in the future, beyond the life of this EPA grant funded project. Permit compliance is a continuous venture. Newly issued permits provide more new review cases, and many existing review cases require re-visits to ascertain their final compliance status. Provided appropriate funding, the Adirondack Park Agency could easily incorporate this program into regular workflows.

However, the strong rates of compliance documented by this project indicate that ongoing monitoring of compliance for all permits is not a particularly pressing need. Permit holders are, by and large, playing by the rules. The value of the compliance program is its ability to maintain contact with permit holders as an additional layer of outreach, and provide follow-up on behalf of regulatory programs staff to be sure permit holders are following through with all required aspects of their permits.

Appendices

Appendix A. Final report on Saranac/Chazy and Lake George/ Lake Champlain watersheds wetland aerial photography interpretation by Donald Bogucki.

Appendix B. Wetland Characterizations of the Saranac/Chazy watershed. Data table organized in order of decreasing area.

Appendix C. Saranac/Chazy wetlands data table organized in order of decreasing number of occurrences.

Appendix D. Wetland Characterizations of the Lake Champlain/Lake George watershed. Data table organized in order of decreasing area.

Appendix E. Lake Champlain/Lake George wetlands data table organized in order of decreasing number of occurrences.

Appendix F. Metadata for digital wetland mapping of the Lake George/Lake Champlain watershed.

Appendix G. Metadata for digital wetland mapping of the Saranac/Chazy watershed.

Appendix H. Adirondack Park Agency Permit Compliance Manual.

Appendix I. History of EPA grants awarded to Adirondack Park Agency.

Appendix A. Final report on Saranac/Chazy and Lake George/ Lake Champlain watersheds wetland aerial photography interpretation by Donald Bogucki.

SARANAC/CHAZY RIVER AND LAKE GEORGE/ CHAMPLAIN WATERSHEDS:

WETLAND AERIAL PHOTOGRAPHY INTERPRETATION AND DIGITAL WETLAND MAP PRODUCTION

FINAL REPORT

CONTRACT C200608

JANUARY 15, 2009

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SARANAC/CHAZY RIVER AND LAKE GEORGE/CHAMPLAIN WATERSHEDS: WETLAND AERIAL PHOTOGRAPHY INTERPRETATION AND DIGITAL WETLAND MAP PRODUCTION

INTRODUCTION

This project was undertaken to obtain a current wetland inventory for the Saranac/Chazy River and Lake George/Champlain watersheds in the Adirondack Park for the purpose of wetland protection. The study area encompasses approximately 816,800 acres and includes all or portions of thirty-eight 7.5 minute USGS quadrangle sheets (Table 1). A total of 126 quarter-quad wetland overlays were produced for the project.

METHODS

Task 1. The Adirondack Park Agency supplied all the 1:40000 NAPP (National Aerial Photography Program) color infrared transparency aerial photographs required for the project (279 photos). Each aerial photo was sorted by flight line, identified with a self-stick label on the upper right hand corner of the transparency, and placed in manila folders according to flight line. The location of all photo principal points was marked on the Ogdensburg and Lake Champlain 1:250000 quad sheets for easy geographic reference. A 9”x 9”clear acetate sheet was secured with tape to each quarter quad transparency, and the quad corners and borders for the 7½-minute topographic quads were drawn on the appropriate photo overlay. In areas of high relief care was taken to compensate for excessive radial image displacement in locating quad borders.

Task 2. The wetlands mapping on the color infrared transparency overlays was completed according to a modified National Wetlands Inventory (NWI) classification system (Cowardin et al. 1979)) developed by the Adirondack Park Agency in previous mapping projects. A primary objective of the project is to develop wetland maps consistent with maps prepared for the adjoining basins for which similar photographic interpretation has been performed. Because even very small wetlands may have significant ecological value and function, all wetlands visible on the photography were delineated and classified. Based upon past work in the Adirondacks, wetland areas as small as 0.1 acre (depending on signature) often can be identified on the imagery. In order to achieve the smallest line width, the wetland boundaries, always drawn on the upland area around the wetland, were delineated with a 4x0 (0.18mm) Koh-i-noor Rapidograph stainless steel technical pen point with Rapidograph 3071-F black acetate ink. All wetland delineations and classifications, both polygon and linear, were done stereoscopically using a Bausch & Lomb SIS 95 Zoom Stereoscope. The wetland cover types were classified to system, subsystem, class, subclass, water regime modifier, and special modifiers when appropriate.

The original Request for Proposals issued for this project on April 18, 2007 by the Adirondack Park Agency specified that Landscape Position, Landform, Water Flow Path, and Waterbody Type descriptors according to Tiner (2003) would be interpreted from aerial photography for these watersheds. After careful review of the requirements for and difficulties in completing this task,

both the contractor and the Park Agency agreed that most of the important information concerning these criteria could be better obtained by GIS analysis of the wetlands data layer. It was therefore decided that this task would not be completed in this portion of the interpretation.

Task 3. Each overlay was edge matched to all adjacent photos. This was done stereoscopically for both the overlays within the study area and to neighboring watersheds (Upper Hudson, AuSable/Boquet, and Raquette-Grasse). Generally this is not a difficult operation except where the adjacent flight line photography is significantly different from the photo being delineated. Some problems were encountered in edge matching for this project and will be discussed in the problems section of the report.

Task 4. The final packet of completed wetland overlays and aerial photographs was returned to the Agency for quality control evaluation in October 2008, and the Agency completed its review of the work in December 2008.

QUALITY ASSURANCE/QUALITY CONTROL

In order to provide maximum quality assurance/quality control a combination of field investigation, topographic analysis, 1:20000 black and white back-up imagery interpretation, and consultation with Adirondack Park Agency personnel was utilized in the wetlands mapping process. Once all photos were delineated, the contractor reexamined each overlay for wetland delineation and classification accuracy. First, each overlay was checked for incomplete polygons and/or linears, unlabelled polygons, and overall line quality utilizing a moveable opaque mask between the photo and the overlay. Second, each photo was checked for any wetlands not delineated and classified. A number of factors affect mapping quality and these conditions will be discussed in the PROBLEMS section of the report.

Although every effort was made to eliminate mistakes and to keep error at a minimum, with tens of thousands of delineations and classifications it is inevitable that some inaccuracies will persist. The project was fortunate in that an arrangement was made between the Adirondack Park Agency and the State University of New York at Plattsburgh to have Carolyn Strauss, a top student in the Environmental Science program with significant remote sensing skills, serve as an APA intern and provide an additional level of QA/QC to the wetlands interpretation. After consultation with the contractor and APA staff, Carolyn concentrated on the following tasks in checking the imagery:

a. Identify missed wetlands. All imagery was examined stereoscopically to identify any wetland site that may have been overlooked in the initial interpretation.

b. Examine wetlands for incorrect delineation. Both polygons and linears were checked for correct placement of wetland borders.

c. Verify that all wetlands were labeled correctly. The labels were checked for

appropriate system, subsystem, class, subclass, water regime modifier and special modifiers. Special attention was given to delineated wetlands with missing labels.

d. Determine continuity of drainage. Most wetlands have at least an outflow stream and many have both an inflow and outflow. A few have neither and a few have just an inlet stream. These water courses are sometimes difficult to see on the 1:40000 imagery and may be missed in the interpretation. The imagery was examined to check for connecting streams and when a questionable area was encountered the appropriate 7½ minute topographic map was consulted. The topographic maps are compiled with larger scale imagery (generally 1:20000) and water courses are often more visible than on the 1:40000 imagery. In most instances, the topographic map was considered the final authority in questionable cases concerning stream connections.

Although a project such as this contains a recognizable amount of mapping error, this is acceptable within the limits and scope of the operation. It cannot be eliminated, and as long as it is within the range of tolerable error, the wetlands delineation and classification is considered a viable product. Mistakes, on the other hand, are unacceptable. Considering the entire scope of the task, however, it is reasonable to assume that some mistakes were made in conducting the study, but the several levels of QA/QC employed in the project should result in a minimal number of mistakes.

PROBLEMS

Based upon previous experience working with wetlands in the Adirondacks, and specifically within the Chazy/Saranac River and Lake George/Champlain watersheds, it was anticipated that four wetlands situations would cause the greatest problems in the mapping process, and, indeed, this was the case for this specific project. First, the wetland coniferous evergreen forest (PFO4) is inherently difficult to distinguish from adjacent upland coniferous evergreen trees. The boundary usually has to be determined by a gentle break in slope, subtle changes in height/crown size, and/or a slight change in vegetation signature. Second, wetlands, especially in the Champlain Valley, have been modified extensively by agriculture and development. Significant drainage and some filling of wetlands have occurred in the area. Adding to the interpretation problem, many areas in the Valley are underlain with dense marine and lacustrine clay soils that make it difficult to delineate wetlands even with undisturbed conditions. Third, a large amount of former farmland, particularly in the Saranac Valley, has been abandoned and the various terrestrial shrub signatures look similar to wetland shrub signatures. Fourth, Lake Champlain is a naturally fluctuating water body with high spring water often as much as 6-7 feet above summer levels. Because the NAPP photography is flown in late April and early May, floodwaters of Lake Champlain have inundated thousands of acres of forested wetland (PFO1), scrub shrub (PSSI) and emergent mash (PEMI). Many areas along the lake are thus mapped as LIOWH rather than their true wetland type.

The following list, with representative examples, summarizes the range of difficulties encountered in mapping wetlands in the designated watersheds:

1. Accurately identifying and delineating coniferous evergreen wetlands (PFO4/PSS4) is one of the most difficult challenges in working with Adirondack wetlands. The photographic

signatures most likely to indicate an ideal coniferous evergreen wetland are (a) a topographic low, flat area, (b) a distinct change in color between wetland and upland, (c) a change in texture representing tree density/and or crown size, (d) an inflow and/or outflow from the wetland (because the tree canopy generally obscures the ground, water courses trough coniferous evergreen wetlands are often difficult to interpret), and (e) a discernable break in slope at the wetland edge. While most coniferous evergreen wetlands exhibit many of the ideal photographic signatures required to identify these wetland types, some are marginal in exhibiting discrete wetland signatures. Two problems are encountered with these potential wetland areas: first, is it a wetland and second, where are the boundaries. As an example, a large area of poorly drained coniferous evergreen forest on relatively level land makes delineating PFO4/SS4B from upland (U) difficult on photo 8020-98 (Bloomingdale Quad) between Vermontville and Bloomingdale and west towards Gabriels.

2. Underexposed imagery (photo 8020-100/Bloomigdale Quad) made the Saranac River channel (R2OWH) and oxbows (POWH) on the Saranac River floodplain difficult to delineate from the dark deciduous broadleaf shrubs (PSS1E). These features should be more easily identified on the orthophoto and a more accurate delineation can be done in the transfer process.

3. There were some minor discrepancies and disagreements for some interpretations along quad boundaries for the previously completed St. Regis Watershed. Because these quadrangles have already been digitized, the edge matching was done to the pre-existing St. Regis delineations and labels rather than have wetland boundaries and /or labels change at the quadrangle border.

4. When film photo rolls change along a particular flight line (photos 8020-65 and 8023-50/Bloomingdale Quad) flying height may vary slightly with a resultant minor scale change (A slightly higher flight height will result in a slightly smaller scale photo). If one is unaware of this it is difficult to acquire perfect stereoscopic vision with the photo pair. The ability of the Bausch & Lomb SIS 95 to independently change left and right optical magnification must be utilized in order to achieve optimal viewing (Pull the center zoom knob up and adjust the left and/or right smaller silver knobs to achieve proper individual lens scale adjustment).

5. Some flight lines were flown early morning or late in the afternoon and exhibit low sun angle and significant shadowing. Color Infrared film is notorious for shadows areas being very dark or black (A primary reason for this is that the color IR film has no blue sensitive emulsion layer and shadow areas are proportionally high in blue electromagnetic energy). Ground detail is commonly lost in these shadow areas and some very dark shadows appear like water features (POWH). In addition, long shadows in deciduous forests make ground interpretation difficult (photo 8020-61 flown at 9:36 am/Bloomingdale Quad).

6. Considerable difficulty exists in differentiating PFO5 (dead trees) from PFO2 (coniferous deciduous trees-larch). Generally, if this signature is associated with PSS3 (broadleaf evergreen shrubs – leatherleaf) without beaver activity it is labeled as PFO2. When it is associated with beaver activity it is considered to be PFO5.

7. In a number of situations it was necessary to discontinue an R2OWH, R3OWH, or R4 linear when the watercourse signature became lost beneath a dense stand of PFO4 or PSS4. The thick evergreen foliage makes it difficult to interpret the stream channel beneath the canopy. It is assumed that it is there, but it simply cannot be mapped.

8. In some areas off-road vehicles and/or log skidders leave tracks that resemble R4 stream courses.

9. Very small ponded waters (usually less than 50 feet across) can be classified as any one of several wetland types. Because of their small size, it is difficult if not impossible to adequately interpret the correct wetland covertype at the 1:40000 scale. The possibilities include POWH, PFO1H, POWE, POWHb, PFO1Hb and PFO1E. It is hard to tell if the water feature is permanent or ephemeral, if vegetation is growing in the water area or on the banks, and/or if it is beaver related. A good example of these very small water features is on photo 8706-118 (Silver Bay Quad).

10. Aerial photography for the study area was flown over a two year period. When adjacent fight lines have a significant time gap between dates, some ground conditions on the common side overlap may change significantly. This is true especially for small, ephemeral water bodies and beaver activity areas, and photos 8016-31 (5/4/94) and 8766-149 (5/7/95) illustrate how some of these features appear and disappear from one year to the next (Mineville and Pt. Henry Quads).

11. In lower elevations and in the southern part of the study area some broadleaf deciduous trees and shrubs have begun to bud and leaf-out. This masks the wetland signature and makes drainage interpretation more difficult (photo 8019-119/Putnam Quad).

12. It is difficult to tell if large impounded areas (photo 8019-110/Ticonderoga Quad) along Lake Champlain are the result of high Lake levels and/or beaver. In this area it appears to be both.

13. In agricultural areas, particularly in the Lake Champlain lowland (photo 8019-116/Crown Point Quad), it is difficult to tell natural farm drainage features (R4f) from excavated drainage ditches R4fd and how many of these to map. It is also difficult to tell if they would be permanent (R2) or intermittent (R4). In forested areas most of these natural features would go unnoticed.

14. The photography for the Lake Champlain shoreline was acquired at near record high Lake level. The flooded deciduous trees along the shore were all mapped as PFO1E but could be PFO1D (photo 8018-114/Crown Point).

15. It is difficult to distinguish true wetlands from seasonally damp farmland in the heavy clay soils along the Lake (photo 8105-3/Pt. Henry Quad).

16. High water in the Champlain Narrows renders it impossible to map true deep water channel versus submerged/floating aquatic bed versus emergent marsh areas. It also is difficult to distinguish between H and E water regime modifiers (photo 8019-106/Pt. Henry Quad). Depending on the year, some years will actually be an H while other years the same area will be an E.

17. It was difficult to see the drainage divide between lake George and Lake Champlain in the Hogback Mountain area (photo 8019-122/Shelving Rock Quad). It was necessary to pay close attention to the drainage as depicted on the topographic map.

18. Although beaver activity may not necessarily have been visible on the aerial imagery, many POWHb wetlands were given the "b" modifier (photo 8019-123/Whitehall Quad) because the water body was not originally present on the topographic map. It was assumed that the pond was created sometime between 1950 (date of map) and 1994 (date of imagery).

19. Edge matching in the Champlain Narrows was very difficult. Flight line "E" was flown in 1995 while flight line "F" was flown in 1994. Different Lake levels and different stages of vegetative growth made the two flight lines quite dissimilar (photos 8766-131 and photos 8019-125/Whitehall and Shelving Rock Quads).

20. Delineating the north half of photos 8025-70 and 8025-73 (Lake George Quad) was difficult because of a nearly 3 week difference in the flight dates (4/17/95 versus 5/7/95) between the Lake George photos and the Bolton Lake photos to the north. Color, phenological stage, and scale were all moderately changed on the stereo pairs. It was very hard to keep the image in a suitable stereoscopic mode and eye fatigue became a problem.

21. Some clouds and cloud shadows are present on photos 8025-68 and 8025-69 (Lake George Quad). Fortunately the ground position of the shadows moves from one photo to the next so suitable ground detail is visible on at least one photo.

22. Underground routing of streams along the Northway and though Lake George Village makes drainage connections unclear (photo 8025-75/Lake George).

CONCLUSION

The ability to accurately delineate and classify wetlands from aerial photography depends upon many factors including image quality, emulsion type, photo scale, date of photography, sun angle, atmospheric parameters, ground conditions (snow, ice, excessive moisture), phenological stage, uniqueness of wetland signature, wetland modification, interpretative equipment, photo interpreter ability and experience, and QA/QC protocol. For this project the imagery was overall quite good. With the exception of some low sun angle images, some exposure fall-off, some snow and ice in higher elevations, and some deciduous leaf-out conditions, the U.S.G.S. 1:40000 color infrared positive transparency imagery was suitable high quality photography for delineating and classifying wetlands in the Chazy/Saranac River and Lake George/Champlain watersheds, and the

Bausch &Lomb SIS 95 Zoom Stereoscope was the perfect instrument for conducting the study. The QA/QC standards that were adopted for the project dictate that all wetlands with identifiable signatures should have been delineated and classified. It is possible that some wetlands with marginal identifiers may have been missed (human error), but the interpretation of natural, non-impacted wetlands is considered to be highly accurate.

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Appendix B. Wetland Characterizations of the Saranac/Chazy watershed. Data table organized in order of decreasing area.

NWILABEL	Cnt_NWILAB	Sum_AREA	Area_ha	Area_ac	Percent_
L1OWH	57	81081489.051800	8108.148900	20035.672300	26.825900
PFO4/SS4B	463	31618236.019600	3161.823600	7813.036300	10.460900
PFO4/SS4E	504	15998895.268300	1599.889500	3953.413100	5.293300
PSS1/EM1E	617	15120634.473600	1512.063400	3736.390100	5.002700
L1OWHh	4	14182735.294400	1418.273500	3504.630200	4.692400
PFO4B	599	11271168.201100	1127.116800	2785.166300	3.729100
PFO4/SS4Bq	29	8894697.199900	889.469700	2197.927500	2.942800
PFO4E	690	8726533.563100	872.653400	2156.373400	2.887200
PSS1/EM1Eb	338	8309183.999500	830.918400	2053.244100	2.749100
PSS3/EM1B	109	6597252.786600	659.725300	1630.216700	2.182700
POWHb	600	4428729.138900	442.872900	1094.362800	1.465300
PSS3B	187	4287555.037400	428.755500	1059.477900	1.418500
PEM1Eb	328	4107213.894500	410.721400	1014.914700	1.358900
PFO4/SS1E	193	4047879.240500	404.787900	1000.252700	1.339200
PSS1E	560	3979687.321800	397.968700	983.402200	1.316700
PFO5/OWHb	284	3570653.086400	357.065300	882.327600	1.181400
PSS4/SS3B	62	3119287.291600	311.928700	770.792700	1.032000
POWH	352	3018602.629500	301.860300	745.913000	0.998700
R2OWH	28	2965388.068400	296.538800	732.763300	0.981100
PFO4/FO2B	54	2909290.463800	290.929000	718.901300	0.962500
PSS4B	133	2861881.095200	286.188100	707.186200	0.946900
PSS3/SS4B	86	2726827.306100	272.682700	673.813700	0.902200
PFO4/SS1B	126	2630220.962500	263.022100	649.941800	0.870200
PFO4/SS4Eb	58	2470385.785000	247.038600	610.445600	0.817300
PEM1/OWHb	143	2325909.775300	232.591000	574.744800	0.769500
PFO1E	521	2033354.027700	203.335400	502.452700	0.672700
PEM1E	197	1974097.127500	197.409700	487.810000	0.653100
PSS1B	248	1956897.841300	195.689800	483.560000	0.647400
PFO1/SS1E	151	1956194.746700	195.619500	483.386200	0.647200
PSS4/SS1E	158	1878645.776400	187.864600	464.223500	0.621600
PSS1/SS4E	168	1805201.672700	180.520200	446.075000	0.597300
PSS1/EM1B	104	1795151.378700	179.515100	443.591600	0.593900
PFO4Bq	15	1675022.938900	167.502300	413.907200	0.554200
PFO4/SS3B	45	1613348.786800	161.334900	398.667200	0.533800
PSS4/EM1E	124	1553524.800800	155.352500	383.884300	0.514000
PSS4/SS1B	57	1546583.805200	154.658400	382.169200	0.511700
PSS1/SS4B	107	1521070.070100	152.107000	375.864600	0.503200
PFO4/SS4B/U	8	1465609.192400	146.560900	362.159900	0.484900
PSS4/EM1Eb	98	1413391.352700	141.339100	349.256600	0.467600
PSS1Eb	91	1270394.718300	127.039500	313.921400	0.420300

PSS4/EM1B	52	1180683.454400	118.068300	291.753200	0.390600
PFO1/SS1B	71	1174074.462700	117.407400	290.120100	0.388400
PFO4/FO1B	41	1011363.022700	101.136300	249.913200	0.334600
PSS1/OWHb	86	950444.788100	95.044500	234.860000	0.314500
PFO4/FO1E	78	945868.563900	94.586900	233.729200	0.312900
PFO1/FO4E	61	907502.250100	90.750200	224.248700	0.300200
PFO4Eb	73	905467.721800	90.546800	223.745900	0.299600
R3OWH	6	905112.056500	90.511200	223.658100	0.299500
PSS4E	105	889943.393600	88.994300	219.909800	0.294400
PSS3/EM1E	16	634332.976900	63.433300	156.747100	0.209900
PSS3/EM1Fb	6	595286.498800	59.528600	147.098500	0.197000
PFO4/OWHb	78	558759.850200	55.876000	138.072600	0.184900
PSS4/SS2B	20	545494.612300	54.549500	134.794700	0.180500
PSS3/SS2B	27	529667.099900	52.966700	130.883600	0.175200
PFO1/FO4B	31	515715.527300	51.571600	127.436100	0.170600
PSS1/EM1Fb	22	510447.680000	51.044800	126.134400	0.168900
PFO4/EM1E	44	496076.213000	49.607600	122.583100	0.164100
PSS3/SS1B	16	478150.625500	47.815100	118.153600	0.158200
L1OWHb	4	473519.027500	47.351900	117.009100	0.156700
PFO4/SS1Eb	26	468931.654800	46.893200	115.875500	0.155100
PFO1B	83	427586.261000	42.758600	105.658900	0.141500
PSS3/OWH	21	426208.099100	42.620800	105.318300	0.141000
PFO4/EM1Eb	20	412194.804700	41.219500	101.855600	0.136400
R2OWHh	1	405334.001700	40.533400	100.160200	0.134100
PFO2/SS3B	15	383735.300600	38.373500	94.823100	0.127000
PSS1/SS4Eb	36	362128.033600	36.212800	89.483800	0.119800
PSS1/SS3B	13	314468.895800	31.446900	77.707000	0.104000
PSS4/SS1Eb	31	307797.327800	30.779700	76.058400	0.101800
PSS5/SS3Fb	2	306684.078100	30.668400	75.783300	0.101500
PEM1B	45	301305.149400	30.130500	74.454100	0.099700
PEM1/OWH	18	293795.027800	29.379500	72.598300	0.097200
PFO4/EM1B	18	280607.384700	28.060700	69.339600	0.092800
POWHh	23	269420.144100	26.942000	66.575200	0.089100
PFO1/OWHb	32	266240.521500	26.624100	65.789500	0.088100
PSS2/SS3B	14	249474.199800	24.947400	61.646400	0.082500
PFO2/SS4B	6	220991.691300	22.099200	54.608200	0.073100
PSS1/SS3E	4	204764.230300	20.476400	50.598300	0.067700
PSS3/EM1Bb	6	199337.616200	19.933800	49.257400	0.066000
PEM1Ef	33	195626.186700	19.562600	48.340300	0.064700
PSS3/EM1F	4	192590.546800	19.259100	47.590200	0.063700
PSS1/OWH	17	190307.807000	19.030800	47.026100	0.063000
PFO4/FO5Eb	8	175627.231200	17.562700	43.398400	0.058100
PFO4Bb	6	158012.119800	15.801200	39.045600	0.052300
PFO4/SS4Eq	2	151498.644800	15.149900	37.436100	0.050100
PFO2/FO4B	6	143430.743400	14.343100	35.442500	0.047500

PSS1/EM1F	6	139868.627600	13.986900	34.562300	0.046300
PSS3/EM1Eb	5	139095.953300	13.909600	34.371400	0.046000
PFO5/EM1Eb	10	138362.816000	13.836300	34.190200	0.045800
PSS4/OWHb	13	138237.827600	13.823800	34.159300	0.045700
PFO1/SS4E	14	133469.987800	13.347000	32.981200	0.044200
POWHx	46	131908.178400	13.190800	32.595200	0.043600
PEM1Bf	7	124604.049600	12.460400	30.790300	0.041200
PSS3/OWHb	8	122496.821000	12.249700	30.269600	0.040500
PFO1Eb	25	106354.957700	10.635500	26.280900	0.035200
PFO4B/U	2	103905.333000	10.390500	25.675600	0.034400
PFO4Eq	2	99621.536500	9.962200	24.617000	0.033000
PSS4Eb	14	97293.808400	9.729400	24.041800	0.032200
PFO1/FO4Bq	1	93148.099400	9.314800	23.017400	0.030800
PSS3/EM1Hb	3	87065.745400	8.706600	21.514400	0.028800
PSS3E	6	86086.410500	8.608600	21.272400	0.028500
PFO1/SS1Eb	6	84836.376000	8.483600	20.963500	0.028100
PFO2B	6	81403.502700	8.140400	20.115200	0.026900
PSS2/EM1B	3	79134.625000	7.913500	19.554600	0.026200
PFO1/EM1B	9	69224.383600	6.922400	17.105700	0.022900
PFO4/SS4Bb	2	69142.065900	6.914200	17.085400	0.022900
PSS1/EM1Ef	6	69008.440800	6.900800	17.052400	0.022800
PSS2/SS4B	4	67990.644900	6.799100	16.800900	0.022500
PSS5Fb	1	66132.881100	6.613300	16.341800	0.021900
PFO2/SS1B	4	65792.440300	6.579200	16.257700	0.021800
POWHr	3	64733.917300	6.473400	15.996100	0.021400
PFO5Eb	7	64619.554000	6.462000	15.967800	0.021400
PFO4/EM1Hb	2	55479.170600	5.547900	13.709200	0.018400
PFO5/SS1Eb	6	53420.932100	5.342100	13.200600	0.017700
PSS1/EM1Bb	2	48501.572000	4.850200	11.985000	0.016000
PSS5/EM1Fb	1	47701.504200	4.770200	11.787300	0.015800
PFO2/EM1B	2	47238.313600	4.723800	11.672800	0.015600
PSS4/SS3E	3	43962.208500	4.396200	10.863300	0.014500
PFO1Bq	1	43737.314300	4.373700	10.807700	0.014500
PFO1/EM1E	7	43565.713700	4.356600	10.765300	0.014400
PSS3/SS1E	3	41296.570700	4.129700	10.204600	0.013700
PFO2/EM1E	2	38814.339800	3.881400	9.591200	0.012800
PFO1/SS4B	2	38282.522600	3.828300	9.459800	0.012700
PSS3/SS4E	3	37178.272500	3.717800	9.187000	0.012300
PSS4/OWH	4	34546.874300	3.454700	8.536700	0.011400
POWHhx	15	31550.483400	3.155000	7.796300	0.010400
PEM1Bb	3	30399.546500	3.040000	7.511900	0.010100
PFO5/FO4Eb	2	29807.193700	2.980700	7.365500	0.009900
PSS4/SS1Bb	1	27443.093800	2.744300	6.781300	0.009100
PSS5/SS4E	1	26699.468800	2.669900	6.597600	0.008800
PSS5/OWHb	3	26525.460300	2.652500	6.554600	0.008800

PSS4/EM1Hb	2	26080.725100	2.608100	6.444700	0.008600
PFO4/SS2B	2	25753.281300	2.575300	6.363800	0.008500
PSS1/EM1Ex	2	25399.008200	2.539900	6.276200	0.008400
PSS3/EM1H	1	23292.893600	2.329300	5.755800	0.007700
POWHbf	1	23180.948100	2.318100	5.728100	0.007700
PEM1F	2	22443.455900	2.244300	5.545900	0.007400
PSS4/SS5B	1	22179.125000	2.217900	5.480600	0.007300
PFO5/SS4Eb	2	21664.406300	2.166400	5.353400	0.007200
PSS3Bb	4	21527.336600	2.152700	5.319500	0.007100
PSS1/EM1Eh	1	21376.576300	2.137700	5.282300	0.007100
PFO4/FO1Eb	2	21058.937500	2.105900	5.203800	0.007000
PSS4/SS1Fb	1	19561.250000	1.956100	4.833700	0.006500
PSS1/SS3Fb	1	17124.593700	1.712500	4.231600	0.005700
PEM1Ebf	1	16647.390400	1.664700	4.113700	0.005500
PFO1Eq	1	16395.062600	1.639500	4.051300	0.005400
PSS1/SS4Bb	1	16348.406300	1.634800	4.039800	0.005400
PEM1Ed	1	16086.727700	1.608700	3.975100	0.005300
PSS4/EM1Fb	3	15808.452200	1.580800	3.906400	0.005200
PFO1/SS4Eb	1	15305.595800	1.530600	3.782100	0.005100
PSS1/EM1Hb	2	15142.579200	1.514300	3.741800	0.005000
PSS1/EM1Bx	3	14749.320000	1.474900	3.644600	0.004900
PFO4F	1	14504.559300	1.450500	3.584200	0.004800
PFO1/EM1Eb	2	14461.148500	1.446100	3.573400	0.004800
PFO5/SS4E	1	13600.833900	1.360100	3.360800	0.004500
PFO2/FO4E	1	13540.055600	1.354000	3.345800	0.004500
PSS4/EM1Bb	2	12148.696200	1.214900	3.002000	0.004000
PSS4/EM1Bq	2	12134.548400	1.213500	2.998500	0.004000
PFO5/SS3F	1	12118.577400	1.211900	2.994600	0.004000
PSS2/OWHb	2	11977.340500	1.197700	2.959700	0.004000
PSS1F	4	10957.312500	1.095700	2.707600	0.003600
PSS1Bf	3	10817.506800	1.081800	2.673100	0.003600
PSS3F	2	10621.389200	1.062100	2.624600	0.003500
PSS1/SS3Eb	1	10275.971900	1.027600	2.539200	0.003400
PFO5/EM1E	1	10219.228600	1.021900	2.525200	0.003400
PFO5/SS3B	1	9688.113200	0.968800	2.394000	0.003200
PSS4/SS3Bq	1	9140.937500	0.914100	2.258800	0.003000
PFO4/FO5Hb	1	8962.686800	0.896300	2.214700	0.003000
PFO1/OWH	3	8495.001300	0.849500	2.099200	0.002800
PSS1/EM1Bf	1	8212.861000	0.821300	2.029400	0.002700
PSS3Eb	1	8034.316200	0.803400	1.985300	0.002700
PFO1Es	5	8006.642400	0.800700	1.978500	0.002600
PFO4/FO5Bb	1	7860.843800	0.786100	1.942500	0.002600
PFO1Bb	1	7606.635500	0.760700	1.879600	0.002500
PSS2/EM1E	1	7576.055100	0.757600	1.872100	0.002500
PSS1Bb	1	7390.099700	0.739000	1.826100	0.002400

PSS3/SS1Bb	1	5812.173800	0.581200	1.436200	0.001900
PEM1Eq	1	5775.122200	0.577500	1.427100	0.001900
PSS4/SS1D	1	5294.656300	0.529500	1.308300	0.001800
PSS1/FO4B	2	5113.671600	0.511400	1.263600	0.001700
PFO4D	1	4996.294100	0.499600	1.234600	0.001700
PSS5/EM1B	1	4794.656300	0.479500	1.184800	0.001600
PSS1/OWHh	1	4415.241800	0.441500	1.091000	0.001500
PFO4Er	1	4408.454300	0.440800	1.089400	0.001500
PSS3/SS1F	1	3743.921900	0.374400	0.925100	0.001200
PEM1D	1	3612.156700	0.361200	0.892600	0.001200
PEM1Bq	1	3299.420800	0.329900	0.815300	0.001100
PFO1D	1	3095.521600	0.309600	0.764900	0.001000
PSS1/FO1E	1	3009.407700	0.300900	0.743600	0.001000
PFO1/FO4H	1	2699.273500	0.269900	0.667000	0.000900
PSS4/FO1Bb	1	2583.854100	0.258400	0.638500	0.000900
PFO5/OWH	1	2434.897500	0.243500	0.601700	0.000800
PFO4/SS1Bb	1	2234.721900	0.223500	0.552200	0.000700
PSS4/SS5Eb	1	2176.732800	0.217700	0.537900	0.000700
PFO4/SS3E	1	2167.422300	0.216700	0.535600	0.000700
PSS1/EM1Ehx	1	2162.834900	0.216300	0.534400	0.000700
PEM1Bx	1	2024.384500	0.202400	0.500200	0.000700
PFO5E	1	1962.379000	0.196200	0.484900	0.000600
PFO4/OWH	1	1769.062500	0.176900	0.437100	0.000600
PSS4Bb	1	1718.266300	0.171800	0.424600	0.000600
PFO4/FO5B	1	1625.182900	0.162500	0.401600	0.000500
PSS3/SS2Bb	1	1480.906300	0.148100	0.365900	0.000500
PSS4F	1	1421.103900	0.142100	0.351200	0.000500
PFO4/FO2Eb	1	1247.270300	0.124700	0.308200	0.000400
PEM1A	1	1158.269100	0.115800	0.286200	0.000400
PEM1Fb	1	1131.042400	0.113100	0.279500	0.000400
PSS3/SS2E	1	1065.565200	0.106600	0.263300	0.000400

Appendix C. Saranac/Chazy wetlands data table organized in order of decreasing number of occurrences.

NWILABEL	Cnt_NWILAB	Sum_AREA	Area_ha	Area_ac	Percent_
PFO4E	690	8726533.563100	872.653400	2156.373400	2.887200
PSS1/EM1E	617	15120634.473600	1512.063400	3736.390100	5.002700
POWHb	600	4428729.138900	442.872900	1094.362800	1.465300
PFO4B	599	11271168.201100	1127.116800	2785.166300	3.729100
PSS1E	560	3979687.321800	397.968700	983.402200	1.316700
PFO1E	521	2033354.027700	203.335400	502.452700	0.672700
PFO4/SS4E	504	15998895.268300	1599.889500	3953.413100	5.293300
PFO4/SS4B	463	31618236.019600	3161.823600	7813.036300	10.460900
POWH	352	3018602.629500	301.860300	745.913000	0.998700
PSS1/EM1Eb	338	8309183.999500	830.918400	2053.244100	2.749100
PEM1Eb	328	4107213.894500	410.721400	1014.914700	1.358900
PFO5/OWHb	284	3570653.086400	357.065300	882.327600	1.181400
PSS1B	248	1956897.841300	195.689800	483.560000	0.647400
PEM1E	197	1974097.127500	197.409700	487.810000	0.653100
PFO4/SS1E	193	4047879.240500	404.787900	1000.252700	1.339200
PSS3B	187	4287555.037400	428.755500	1059.477900	1.418500
PSS1/SS4E	168	1805201.672700	180.520200	446.075000	0.597300
PSS4/SS1E	158	1878645.776400	187.864600	464.223500	0.621600
PFO1/SS1E	151	1956194.746700	195.619500	483.386200	0.647200
PEM1/OWHb	143	2325909.775300	232.591000	574.744800	0.769500
PSS4B	133	2861881.095200	286.188100	707.186200	0.946900
PFO4/SS1B	126	2630220.962500	263.022100	649.941800	0.870200
PSS4/EM1E	124	1553524.800800	155.352500	383.884300	0.514000
PSS3/EM1B	109	6597252.786600	659.725300	1630.216700	2.182700
PSS1/SS4B	107	1521070.070100	152.107000	375.864600	0.503200
PSS4E	105	889943.393600	88.994300	219.909800	0.294400
PSS1/EM1B	104	1795151.378700	179.515100	443.591600	0.593900
PSS4/EM1Eb	98	1413391.352700	141.339100	349.256600	0.467600
PSS1Eb	91	1270394.718300	127.039500	313.921400	0.420300
PSS3/SS4B	86	2726827.306100	272.682700	673.813700	0.902200
PSS1/OWHb	86	950444.788100	95.044500	234.860000	0.314500
PFO1B	83	427586.261000	42.758600	105.658900	0.141500
PFO4/FO1E	78	945868.563900	94.586900	233.729200	0.312900
PFO4/OWHb	78	558759.850200	55.876000	138.072600	0.184900
PFO4Eb	73	905467.721800	90.546800	223.745900	0.299600
PFO1/SS1B	71	1174074.462700	117.407400	290.120100	0.388400
PSS4/SS3B	62	3119287.291600	311.928700	770.792700	1.032000
PFO1/FO4E	61	907502.250100	90.750200	224.248700	0.300200
PFO4/SS4Eb	58	2470385.785000	247.038600	610.445600	0.817300
L1OWH	57	81081489.051800	8108.148900	20035.672300	26.825900

PSS4/SS1B	57	1546583.805200	154.658400	382.169200	0.511700
PFO4/FO2B	54	2909290.463800	290.929000	718.901300	0.962500
PSS4/EM1B	52	1180683.454400	118.068300	291.753200	0.390600
POWHx	46	131908.178400	13.190800	32.595200	0.043600
PFO4/SS3B	45	1613348.786800	161.334900	398.667200	0.533800
PEM1B	45	301305.149400	30.130500	74.454100	0.099700
PFO4/EM1E	44	496076.213000	49.607600	122.583100	0.164100
PFO4/FO1B	41	1011363.022700	101.136300	249.913200	0.334600
PSS1/SS4Eb	36	362128.033600	36.212800	89.483800	0.119800
PEM1Ef	33	195626.186700	19.562600	48.340300	0.064700
PFO1/OWHb	32	266240.521500	26.624100	65.789500	0.088100
PFO1/FO4B	31	515715.527300	51.571600	127.436100	0.170600
PSS4/SS1Eb	31	307797.327800	30.779700	76.058400	0.101800
PFO4/SS4Bq	29	8894697.199900	889.469700	2197.927500	2.942800
R2OWH	28	2965388.068400	296.538800	732.763300	0.981100
PSS3/SS2B	27	529667.099900	52.966700	130.883600	0.175200
PFO4/SS1Eb	26	468931.654800	46.893200	115.875500	0.155100
PFO1Eb	25	106354.957700	10.635500	26.280900	0.035200
POWHh	23	269420.144100	26.942000	66.575200	0.089100
PSS1/EM1Fb	22	510447.680000	51.044800	126.134400	0.168900
PSS3/OWH	21	426208.099100	42.620800	105.318300	0.141000
PSS4/SS2B	20	545494.612300	54.549500	134.794700	0.180500
PFO4/EM1Eb	20	412194.804700	41.219500	101.855600	0.136400
PEM1/OWH	18	293795.027800	29.379500	72.598300	0.097200
PFO4/EM1B	18	280607.384700	28.060700	69.339600	0.092800
PSS1/OWH	17	190307.807000	19.030800	47.026100	0.063000
PSS3/EM1E	16	634332.976900	63.433300	156.747100	0.209900
PSS3/SS1B	16	478150.625500	47.815100	118.153600	0.158200
PFO4Bq	15	1675022.938900	167.502300	413.907200	0.554200
PFO2/SS3B	15	383735.300600	38.373500	94.823100	0.127000
POWHhx	15	31550.483400	3.155000	7.796300	0.010400
PSS2/SS3B	14	249474.199800	24.947400	61.646400	0.082500
PFO1/SS4E	14	133469.987800	13.347000	32.981200	0.044200
PSS4Eb	14	97293.808400	9.729400	24.041800	0.032200
PSS1/SS3B	13	314468.895800	31.446900	77.707000	0.104000
PSS4/OWHb	13	138237.827600	13.823800	34.159300	0.045700
PFO5/EM1Eb	10	138362.816000	13.836300	34.190200	0.045800
PFO1/EM1B	9	69224.383600	6.922400	17.105700	0.022900
PFO4/SS4B/U	8	1465609.192400	146.560900	362.159900	0.484900
PFO4/FO5Eb	8	175627.231200	17.562700	43.398400	0.058100
PSS3/OWHb	8	122496.821000	12.249700	30.269600	0.040500
PEM1Bf	7	124604.049600	12.460400	30.790300	0.041200
PFO5Eb	7	64619.554000	6.462000	15.967800	0.021400
PFO1/EM1E	7	43565.713700	4.356600	10.765300	0.014400
R3OWH	6	905112.056500	90.511200	223.658100	0.299500

PSS3/EM1Fb	6	595286.498800	59.528600	147.098500	0.197000
PFO2/SS4B	6	220991.691300	22.099200	54.608200	0.073100
PSS3/EM1Bb	6	199337.616200	19.933800	49.257400	0.066000
PFO4Bb	6	158012.119800	15.801200	39.045600	0.052300
PFO2/FO4B	6	143430.743400	14.343100	35.442500	0.047500
PSS1/EM1F	6	139868.627600	13.986900	34.562300	0.046300
PSS3E	6	86086.410500	8.608600	21.272400	0.028500
PFO1/SS1Eb	6	84836.376000	8.483600	20.963500	0.028100
PFO2B	6	81403.502700	8.140400	20.115200	0.026900
PSS1/EM1Ef	6	69008.440800	6.900800	17.052400	0.022800
PFO5/SS1Eb	6	53420.932100	5.342100	13.200600	0.017700
PSS3/EM1Eb	5	139095.953300	13.909600	34.371400	0.046000
PFO1Es	5	8006.642400	0.800700	1.978500	0.002600
L1OWHh	4	14182735.294400	1418.273500	3504.630200	4.692400
L1OWHb	4	473519.027500	47.351900	117.009100	0.156700
PSS1/SS3E	4	204764.230300	20.476400	50.598300	0.067700
PSS3/EM1F	4	192590.546800	19.259100	47.590200	0.063700
PSS2/SS4B	4	67990.644900	6.799100	16.800900	0.022500
PFO2/SS1B	4	65792.440300	6.579200	16.257700	0.021800
PSS4/OWH	4	34546.874300	3.454700	8.536700	0.011400
PSS3Bb	4	21527.336600	2.152700	5.319500	0.007100
PSS1F	4	10957.312500	1.095700	2.707600	0.003600
PSS3/EM1Hb	3	87065.745400	8.706600	21.514400	0.028800
PSS2/EM1B	3	79134.625000	7.913500	19.554600	0.026200
POWHr	3	64733.917300	6.473400	15.996100	0.021400
PSS4/SS3E	3	43962.208500	4.396200	10.863300	0.014500
PSS3/SS1E	3	41296.570700	4.129700	10.204600	0.013700
PSS3/SS4E	3	37178.272500	3.717800	9.187000	0.012300
PEM1Bb	3	30399.546500	3.040000	7.511900	0.010100
PSS5/OWHb	3	26525.460300	2.652500	6.554600	0.008800
PSS4/EM1Fb	3	15808.452200	1.580800	3.906400	0.005200
PSS1/EM1Bx	3	14749.320000	1.474900	3.644600	0.004900
PSS1Bf	3	10817.506800	1.081800	2.673100	0.003600
PFO1/OWH	3	8495.001300	0.849500	2.099200	0.002800
PSS5/SS3Fb	2	306684.078100	30.668400	75.783300	0.101500
PFO4/SS4Eq	2	151498.644800	15.149900	37.436100	0.050100
PFO4B/U	2	103905.333000	10.390500	25.675600	0.034400
PFO4Eq	2	99621.536500	9.962200	24.617000	0.033000
PFO4/SS4Bb	2	69142.065900	6.914200	17.085400	0.022900
PFO4/EM1Hb	2	55479.170600	5.547900	13.709200	0.018400
PSS1/EM1Bb	2	48501.572000	4.850200	11.985000	0.016000
PFO2/EM1B	2	47238.313600	4.723800	11.672800	0.015600
PFO2/EM1E	2	38814.339800	3.881400	9.591200	0.012800
PFO1/SS4B	2	38282.522600	3.828300	9.459800	0.012700
PFO5/FO4Eb	2	29807.193700	2.980700	7.365500	0.009900

PSS4/EM1Hb	2	26080.725100	2.608100	6.444700	0.008600
PFO4/SS2B	2	25753.281300	2.575300	6.363800	0.008500
PSS1/EM1Ex	2	25399.008200	2.539900	6.276200	0.008400
PEM1F	2	22443.455900	2.244300	5.545900	0.007400
PFO5/SS4Eb	2	21664.406300	2.166400	5.353400	0.007200
PFO4/FO1Eb	2	21058.937500	2.105900	5.203800	0.007000
PSS1/EM1Hb	2	15142.579200	1.514300	3.741800	0.005000
PFO1/EM1Eb	2	14461.148500	1.446100	3.573400	0.004800
PSS4/EM1Bb	2	12148.696200	1.214900	3.002000	0.004000
PSS4/EM1Bq	2	12134.548400	1.213500	2.998500	0.004000
PSS2/OWHb	2	11977.340500	1.197700	2.959700	0.004000
PSS3F	2	10621.389200	1.062100	2.624600	0.003500
PSS1/FO4B	2	5113.671600	0.511400	1.263600	0.001700
R2OWHh	1	405334.001700	40.533400	100.160200	0.134100
PFO1/FO4Bq	1	93148.099400	9.314800	23.017400	0.030800
PSS5Fb	1	66132.881100	6.613300	16.341800	0.021900
PSS5/EM1Fb	1	47701.504200	4.770200	11.787300	0.015800
PFO1Bq	1	43737.314300	4.373700	10.807700	0.014500
PSS4/SS1Bb	1	27443.093800	2.744300	6.781300	0.009100
PSS5/SS4E	1	26699.468800	2.669900	6.597600	0.008800
PSS3/EM1H	1	23292.893600	2.329300	5.755800	0.007700
POWHbf	1	23180.948100	2.318100	5.728100	0.007700
PSS4/SS5B	1	22179.125000	2.217900	5.480600	0.007300
PSS1/EM1Eh	1	21376.576300	2.137700	5.282300	0.007100
PSS4/SS1Fb	1	19561.250000	1.956100	4.833700	0.006500
PSS1/SS3Fb	1	17124.593700	1.712500	4.231600	0.005700
PEM1Ebf	1	16647.390400	1.664700	4.113700	0.005500
PFO1Eq	1	16395.062600	1.639500	4.051300	0.005400
PSS1/SS4Bb	1	16348.406300	1.634800	4.039800	0.005400
PEM1Ed	1	16086.727700	1.608700	3.975100	0.005300
PFO1/SS4Eb	1	15305.595800	1.530600	3.782100	0.005100
PFO4F	1	14504.559300	1.450500	3.584200	0.004800
PFO5/SS4E	1	13600.833900	1.360100	3.360800	0.004500
PFO2/FO4E	1	13540.055600	1.354000	3.345800	0.004500
PFO5/SS3F	1	12118.577400	1.211900	2.994600	0.004000
PSS1/SS3Eb	1	10275.971900	1.027600	2.539200	0.003400
PFO5/EM1E	1	10219.228600	1.021900	2.525200	0.003400
PFO5/SS3B	1	9688.113200	0.968800	2.394000	0.003200
PSS4/SS3Bq	1	9140.937500	0.914100	2.258800	0.003000
PFO4/FO5Hb	1	8962.686800	0.896300	2.214700	0.003000
PSS1/EM1Bf	1	8212.861000	0.821300	2.029400	0.002700
PSS3Eb	1	8034.316200	0.803400	1.985300	0.002700
PFO4/FO5Bb	1	7860.843800	0.786100	1.942500	0.002600
PFO1Bb	1	7606.635500	0.760700	1.879600	0.002500
PSS2/EM1E	1	7576.055100	0.757600	1.872100	0.002500

PSS1Bb	1	7390.099700	0.739000	1.826100	0.002400
PSS3/SS1Bb	1	5812.173800	0.581200	1.436200	0.001900
PEM1Eq	1	5775.122200	0.577500	1.427100	0.001900
PSS4/SS1D	1	5294.656300	0.529500	1.308300	0.001800
PFO4D	1	4996.294100	0.499600	1.234600	0.001700
PSS5/EM1B	1	4794.656300	0.479500	1.184800	0.001600
PSS1/OWHh	1	4415.241800	0.441500	1.091000	0.001500
PFO4Er	1	4408.454300	0.440800	1.089400	0.001500
PSS3/SS1F	1	3743.921900	0.374400	0.925100	0.001200
PEM1D	1	3612.156700	0.361200	0.892600	0.001200
PEM1Bq	1	3299.420800	0.329900	0.815300	0.001100
PFO1D	1	3095.521600	0.309600	0.764900	0.001000
PSS1/FO1E	1	3009.407700	0.300900	0.743600	0.001000
PFO1/FO4H	1	2699.273500	0.269900	0.667000	0.000900
PSS4/FO1Bb	1	2583.854100	0.258400	0.638500	0.000900
PFO5/OWH	1	2434.897500	0.243500	0.601700	0.000800
PFO4/SS1Bb	1	2234.721900	0.223500	0.552200	0.000700
PSS4/SS5Eb	1	2176.732800	0.217700	0.537900	0.000700
PFO4/SS3E	1	2167.422300	0.216700	0.535600	0.000700
PSS1/EM1Ehx	1	2162.834900	0.216300	0.534400	0.000700
PEM1Bx	1	2024.384500	0.202400	0.500200	0.000700
PFO5E	1	1962.379000	0.196200	0.484900	0.000600
PFO4/OWH	1	1769.062500	0.176900	0.437100	0.000600
PSS4Bb	1	1718.266300	0.171800	0.424600	0.000600
PFO4/FO5B	1	1625.182900	0.162500	0.401600	0.000500
PSS3/SS2Bb	1	1480.906300	0.148100	0.365900	0.000500
PSS4F	1	1421.103900	0.142100	0.351200	0.000500
PFO4/FO2Eb	1	1247.270300	0.124700	0.308200	0.000400
PEM1A	1	1158.269100	0.115800	0.286200	0.000400
PEM1Fb	1	1131.042400	0.113100	0.279500	0.000400
PSS3/SS2E	1	1065.565200	0.106600	0.263300	0.000400

Appendix D. Wetland Characterizations of the Lake Champlain/Lake George watershed. Data table organized in order of decreasing area.

NWILABEL	Cnt_NWILAB	Sum_AREA	Area_Ha	Area_Ac	Percent_
L1OWH	22	181394794.441400	18139.479400	44823.629900	71.167600
PSS1/EM1E	637	7021955.900500	702.195600	1735.163100	2.755000
POWHb	468	5258020.668700	525.802100	1299.285200	2.062900
PSS1/EM1Eb	317	5113286.266000	511.328600	1263.520600	2.006100
PFO5/OWHb	316	4448745.250000	444.874500	1099.308900	1.745400
POWH	463	3380009.714600	338.001000	835.218600	1.326100
L1OWHh	5	3329163.404000	332.916300	822.654200	1.306100
PFO4/SS4E	193	3018461.801900	301.846200	745.878200	1.184300
PSS1/EM1B	54	2706909.307900	270.690900	668.891900	1.062000
PFO1/SS1E	229	2312660.961700	231.266100	571.471000	0.907300
PFO4E	296	2296742.434500	229.674200	567.537400	0.901100
PEM1E	246	2295947.408600	229.594700	567.341000	0.900800
PSS1E	466	2254170.319000	225.417000	557.017600	0.884400
PFO1E	371	1855918.242300	185.591800	458.607400	0.728100
PFO4/SS1E	160	1632902.878900	163.290300	403.499100	0.640600
PEM1/OWH	42	1400926.384500	140.092600	346.176400	0.549600
PFO4/SS4B	54	1357379.860400	135.738000	335.415900	0.532500
PSS1/SS4E	185	1238281.911200	123.828200	305.986100	0.485800
PEM1Eb	149	1165256.204400	116.525600	287.941100	0.457200
PSS1/SS4B	49	1100502.370700	110.050200	271.940100	0.431800
PSS4/SS1E	121	1039877.367800	103.987700	256.959300	0.408000
PEM1/OWHb	110	1038683.168600	103.868300	256.664200	0.407500
PFO4/SS1B	66	1038472.468300	103.847200	256.612100	0.407400
PSS4/SS1B	32	935321.334000	93.532100	231.122900	0.367000
PSS1B	147	765564.636000	76.556500	189.175100	0.300400
PEM1/AB3E	14	732721.726400	73.272200	181.059500	0.287500
L1OWHd	1	650777.238500	65.077700	160.810600	0.255300
PFO1/FO4E	37	599887.701200	59.988800	148.235500	0.235400
PEM1Ef	71	590251.006200	59.025100	145.854200	0.231600
POWHh	81	517198.420300	51.719800	127.802500	0.202900
PFO4B	61	460139.752700	46.014000	113.703000	0.180500
PSS4E	89	430312.547700	43.031300	106.332500	0.168800
PFO4/SS4Eb	20	418392.309800	41.839200	103.387000	0.164200
PSS4B	16	393384.984500	39.338500	97.207500	0.154300
PSS3/OWHb	14	388069.277800	38.806900	95.894000	0.152300
R2OWH	9	364600.644700	36.460100	90.094800	0.143000
PSS1/OWHb	52	346106.579300	34.610700	85.524800	0.135800
PSS1Eb	49	336947.945000	33.694800	83.261700	0.132200
PSS1/OWH	22	333980.689100	33.398100	82.528400	0.131000
PFO4Eb	37	323677.507600	32.367800	79.982500	0.127000

PEM1/AB3H	1	305731.548000	30.573200	75.547900	0.119900
PFO4/OWHb	52	303985.954900	30.398600	75.116600	0.119300
L1OWHb	2	301429.156000	30.142900	74.484800	0.118300
PFO4/FO1E	21	297855.723100	29.785600	73.601800	0.116900
PFO1/SS1B	39	292542.378500	29.254200	72.288800	0.114800
PFO1B	41	267268.615600	26.726900	66.043500	0.104900
PFO4/SS1Eb	28	259412.589400	25.941300	64.102200	0.101800
PSS1/SS4Eb	22	250660.139900	25.066000	61.939500	0.098300
POWHx	93	248414.221900	24.841400	61.384500	0.097500
R3OWH	7	245943.884600	24.594400	60.774100	0.096500
PSS1/EM1Ef	14	239048.291500	23.904800	59.070100	0.093800
PFO1/EM1E	21	238858.756300	23.885900	59.023300	0.093700
PSS4/SS1Eb	15	217523.518100	21.752400	53.751200	0.085300
PSS3B	22	205107.613900	20.510800	50.683200	0.080500
PSS3/EM1B	9	186563.295300	18.656300	46.100800	0.073200
PSS5/EM1Eb	3	186072.968900	18.607300	45.979600	0.073000
PSS3/EM1Bb	4	184215.359200	18.421500	45.520600	0.072300
PAB3H	3	169693.460600	16.969300	41.932200	0.066600
PEM1B	39	168866.853200	16.886700	41.727900	0.066300
PEM1/OWHr	4	158241.225700	15.824100	39.102300	0.062100
PSS4/EM1Eb	20	156044.612100	15.604500	38.559500	0.061200
PEM1Bf	26	151259.820500	15.126000	37.377100	0.059300
PFO5/EM1Hb	8	139727.604000	13.972800	34.527400	0.054800
PSS4/EM1E	25	135677.458200	13.567700	33.526600	0.053200
PSS4/EM1B	13	124282.960900	12.428300	30.711000	0.048800
PSS5Eb	2	115498.945500	11.549900	28.540400	0.045300
PFO4/EM1E	14	114452.630200	11.445300	28.281900	0.044900
PFO5/OWHh	12	113570.494400	11.357000	28.063900	0.044600
PSS3/EM1Eb	5	109481.899700	10.948200	27.053600	0.043000
PSS4/OWHb	17	105098.988800	10.509900	25.970500	0.041200
PFO1/SS4E	12	103771.203700	10.377100	25.642400	0.040700
PEM1Eh	11	100604.333500	10.060400	24.859900	0.039500
POWHhx	38	92443.386400	9.244300	22.843300	0.036300
PFO4/EM1Eb	9	91991.803000	9.199200	22.731700	0.036100
PSS1/SS3B	2	91229.984100	9.123000	22.543400	0.035800
PEM1/OWHh	8	88548.981400	8.854900	21.880900	0.034700
PSS3/EM1E	5	85827.641200	8.582800	21.208500	0.033700
PSS5/OWHb	6	79035.720700	7.903600	19.530200	0.031000
PFO5/OWH	15	78077.545500	7.807800	19.293400	0.030600
PFO1/FO4B	7	69506.749200	6.950700	17.175500	0.027300
PFO1/EM1Eb	5	68928.087100	6.892800	17.032500	0.027000
PSS3/SS1B	6	64112.458500	6.411200	15.842500	0.025200
PFO1/SS1Eb	6	63105.107800	6.310500	15.593600	0.024800
PSS1/SS3E	2	58122.203900	5.812200	14.362300	0.022800
PFO5/EM1Eb	3	57423.155000	5.742300	14.189600	0.022500

PFO5/SS1Eb	1	55728.556200	5.572900	13.770800	0.021900
PSS1/SS5E	3	53964.077600	5.396400	13.334800	0.021200
POWHr	26	50528.475700	5.052800	12.485900	0.019800
PFO5/SS5Eb	2	48276.638200	4.827700	11.929400	0.018900
PSS1/EM1Eh	6	47789.145200	4.778900	11.809000	0.018700
PFO4/FO1B	6	46990.762800	4.699100	11.611700	0.018400
PFO5/SS5Hb	1	45285.985500	4.528600	11.190400	0.017800
PSS3/SS1Eb	3	44125.771800	4.412600	10.903700	0.017300
PSS1/SS4Bb	1	42291.671800	4.229200	10.450500	0.016600
PFO5Eb	6	40625.524000	4.062600	10.038800	0.015900
PFO5/SS3B	1	35821.766300	3.582200	8.851800	0.014100
PFO4/SS1D	1	35240.222900	3.524000	8.708000	0.013800
PSS3/SS4B	4	35000.019100	3.500000	8.648700	0.013700
PFO4/EM1B	5	31571.934000	3.157200	7.801600	0.012400
PFO4/FO5Eb	1	30780.880600	3.078100	7.606100	0.012100
PSS1Ef	3	30113.908700	3.011400	7.441300	0.011800
PFO5/SS1B	3	27827.665700	2.782800	6.876400	0.010900
PFO1/OWHb	9	27231.177200	2.723100	6.729000	0.010700
PSS4Eb	5	27018.813600	2.701900	6.676500	0.010600
PFO1D	2	26030.803800	2.603100	6.432400	0.010200
PEM1/OWHx	4	25809.480500	2.580900	6.377700	0.010100
PSS4/SS1H	1	21725.789800	2.172600	5.368600	0.008500
PFO5/SS1Bb	2	21643.007000	2.164300	5.348100	0.008500
PFO1/EM1B	3	20948.866800	2.094900	5.176600	0.008200
PFO1/SS1Es	2	20885.455900	2.088500	5.160900	0.008200
PSS1/EM1Hb	1	20884.289800	2.088400	5.160600	0.008200
PSS3/EM1Hb	1	19958.187000	1.995800	4.931800	0.007800
PSS1/EM1Ex	4	19762.285600	1.976200	4.883400	0.007800
POWHbf	1	19612.123600	1.961200	4.846300	0.007700
PFO4/OWHh	3	19067.900600	1.906800	4.711800	0.007500
PFO1/OWH	4	18784.408300	1.878400	4.641700	0.007400
PSS1Ex	5	18050.628400	1.805100	4.460400	0.007100
PSS1Es	2	17417.218800	1.741700	4.303900	0.006800
PFO1/SS1Bf	1	16853.910200	1.685400	4.164700	0.006600
PFO1/FO4Eb	4	16273.268700	1.627300	4.021200	0.006400
PSS5/SS4Eb	1	16054.028000	1.605400	3.967000	0.006300
PSS1Bb	2	15070.830900	1.507100	3.724100	0.005900
PFO1Eb	8	14529.312300	1.452900	3.590300	0.005700
PSS4/SS1Eh	1	14376.740300	1.437700	3.552600	0.005600
PEM1/EM1Eb	2	13871.565700	1.387200	3.427700	0.005400
PFO4/FO1Eb	2	13780.387600	1.378000	3.405200	0.005400
POWHs	4	12940.088300	1.294000	3.197600	0.005100
PSS4/EM1Bf	2	12683.929500	1.268400	3.134300	0.005000
PFO4/FO5Hb	2	12523.126900	1.252300	3.094500	0.004900
PFO5/SS1Hb	1	12383.878000	1.238400	3.060100	0.004900

PFO4/EM1Bb	2	10562.380500	1.056200	2.610000	0.004100
PSS1/EM1Bb	2	10220.799100	1.022100	2.525600	0.004000
PSS1/OWHx	2	9398.521600	0.939900	2.322400	0.003700
PFO5/FO4Eb	3	9393.692000	0.939400	2.321200	0.003700
PFO4Bb	2	8878.013700	0.887800	2.193800	0.003500
PEM1/AB3Hb	1	8859.578400	0.886000	2.189200	0.003500
PFO4/SS1Bb	2	8406.632100	0.840700	2.077300	0.003300
PSS4/EM1Bb	1	8024.634800	0.802500	1.982900	0.003100
PSS3E	1	7858.266900	0.785800	1.941800	0.003100
POWHfx	2	7092.527700	0.709300	1.752600	0.002800
PFO4/OWH	4	7008.413000	0.700800	1.731800	0.002700
PSS4/EM1Bh	1	6509.780500	0.651000	1.608600	0.002600
PSS3/SS1E	2	5949.373300	0.594900	1.470100	0.002300
PFO4/FO5E	1	5601.063900	0.560100	1.384100	0.002200
PFO4/SS1Hb	1	5496.782200	0.549700	1.358300	0.002200
PSS4/OWH	2	5292.210100	0.529200	1.307700	0.002100
PSS4/EM1Eh	1	5288.296900	0.528800	1.306800	0.002100
PFO1/SS1Ex	2	5282.052300	0.528200	1.305200	0.002100
PSS4/SS3B	1	4964.611000	0.496500	1.226800	0.001900
PFO1/SS4B	2	4781.262400	0.478100	1.181500	0.001900
PSS1/EM1Bf	1	4768.511400	0.476900	1.178300	0.001900
R2OWHh	1	4718.870100	0.471900	1.166100	0.001900
PFO1/SS1Bb	2	4713.175900	0.471300	1.164700	0.001800
PEM1/SS4Ef	1	4058.532600	0.405900	1.002900	0.001600
PSS1Bf	1	3809.887000	0.381000	0.941400	0.001500
POWHf	1	3695.062400	0.369500	0.913100	0.001400
PEM1/OWEb	1	3586.479500	0.358600	0.886200	0.001400
PFO5/FO4B	1	3543.950500	0.354400	0.875700	0.001400
PFO4/EM1Hb	1	3304.769900	0.330500	0.816600	0.001300
PFO4Bx	1	2748.214200	0.274800	0.679100	0.001100
PFO4H	1	2099.610900	0.210000	0.518800	0.000800
PFO5/FO4E	1	2086.769300	0.208700	0.515700	0.000800
PFO1Bb	1	1704.551400	0.170500	0.421200	0.000700
POWHd	1	1459.594700	0.146000	0.360700	0.000600
PFO4/SS5Eb	1	1341.094400	0.134100	0.331400	0.000500
PEM1Bx	1	852.489200	0.085200	0.210700	0.000300
PSS1/OWHh	1	673.140800	0.067300	0.166300	0.000300

Appendix E. Lake Champlain/Lake George wetlands data table organized in order of decreasing number of occurrences.

NWILABEL	Cnt_NWILAB	Sum_AREA	Area_Ha	Area_Ac	Percent_
PSS1/EM1E	637	7021955.900500	702.195600	1735.163100	2.755000
POWHb	468	5258020.668700	525.802100	1299.285200	2.062900
PSS1E	466	2254170.319000	225.417000	557.017600	0.884400
POWH	463	3380009.714600	338.001000	835.218600	1.326100
PFO1E	371	1855918.242300	185.591800	458.607400	0.728100
PSS1/EM1Eb	317	5113286.266000	511.328600	1263.520600	2.006100
PFO5/OWHb	316	4448745.250000	444.874500	1099.308900	1.745400
PFO4E	296	2296742.434500	229.674200	567.537400	0.901100
PEM1E	246	2295947.408600	229.594700	567.341000	0.900800
PFO1/SS1E	229	2312660.961700	231.266100	571.471000	0.907300
PFO4/SS4E	193	3018461.801900	301.846200	745.878200	1.184300
PSS1/SS4E	185	1238281.911200	123.828200	305.986100	0.485800
PFO4/SS1E	160	1632902.878900	163.290300	403.499100	0.640600
PEM1Eb	149	1165256.204400	116.525600	287.941100	0.457200
PSS1B	147	765564.636000	76.556500	189.175100	0.300400
PSS4/SS1E	121	1039877.367800	103.987700	256.959300	0.408000
PEM1/OWHb	110	1038683.168600	103.868300	256.664200	0.407500
POWHx	93	248414.221900	24.841400	61.384500	0.097500
PSS4E	89	430312.547700	43.031300	106.332500	0.168800
POWHh	81	517198.420300	51.719800	127.802500	0.202900
PEM1Ef	71	590251.006200	59.025100	145.854200	0.231600
PFO4/SS1B	66	1038472.468300	103.847200	256.612100	0.407400
PFO4B	61	460139.752700	46.014000	113.703000	0.180500
PSS1/EM1B	54	2706909.307900	270.690900	668.891900	1.062000
PFO4/SS4B	54	1357379.860400	135.738000	335.415900	0.532500
PSS1/OWHb	52	346106.579300	34.610700	85.524800	0.135800
PFO4/OWHb	52	303985.954900	30.398600	75.116600	0.119300
PSS1Eb	49	336947.945000	33.694800	83.261700	0.132200
PSS1/SS4B	49	1100502.370700	110.050200	271.940100	0.431800
PEM1/OWH	42	1400926.384500	140.092600	346.176400	0.549600
PFO1B	41	267268.615600	26.726900	66.043500	0.104900
PFO1/SS1B	39	292542.378500	29.254200	72.288800	0.114800
PEM1B	39	168866.853200	16.886700	41.727900	0.066300
POWHhx	38	92443.386400	9.244300	22.843300	0.036300
PFO4Eb	37	323677.507600	32.367800	79.982500	0.127000
PFO1/FO4E	37	599887.701200	59.988800	148.235500	0.235400
PSS4/SS1B	32	935321.334000	93.532100	231.122900	0.367000
PFO4/SS1Eb	28	259412.589400	25.941300	64.102200	0.101800
POWHr	26	50528.475700	5.052800	12.485900	0.019800
PEM1Bf	26	151259.820500	15.126000	37.377100	0.059300

PSS4/EM1E	25	135677.458200	13.567700	33.526600	0.053200
PSS3B	22	205107.613900	20.510800	50.683200	0.080500
PSS1/SS4Eb	22	250660.139900	25.066000	61.939500	0.098300
PSS1/OWH	22	333980.689100	33.398100	82.528400	0.131000
L1OWH	22	181394794.441400	18139.479400	44823.629900	71.167600
PFO4/FO1E	21	297855.723100	29.785600	73.601800	0.116900
PFO1/EM1E	21	238858.756300	23.885900	59.023300	0.093700
PSS4/EM1Eb	20	156044.612100	15.604500	38.559500	0.061200
PFO4/SS4Eb	20	418392.309800	41.839200	103.387000	0.164200
PSS4/OWHb	17	105098.988800	10.509900	25.970500	0.041200
PSS4B	16	393384.984500	39.338500	97.207500	0.154300
PSS4/SS1Eb	15	217523.518100	21.752400	53.751200	0.085300
PFO5/OWH	15	78077.545500	7.807800	19.293400	0.030600
PSS3/OWHb	14	388069.277800	38.806900	95.894000	0.152300
PSS1/EM1Ef	14	239048.291500	23.904800	59.070100	0.093800
PFO4/EM1E	14	114452.630200	11.445300	28.281900	0.044900
PEM1/AB3E	14	732721.726400	73.272200	181.059500	0.287500
PSS4/EM1B	13	124282.960900	12.428300	30.711000	0.048800
PFO5/OWHh	12	113570.494400	11.357000	28.063900	0.044600
PFO1/SS4E	12	103771.203700	10.377100	25.642400	0.040700
PEM1Eh	11	100604.333500	10.060400	24.859900	0.039500
R2OWH	9	364600.644700	36.460100	90.094800	0.143000
PSS3/EM1B	9	186563.295300	18.656300	46.100800	0.073200
PFO4/EM1Eb	9	91991.803000	9.199200	22.731700	0.036100
PFO1/OWHb	9	27231.177200	2.723100	6.729000	0.010700
PFO5/EM1Hb	8	139727.604000	13.972800	34.527400	0.054800
PFO1Eb	8	14529.312300	1.452900	3.590300	0.005700
PEM1/OWHh	8	88548.981400	8.854900	21.880900	0.034700
R3OWH	7	245943.884600	24.594400	60.774100	0.096500
PFO1/FO4B	7	69506.749200	6.950700	17.175500	0.027300
PSS5/OWHb	6	79035.720700	7.903600	19.530200	0.031000
PSS3/SS1B	6	64112.458500	6.411200	15.842500	0.025200
PSS1/EM1Eh	6	47789.145200	4.778900	11.809000	0.018700
PFO5Eb	6	40625.524000	4.062600	10.038800	0.015900
PFO4/FO1B	6	46990.762800	4.699100	11.611700	0.018400
PFO1/SS1Eb	6	63105.107800	6.310500	15.593600	0.024800
PSS4Eb	5	27018.813600	2.701900	6.676500	0.010600
PSS3/EM1Eb	5	109481.899700	10.948200	27.053600	0.043000
PSS3/EM1E	5	85827.641200	8.582800	21.208500	0.033700
PSS1Ex	5	18050.628400	1.805100	4.460400	0.007100
PFO4/EM1B	5	31571.934000	3.157200	7.801600	0.012400
PFO1/EM1Eb	5	68928.087100	6.892800	17.032500	0.027000
L1OWHh	5	3329163.404000	332.916300	822.654200	1.306100
PSS3/SS4B	4	35000.019100	3.500000	8.648700	0.013700
PSS3/EM1Bb	4	184215.359200	18.421500	45.520600	0.072300

PSS1/EM1Ex	4	19762.285600	1.976200	4.883400	0.007800
POWHs	4	12940.088300	1.294000	3.197600	0.005100
PFO4/OWH	4	7008.413000	0.700800	1.731800	0.002700
PFO1/OWH	4	18784.408300	1.878400	4.641700	0.007400
PFO1/FO4Eb	4	16273.268700	1.627300	4.021200	0.006400
PEM1/OWHx	4	25809.480500	2.580900	6.377700	0.010100
PEM1/OWHr	4	158241.225700	15.824100	39.102300	0.062100
PSS5/EM1Eb	3	186072.968900	18.607300	45.979600	0.073000
PSS3/SS1Eb	3	44125.771800	4.412600	10.903700	0.017300
PSS1Ef	3	30113.908700	3.011400	7.441300	0.011800
PSS1/SS5E	3	53964.077600	5.396400	13.334800	0.021200
PFO5/SS1B	3	27827.665700	2.782800	6.876400	0.010900
PFO5/FO4Eb	3	9393.692000	0.939400	2.321200	0.003700
PFO5/EM1Eb	3	57423.155000	5.742300	14.189600	0.022500
PFO4/OWHh	3	19067.900600	1.906800	4.711800	0.007500
PFO1/EM1B	3	20948.866800	2.094900	5.176600	0.008200
PAB3H	3	169693.460600	16.969300	41.932200	0.066600
PSS5Eb	2	115498.945500	11.549900	28.540400	0.045300
PSS4/OWH	2	5292.210100	0.529200	1.307700	0.002100
PSS4/EM1Bf	2	12683.929500	1.268400	3.134300	0.005000
PSS3/SS1E	2	5949.373300	0.594900	1.470100	0.002300
PSS1Es	2	17417.218800	1.741700	4.303900	0.006800
PSS1Bb	2	15070.830900	1.507100	3.724100	0.005900
PSS1/SS3E	2	58122.203900	5.812200	14.362300	0.022800
PSS1/SS3B	2	91229.984100	9.123000	22.543400	0.035800
PSS1/OWHx	2	9398.521600	0.939900	2.322400	0.003700
PSS1/EM1Bb	2	10220.799100	1.022100	2.525600	0.004000
POWHfx	2	7092.527700	0.709300	1.752600	0.002800
PFO5/SS5Eb	2	48276.638200	4.827700	11.929400	0.018900
PFO5/SS1Bb	2	21643.007000	2.164300	5.348100	0.008500
PFO4Bb	2	8878.013700	0.887800	2.193800	0.003500
PFO4/SS1Bb	2	8406.632100	0.840700	2.077300	0.003300
PFO4/FO5Hb	2	12523.126900	1.252300	3.094500	0.004900
PFO4/FO1Eb	2	13780.387600	1.378000	3.405200	0.005400
PFO4/EM1Bb	2	10562.380500	1.056200	2.610000	0.004100
PFO1D	2	26030.803800	2.603100	6.432400	0.010200
PFO1/SS4B	2	4781.262400	0.478100	1.181500	0.001900
PFO1/SS1Ex	2	5282.052300	0.528200	1.305200	0.002100
PFO1/SS1Es	2	20885.455900	2.088500	5.160900	0.008200
PFO1/SS1Bb	2	4713.175900	0.471300	1.164700	0.001800
PEM1/EM1Eb	2	13871.565700	1.387200	3.427700	0.005400
L1OWHb	2	301429.156000	30.142900	74.484800	0.118300
R2OWHh	1	4718.870100	0.471900	1.166100	0.001900
PSS5/SS4Eb	1	16054.028000	1.605400	3.967000	0.006300
PSS4/SS3B	1	4964.611000	0.496500	1.226800	0.001900

PSS4/SS1H	1	21725.789800	2.172600	5.368600	0.008500
PSS4/SS1Eh	1	14376.740300	1.437700	3.552600	0.005600
PSS4/EM1Eh	1	5288.296900	0.528800	1.306800	0.002100
PSS4/EM1Bh	1	6509.780500	0.651000	1.608600	0.002600
PSS4/EM1Bb	1	8024.634800	0.802500	1.982900	0.003100
PSS3E	1	7858.266900	0.785800	1.941800	0.003100
PSS3/EM1Hb	1	19958.187000	1.995800	4.931800	0.007800
PSS1Bf	1	3809.887000	0.381000	0.941400	0.001500
PSS1/SS4Bb	1	42291.671800	4.229200	10.450500	0.016600
PSS1/OWHh	1	673.140800	0.067300	0.166300	0.000300
PSS1/EM1Hb	1	20884.289800	2.088400	5.160600	0.008200
PSS1/EM1Bf	1	4768.511400	0.476900	1.178300	0.001900
POWHf	1	3695.062400	0.369500	0.913100	0.001400
POWHd	1	1459.594700	0.146000	0.360700	0.000600
POWHbf	1	19612.123600	1.961200	4.846300	0.007700
PFO5/SS5Hb	1	45285.985500	4.528600	11.190400	0.017800
PFO5/SS3B	1	35821.766300	3.582200	8.851800	0.014100
PFO5/SS1Hb	1	12383.878000	1.238400	3.060100	0.004900
PFO5/SS1Eb	1	55728.556200	5.572900	13.770800	0.021900
PFO5/FO4E	1	2086.769300	0.208700	0.515700	0.000800
PFO5/FO4B	1	3543.950500	0.354400	0.875700	0.001400
PFO4H	1	2099.610900	0.210000	0.518800	0.000800
PFO4Bx	1	2748.214200	0.274800	0.679100	0.001100
PFO4/SS5Eb	1	1341.094400	0.134100	0.331400	0.000500
PFO4/SS1Hb	1	5496.782200	0.549700	1.358300	0.002200
PFO4/SS1D	1	35240.222900	3.524000	8.708000	0.013800
PFO4/FO5Eb	1	30780.880600	3.078100	7.606100	0.012100
PFO4/FO5E	1	5601.063900	0.560100	1.384100	0.002200
PFO4/EM1Hb	1	3304.769900	0.330500	0.816600	0.001300
PFO1Bb	1	1704.551400	0.170500	0.421200	0.000700
PFO1/SS1Bf	1	16853.910200	1.685400	4.164700	0.006600
PEM1Bx	1	852.489200	0.085200	0.210700	0.000300
PEM1/SS4Ef	1	4058.532600	0.405900	1.002900	0.001600
PEM1/OWEb	1	3586.479500	0.358600	0.886200	0.001400
PEM1/AB3Hb	1	8859.578400	0.886000	2.189200	0.003500
PEM1/AB3H	1	305731.548000	30.573200	75.547900	0.119900
L1OWHd	1	650777.238500	65.077700	160.810600	0.255300

Appendix F. Metadata for digital wetland mapping of the Lake George/Lake Champlain watershed

Metadata:

- Identification_Information
- Data_Quality_Information
- Spatial_Data_Organization_Information
- Spatial_Reference_Information
- Entity_and_Attribute_Information
- Distribution_Information
- Metadata_Reference_Information

Identification_Information:
Citation:
Citation_Information:
Originator: New York State Adirondack Park Agency
Originator: Daniel M. Spada, Project Director
Publication_Date: 20101231
Title: lchamplgeowtl
Edition: Version 1.0
Geospatial_Data_Presentation_Form: vector digital data
Series_Information:
Series_Name: Watershed Scale Protection for Adirondack Wetlands
Issue_Identification:
Effectiveness of and Enhancements to the Adirondack Park Agency's Wetland Protection Program
Publication_Information:
Publication_Place: Ray Brook, NY
Publisher: New York State Adirondack Park Agency
Online_Linkage: \\ALLEN-06\HiHoSilver\sar_champ_final\wetlands\lchamplgeowtl
Description:
Abstract:
All or part of 22 USGS 7.5' quadrangle-based wetland coverages were prepared for the Lake Champlain/Lake George watersheds within the New York State Adirondack Park using ArcGIS 9.3.1 at the Remote Sensing/GIS Laboratory, State University of NY (SUNY) Plattsburgh. Wetland delineations on 1:40000 color infrared NAPP air photo transparencies were scanned and geocorrected. Wetlands were digitized as line shapefiles in ArcGIS from the geocorrected scanned imagery using ArcGIS ERDAS Stereo Analyst extension. Individual quadrangrangle line shapefiles were merged into a single polygon and arc coverage, which was edited and attributed in ArcInfo. This wetlands database consists of both polygon and linear features labeled using National Wetlands Inventory (NWI) conventions as modified for use by the NYS Adirondack Park Agency. The wetland coverage was exported as an Arc Interchange File to the New York State, Executive Department, Adirondack Park Agency (NYS APA) running ArcInfo version 9.x.
Purpose:

The wetlands database is part of a larger database designed to help evaluate watershed/wetland relationships and provide data for cumulative impact assessments. The outreach efforts to share the Agency natural resource database will encourage resource appreciation and wise use, particularly in a regional context.
Supplemental_Information:
Color infrared transparencies with wetlands delineated on acetate overlays were scanned at 2000 dpi into tif files using an Epson Expressions XL 10000 scanner at the SUNY Plattsburgh Remote Sensing/GIS Laboratory. Air photos and their stereo pairs were geocorrected using the ArcGIS ERDAS Image Analysis extension, orthothoimagery from the NYS GIS Clearinghouse, USGS DEM files from CUGIR, and USGS camera calibration files. Transfer from acetate overlays to digital wetland arc shapefiles was done using the ArcGIS ERDAS Stereo Analyst extension, Sterographics CrystalEyes3 glasses and E-2 emitter. All digital files used the UTM Zone 18N NAD83 coordinate system. Line shapefiles were appended into a single arc and polygon coverage with the outer boundary of the study area and the 7.5' USGS quadrangle boundaries. Digital wetland boundaries were edited in coverage format with a snapdistance 20.0 meters, snaptype closest, weed tolerance 3.0 meters, and a fuzzy tolerance of 1.219 meters. Wetland labels were added during heads-up editing with a customized on-screen menu using the georeferenced air photo acetate wetland overlays as a backdrop. Wetland label columns were concatenated into a unified wetland label using ArcInfo. Wetland labels follow the conventions established by Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. FWS/OBS-79/31. Office of Biological Services, U.S. Fish and Wildlife Service. U.S. Department of the Interior, Washington, D.C. 103 pp. Some modifications to the conventions were made to accommodate this project and are noted in the NWI label tables accompnaying this metadata. Files were transported to the NYS APA as ArcInfo export files (no compression)
.
Time_Period_of_Content:
Time_Period_Information:
Multiple_Dates/Times:
Single_Date/Time:
Calendar_Date: 19940504
Single_Date/Time:
Calendar_Date: 19940514
Single_Date/Time:
Calendar_Date: 19950417
Single_Date/Time:
Calendar_Date: 19950507
Single_Date/Time:
Calendar_Date: 19970508
Currentness_Reference: imagery and orthoimagery dates
Status:
Progress: Complete
Maintenance_and_Update_Frequency: As needed
Spatial_Domain:
Bounding_Coordinates:

West_Bounding_Coordinate: -73.781598
East_Bounding_Coordinate: -73.338500
North_Bounding_Coordinate: 44.212724
South_Bounding_Coordinate: 43.289268
Keywords:
Theme:
Theme_Keyword_Thesaurus: None
Theme_Keyword: Wetlands
Theme_Keyword: Vegetation
Theme_Keyword: NWI cover types
Theme_Keyword: Geographic Information System (GIS)
Theme_Keyword: ArcInfo
Place:
Place_Keyword_Thesaurus: Geographic Names Information System
Place_Keyword: New York
Place_Keyword: Adirondack Park
Place_Keyword: Adirondack Mountains
Place_Keyword: Lake Champlain
Place_Keyword: Lake George
Stratum:
Stratum_Keyword_Thesaurus: None
Temporal:
Temporal_Keyword_Thesaurus: None
Temporal_Keyword: Date of aerial photography and orthoimagery: 1994-1995
Access_Constraints: None
Use_Constraints:
These data may not be used for legal determinations. Please credit use of this data set to the New York State Adirondack Park Agency, Ray Brook, New York 12977. Please send a copy of any reports or papers in which these data were used or referenced to the above address, Attention: Susan VanWormer, Librarian.
Point_of_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: NYS Adirondack Park Agency
Contact_Person: Daniel M. Spada
Contact_Position: Supervisor Natural Resource Analysis
Contact_Address:
Address_Type: mailing and physical address
Address: Route 86, P.O. Box 99
City: Ray Brook
State_or_Province: New York
Postal_Code: 12977
Country: USA
Contact_Voice_Telephone: (518) 891-4050
Contact_Facsimile_Telephone: (518) 891-3938
Contact_Electronic_Mail_Address: dmspada@gw.dec.state.ny.us

Hours_of_Service: 8:30 AM - 4:30 PM Monday through Friday
Data_Set_Credit:
Funding was provided by the US Environmental Protection Agency Office of Wetlands Protection; State Wetlands Protection Program; Project #C200609 to the New York State Adirondack Park Agency. Subcontractors for portions of the grant were the Remote Sensing/GIS Laboratory, Plattsburgh State University,
Security_Information:
Security_Classification_System: None
Security_Classification: Unclassified
Security_Handling_Description: None
Native_Data_Set_Environment:
Microsoft Windows XP Version 5.1 (Build 2600) Service Pack 3; ESRI ArcCatalog 9.3.1.3500

Data_Quality_Information:
Attribute_Accuracy:
Attribute_Accuracy_Report:
Attributes assigned to polygon features consist of unique User-Ids and wetland labels. Arc attributes include a unique User-ID, ARCVALUE to identify quadrangle and watershed boundaries, and wetland labels for linear wetlands. Quadrangle boundaries were temporary for the purposes of editing and attribution and were removed prior to creating the final coverage. Polygon and linear wetland labels were derived from photointerpretation techniques. Wetland labels were entered by georeferencing the scanned air photo acetate overlay of wetland delineations to the digital wetland coverage. To minimize typographical errors, both polygon and linear wetland labels were entered utilizing an on-screen menu consisting of columns representing wetland label components. Label columns were concatenated in ArcInfo to create a unified wetland cover type label. The NWILABEL item was visually checked on the computer screen for integrity and labeling accuracy. Polygon and linear wetland labels were summarized in ArcMap to identify nonsensical or illogical NWI labels, which were corrected in ArcInfo ArcEdit.
Quantitative_Attribute_Accuracy_Assessment:
Attribute_Accuracy_Value: Unknown
Attribute_Accuracy_Explanation:
Polygon and linear wetland cover type labels were derived from photointerpretation techniques. All photo overlays were checked by two independent interpreters for missing wetlands, uplands delineated as wetland, incorrectly delineated polygons, missing wetland labels, and incorrect wetland labels by two people in a prior project. Photo overlays were directly compared to the digital wetland files utilizing scanned copies of the photo overlays corrected to the wetland delineations. This process facilitated the entry of wetland cover type labels and to discover missing arcs. Digitized and scanned coverage hard copies were directly compared to orthophoto overlays to check for missing arcs. The process of digitally labeling the wetland coverages also helped to resolve some missing, incomplete, and nonsensical labels. Finally, all wetland labels were printed in tabular form and proof-read to ensure both complete labeling of the coverage and logical label content. No quantitative accuracy assessment was performed.
Logical_Consistency_Report:

Polygons: All polygons were required to possess either a wetland or upland cover type (i.e., a SYSTEM entry and therefore a final NWILABEL entry were mandatory). During the labeling process, digital polygons were checked for the presence of a label point and incomplete polygons were repaired.
Arcs: Only linear wetlands arcs received a wetland label. ArcMap was used to color-code linear wetlands to help discover those linear wetlands missing a label or those that were labeled improperly. Only linear wetlands were allowed to exhibit dangle nodes.
Inter-coverage consistency: Wetland labels and arcs along adjacent quadrangle edges were proofread using ArcMap and corrected in ArcInfo ArcEdit.
Completeness_Report:
Extensive quality assurance/quality control measures were taken for all steps of database creation. All wetland labels were reviewed for conformance to National Wetlands Inventory standards. It is expected that because the derivation of data from photointerpretation techniques, uncorrectable errors and mistakes may be present. Identifiable mistakes will be corrected as needed. These wetland maps contain only those wetlands that were identifiable from aerial photographs.
Positional_Accuracy:
Horizontal_Positional_Accuracy:
Horizontal_Positional_Accuracy_Report:
Horizontal positional accuracy has error potential from several different steps: photointerpretation, air photo rectification, and digitizing techniques.While great care was taken at every step, no formal quantitative accuracy assessment was conducted.
Vertical_Positional_Accuracy:
Vertical_Positional_Accuracy_Report:
No vertical coordinates are associated with this data set. Scanned air photo transparencies were geocorrected to orthhoimagery created from the same imagery. Topographic displacements in the NAPP imagery and derived wetland files were corrected using USGS DEM files.
Lineage:
Source_Information:
Source_Citation:
Citation_Information:
Originator: USGS
Publication_Date: 1992-1996
Title: Report of Calibration of Aerial Mapping Camera
Geospatial_Data_Presentation_Form: document
Other_Citation_Details:
Camera calibration reports are produced by USGS. Four different reports were used for this project that correspond to the camera and lens serial numbers. The report numbers used are OSL/1782, OSL/2160, OSL/1962, and OSL/1950.
Type_of_Source_Media: online
Source_Time_Period_of_Content:
Time_Period_Information:
Multiple_Dates/Times:
Single_Date/Time:
Calendar_Date: 19921002

Single_Date/Time:
Calendar_Date: 19940106
Single_Date/Time:
Calendar_Date: 19940208
Single_Date/Time:
Calendar_Date: 19960119
Source_Citation_Abbreviation: CAMERA
Source_Contribution:
Camera information used to geocorrect scanned air photo transparencies.
Source_Information:
Source_Citation:
Citation_Information:
Originator: USGS
Publication_Date: Unknown
Title: Digital Elevation Model
Other_Citation_Details:
DEM created by NYS Department of Environmental Conservation and tiled by 7.5' quadrangle. Files downloaded from the Cornell Univeristy Geospatial Information Repository (CUGIR). These files are 10-m raster files in NAD27. While the elevation resolution is 0.1 meter, vertical accuracy is 6-8 meters.
Online_Linkage: <http://cugir.mannlib.cornell.edu/datatheme.jsp?id=23>
Source_Scale_Denominator: 24000
Type_of_Source_Media: online
Source_Citation_Abbreviation: DEM
Source_Contribution: Elevation file used to geocorrect scanned air photo files.
Source_Information:
Source_Citation:
Citation_Information:
Originator: NYS GIS Clearinghouse
Title: New York State Digitally Enhanced Orthoimagery
Geospatial_Data_Presentation_Form: remote-sensing image
Other_Citation_Details:
Orthoimagery produced from NAPP imagery through the federal Digital Orthophotgraphy Quarter Quadrangle program (DOQQ), the NYS Department of Environmental Conservation, and enhanced through NYS Y2K emergency preparedness planning effort.
Online_Linkage: <http://www.nysgis.state.ny.us/gateway/mg/napp_descrip.htm>
Source_Scale_Denominator: 12000
Type_of_Source_Media: online
Source_Time_Period_of_Content:
Time_Period_Information:
Multiple_Dates/Times:
Single_Date/Time:
Calendar_Date: 19940504
Single_Date/Time:
Calendar_Date: 19940514
Single_Date/Time:

Calendar_Date: 19950417
Single_Date/Time:
Calendar_Date: 19950507
Single_Date/Time:
Calendar_Date: 19970508
Source_Currentness_Reference: ground condition
Source_Citation_Abbreviation: ORTHOS
Source_Contribution:
Map base for geocorrection of scanned aerial imagery and for QA/QC of wetland positional accuracy of final wetland files.
Source_Information:
Source_Citation:
Citation_Information:
Publication_Date: 2010
Title: Lake Champlain/Lake George outer watershed boundary
Other_Citation_Details:
File developed from digital 7.5' and 7.5 x 15' USGS topographic maps.
Source_Scale_Denominator: 24000
Type_of_Source_Media: disc
Source_Citation_Abbreviation: OUTER
Source_Contribution:
Outer study area boundary. Used as a boundary for mapping wetlands and for clipping digital files. A digital watershed data layer derived from digital USGS 7.5' and 7.5' x 15' topographic maps defined the outer boundary of the mapped area.
Source_Information:
Source_Citation:
Citation_Information:
Originator: NYS Adirondack Park Agency
Title:
Wetland aerial photography acetate overlays of wetland delineations
Geospatial_Data_Presentation_Form: document
Source_Scale_Denominator: 40000
Type_of_Source_Media: stable-base material
Source_Time_Period_of_Content:
Source_Currentness_Reference: ground condition on aerial imagery date
Source_Citation_Abbreviation: OVERLAY
Source_Contribution:
Wetland delineation overlay for aerial photos. Used to create wetland digital files and for attributing wetlands.
Source_Information:
Source_Citation:
Citation_Information:
Originator: USGS
Title: National Aerial Photography Program (NAPP)
Geospatial_Data_Presentation_Form: remote-sensing image
Other_Citation_Details:

9" x 9" color infrared vertical aerial photographic transparencies.
Source_Scale_Denominator: 40000
Type_of_Source_Media: transparency
Source_Time_Period_of_Content:
Time_Period_Information:
Multiple_Dates/Times:
Single_Date/Time:
Calendar_Date: 19940504
Single_Date/Time:
Calendar_Date: 19940514
Single_Date/Time:
Calendar_Date: 19950417
Single_Date/Time:
Calendar_Date: 19950507
Single_Date/Time:
Calendar_Date: 19970508
Source_Currentness_Reference: ground condition
Source_Citation_Abbreviation: PHOTOS
Source_Contribution:
Color infrared aerial photos used for wetland delineations. Wetland overlays were retained on imagery for geocorrection and extraction of wetland boundaries to shapefiles.
Source_Information:
Source_Citation:
Citation_Information:
Originator: NYS Adirondack Park Agency
Title: 7.5' Quadrangle Index
Geospatial_Data_Presentation_Form: vector digital data
Online_Linkage: <http://www.apa.state.ny.us/gis/shared/htmlpages/data.html#wetl>
Source_Scale_Denominator: 24000
Type_of_Source_Media: disc
Source_Citation_Abbreviation: QUADS
Source_Contribution:
7.5' quadrangle boundaries used to subset study area for wetland data creation, editing, and attribution.
Process_Step:
Process_Description:
Corlor infrared aerial photo transparenceis with acetate wetland delineation overlays and their stereo pairs were scanned at 2000 dpi.
Source_Used_Citation_Abbreviation: PHOTO
Source_Produced_Citation_Abbreviation: PHOTO-SCAN
Process_Contact:
Contact_Information:
Contact_Person_Primary:
Contact_Person: Eileen B. Allen
Contact_Address:
Address_Type: mailing and physical address

Address: Center for Earth & Environmental Science, 101 Broad Street
City: Plattsburgh
State_or_Province: NY
Postal_Code: 12901
Country: USA
Process_Step:
Process_Description:
Aerial photos with wetland delineation overlays and their stereo pairs were geocorrected using ArcGIS and the ERDAS Image Analysis extension
Source_Used_Citation_Abbreviation: PHOTO-SCAN, ORTHOS, DEM, CAMERA
Source_Produced_Citation_Abbreviation: PHOTO-GEOREF
Process_Contact:
Contact_Information:
Contact_Person_Primary:
Contact_Person: Eileen B. Allen
Process_Step:
Process_Description:
Extract wetland delineations from aerial photo overlays into line shapefiles using ArcGIS and ERDAS Stereo Analyst extension. Work was done using geocorrected stereo air photos with Stereographics Crystal Eyes3 and E-2 emmitter.
Source_Used_Citation_Abbreviation: PHOTO-GEOREF, ORTHOS, DEM
Source_Produced_Citation_Abbreviation: WTL-SHP
Process_Step:
Process_Description:
Merge individual photo line shapefiles into a study area-wide coverage. Add quadrangle boundaries and outer watershed boundary. Clean with 1.219 fuzzy tolerance and 0.00 dangle tolerance into a polygon and arc ArcInfo coverage.
Source_Used_Citation_Abbreviation: WTL-SHP, OUTER, QUADS
Source_Produced_Citation_Abbreviation: WTL-COV
Process_Step:
Process_Description:
Extract 7.5' quadrangle areas from WTL-COV for labeling and editing purposes. Edit coverage to ensure closed polygons and delete extraneous dangles. Roughly georeference the wetland delineation overlay from the aerial photos and use as a backdrop to label arcs and polygons using a customized screen menu. Concatenate SYSTEM, CLASS1, CLASS2, REGIME, SPECIAL1, SPECIAL2, and SPECIAL3 into NWILABEL using ArcInfo Info for both arcs and label points. BUILD coverages.
Source_Used_Citation_Abbreviation: WTL-COV, OVERLAY
Source_Produced_Citation_Abbreviation: WTL-COV-LAB
Process_Step:
Process_Description:
Merge individual quadrangle coverages into a unified wetland coverage for the study area. Check adjoining quadrangle boundaries and ensure that wetland delineations and labels match across boundaries and then remove quadrangle boundary arcs. List all arc and polygon wetland labels to check for unlabeled polygons and either illegal or illogical wetland labels. Visually examine the wetland coverages in ArcMap to discover wetland

spatial and attribute problems. Examine coverages for adjoining wetlands with the same NWI label but without an intervening labeled arc. Peruse wetland coverage over orthophotos (SID format in ArcGIS, convert SID files into merged IMG files for ArcInfo) at a scale of 1:5000 and correct spatial errors to ensure reasonable delineations at a scale of 1:24000. Make any edit changes in ArcInfo with ArcTools edit tools and a customized on-screen attribute menu. BUILD or CLEAN as needed.
Source_Used_Citation_Abbreviation: WTL-COV-LAB, ORTHOS
Source_Produced_Citation_Abbreviation: WTL-FINAL
Cloud_Cover: 0%

Spatial_Data_Organization_Information:
Indirect_Spatial_Reference:
Wetlands are defined as polygons identified by a software-placed label point or as an arc labeled with a wetland cover type. Some arcs and polygons represent boundaries imposed by the study area boundary and therefore do not represent true feature boundaries. All non-wetland polygons possess a U SYSTEM and NWILABEL. All non-wetland arcs possess a blank cover type label.
Direct_Spatial_Reference_Method: Vector
Point_and_Vector_Object_Information:
SDTS_Terms_Description:
SDTS_Point_and_Vector_Object_Type: Complete chain
Point_and_Vector_Object_Count: 19840
SDTS_Terms_Description:
SDTS_Point_and_Vector_Object_Type: Label point
Point_and_Vector_Object_Count: 7000
SDTS_Terms_Description:
SDTS_Point_and_Vector_Object_Type: GT-polygon composed of chains
Point_and_Vector_Object_Count: 6999
SDTS_Terms_Description:
SDTS_Point_and_Vector_Object_Type: Point
Point_and_Vector_Object_Count: 0

Spatial_Reference_Information:
Horizontal_Coordinate_System_Definition:
Planar:
Grid_Coordinate_System:
Grid_Coordinate_System_Name: Universal Transverse Mercator
Universal_Transverse_Mercator:
UTM_Zone_Number: 18N
Transverse_Mercator:
Scale_Factor_at_Central_Meridian: 0.999600
Longitude_of_Central_Meridian: -75.000000
Latitude_of_Projection_Origin: 0.000000
False_Easting: 500000.000000
False_Northing: 0.000000
Planar_Coordinate_Information:

Planar_Coordinate_Encoding_Method: coordinate pair
Coordinate_Representation:
Abscissa_Resolution: 0.000000
Ordinate_Resolution: 0.000000
Planar_Distance_Units: meters
Geodetic_Model:
Horizontal_Datum_Name: North American Datum of 1983
Ellipsoid_Name: Geodetic Reference System 80
Semi-major_Axis: 6378137.000000
Denominator_of_Flattening_Ratio: 298.257222

Entity_and_Attribute_Information:
Detailed_Description:
Entity_Type:
Entity_Type_Label: lchamplgeowtl.aat
Entity_Type_Definition: Arc attribute table
Entity_Type_Definition_Source: ArcInfo
Attribute:
Attribute_Label: FID
Attribute_Definition: Internal feature number.
Attribute_Definition_Source: ESRI
Attribute_Domain_Values:
Unrepresentable_Domain:
Sequential unique whole numbers that are automatically generated.
Attribute:
Attribute_Label: Shape
Attribute_Definition: Feature geometry.
Attribute_Definition_Source: ESRI
Attribute_Domain_Values:
Unrepresentable_Domain: Coordinates defining the features.
Attribute:
Attribute_Label: FNODE#
Attribute_Definition: Internal node number for the beginning of an arc (from-node).
Attribute_Definition_Source: ESRI
Attribute_Domain_Values:
Unrepresentable_Domain: Whole numbers that are automatically generated.
Attribute:
Attribute_Label: TNODE#
Attribute_Definition: Internal node number for the end of an arc (to-node).
Attribute_Definition_Source: ESRI
Attribute_Domain_Values:
Unrepresentable_Domain: Whole numbers that are automatically generated.
Attribute:
Attribute_Label: LPOLY#
Attribute_Definition: Internal node number for the left polygon.
Attribute_Definition_Source: ESRI

Attribute_Domain_Values:
Unrepresentable_Domain: Whole numbers that are automatically generated.
Attribute:
Attribute_Label: RPOLY#
Attribute_Definition: Internal node number for the right polygon.
Attribute_Definition_Source: ESRI
Attribute_Domain_Values:
Unrepresentable_Domain: Whole numbers that are automatically generated.
Attribute:
Attribute_Label: LENGTH
Attribute_Definition: Length of feature in internal units.
Attribute_Definition_Source: ESRI
Attribute_Domain_Values:
Unrepresentable_Domain: Positive real numbers that are automatically generated.
Attribute:
Attribute_Label: LCHAMPLGEOWTL#
Attribute_Definition: Internal feature number.
Attribute_Definition_Source: ESRI
Attribute_Domain_Values:
Unrepresentable_Domain:
Sequential unique whole numbers that are automatically generated.
Attribute:
Attribute_Label: LCHAMPLGEOWTL-ID
Attribute_Definition: User-defined feature number.
Attribute_Definition_Source: ESRI
Attribute:
Attribute_Label: ARCVALUE
Attribute_Definition:
Value (5) to uniquely the identify the Lake Champlain/Lake George watershed (study area boundary). Linear wetlands and wetland polygon boundaries are given a value of 6.
Attribute_Definition_Source: user-defined
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: P
Enumerated_Domain_Value_Definition:
Palustrine habitat, non-tidal, less than 8 hectares (20 acres) and less than 2 meters deep
Enumerated_Domain:
Enumerated_Domain_Value: R2
Enumerated_Domain_Value_Definition: Lower perennial riverine
Enumerated_Domain:
Enumerated_Domain_Value: R3
Enumerated_Domain_Value_Definition: Upper perennial riverine
Enumerated_Domain:
Enumerated_Domain_Value: R4
Enumerated_Domain_Value_Definition: Intermittent riverine
Enumerated_Domain:

Enumerated_Domain_Value: U
Enumerated_Domain_Value_Definition: Upland
Attribute_Value_Accuracy_Information:
Attribute_Measurement_Frequency: As needed
Attribute:
Attribute_Label: SYSTEM
Attribute_Definition:
Complex of wetlands and deepwater habitats that share the influence of similar hydrologic, geomorphologic, chemical, or biological factors. This parameter is mandatory for all linear wetlands in the study area.
Attribute_Definition_Source: Cowardin et al 1979
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: P
Enumerated_Domain_Value_Definition:
Palustrine habitat, non-tidal, less than 8 hectares (20 acres) and less than 2 meters deep
Enumerated_Domain:
Enumerated_Domain_Value: R2
Enumerated_Domain_Value_Definition: Lower perennial riverine
Enumerated_Domain:
Enumerated_Domain_Value: R3
Enumerated_Domain_Value_Definition: Upper perennial riverine
Enumerated_Domain:
Enumerated_Domain_Value: R4
Enumerated_Domain_Value_Definition: Intermittent riverine
Attribute_Value_Accuracy_Information:
Attribute_Value_Accuracy_Explanation: Attributes derived from photointerpretation techniques.
Attribute_Measurement_Frequency: As needed
Attribute:
Attribute_Label: CLASS1
Attribute_Definition:
General appearance of the habitat in terms of either the dominant life form of the vegetation or the physiography and composition of the substrate. Covers at least 30% of the substrate. A value in this column is mandatory for all linear wetlands.
Attribute_Definition_Source: Cowardin et al 1979
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: EM1
Enumerated_Domain_Value_Definition: Persistent emergent
Enumerated_Domain:
Enumerated_Domain_Value: FO1
Enumerated_Domain_Value_Definition: Forested, broad-leaved deciduous
Enumerated_Domain:
Enumerated_Domain_Value: FO4
Enumerated_Domain_Value_Definition: Forested, evergreen

Enumerated_Domain:
Enumerated_Domain_Value: OW
Enumerated_Domain_Value_Definition: Open water
Enumerated_Domain:
Enumerated_Domain_Value: SB3
Enumerated_Domain_Value_Definition: Stream bed, cobble/gravel
Enumerated_Domain:
Enumerated_Domain_Value: SS1
Enumerated_Domain_Value_Definition: Scrub/shrub (shorter than 6 meters), broad-leaved deciduous
Enumerated_Domain:
Enumerated_Domain_Value: SS4
Enumerated_Domain_Value_Definition: Scrub/shrub (shorter than 6 meters), Needle-leaved evergreen
Attribute_Value_Accuracy_Information:
Attribute_Value_Accuracy_Explanation: Attributes derived from photointerpretation techniques.
Attribute_Measurement_Frequency: As needed
Attribute:
Attribute_Label: CLASS2
Attribute_Definition:
General appearance of the habitat in terms of either the dominant life form of the vegetation or the physiography and composition of the substrate. Covers at least 30% of the substrate. Life form must be the same or lower in height than CLASS1. If the same general life form as CLASS1 (ex. FO), CLASS2 has equal or less areal extent. A value in this column is not mandatory.
Attribute_Definition_Source: Cowardin et al 1979
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: /FO4
Enumerated_Domain_Value_Definition: Forested, evergreen
Enumerated_Domain:
Enumerated_Domain_Value: /SS1
Enumerated_Domain_Value_Definition: Scrub/shrub (shorter than 6 meters), broad-leaved deciduous
Attribute_Value_Accuracy_Information:
Attribute_Value_Accuracy_Explanation: Attributes derived from photointerpretation techniques.
Attribute_Measurement_Frequency: As needed
Attribute:
Attribute_Label: REGIME
Attribute_Definition:
The water regime modifier describes the hydrologic characteristics of the community. Only non-tidal regimes were used in the Adirondacks. A value in this column is mandatory for all linear wetlands.
Attribute_Definition_Source: Cowardin et al 1979

Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: B
Enumerated_Domain_Value_Definition: Saturated
Enumerated_Domain:
Enumerated_Domain_Value: E
Enumerated_Domain_Value_Definition: Seasonally flooded, saturated
Enumerated_Domain:
Enumerated_Domain_Value: H
Enumerated_Domain_Value_Definition: Permanent
Attribute_Value_Accuracy_Information:
Attribute_Value_Accuracy_Explanation: Attributes derived from photointerpretation techniques.
Attribute_Measurement_Frequency: As needed
Attribute:
Attribute_Label: SPECIAL1
Attribute_Definition:
Special modifiers are used to denote man-made or beaver modifications to the habitat. Optional parameter.
Attribute_Definition_Source: Cowardin et al 1979
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: d
Enumerated_Domain_Value_Definition: Partially drained/ditched
Enumerated_Domain:
Enumerated_Domain_Value: f
Enumerated_Domain_Value_Definition: Farmed
Enumerated_Domain:
Enumerated_Domain_Value: r
Enumerated_Domain_Value_Definition: Artificial
Enumerated_Domain:
Enumerated_Domain_Value: x
Enumerated_Domain_Value_Definition: Excavated
Attribute_Value_Accuracy_Information:
Attribute_Value_Accuracy_Explanation: Attributes derived from photointerpretation techniques.
Attribute_Measurement_Frequency: As needed
Attribute:
Attribute_Label: SPECIAL2
Attribute_Definition:
Special modifiers are used to denote man-made or beaver modifications to the habitat. Optional parameter.
Attribute_Definition_Source: Cowardin et al 1979
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: d

Enumerated_Domain_Value_Definition: Partially drained/ditched
Enumerated_Domain:
Enumerated_Domain_Value: f
Enumerated_Domain_Value_Definition: Farmed
Attribute:
Attribute_Label: SPECIAL3
Attribute_Definition:
Special modifiers are used to denote man-made or beaver modifications to the habitat. Optional parameter.
Attribute_Definition_Source: Cowardin et al 1979
Attribute_Domain_Values:
Enumerated_Domain:
Attribute_Value_Accuracy_Information:
Attribute_Value_Accuracy_Explanation: Attributes derived from photointerpretation techniques.
Attribute_Measurement_Frequency: As needed
Attribute:
Attribute_Label: NWILABEL
Attribute_Definition:
Unified label of SYSTEM, CLASS1, CLASS2, REGIME, SPECIAL1, SPECIAL2, and SPECIAL3. See the definitions of the individual components. This attribute is considered the NWI wetland label. Mandatory parameter for all linear wetlands within the study area, including linear uplands.
Attribute_Definition_Source: Cowardin et al 1979
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: see component values
Beginning_Date_of_Attribute_Values: 19940504
Ending_Date_of_Attribute_Values: 19970508
Attribute_Value_Accuracy_Information:
Attribute_Value_Accuracy_Explanation: Attributes derived from photointerpretation techniques.
Detailed_Description:
Entity_Type:
Entity_Type_Label: lchamplgeowtl.pat
Entity_Type_Definition: Polygon attribute table
Entity_Type_Definition_Source: ArcInfo
Attribute:
Attribute_Label: FID
Attribute_Definition: Internal feature number.
Attribute_Definition_Source: ESRI
Attribute_Domain_Values:
Unrepresentable_Domain:
Sequential unique whole numbers that are automatically generated.
Attribute_Measurement_Frequency: As needed
Attribute:

Attribute_Label: Shape
Attribute_Definition: Feature geometry.
Attribute_Definition_Source: ESRI
Attribute_Domain_Values:
Unrepresentable_Domain: Coordinates defining the features.
Attribute_Measurement_Frequency: As needed
Attribute:
Attribute_Label: AREA
Attribute_Definition: Area of feature in internal units squared.
Attribute_Definition_Source: ESRI
Attribute_Domain_Values:
Unrepresentable_Domain: Positive real numbers that are automatically generated.
Beginning_Date_of_Attribute_Values: 1994 (imagery date)
Ending_Date_of_Attribute_Values: 1995 (imagery date)
Attribute_Measurement_Frequency: As needed
Attribute:
Attribute_Label: PERIMETER
Attribute_Definition: Perimeter of feature in internal units.
Attribute_Definition_Source: ESRI
Attribute_Domain_Values:
Unrepresentable_Domain: Positive real numbers that are automatically generated.
Beginning_Date_of_Attribute_Values: 1994 (imagery date)
Ending_Date_of_Attribute_Values: 1995 (imagery date)
Attribute_Measurement_Frequency: As needed
Attribute:
Attribute_Label: LCHAMPLGEOWTL#
Attribute_Definition: Internal feature number.
Attribute_Definition_Source: ESRI
Attribute_Domain_Values:
Unrepresentable_Domain:
Sequential unique whole numbers that are automatically generated.
Attribute:
Attribute_Label: LCHAMPLGEOWTL-ID
Attribute_Definition: User-defined feature number.
Attribute_Definition_Source: ESRI
Attribute_Measurement_Frequency: As needed
Attribute:
Attribute_Label: SYSTEM
Attribute_Definition:
Complex of wetlands and deepwater habitats that share the influence of similar hydrologic, geomorphologic, chemical, or biological factors. This parameter is mandatory for all polygons in the study area.
Attribute_Definition_Source: Cowardin et al 1979
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: L1

Enumerated_Domain_Value_Definition:
Lacustrine limnetic habitat, greater than 8 hectares (20 acres) and more than 2 meters deep
Enumerated_Domain_Value_Definition_Source: Cowardin et al 1979
Enumerated_Domain:
Enumerated_Domain_Value: P
Enumerated_Domain_Value_Definition:
Palustrine habitat, non-tidal, less than 8 hectares (20 acres) and less than 2 meters deep
Enumerated_Domain:
Enumerated_Domain_Value: R2
Enumerated_Domain_Value_Definition: Lower perennial riverine
Enumerated_Domain:
Enumerated_Domain_Value: R3
Enumerated_Domain_Value_Definition: Upper perennial riverine
Enumerated_Domain:
Enumerated_Domain_Value: U
Enumerated_Domain_Value_Definition: Upland
Attribute_Value_Accuracy_Information:
Attribute_Value_Accuracy_Explanation: Attributes derived from photointerpretation
Attribute_Measurement_Frequency: As needed
Attribute:
Attribute_Label: CLASS1
Attribute_Definition:
General appearance of the habitat in terms of either the dominant life form of the vegetation or the physiography and composition of the substrate. Covers at least 30% of the substrate. A value in this column is mandatory for all linear wetlands.
Attribute_Definition_Source: Cowardin et al 1979
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: AB3
Enumerated_Domain_Value_Definition: Aquatic bed, rooted vascular
Enumerated_Domain:
Enumerated_Domain_Value: EM1
Enumerated_Domain_Value_Definition: Persistent emergent
Enumerated_Domain:
Enumerated_Domain_Value: FO1
Enumerated_Domain_Value_Definition: Forested, broad-leaved deciduous
Enumerated_Domain:
Enumerated_Domain_Value: FO4
Enumerated_Domain_Value_Definition: Forested, evergreen
Enumerated_Domain:
Enumerated_Domain_Value: FO5
Enumerated_Domain_Value_Definition: Forested, dead
Enumerated_Domain:
Enumerated_Domain_Value: OW
Enumerated_Domain_Value_Definition: Open water
Enumerated_Domain:

Enumerated_Domain_Value: SS1
Enumerated_Domain_Value_Definition: Scrub/shrub (shorter than 6 meters), broad-leaved deciduous
Enumerated_Domain:
Enumerated_Domain_Value: SS2
Enumerated_Domain_Value_Definition: Scrub/shrub (shorter than 6 meters), broad-leaved evergreen
Enumerated_Domain:
Enumerated_Domain_Value: SS3
Enumerated_Domain_Value_Definition: Scrub/shrub (shorter than 6 meters), broad-leaved evergreen
Enumerated_Domain:
Enumerated_Domain_Value: SS4
Enumerated_Domain_Value_Definition: Scrub/shrub (shorter than 6 meters), needle-leaved evergreen
Enumerated_Domain:
Enumerated_Domain_Value: SS5
Enumerated_Domain_Value_Definition: Scrub/shrub (shorter than 6 meters), dead
Enumerated_Domain:
Enumerated_Domain_Value: UB3
Enumerated_Domain_Value_Definition: Unconsolidated bottom, mud
Enumerated_Domain:
Enumerated_Domain_Value: US2
Enumerated_Domain_Value_Definition: Unconsolidated shore, sand
Attribute_Value_Accuracy_Information:
Attribute_Value_Accuracy_Explanation: Attributes derived from photointerpretation techniques.
Attribute:
Attribute_Label: CLASS2
Attribute_Definition:
General appearance of the habitat in terms of either the dominant life form of the vegetation or the physiography and composition of the substrate. Covers at least 30% of the substrate. Life form must be the same or lower in height than CLASS1. If the same general life form as CLASS1 (ex. FO), CLASS2 has equal or less areal extent. A value in this column is not mandatory.
Attribute_Definition_Source: Cowardin et al 1979
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: /AB3
Enumerated_Domain_Value_Definition: Aquatic bed, rooted vascular
Enumerated_Domain:
Enumerated_Domain_Value: /EM1
Enumerated_Domain_Value_Definition: Persistent emergent
Enumerated_Domain:
Enumerated_Domain_Value: /FO1
Enumerated_Domain_Value_Definition: Forested, broad-leaved deciduous

Enumerated_Domain:
Enumerated_Domain_Value: /FO4
Enumerated_Domain_Value_Definition: Forested, evergreen
Enumerated_Domain:
Enumerated_Domain_Value: /FO5
Enumerated_Domain_Value_Definition: Forested, dead
Enumerated_Domain:
Enumerated_Domain_Value: /OW
Enumerated_Domain_Value_Definition: Open water
Enumerated_Domain:
Enumerated_Domain_Value: /SS1
Enumerated_Domain_Value_Definition: Scrub/shrub (shorter than 6 meters), broad-leaved deciduous
Enumerated_Domain:
Enumerated_Domain_Value: /SS3
Enumerated_Domain_Value_Definition: Scrub/shrub (shorter than 6 meters), broad-leaved evergreen
Enumerated_Domain:
Enumerated_Domain_Value: /SS4
Enumerated_Domain_Value_Definition: Scrub/shrub (shorter than 6 meters), needle-leaved evergreen
Enumerated_Domain:
Enumerated_Domain_Value: /SS5
Enumerated_Domain_Value_Definition: Scrub/shrub (shorter than 6 meters), dead
Attribute_Value_Accuracy_Information:
Attribute_Value_Accuracy_Explanation: Attributes derived from photointerpretation techniques.
Attribute_Measurement_Frequency: As needed
Attribute:
Attribute_Label: REGIME
Attribute_Definition:
The water regime modifier describes the hydrologic characteristics of the community. Only non-tidal regimes were used in the Adirondacks. A value in this column is mandatory for all wetland polygons.
Attribute_Definition_Source: Cowardin et al 1979
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: B
Enumerated_Domain_Value_Definition: Saturated
Enumerated_Domain:
Enumerated_Domain_Value: D
Enumerated_Domain_Value_Definition: Seasonally flooded - well drained
Enumerated_Domain:
Enumerated_Domain_Value: E
Enumerated_Domain_Value_Definition: Seasonally flooded - saturated
Enumerated_Domain:

Enumerated_Domain_Value: H
Enumerated_Domain_Value_Definition: Permanent
Attribute_Value_Accuracy_Information:
Attribute_Value_Accuracy_Explanation: Attributes derived from photointerpretation techniques.
Attribute_Measurement_Frequency: As needed
Attribute:
Attribute_Label: SPECIAL1
Attribute_Definition:
Special modifiers are used to denote man-made or beaver modifications to the habitat. Optional parameter.
Attribute_Definition_Source: Cowardin et al 1979
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: b
Enumerated_Domain_Value_Definition: Beaver
Enumerated_Domain:
Enumerated_Domain_Value: d
Enumerated_Domain_Value_Definition: Partially drained, ditched
Enumerated_Domain:
Enumerated_Domain_Value: f
Enumerated_Domain_Value_Definition: Farmed
Enumerated_Domain:
Enumerated_Domain_Value: h
Enumerated_Domain_Value_Definition: Diked/impounded
Enumerated_Domain:
Enumerated_Domain_Value: r
Enumerated_Domain_Value_Definition: Artificial
Enumerated_Domain:
Enumerated_Domain_Value: s
Enumerated_Domain_Value_Definition: Spoil
Enumerated_Domain:
Enumerated_Domain_Value: x
Enumerated_Domain_Value_Definition: Excavated
Attribute_Value_Accuracy_Information:
Attribute_Value_Accuracy_Explanation: Attributes derived from photointerpretation techniques.
Attribute_Measurement_Frequency: As needed
Attribute:
Attribute_Label: SPECIAL2
Attribute_Definition:
Special modifiers are used to denote man-made or beaver modifications to the habitat. Optional parameter.
Attribute_Definition_Source: Cowardin et al 1979
Attribute_Domain_Values:
Enumerated_Domain:

Enumerated_Domain_Value: f
Enumerated_Domain_Value_Definition: Farmed
Enumerated_Domain:
Enumerated_Domain_Value: x
Enumerated_Domain_Value_Definition: Excavated
Attribute_Value_Accuracy_Information:
Attribute_Value_Accuracy_Explanation: Attributes derived from photointerpretation techniques.
Attribute_Measurement_Frequency: As needed
Attribute:
Attribute_Label: SPECIAL3
Attribute_Definition:
Special modifiers are used to denote man-made or beaver modifications to the habitat. Optional parameter.
Attribute_Definition_Source: Cowardin et al 1979
Attribute_Domain_Values:
Attribute_Value_Accuracy_Information:
Attribute_Value_Accuracy_Explanation: Attributes derived from photointerpretation techniques.
Attribute_Measurement_Frequency: As needed
Attribute:
Attribute_Label: NWILABEL
Attribute_Definition:
Unified label of SYSTEM, CLASS1, CLASS2, REGIME, SPECIAL1, SPECIAL2, and SPECIAL3. See the definitions of the individual components. This attribute is considered the NWI wetland label. Mandatory parameter for all polygons within the study area, including upland polygons.
Attribute_Definition_Source: Cowardin et al 1979
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: see component values
Beginning_Date_of_Attribute_Values: 19940504
Ending_Date_of_Attribute_Values: 19970508
Attribute_Value_Accuracy_Information:
Attribute_Value_Accuracy_Explanation: Attributes derived from photointerpretation techniques.
Attribute_Measurement_Frequency: As needed

Distribution_Information:
Distributor:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: NYS Adirondack Park Agency
Contact_Person: Daniel M. Spada
Contact_Position: Supervisor Natural Resource Analysis
Contact_Voice_Telephone: (518) 891-4050

Contact_Facsimile_Telephone: (518) 891-3938
Contact_Electronic_Mail_Address: dmspada@gw.dec.state.ny.us
Resource_Description:
Downloadable Data, may be available on other media such as CD. Wetlands in the Lake Champlain/Lake George basins.
Distribution_Liability:
Although these data have been processed successfully on a computer system at the NYS APA, no warranty expressed or implied is made regarding the accuracy or utility of the data on any other system or for general or scientific purposes, nor shall the act of distribution constitute any such warranty. This disclaimer applies both to individual use of the data and aggregate use with other data. It is strongly recommended that these data be directly acquired from the NYS APA, and not indirectly through other sources which may have changed the data in some way. It is also strongly recommended that careful attention be paid to the contents of the metadata file associated with these data. The NYS APA shall not be held liable for improper or incorrect use of the data described and/or contained herein. These data shall not be used for legal jurisdictional determinations.
Standard_Order_Process:
Digital_Form:
Digital_Transfer_Information:
Format_Name: ARCE
Format_Version_Number: ArcInfo 9.3.1
File_Decompression_Technique: no compression applied
Transfer_Size: 6.914
Technical_Prerequisites:
These data were created in ESRI's ArcGIS 9.3.1 ArcInfo coverage format.

Metadata_Reference_Information:
Metadata_Date: 20101010
Metadata_Contact:
Contact_Information:
Contact_Person_Primary:
Contact_Person: Eileen B. Allen
Contact_Organization: State University of NY at Plattsburgh, GIS Laboratory
Contact_Position: GIS Coordinator
Contact_Address:
Address_Type: mailing address
Address: Center for Earth & Environmental Science
Address: State University of NY at Plattsburgh
Address: 101 Broad Street
City: Plattsburgh
State_or_Province: NY
Postal_Code: 12901
Contact_Voice_Telephone: (518) 564-2020
Contact_Facsimile_Telephone: (518) 564-5267
Contact_Electronic_Mail_Address: eileen.allen@plattsburgh.edu
Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata

Metadata_Standard_Version: FGDC-STD-001-1998
Metadata_Time_Convention: local time
Metadata_Security_Information:
Metadata_Security_Classification_System: none
Metadata_Security_Classification: Unclassified
Metadata_Security_Handling_Description: none
Metadata_Extensions:
Online_Linkage: <http://www.esri.com/metadata/esriprof80.html>
Profile_Name: ESRI Metadata Profile

Appendix G. Metadata for digital wetland mapping of the Saranac/Chazy watershed

Metadata:

- Identification_Information
- Data_Quality_Information
- Spatial_Data_Organization_Information
- Spatial_Reference_Information
- Entity_and_Attribute_Information
- Distribution_Information
- Metadata_Reference_Information

Identification_Information:

Citation:
Citation_Information:
Originator: New York State Adirondack Park Agency
Originator: Daniel M. Spada, Project Director
Publication_Date: 20101231
Title: sarchazywtl
Edition: Version 1.0
Geospatial_Data_Presentation_Form: vector digital data
Series_Information:
Series_Name: Watershed Scale Protection for Adirondack Wetlands
Issue_Identification:
Effectiveness of and Enhancements to the Adirondack Park Agency's Wetland Protection Program
Publication_Information:
Publication_Place: Ray Brook, NY
Publisher: New York State Adirondack Park Agency
Online_Linkage: \\ALLEN-06\HiHoSilver\sar_champ_final\wetlands\sarchazywtl
Description:
Abstract:
All or part of 28 USGS 7.5' quadrangle-based wetland coverages were prepared for the Saranac River/Chazy River watersheds within the New York State Adirondack Park using ArcGIS 9.3.1 at the Remote Sensing/GIS Laboratory, State University of NY (SUNY) Plattsburgh. Wetland delineations on 1:40000 color infrared NAPP air photo transparencies were scanned and geocorrected. Wetlands were digitized as line shapefiles in ArcGIS from the geocorrected scanned imagery using ArcGIS ERDAS Stereo Analyst extension. Individual quadrangrangle line shapefiles were merged into a single polygon and arc coverage, which was edited and attributed in ArcInfo. This wetlands database consists of both polygon and linear features labeled using National Wetlands Inventory (NWI) conventions as modified for use by the NYS Adirondack Park Agency. The wetland coverage was exported as an Arc Interchange File to the New York State, Executive Department, Adirondack Park Agency (NYS APA) running ArcInfo version 9.x.

Purpose:
The wetlands database is part of a larger database designed to help evaluate watershed/wetland relationships and provide data for cumulative impact assessments. The outreach efforts to share the Agency natural resource database will encourage resource appreciation and wise use, particularly in a regional context.
Supplemental_Information:
Color infrared transparencies with wetlands delineated on acetate overlays were scanned at 2000 dpi into tif files using an Epson Expressions XL 10000 scanner at the SUNY Plattsburgh Remote Sensing/GIS Laboratory. Air photos and their stereo pairs were geocorrected using the ArcGIS ERDAS Image Analysis extension, orthothoimagery from the NYS GIS Clearinghouse, USGS DEM files from CUGIR, and USGS camera calibration files. Transfer from acetate overlays to digital wetland arc shapefiles was done using the ArcGIS ERDAS Stereo Analyst extension, Sterographics CrystalEyes3 glasses and E-2 emitter. All digital files used the UTM Zone 18N NAD83 coordinate system. Line shapefiles were appended into a single arc and polygon coverage with the outer boundary of the study area and the 7.5' USGS quadrangle boundaries. Digital wetland boundaries were edited in coverage format with a snapdistance 20.0 meters, snaptype closest, weed tolerance 3.0 meters, and a fuzzy tolerance of 1.219 meters. Wetland labels were added during heads-up editing with a customized on-screen menu using the georeferenced air photo acetate wetland overlays as a backdrop. Wetland label columns were concatenated into a unified wetland label using ArcInfo. Wetland labels follow the conventions established by Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. FWS/OBS-79/31. Office of Biological Services, U.S. Fish and Wildlife Service. U.S. Department of the Interior, Washington, D.C. 103 pp. Some modifications to the conventions were made to accommodate this project and are noted in the NWI label tables accompnaying this metadata. Files were transported to the NYS APA as ArcInfo export files (no compression)
.
Wetlands for seven quadrangles in the study area were delineated and transferred to hard copy orthoimagery and then into digital files in previous projects. Wilmington was done in the AuSable-Boquet River Watershed project and the other six (Debar Mountain, Brandon, St. Regis, Gabriels, Derrick, and Upper Saranac) were completed for the St. Regis (St. Lawrence I) Watershed project. Please refer to the project metadata for these watershed for the delineation and transfer protocols.
Time_Period_of_Content:
Time_Period_Information:
Multiple_Dates/Times:
Single_Date/Time:
Calendar_Date: 19940514
Single_Date/Time:
Calendar_Date: 19950507
Single_Date/Time:
Calendar_Date: 19760513
Time_of_Day: St.Regis and AuSable-Boquet wetlands orthoimagery
Currentness_Reference: imagery and orthoimagery dates
Status:

Progress: Complete
Maintenance_and_Update_Frequency: As needed
Spatial_Domain:
Bounding_Coordinates:
West_Bounding_Coordinate: -74.463655
East_Bounding_Coordinate: -73.628061
North_Bounding_Coordinate: 44.883210
South_Bounding_Coordinate: 44.182096
Keywords:
Theme:
Theme_Keyword_Thesaurus: None
Theme_Keyword: Wetlands
Theme_Keyword: Vegetation
Theme_Keyword: NWI cover types
Theme_Keyword: Geographic Information System (GIS)
Theme_Keyword: ArcInfo
Place:
Place_Keyword_Thesaurus: Geographic Names Information System
Place_Keyword: New York
Place_Keyword: Adirondack Park
Place_Keyword: Adirondack Mountains
Place_Keyword: Chazy River
Place_Keyword: Saranac River
Stratum:
Stratum_Keyword_Thesaurus: None
Temporal:
Temporal_Keyword_Thesaurus: None
Temporal_Keyword: Date of aerial photography and orthoimagery: 1994-1995
Access_Constraints: None
Use_Constraints:
These data may not be used for legal determinations. Please credit use of this data set to the New York State Adirondack Park Agency, Ray Brook, New York 12977. Please send a copy of any reports or papers in which these data were used or referenced to the above address, Attention: Susan VanWormer, Librarian.
Point_of_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: NYS Adirondack Park Agency
Contact_Person: Daniel M. Spada
Contact_Position: Supervisor Natural Resource Analysis
Contact_Address:
Address_Type: mailing and physical address
Address: Route 86, P.O. Box 99
City: Ray Brook
State_or_Province: New York
Postal_Code: 12977

Country: USA
Contact_Voice_Telephone: (518) 891-4050
Contact_Facsimile_Telephone: (518) 891-3938
Contact_Electronic_Mail_Address: dmspada@gw.dec.state.ny.us
Hours_of_Service: 8:30 AM - 4:30 PM Monday through Friday
Data_Set_Credit:
Funding was provided by the US Environmental Protection Agency Office of Wetlands Protection; State Wetlands Protection Program; Project #C200609 to the New York State Adirondack Park Agency. Subcontractors for portions of the grant were the Remote Sensing/GIS Laboratory, Plattsburgh State University,
Security_Information:
Security_Classification_System: None
Security_Classification: Unclassified
Security_Handling_Description: None
Native_Data_Set_Environment:
Microsoft Windows XP Version 5.1 (Build 2600) Service Pack 3; ESRI ArcCatalog 9.3.1.3500

Data_Quality_Information:
Attribute_Accuracy:
Attribute_Accuracy_Report:
Attributes assigned to polygon features consist of unique User-Ids and wetland labels. Arc attributes include a unique User-ID, ARCVALUE to identify quadrangle and watershed boundaries, and wetland labels for linear wetlands. Quadrangle boundaries were temporary for the purposes of editing and attribution and were removed prior to creating the final coverage. Polygon and linear wetland labels were derived from photointerpretation techniques. Wetland labels were entered by georeferencing the scanned air photo acetate overlay of wetland delineations to the digital wetland coverage. To minimize typographical errors, both polygon and linear wetland labels were entered utilizing an on-screen menu consisting of columns representing wetland label components. Label columns were concatenated in ArcInfo to create a unified wetland cover type label. The NWILABEL item was visually checked on the computer screen for integrity and labeling accuracy. Polygon and linear wetland labels were summarized in ArcMap to identify nonsensical or illogical NWI labels, which were corrected in ArcInfo ArcEdit.
Quantitative_Attribute_Accuracy_Assessment:
Attribute_Accuracy_Value: Unknown
Attribute_Accuracy_Explanation:
Polygon and linear wetland cover type labels were derived from photointerpretation techniques. All photo overlays were checked by two independent interpreters for missing wetlands, uplands delineated as wetland, incorrectly delineated polygons, missing wetland labels, and incorrect wetland labels by two people in a prior project. Photo overlays were directly compared to the digital wetland files utilizing scanned copies of the photo overlays corrected to the wetland delineations. This process facilitated the entry of wetland cover type labels and to discover missing arcs. Digitized and scanned coverage hard copies were directly compared to orthophoto overlays to check for missing arcs. The process of digitally labeling the wetland coverages also helped to resolve some missing, incomplete,

and nonsensical labels. Finally, all wetland labels were printed in tabular form and proof-read to ensure both complete labeling of the coverage and logical label content. No quantitative accuracy assessment was performed.
Logical_Consistency_Report:
Polygons: All polygons were required to possess either a wetland or upland cover type (i.e., a SYSTEM entry and therefore a final NWILABEL entry were mandatory). During the labeling process, digital polygons were checked for the presence of a label point and incomplete polygons were repaired.
Arcs: Only linear wetlands arcs received a wetland label. ArcMap was used to color-code linear wetlands to help discover those linear wetlands missing a label or those that were labeled improperly. Only linear wetlands were allowed to exhibit dangle nodes.
Inter-coverage consistency: Wetland labels and arcs along adjacent quadrangle edges were proofread using ArcMap and corrected in ArcInfo ArcEdit.
Completeness_Report:
Extensive quality assurance/quality control measures were taken for all steps of database creation. All wetland labels were reviewed for conformance to National Wetlands Inventory standards. It is expected that because the derivation of data from photointerpretation techniques, uncorrectable errors and mistakes may be present. Identifiable mistakes will be corrected as needed. These wetland maps contain only those wetlands that were identifiable from aerial photographs.
Positional_Accuracy:
Horizontal_Positional_Accuracy:
Horizontal_Positional_Accuracy_Report:
Horizontal positional accuracy has error potential from several different steps: photointerpretation, air photo rectification, and digitizing techniques.While great care was taken at every step, no formal quantitative accuracy assessment was conducted.
Vertical_Positional_Accuracy:
Vertical_Positional_Accuracy_Report:
No vertical coordinates are associated with this data set. Scanned air photo transparencies were geocorrected to orthhoimagery created from the same imagery. Topographic displacements in the NAPP imagery and derived wetland files were corrected using USGS DEM files.
Lineage:
Source_Information:
Source_Citation:
Citation_Information:
Originator: USGS
Publication_Date: 1992-1996
Title: Report of Calibration of Aerial Mapping Camera
Geospatial_Data_Presentation_Form: document
Other_Citation_Details:
Camera calibration reports are produced by USGS. Four different reports were used for this project that correspond to the camera and lens serial numbers. The report numbers used are OSL/1782, OSL/2160, OSL/1962, and OSL/1950.
Type_of_Source_Media: online
Source_Time_Period_of_Content:

Time_Period_Information:
Multiple_Dates/Times:
Single_Date/Time:
Calendar_Date: 19940106
Single_Date/Time:
Calendar_Date: 19940208
Source_Citation_Abbreviation: CAMERA
Source_Contribution:
Camera information used to geocorrect scanned air photo transparencies.
Source_Information:
Source_Citation:
Citation_Information:
Originator: USGS
Publication_Date: Unknown
Title: Digital Elevation Model
Other_Citation_Details:
DEM created by NYS Department of Environmental Conservation and tiled by 7.5' quadrangle. Files downloaded from the Cornell Univeristy Geospatial Information Repository (CUGIR). These files are 10-m raster files in NAD27. While the elevation resolution is 0.1 meter, vertical accuracy is 6-8 meters.
Online_Linkage: <http://cugir.mannlib.cornell.edu/datatheme.jsp?id=23>
Source_Scale_Denominator: 24000
Type_of_Source_Media: online
Source_Citation_Abbreviation: DEM
Source_Contribution: Elevation file used to geocorrect scanned air photo files.
Source_Information:
Source_Citation:
Citation_Information:
Originator: NYS GIS Clearinghouse
Title: New York State Digitally Enhanced Orthoimagery
Geospatial_Data_Presentation_Form: remote-sensing image
Other_Citation_Details:
Orthoimagery produced from NAPP imagery through the federal Digital Orthophotgraphy Quarter Quadrangle program (DOQQ), the NYS Department of Environmental Conservation, and enhanced through NYS Y2K emergency preparedness planning effort.
Online_Linkage: <http://www.nysgis.state.ny.us/gateway/mg/napp_descrip.htm>
Source_Scale_Denominator: 12000
Type_of_Source_Media: online
Source_Time_Period_of_Content:
Time_Period_Information:
Multiple_Dates/Times:
Single_Date/Time:
Calendar_Date: 19940514
Single_Date/Time:
Calendar_Date: 19950507
Single_Date/Time:

Calendar_Date: 19970508
Single_Date/Time:
Calendar_Date: 19760513
Time_of_Day:
Brandon, St. Regis, Gabriels, Derrick, Upper Saranac, and Wilmington quadrangle hard copy orthoimagery
Source_Currentness_Reference: ground condition
Source_Citation_Abbreviation: ORTHOS
Source_Contribution:
Map base for geocorrection of scanned aerial imagery and for QA/QC of wetland positional accuracy of final wetland files. Wetlands data in this watershed from the St. Regis and AuSable-Boquet projects were transferred to hard copy orthoimagey dated 19760513 (Brandon, St. Regis, Gabriels, Derrick, Upper Saranac, and Wilmington quadrangles) and 19940514 for the Debar Mountain quadrangle.
Source_Information:
Source_Citation:
Citation_Information:
Publication_Date: 2010
Title: Saranac River/Chazy River outer watershed boundary
Other_Citation_Details:
File developed from digital 7.5' and 7.5 x 15' USGS topographic maps.
Source_Scale_Denominator: 24000
Type_of_Source_Media: disc
Source_Citation_Abbreviation: OUTER
Source_Contribution:
Outer study area boundary. Used as a boundary for mapping wetlands and for clipping digital files. A digital watershed data layer derived from digital USGS 7.5' and 7.5' x 15' topographic maps defined the outer boundary of the mapped area.
Source_Information:
Source_Citation:
Citation_Information:
Originator: NYS Adirondack Park Agency
Title:
Wetland aerial photography acetate overlays of wetland delineations
Geospatial_Data_Presentation_Form: document
Source_Scale_Denominator: 40000
Type_of_Source_Media: stable-base material
Source_Time_Period_of_Content:
Source_Currentness_Reference: ground condition on aerial imagery date
Source_Citation_Abbreviation: OVERLAY
Source_Contribution:
Wetland delineation overlay for aerial photos. Used to create wetland digital files and for attributing wetlands.
Source_Information:
Source_Citation:
Citation_Information:

Originator: USGS
Title: National Aerial Photography Program (NAPP)
Geospatial_Data_Presentation_Form: remote-sensing image
Other_Citation_Details:
9" x 9" color infrared vertical aerial photographic transparencies.
Source_Scale_Denominator: 40000
Type_of_Source_Media: transparency
Source_Time_Period_of_Content:
Time_Period_Information:
Multiple_Dates/Times:
Single_Date/Time:
Calendar_Date: 19940514
Single_Date/Time:
Calendar_Date: 19950507
Single_Date/Time:
Calendar_Date: 19970508
Source_Currentness_Reference: ground condition
Source_Citation_Abbreviation: PHOTOS
Source_Contribution:
Color infrared aerial photos used for wetland delineations. Wetland overlays were retained on imagery for geocorrection and extraction of wetland boundaries to shapefiles.
Source_Information:
Source_Citation:
Citation_Information:
Originator: NYS Adirondack Park Agency
Title: 7.5' Quadrangle Index
Geospatial_Data_Presentation_Form: vector digital data
Online_Linkage: <http://www.apa.state.ny.us/gis/shared/htmlpages/data.html#wetl>
Source_Scale_Denominator: 24000
Type_of_Source_Media: disc
Source_Citation_Abbreviation: QUADS
Source_Contribution:
7.5' quadrangle boundaries used to subset study area for wetland data creation, editing, and attribution.
Source_Information:
Source_Citation:
Citation_Information:
Originator: NYS Adirondack Park Agency
Title: Wetlands mapped within the study area during previous projects
Other_Citation_Details:
Wetlands for seven quadrangles in the study area were delineated and transferred to digital files in previous projects. Wilmington was done in the AuSable-Boquet River Watershed project and the other six (Debar Mountain, Brandon, St. Regis, Gabriels, Derrick, and Upper Saranac) were completed for the St. Regis (St. Lawrence I) Watershed project. Please refer to the project metadata for these watershed for the delineation and transfer protocols.

Source_Scale_Denominator: 24000
Type_of_Source_Media: disc
Source_Citation_Abbreviation: CHAMP_WTL
Source_Contribution:
Wetlands delineations and labels for the Debar Mountain, Brandon, St. Regis, Gavriels, Derrick, Upper Saranac, and Wilmington quadrangles.
Process_Step:
Process_Description:
Corlor infrared aerial photo transparenceis with acetate wetland delineation overlays and their stereo pairs were scanned at 2000 dpi.
Source_Used_Citation_Abbreviation: PHOTO
Source_Produced_Citation_Abbreviation: PHOTO-SCAN
Process_Contact:
Contact_Information:
Contact_Person_Primary:
Contact_Person: Eileen B. Allen
Contact_Address:
Address_Type: mailing and physical address
Address: Center for Earth & Environmental Science, 101 Broad Street
City: Plattsburgh
State_or_Province: NY
Postal_Code: 12901
Country: USA
Process_Step:
Process_Description:
Aerial photos with wetland delineation overlays and their stereo pairs were geocorrected using ArcGIS and the ERDAS Image Analysis extension
Source_Used_Citation_Abbreviation: PHOTO-SCAN, ORTHOS, DEM, CAMERA
Source_Produced_Citation_Abbreviation: PHOTO-GEOREF
Process_Contact:
Contact_Information:
Contact_Person_Primary:
Contact_Person: Eileen B. Allen
Process_Step:
Process_Description:
Extract wetland delineations from aerial photo overlays into line shapefiles using ArcGIS and ERDAS Stereo Analyst extension. Work was done using geocorrected stereo air photos with Stereographics Crystal Eyes3 and E-2 emmitter.
Source_Used_Citation_Abbreviation: PHOTO-GEOREF, ORTHOS, DEM
Source_Produced_Citation_Abbreviation: WTL-SHP
Process_Step:
Process_Description:
Merge individual photo line shapefiles into a study area-wide coverage. Add quadrangle boundaries and outer watershed boundary. Clean with 1.219 fuzzy tolerance and 0.00 dangle tolerance into a polygon and arc ArcInfo coverage.
Source_Used_Citation_Abbreviation: WTL-SHP, OUTER, QUADS

Source_Produced_Citation_Abbreviation: WTL-COV
Process_Step:
Process_Description:
Extract 7.5' quadrangle areas from WTL-COV for labeling and editing purposes. Edit coverage to ensure closed polygons and delete extraneous dangles. Roughly georeference the wetland delineation overlay from the aerial photos and use as a backdrop to label arcs and polygons using a customized screen menu. Concatenate SYSTEM, CLASS1, CLASS2, REGIME, SPECIAL1, SPECIAL2, and SPECIAL3 into NWILABEL using ArcInfo Info for both arcs and label points. BUILD coverages.
Source_Used_Citation_Abbreviation: WTL-COV, OVERLAY
Source_Produced_Citation_Abbreviation: WTL-COV-LAB
Process_Step:
Process_Description:
Merge individual quadrangle coverages into a unified wetland coverage for the study area. Check adjoining quadrangle boundaries and ensure that wetland delineations and labels match across boundaries and then remove quadrangle boundary arcs. List all arc and polygon wetland labels to check for unlabeled polygons and either illegal or illogical wetland labels. Visually examine the wetland coverages in ArcMap to discover wetland spatial and attribute problems. Examine coverages for adjoining wetlands with the same NWI label but without an intervening labeled arc. Peruse wetland coverage over orthophotos (SID format in ArcGIS, convert SID files into merged IMG files for ArcInfo) at a scale of 1:5000 and correct spatial errors to ensure reasonable delineations at a scale of 1:24000. Make any edit changes in ArcInfo with ArcTools edit tools and a customized on-screen attribute menu. BUILD or CLEAN as needed.
Source_Used_Citation_Abbreviation: WTL-COV-LAB, ORTHOS, CHAMP_WTL
Source_Produced_Citation_Abbreviation: WTL-FINAL
Process_Step:
Process_Description: Metadata imported.
Source_Used_Citation_Abbreviation:
J:\SAR_CHAMP_FINAL\Wetlands\lchamplgeowtl\metadata.xml
Process_Date: 20101011
Process_Time: 11121800
Cloud_Cover: 0%

Spatial_Data_Organization_Information:
Indirect_Spatial_Reference:
Wetlands are defined as polygons identified by a software-placed label point or as an arc labeled with a wetland cover type. Some arcs and polygons represent boundaries imposed by the study area boundary and therefore do not represent true feature boundaries. All non-wetland polygons possess a U SYSTEM and NWILABEL. All non-wetland arcs possess a blank cover type label.
Direct_Spatial_Reference_Method: Vector
Point_and_Vector_Object_Information:
SDTS_Terms_Description:
SDTS_Point_and_Vector_Object_Type: Complete chain
Point_and_Vector_Object_Count: 28473

SDTS_Terms_Description:
SDTS_Point_and_Vector_Object_Type: Label point
Point_and_Vector_Object_Count: 10828
SDTS_Terms_Description:
SDTS_Point_and_Vector_Object_Type: GT-polygon composed of chains
Point_and_Vector_Object_Count: 10828
SDTS_Terms_Description:
SDTS_Point_and_Vector_Object_Type: Point
Point_and_Vector_Object_Count: 0

Spatial_Reference_Information:
Horizontal_Coordinate_System_Definition:
Planar:
Grid_Coordinate_System:
Grid_Coordinate_System_Name: Universal Transverse Mercator
Universal_Transverse_Mercator:
UTM_Zone_Number: 18
Transverse_Mercator:
Scale_Factor_at_Central_Meridian: 0.999600
Longitude_of_Central_Meridian: -75.000000
Latitude_of_Projection_Origin: 0.000000
False_Easting: 500000.000000
False_Northing: 0.000000
Planar_Coordinate_Information:
Planar_Coordinate_Encoding_Method: coordinate pair
Coordinate_Representation:
Abscissa_Resolution: 0.000000
Ordinate_Resolution: 0.000000
Planar_Distance_Units: meters
Geodetic_Model:
Horizontal_Datum_Name: North American Datum of 1983
Ellipsoid_Name: Geodetic Reference System 80
Semi-major_Axis: 6378137.000000
Denominator_of_Flattening_Ratio: 298.257222

Entity_and_Attribute_Information:
Detailed_Description:
Entity_Type:
Entity_Type_Label: sarchazywtl.aat
Entity_Type_Definition: Arc attribute table
Entity_Type_Definition_Source: ArcInfo
Attribute:
Attribute_Label: FID
Attribute_Definition: Internal feature number.
Attribute_Definition_Source: ESRI
Attribute_Domain_Values:

Unrepresentable_Domain:
Sequential unique whole numbers that are automatically generated.
Attribute:
Attribute_Label: Shape
Attribute_Definition: Feature geometry.
Attribute_Definition_Source: ESRI
Attribute_Domain_Values:
Unrepresentable_Domain: Coordinates defining the features.
Attribute:
Attribute_Label: FNODE#
Attribute_Definition: Internal node number for the beginning of an arc (from-node).
Attribute_Definition_Source: ESRI
Attribute_Domain_Values:
Unrepresentable_Domain: Whole numbers that are automatically generated.
Attribute:
Attribute_Label: TNODE#
Attribute_Definition: Internal node number for the end of an arc (to-node).
Attribute_Definition_Source: ESRI
Attribute_Domain_Values:
Unrepresentable_Domain: Whole numbers that are automatically generated.
Attribute:
Attribute_Label: LPOLY#
Attribute_Definition: Internal node number for the left polygon.
Attribute_Definition_Source: ESRI
Attribute_Domain_Values:
Unrepresentable_Domain: Whole numbers that are automatically generated.
Attribute:
Attribute_Label: RPOLY#
Attribute_Definition: Internal node number for the right polygon.
Attribute_Definition_Source: ESRI
Attribute_Domain_Values:
Unrepresentable_Domain: Whole numbers that are automatically generated.
Attribute:
Attribute_Label: LENGTH
Attribute_Definition: Length of feature in internal units.
Attribute_Definition_Source: ESRI
Attribute_Domain_Values:
Unrepresentable_Domain: Positive real numbers that are automatically generated.
Attribute:
Attribute_Label: SARCHAZYWTL#
Attribute_Definition: Internal feature number.
Attribute_Definition_Source: ESRI
Attribute_Domain_Values:
Unrepresentable_Domain:
Sequential unique whole numbers that are automatically generated.
Attribute:

Attribute_Label: SARCHAZYWTL-ID
Attribute_Definition: User-defined feature number.
Attribute_Definition_Source: ESRI
Attribute:
Attribute_Label: ARCVALUE
Attribute_Definition:
Value (5) to uniquely the identify the Saranac River/Chazy river watershed (study area boundary). Linear wetlands and wetland polygon boundaries are given a value of 6.
Attribute_Definition_Source: user-defined
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: P
Enumerated_Domain_Value_Definition:
Palustrine habitat, non-tidal, less than 8 hectares (20 acres) and less than 2 meters deep
Enumerated_Domain:
Enumerated_Domain_Value: R2
Enumerated_Domain_Value_Definition: Lower perennial riverine
Enumerated_Domain:
Enumerated_Domain_Value: R3
Enumerated_Domain_Value_Definition: Upper perennial riverine
Enumerated_Domain:
Enumerated_Domain_Value: R4
Enumerated_Domain_Value_Definition: Intermittent riverine
Enumerated_Domain:
Enumerated_Domain_Value: U
Enumerated_Domain_Value_Definition: Upland
Attribute_Value_Accuracy_Information:
Attribute_Measurement_Frequency: As needed
Attribute:
Attribute_Label: SYSTEM
Attribute_Definition:
Complex of wetlands and deepwater habitats that share the influence of similar hydrologic, geomorphologic, chemical, or biological factors. This parameter is mandatory for all linear wetlands in the study area.
Attribute_Definition_Source: Cowardin et al 1979
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: P
Enumerated_Domain_Value_Definition:
Palustrine habitat, non-tidal, less than 8 hectares (20 acres) and less than 2 meters deep
Enumerated_Domain:
Enumerated_Domain_Value: R2
Enumerated_Domain_Value_Definition: Lower perennial riverine
Enumerated_Domain:
Enumerated_Domain_Value: R3
Enumerated_Domain_Value_Definition: Upper perennial riverine

Enumerated_Domain:
Enumerated_Domain_Value: R4
Enumerated_Domain_Value_Definition: Intermittent riverine
Attribute_Value_Accuracy_Information:
Attribute_Value_Accuracy_Explanation: Attributes derived from photointerpretation techniques.
Attribute_Measurement_Frequency: As needed
Attribute:
Attribute_Label: CLASS1
Attribute_Definition:
General appearance of the habitat in terms of either the dominant life form of the vegetation or the physiography and composition of the substrate. Covers at least 30% of the substrate. A value in this column is mandatory for all linear wetlands.
Attribute_Definition_Source: Cowardin et al 1979
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: EM1
Enumerated_Domain_Value_Definition: Persistent emergent
Enumerated_Domain:
Enumerated_Domain_Value: FO1
Enumerated_Domain_Value_Definition: Forested, broad-leaved deciduous
Enumerated_Domain:
Enumerated_Domain_Value: FO4
Enumerated_Domain_Value_Definition: Forested, evergreen
Enumerated_Domain:
Enumerated_Domain_Value: OW
Enumerated_Domain_Value_Definition: Open water
Enumerated_Domain:
Enumerated_Domain_Value: SB3
Enumerated_Domain_Value_Definition: Stream bed, cobble/gravel
Enumerated_Domain:
Enumerated_Domain_Value: SS1
Enumerated_Domain_Value_Definition: Scrub/shrub (shorter than 6 meters), broad-leaved deciduous
Enumerated_Domain:
Enumerated_Domain_Value: SS3
Enumerated_Domain_Value_Definition: Scrub/shrub (shorter than 6 meters), Broad-leaved evergreen
Enumerated_Domain:
Enumerated_Domain_Value: SS4
Enumerated_Domain_Value_Definition: Scrub/shrub (shorter than 6 meters), Needle-leaved evergreen
Attribute_Value_Accuracy_Information:
Attribute_Value_Accuracy_Explanation: Attributes derived from photointerpretation techniques.
Attribute_Measurement_Frequency: As needed

Attribute:
Attribute_Label: CLASS2
Attribute_Definition:
General appearance of the habitat in terms of either the dominant life form of the vegetation or the physiography and composition of the substrate. Covers at least 30% of the substrate. Life form must be the same or lower in height than CLASS1. If the same general life form as CLASS1 (ex. FO), CLASS2 has equal or less areal extent. A value in this column is not mandatory.
Attribute_Definition_Source: Cowardin et al 1979
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: /EM1
Enumerated_Domain_Value_Definition: Emergent, Persistent
Enumerated_Domain:
Enumerated_Domain_Value: /OW
Enumerated_Domain_Value_Definition: Open Water
Enumerated_Domain:
Enumerated_Domain_Value: /SS1
Enumerated_Domain_Value_Definition: Scrub/shrub (shorter than 6 meters), Broad-leaved deciduous
Enumerated_Domain:
Enumerated_Domain_Value: /SS4
Enumerated_Domain_Value_Definition: Scrub/shrub (shorter than 6 meters), Needle-leaved deciduous
Attribute_Value_Accuracy_Information:
Attribute_Value_Accuracy_Explanation: Attributes derived from photointerpretation techniques.
Attribute_Measurement_Frequency: As needed
Attribute:
Attribute_Label: REGIME
Attribute_Definition:
The water regime modifier describes the hydrologic characteristics of the community. Only non-tidal regimes were used in the Adirondacks. A value in this column is mandatory for all linear wetlands.
Attribute_Definition_Source: Cowardin et al 1979
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: B
Enumerated_Domain_Value_Definition: Saturated
Enumerated_Domain:
Enumerated_Domain_Value: E
Enumerated_Domain_Value_Definition: Seasonally flooded, saturated
Enumerated_Domain:
Enumerated_Domain_Value: F
Enumerated_Domain_Value_Definition: Semipermanent
Enumerated_Domain:

Enumerated_Domain_Value: H
Enumerated_Domain_Value_Definition: Permanent
Attribute_Value_Accuracy_Information:
Attribute_Value_Accuracy_Explanation: Attributes derived from photointerpretation techniques.
Attribute_Measurement_Frequency: As needed
Attribute:
Attribute_Label: SPECIAL1
Attribute_Definition:
Special modifiers are used to denote man-made or beaver modifications to the habitat. Optional parameter.
Attribute_Definition_Source: Cowardin et al 1979
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: b
Enumerated_Domain_Value_Definition: Beaver
Enumerated_Domain:
Enumerated_Domain_Value: d
Enumerated_Domain_Value_Definition: Partially drained/Ditched
Enumerated_Domain:
Enumerated_Domain_Value: f
Enumerated_Domain_Value_Definition: Farmed
Attribute_Value_Accuracy_Information:
Attribute_Value_Accuracy_Explanation: Attributes derived from photointerpretation techniques.
Attribute_Measurement_Frequency: As needed
Attribute:
Attribute_Label: SPECIAL2
Attribute_Definition:
Special modifiers are used to denote man-made or beaver modifications to the habitat. Optional parameter.
Attribute_Definition_Source: Cowardin et al 1979
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: f
Enumerated_Domain_Value_Definition: Farmed
Attribute:
Attribute_Label: SPECIAL3
Attribute_Definition:
Special modifiers are used to denote man-made or beaver modifications to the habitat. Optional parameter.
Attribute_Definition_Source: Cowardin et al 1979
Attribute_Domain_Values:
Enumerated_Domain:
Attribute_Value_Accuracy_Information:

Attribute_Value_Accuracy_Explanation: Attributes derived from photointerpretation techniques.
Attribute_Measurement_Frequency: As needed
Attribute:
Attribute_Label: NWILABEL
Attribute_Definition:
Unified label of SYSTEM, CLASS1, CLASS2, REGIME, SPECIAL1, SPECIAL2, and SPECIAL3. See the definitions of the individual components. This attribute is considered the NWI wetland label. Mandatory parameter for all linear wetlands within the study area, including linear uplands.
Attribute_Definition_Source: Cowardin et al 1979
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: see component values
Beginning_Date_of_Attribute_Values: 19940504
Ending_Date_of_Attribute_Values: 19970508
Attribute_Value_Accuracy_Information:
Attribute_Value_Accuracy_Explanation: Attributes derived from photointerpretation techniques.
Detailed_Description:
Entity_Type:
Entity_Type_Label: sarchazywtl.pat
Entity_Type_Definition: Polygon attribute table
Entity_Type_Definition_Source: ArcInfo
Attribute:
Attribute_Label: FID
Attribute_Definition: Internal feature number.
Attribute_Definition_Source: ESRI
Attribute_Domain_Values:
Unrepresentable_Domain:
Sequential unique whole numbers that are automatically generated.
Attribute_Measurement_Frequency: As needed
Attribute:
Attribute_Label: Shape
Attribute_Definition: Feature geometry.
Attribute_Definition_Source: ESRI
Attribute_Domain_Values:
Unrepresentable_Domain: Coordinates defining the features.
Attribute_Measurement_Frequency: As needed
Attribute:
Attribute_Label: AREA
Attribute_Definition: Area of feature in internal units squared.
Attribute_Definition_Source: ESRI
Attribute_Domain_Values:
Unrepresentable_Domain: Positive real numbers that are automatically generated.
Beginning_Date_of_Attribute_Values: 1994 (imagery date)

Ending_Date_of_Attribute_Values: 1995 (imagery date)
Attribute_Measurement_Frequency: As needed
Attribute:
Attribute_Label: PERIMETER
Attribute_Definition: Perimeter of feature in internal units.
Attribute_Definition_Source: ESRI
Attribute_Domain_Values:
Unrepresentable_Domain: Positive real numbers that are automatically generated.
Beginning_Date_of_Attribute_Values: 1994 (imagery date)
Ending_Date_of_Attribute_Values: 1995 (imagery date)
Attribute_Measurement_Frequency: As needed
Attribute:
Attribute_Label: SARCHAZYWTL#
Attribute_Definition: Internal feature number.
Attribute_Definition_Source: ESRI
Attribute_Domain_Values:
Unrepresentable_Domain:
Sequential unique whole numbers that are automatically generated.
Attribute:
Attribute_Label: SARCHAZYWTL-ID
Attribute_Definition: User-defined feature number.
Attribute_Definition_Source: ESRI
Attribute_Measurement_Frequency: As needed
Attribute:
Attribute_Label: SYSTEM
Attribute_Definition:
Complex of wetlands and deepwater habitats that share the influence of similar hydrologic, geomorphologic, chemical, or biological factors. This parameter is mandatory for all polygons in the study area.
Attribute_Definition_Source: Cowardin et al 1979
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: L1
Enumerated_Domain_Value_Definition:
Lacustrine limnetic habitat, greater than 8 hectares (20 acres) and more than 2 meters deep
Enumerated_Domain_Value_Definition_Source: Cowardin et al 1979
Enumerated_Domain:
Enumerated_Domain_Value: P
Enumerated_Domain_Value_Definition:
Palustrine habitat, non-tidal, less than 8 hectares (20 acres) and less than 2 meters deep
Enumerated_Domain:
Enumerated_Domain_Value: R2
Enumerated_Domain_Value_Definition: Lower perennial riverine
Enumerated_Domain:
Enumerated_Domain_Value: R3
Enumerated_Domain_Value_Definition: Upper perennial riverine

Enumerated_Domain:
Enumerated_Domain_Value: U
Enumerated_Domain_Value_Definition: Upland
Attribute_Value_Accuracy_Information:
Attribute_Value_Accuracy_Explanation: Attributes derived from photointerpretation
Attribute_Measurement_Frequency: As needed
Attribute:
Attribute_Label: CLASS1
Attribute_Definition:
General appearance of the habitat in terms of either the dominant life form of the vegetation or the physiography and composition of the substrate. Covers at least 30% of the substrate. A value in this column is mandatory for all linear wetlands.
Attribute_Definition_Source: Cowardin et al 1979
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: EM1
Enumerated_Domain_Value_Definition: Persistent emergent
Enumerated_Domain:
Enumerated_Domain_Value: FO1
Enumerated_Domain_Value_Definition: Forested, broad-leaved deciduous
Enumerated_Domain:
Enumerated_Domain_Value: FO2
Enumerated_Domain_Value_Definition: Forested, needle-leaved deciduous
Enumerated_Domain:
Enumerated_Domain_Value: FO4
Enumerated_Domain_Value_Definition: Forested, evergreen
Enumerated_Domain:
Enumerated_Domain_Value: FO5
Enumerated_Domain_Value_Definition: Forested, dead
Enumerated_Domain:
Enumerated_Domain_Value: OW
Enumerated_Domain_Value_Definition: Open water
Enumerated_Domain:
Enumerated_Domain_Value: SS1
Enumerated_Domain_Value_Definition: Scrub/shrub (shorter than 6 meters), broad-leaved deciduous
Enumerated_Domain:
Enumerated_Domain_Value: SS2
Enumerated_Domain_Value_Definition: Scrub/shrub (shorter than 6 meters), broad-leaved evergreen
Enumerated_Domain:
Enumerated_Domain_Value: SS3
Enumerated_Domain_Value_Definition: Scrub/shrub (shorter than 6 meters), broad-leaved evergreen
Enumerated_Domain:
Enumerated_Domain_Value: SS4

Enumerated_Domain_Value_Definition: Scrub/shrub (shorter than 6 meters), needle-leaved evergreen
Enumerated_Domain:
Enumerated_Domain_Value: SS5
Enumerated_Domain_Value_Definition: Scrub/shrub (shorter than 6 meters), dead
Attribute_Value_Accuracy_Information:
Attribute_Value_Accuracy_Explanation: Attributes derived from photointerpretation techniques.
Attribute:
Attribute_Label: CLASS2
Attribute_Definition:
General appearance of the habitat in terms of either the dominant life form of the vegetation or the physiography and composition of the substrate. Covers at least 30% of the substrate. Life form must be the same or lower in height than CLASS1. If the same general life form as CLASS1 (ex. FO), CLASS2 has equal or less areal extent. A value in this column is not mandatory.
Attribute_Definition_Source: Cowardin et al 1979
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: /EM1
Enumerated_Domain_Value_Definition: Persistent emergent
Enumerated_Domain:
Enumerated_Domain_Value: /FO1
Enumerated_Domain_Value_Definition: Forested, broad-leaved deciduous
Enumerated_Domain:
Enumerated_Domain_Value: /FO2
Enumerated_Domain_Value_Definition: Forested, needle-leaved deciduous
Enumerated_Domain:
Enumerated_Domain_Value: /FO4
Enumerated_Domain_Value_Definition: Forested, evergreen
Enumerated_Domain:
Enumerated_Domain_Value: /FO5
Enumerated_Domain_Value_Definition: Forested, dead
Enumerated_Domain:
Enumerated_Domain_Value: /OW
Enumerated_Domain_Value_Definition: Open water
Enumerated_Domain:
Enumerated_Domain_Value: /SS1
Enumerated_Domain_Value_Definition: Scrub/shrub (shorter than 6 meters), broad-leaved deciduous
Enumerated_Domain:
Enumerated_Domain_Value: /SS2
Enumerated_Domain_Value_Definition: Scrub/shrub (shorter than 6 meters), needle-leaved deciduous
Enumerated_Domain:
Enumerated_Domain_Value: /SS3

Enumerated_Domain_Value_Definition: Scrub/shrub (shorter than 6 meters), broad-leaved evergreen
Enumerated_Domain:
Enumerated_Domain_Value: /SS4
Enumerated_Domain_Value_Definition: Scrub/shrub (shorter than 6 meters), needle-leaved evergreen
Enumerated_Domain:
Enumerated_Domain_Value: /SS5
Enumerated_Domain_Value_Definition: Scrub/shrub (shorter than 6 meters), dead
Attribute_Value_Accuracy_Information:
Attribute_Value_Accuracy_Explanation: Attributes derived from photointerpretation techniques.
Attribute_Measurement_Frequency: As needed
Attribute:
Attribute_Label: REGIME
Attribute_Definition:
The water regime modifier describes the hydrologic characteristics of the community. Only non-tidal regimes were used in the Adirondacks. A value in this column is mandatory for all wetland polygons.
Attribute_Definition_Source: Cowardin et al 1979
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: A
Enumerated_Domain_Value_Definition: Temporary
Enumerated_Domain:
Enumerated_Domain_Value: B
Enumerated_Domain_Value_Definition: Saturated
Enumerated_Domain:
Enumerated_Domain_Value: D
Enumerated_Domain_Value_Definition: Seasonally flooded - well drained
Enumerated_Domain:
Enumerated_Domain_Value: E
Enumerated_Domain_Value_Definition: Seasonally flooded - saturated
Enumerated_Domain:
Enumerated_Domain_Value: F
Enumerated_Domain_Value_Definition: Semipermanent
Enumerated_Domain:
Enumerated_Domain_Value: H
Enumerated_Domain_Value_Definition: Permanent
Attribute_Value_Accuracy_Information:
Attribute_Value_Accuracy_Explanation: Attributes derived from photointerpretation techniques.
Attribute_Measurement_Frequency: As needed
Attribute:
Attribute_Label: SPECIAL1
Attribute_Definition:

Special modifiers are used to denote man-made or beaver modifications to the habitat. Optional parameter.
Attribute_Definition_Source: Cowardin et al 1979
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: b
Enumerated_Domain_Value_Definition: Beaver
Enumerated_Domain:
Enumerated_Domain_Value: d
Enumerated_Domain_Value_Definition: Partially drained, ditched
Enumerated_Domain:
Enumerated_Domain_Value: f
Enumerated_Domain_Value_Definition: Farmed
Enumerated_Domain:
Enumerated_Domain_Value: h
Enumerated_Domain_Value_Definition: Diked/impounded
Enumerated_Domain:
Enumerated_Domain_Value: q
Enumerated_Domain_Value_Definition:
Special modifier developed for the AuSable-Boquet project, denotes upland areas that may be suitable for wetland reversion.
Enumerated_Domain:
Enumerated_Domain_Value: r
Enumerated_Domain_Value_Definition: Artificial
Enumerated_Domain:
Enumerated_Domain_Value: s
Enumerated_Domain_Value_Definition: Spoil
Enumerated_Domain:
Enumerated_Domain_Value: x
Enumerated_Domain_Value_Definition: Excavated
Enumerated_Domain:
Enumerated_Domain_Value: /U
Enumerated_Domain_Value_Definition:
Upland. Used in mixed upland/wetland habitats too homogeneous for separate delineations. Although this designation is not an official Cowardin et al. definition, it is in use by various NWI offices and was suggested for use in a previous project by Ralph W. Tiner, Jr., U.S. Fish and Wildlife Service.
Attribute_Value_Accuracy_Information:
Attribute_Value_Accuracy_Explanation: Attributes derived from photointerpretation techniques.
Attribute_Measurement_Frequency: As needed
Attribute:
Attribute_Label: SPECIAL2
Attribute_Definition:
Special modifiers are used to denote man-made or beaver modifications to the habitat. Optional parameter.

Attribute_Definition_Source: Cowardin et al 1979
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: f
Enumerated_Domain_Value_Definition: Farmed
Enumerated_Domain:
Enumerated_Domain_Value: x
Enumerated_Domain_Value_Definition: Excavated
Attribute_Value_Accuracy_Information:
Attribute_Value_Accuracy_Explanation: Attributes derived from photointerpretation techniques.
Attribute_Measurement_Frequency: As needed
Attribute:
Attribute_Label: SPECIAL3
Attribute_Definition:
Special modifiers are used to denote man-made or beaver modifications to the habitat. Optional parameter.
Attribute_Definition_Source: Cowardin et al 1979
Attribute_Domain_Values:
Attribute_Value_Accuracy_Information:
Attribute_Value_Accuracy_Explanation: Attributes derived from photointerpretation techniques.
Attribute_Measurement_Frequency: As needed
Attribute:
Attribute_Label: NWILABEL
Attribute_Definition:
Unified label of SYSTEM, CLASS1, CLASS2, REGIME, SPECIAL1, SPECIAL2, and SPECIAL3. See the definitions of the individual components. This attribute is considered the NWI wetland label. Mandatory parameter for all polygons within the study area, including upland polygons.
Attribute_Definition_Source: Cowardin et al 1979
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: see component values
Beginning_Date_of_Attribute_Values: 19940504
Ending_Date_of_Attribute_Values: 19970508
Attribute_Value_Accuracy_Information:
Attribute_Value_Accuracy_Explanation: Attributes derived from photointerpretation techniques.
Attribute_Measurement_Frequency: As needed

Distribution_Information:
Distributor:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: NYS Adirondack Park Agency

Contact_Person: Daniel M. Spada
Contact_Position: Supervisor Natural Resource Analysis
Contact_Voice_Telephone: (518) 891-4050
Contact_Facsimile_Telephone: (518) 891-3938
Contact_Electronic_Mail_Address: dmspada@gw.dec.state.ny.us
Resource_Description:
Downloadable Data, may be available on other media such as CD. Wetlands in the Saranac River/Chazy River basins.
Distribution_Liability:
Although these data have been processed successfully on a computer system at the NYS APA, no warranty expressed or implied is made regarding the accuracy or utility of the data on any other system or for general or scientific purposes, nor shall the act of distribution constitute any such warranty. This disclaimer applies both to individual use of the data and aggregate use with other data. It is strongly recommended that these data be directly acquired from the NYS APA, and not indirectly through other sources which may have changed the data in some way. It is also strongly recommended that careful attention be paid to the contents of the metadata file associated with these data. The NYS APA shall not be held liable for improper or incorrect use of the data described and/or contained herein. These data shall not be used for legal jurisdictional determinations.
Standard_Order_Process:
Digital_Form:
Digital_Transfer_Information:
Format_Name: ARCE
Format_Version_Number: ArcInfo 9.3.1
File_Decompression_Technique: no compression applied
Transfer_Size: 11.548
Technical_Prerequisites:
These data were created in ESRI's ArcGIS 9.3.1 ArcInfo coverage format.

Metadata_Reference_Information:
Metadata_Date: 20101011
Metadata_Contact:
Contact_Information:
Contact_Person_Primary:
Contact_Person: Eileen B. Allen
Contact_Organization: State University of NY at Plattsburgh, GIS Laboratory
Contact_Position: GIS Coordinator
Contact_Address:
Address_Type: mailing address
Address: Center for Earth & Environmental Science
Address: State University of NY at Plattsburgh
Address: 101 Broad Street
City: Plattsburgh
State_or_Province: NY
Postal_Code: 12901
Contact_Voice_Telephone: (518) 564-2020

Contact_Facsimile_Telephone: (518) 564-5267
Contact_Electronic_Mail_Address: eileen.allen@plattsburgh.edu
Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata
Metadata_Standard_Version: FGDC-STD-001-1998
Metadata_Time_Convention: local time
Metadata_Security_Information:
Metadata_Security_Classification_System: none
Metadata_Security_Classification: Unclassified
Metadata_Security_Handling_Description: none
Metadata_Extensions:
Online_Linkage: <http://www.esri.com/metadata/esriprof80.html>
Profile_Name: ESRI Metadata Profile

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Appendix H. Adirondack Park Agency Permit Compliance Monitoring Manual.

Adirondack Park Agency
Permit Compliance Monitoring Manual

INTRODUCTION

The Adirondack Park Agency (APA) was awarded an Environmental Protection Agency (EPA) grant (#WL-97267806-0) in the fall of 2006. Two of the grant's objectives involved the creation of a program to document compliance with APA permits.

This document describes the development of APA's permit compliance monitoring program, the methodology created to implement the program and documentation protocol devised to share the program's findings with APA staff. The grant provided funding for contractors to manage the program through the end of 2010. This document stands as a record of the project, and as a manual to guide continuation of the program.

STATUTORY AND REGULATORY ENFORCEMENT AUTHORITY

The APA is a regulatory agency charged with administering the New York State Adirondack Park Agency Act (ECL Article 27, the Wild, Scenic and Recreational Rivers System Act (ECL Article 15), and the NYS Freshwater Wetlands Act (ECL Article 24) within the Adirondack Park.

The purpose of the Adirondack Park Agency Act (APA Act, the Act) is to "insure optimum overall conservation, protection, preservation, development and use of the unique scenic, aesthetic, wildlife, recreational, open space, historic, ecological and natural resources of the Adirondack Park." Towards this end, the Act establishes use restrictions for private lands within the six-million-acre Adirondack Park, regulated through a permitting program. Failure to obtain necessary Agency permits under these laws, or to undertake a project pursuant to the terms and conditions of an issued permit, constitutes a violation.

Effective enforcement of the Agency's laws, regulations, permits and orders is fundamental to the fulfillment of the Agency's statutory mandate to protect the natural resources of the Park. The guidelines described herein establish a formalized approach for permit compliance monitoring as directed by the APA Act. Additional guidelines may be adopted by other internal divisions, including Legal, Resource Analysis and Scientific Services, Planning, and Regulatory Programs.

PERMIT COMPLIANCE MONITORING PROGRAM OBJECTIVES

The intent of this project was to create a system to track the protection of resources in the Adirondack Park by documenting compliance with permit conditions issued by the Agency. The following objectives are taken from the grant proposal:

- **Develop and implement a permit compliance monitoring program.**

Prior to this project, compliance inspections on Adirondack Park Agency permits were conducted primarily by Agency project review staff on an *ad hoc* basis. Burdened by a heavy workload of incoming permit applications, inspections were frequently neglected. This project formalizes an Adirondack Park Agency permit compliance program and adopts a methodology to inspect undertaken projects in a timely manner following permit issuance, offer assistance to permit holders as projects enter the construction phase and compile data based on inspection findings.

- **Expand the Adirondack Park Agency's existing wetland, protection and enforcement tracking system.**

Permit compliance data has been added to the Agency's Master Action Database (MAD) and Look-Up System (LUS). A compliance interface in the MAD was designed to manage compliance inspection work flow, maintain notes related to site visits and advise as to future action necessary for given projects. All site visits are logged in the LUS, an easy to use spatial tracking system.

WORKING WITH LANDOWNERS

The permit compliance monitoring program is designed to create positive relationships with permit holders. Prior to this program, permit issuance was often the last formal contact the Agency had with many permit holders. This program provides an additional point of contact as projects enter the construction phase, to ensure understanding of permit conditions, answer questions, and avoid inadvertent violations. The APA permitting process can be difficult to navigate. The compliance program offers permit holders an accomplished sense of closure, knowing they've successfully completed the process and that the APA has record of the final product.

The additional contact also provides an educational outreach opportunity. It is critical that permit holders understand the reasons for permit restrictions pertaining to their projects and don't see the Agency as simply another regulatory hurdle. If permit holders are to understand, appreciate, and comply with Agency regulations, they must have access to relevant information. Site visits with landowners present are an excellent opportunity to explain permit conditions and how they relate to the resources on their property.

COLLABORATION WITH APA STAFF

The permit compliance program is designed to be integrated with existing Agency divisions. Following issuance of a permit, Compliance Monitoring Staff should contact appropriate Agency staff for background information regarding particular projects (see Appendix A. for sample staff contact letter and mailing procedure). Compliance staff should be made aware of any important details prior to contacting permit holders, including time

sensitive project deadlines, peculiar circumstances and sensitive working relationships with permit holders. Upon issuance of a permit, the Environmental Program Specialist (EPS) shall provide the Compliance Monitoring Staff with the conditions of the permit, photographs of the site and recommendations for when the monitoring should be conducted.

Staff conducting permit compliance may, as appropriate, request other willing and approved persons to participate with compliance reviews, including, but not limited to:

- other project review staff;
- RASS staff;
- APA enforcement officers;
- other State agency staff (e.g., DEC, DOT); or
- Municipal government staff (e.g., local code enforcement officers).

Use of other persons should be discussed in advance with the Deputy Director of Regulatory Programs or the staff person's supervisor. However, when other persons conduct the site visit, permit compliance staff remains responsible for collecting data.

DEVELOPING AN APA PERMIT COMPLIANCE PROGRAM

In January, 2007, three independent contractors began the process of development and implementation. Since the project was funded by an EPA grant, the initial permit reviews focused solely on wetland and shoreline permits. It was decided that those permits would enable the Agency to determine compliance trends and amounts of wetland and shoreline that was damaged or loss due to non-compliance.

The historical permit review provided an opportunity to create a workable methodology. In 2008, once the historical permit reviews were complete, the program was expanded to include all newly issued permits for all conditions contained therein.

SELECTION OF HISTORIC PERMITS FOR INITIAL REVIEW

It was decided that permits involving wetlands and shorelines issued between 2000 and 2007 would be reviewed. The MAD was mined for such permits and each permit was skimmed to determine if a compliance check was warranted. Permits which had conditions applicable only during the construction phase of the project (i.e. erosion control) or had no new land use associated were omitted from review.

The historical permits were reviewed to determine wetland compliance rates to fulfill the purposes of the EPA grant. This program was not developed to find new enforcement cases.

All newly issued permits are reviewed for compliance, regardless of their wetland or shoreline status.

INITIATING CONTACT WITH THE PERMIT HOLDER:

Historical Permits

In the case of reviewing historical permits, a certified letter of introduction and purpose should be sent to the current permit holders. Since property may have been conveyed since permit issuance, it is important to check the tax map number for current ownership information and address. An example of an introduction letter can be found in Appendix A.

It is possible that the current landowner is not the person who applied for the permit and thus may not be aware of it. If ownership of the property has changed since the permit was issued, it may be necessary to explain the conditions of the permit to the current owner. The landowner may also need a copy of the permit itself for their records. Do not send electronic copies of the permit, only signed hard copies can be mailed. A site visit should not be arranged until the current owner has had ample opportunity to review the permit.

Newly Issued Permits

Every two months, holders of newly issued permits are contacted by mail by permit compliance staff to inform them of the compliance program, and to offer assistance in understanding permit conditions. Permit holders are asked to respond with project status updates, which in turn are used by the permit compliance staff to compile an appropriate schedule of field visits. Landowners are reminded of the conditions concerning their permit's expiration date and of the need to record the permit in the office of their County Clerk. The two month interval between mailings ensures new permit holders are reminded of recording requirements during the 60 day window allotted to do so.

The mailing preparation procedure is as follows:

- Run a report listing all newly issued permits from the previous two month period, including mailing addresses. Access the "print reports" section in the MAD immediately beneath the "EPA Compliance Monitoring Tab". Click on "address list compliance monitoring", and input the dates of interest when prompted to do so. Highlight all the data in the table that appears. Press "Ctrl+C" to copy the data. Open an Excel worksheet, and press "Ctrl+V" to paste the data in the Excel table.
- Prepare a list for staff review prior to the mailing. (Note: It is a good idea to prepare new Compliance MAD records at this time as well, to avoid repeating the Copy/Paste step).
    - First, be sure the raw data is saved separately.
    - Insert a "Project Description" field. Copy and paste project descriptions from the project section of the MAD.
    - Insert a "PRO" field. Populate with the appropriate staff names.
    - Insert a "Town" field. Populate with the appropriate project locations.
    - Cull the list down to the basics needed for staff review (Permit Number, PRO, Town, First Name, Last Name, Project Determination Date and Project Description). Sort the list by "Title" and remove all entries except "Project Sponsor". To prevent staff confusion there should be just one entry for each permit

number.
    - Sort the new list by PRO and then by permit number, and save the file as "List for Staff Review".
    - Send the list to appropriate staff for their comments on specific projects, project sponsors, etc. (See Appendix B. for "Compliance Mailing Email to Staff")
    - Make note of responses to this email in the Compliance section of the MAD.

- Prepare the mailing.
    - Perform a mail merge in Microsoft Word to extract the addresses from the Excel spreadsheet. Arrange the addresses alphabetically by last name. Print mailing labels and affix to envelopes.
    - Prepare the letter itself (see Appendix A.) using the mail merge to insert address, greeting line and permit number. Again, be sure the addresses are arranged alphabetically by last name (to keep things in order for envelope stuffing).
    - Add CC information to letters where appropriate.
    - Create project description inserts for each letter (see Appendix D. "Project Descriptions Template for Mailing"). These should also be arranged alphabetically by last name.
    - Stuff the envelopes, seal and send.

ARRANGING SITE VISITS:

Following the mailing, site visits should be arranged where necessary. Permit holders will respond to the mailing by phone and email in the two week period after it is sent. During these communications, determine the status of the project and decide if a site visit is warranted. The landowner is not obligated to join permit compliance staff for the site visit, but should be invited. If the landowner does not wish to be present during the site visit they should be notified of the scheduled date if possible. If the landowner refuses to allow permit compliance staff on to the property, the EPS should be notified.

If multiple projects ready for review are located in the same general location, try to arrange site visits and appointments for the same day. This will reduce the need for additional travel.

PREPARING FOR A SITE VISIT:

Carefully read and review the permit and maps prior to the site visit. Any questions should be answered by either the EPS who wrote the permit or another EPS if the original author is not available. The following documentation will be useful to have on hand during the visit:

- Complete copy of the permit and related permit amendments
- Printout of site plan and other relevant plans
- Printout of Lookup System location map (If Lookup map is unavailable, bring maps created on GIS necessary to locate the site)
- MAD entry sheets
- Aerial photos

Prior to the visit, make note of all items in the permit which will require inspection. Be prepared to ask the permit holder about any administrative items that need attention (septic compliance letters, planting plans, etc.)

COMPLIANCE MONITORING REVIEW PROCEDURES:

When meeting with a landowner, be punctual and polite. Ask if they understand the permit conditions. Make a point of explaining the ecological implications of conditions when possible.

Document the site with photographs. Be sure to inspect all relevant aspects of compliance as indicated in the permit. The list below covers many common aspects, but individual permits are project specific and may vary:

- Proper location of development as shown on site plan
- Proper size of development (height, footprint, etc)
- Proper location of septic system (especially in relation to wetlands and shorelines)
- Proper observance of cutting limitations (shoreline cutting, screening, clearing limits, etc.)
- Proper installation of erosion and sedimentation control measures (silt fencing, check dams, etc)
- Proper stabilization of disturbed areas
- Proper stormwater management (according to approved plans, where applicable)
- Adherence to planting plan, vegetative screening measures (if applicable)
- Proper building color
- Verify integrity of wetland areas, shorelines and streambanks

Make a note of any and all items which need attention. If you're with the permit holder, bring these items to his or her attention. Focus on the reasons for the permit conditions, and explain the potential problems that arise from non-compliance. Do not speculate on any corrective actions that may need to be implemented. Tell the landowner that you will follow up after discussing your visit with the EPS who wrote the permit.

If you do not know whether or not a condition is in compliance, take special care to document the site condition in question. It may be possible to make a determination back in the office with additional supporting documentation and/or staff guidance.

Discuss any matters of non-compliance with the appropriate Agency staff. Decide upon necessary follow-up actions, as described below.

All data and photographs collected during a permit compliance monitoring visit should be properly labeled and entered into the appropriate databases as soon as possible.

FOLLOW UP

Project Not Yet Started

- Attempt to pinpoint a project start date; make note of the project status in the MAD; make note of a suggested re-inspection date in the MAD

In Compliance

- If the project is completed and is in compliance, the permit will not need to be monitored again.

Non-compliance

- Bring the documentation from the site visit to the Project Review Officer who wrote the permit (or to the Deputy Director of Regulatory Programs if the original PRO is no longer available). Discuss the matter of non-compliance and possible solutions. Final determination of the next step is to be made by the EPS.

- Possible outcomes of the discussion with the PRO include:

    - Casual resolution through discussion with the permit holder
    - Resolution through permit amendment or letter of compliance
    - Opening of an enforcement case; transfer of the matter to the Enforcement Division

- A letter should be sent to the landowner describing the specific nature of the non-compliance and the procedure required by the APA to bring the project into compliance. This letter may be drafted by contract compliance staff, but it should be signed by the appropriate PRO. Final authority must come from the Agency.

- A violation deemed to be severe may be directed to the Enforcement Division. That decision is to be made by the Regulatory Programs Division. In this case, prepare a packet of information for the Enforcement Division, including:

    - Potential Violation Report form (PVR)
    - Memo describing the Non-Compliance and the background
    - Copy of the permit
    - Copy of photographs and other supporting documentation from the site visit
    - Maps, site plans, etc.

    An enforcement case will be opened, effectively closing the compliance case.

DATA COLLECTION AND ENTRY

The permit compliance monitor is responsible for logging data from site visits into both the Master Action Database (MAD) and the Lookup System (LUS).

The databases designed for this program were determined after reviewing a multitude of permits. The fields chosen for the MAD database are necessary for tracking program status and

needs. More detailed information can be found in the Compliance files and in the EPA drive under individual permit number.

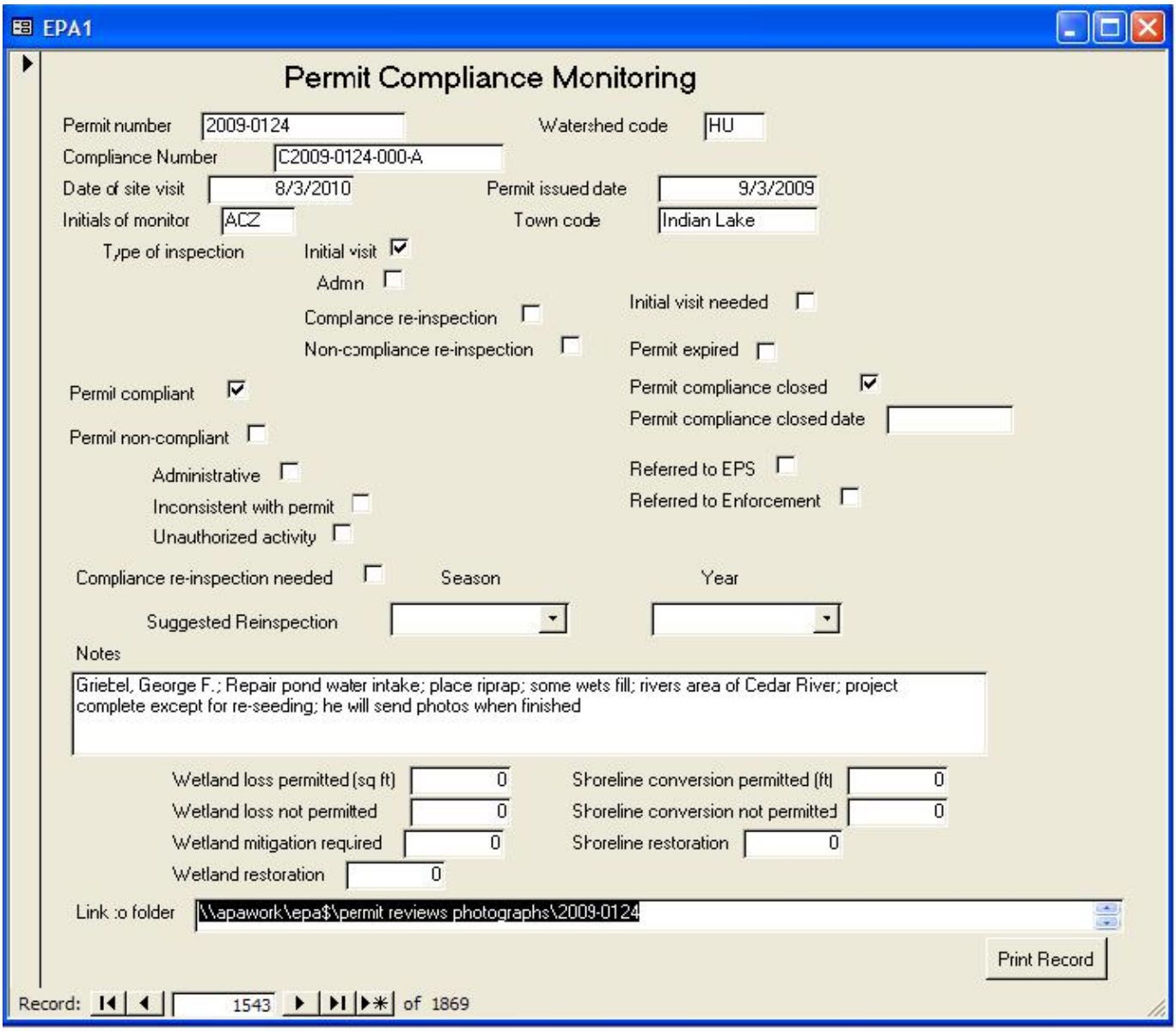
Photographs are taken with digital cameras and those pictures are also linked to the appropriate compliance record. Each permit has been given its own folder with three sub-folders: Compliance Photos, Pre-permit photos, and Documentation. The Documentation folder contains any memos or PVR forms that have resulted from a permit review.

Each permit compliance staffperson needs to keep track of which permits have been reviewed and give that information to whoever is responsible for updating the project section of MAD. They can then check off that a compliance visit has occurred and can add the watershed code to the project record for cross reference.

MAD

The compliance section of the MAD houses data pertaining to all compliance reviews opened and closed. The database offers a convenient method of keeping tabs on open cases, and creating a schedule for upcoming visits.

A new record should be made for each site visit and for each individual lot involving new land use and development in the case of a permit involving a subdivision. A single permit will have multiple records if multiple visits have been made and/or if multiple lots exist on the project site.



MAD Data Entry Conventions

- **Permit Number:** The permit number applicable to the compliance review case. Permit amendments get separate entries (and should be cross referenced to the original permit in the "Notes" section, described below)
- **Watershed Code:** The watershed in which the project is located. This field is helpful for arranging multiple site visits in the same geographical area. This is a two letter code (AB=Ausable/Bouquet, BL=Black, GR=Grasse, HU=Hudson, LG=Lake

George/Lake Champlain, MO=Mohawk, OS=Oswegatchie, RA=Raquette, SA=Sacandaga, SC=Saranac/Chazy, SR=St. Regis, ST=Salmon/Trout).

- **Compliance Number:** This number was created in order to keep track of subdivisions and multiple visits for a single for one permit. The formula used is C+ permit number+lot number +letter tie breaker if necessary. Example: C2000-0001-001-B. The B would indicate that this is the record for a second visit to the project site. The 001 indicates that this is the first lot in the subdivision. C2000-0001-002-B would be the second visit to the second lot in the subdivision. If no lot number is indicated, the project does not involve a subdivision. Example: C2000-0001-000-B.
- **Date of Site Visit:** The date the site visit was made. In the case of administrative reviews, the date the final determination was made. Entered in this format: MM/DD/YYYY
- **Permit Issued Date:** The date of permit issuance. Useful in knowing how long a permit in need of an initial visit has been waiting.
- **Initials of Monitor:** First, middle and last initial, all in CAPS.
- **Town Code:** Type out the full name of the town where the project is located
- **Type of Inspection:**
    - **Initial visit**: This was the first time a staff person was here for the purpose of compliance monitoring.
    - **Admin:** This inspection is administrative in nature, not requiring a site visit. Common examples include projects involving now new land use or development, or simple subdivisions with no building involved. Typically these only require verification that the permit was recorded in a timely manner. Date of inspection should be noted as the date the final determination is made.
    - **Compliance re-inspection**: This is a revisit to this site. Previous visits were inconclusive, perhaps because work was not started or had not been completed. The previous record(s) will have been noted as "Compliant", but will not have been closed.
    - **Non-compliance re-inspection:** This is a revisit to this site. Previous visits showed non-compliant activity requiring corrective actions. The re-visit is made to verify the correction.
- **Initial Visit Needed:** No visit has yet been made to the project site. All entries created at the time of the mailing will be listed as Initial Visit Needed.
- **Permit Expired:** The permit's expiration date has passed without the project having been undertaken. The project may not continue without a new or renewed permit. The current permit holder should be notified and informed of the steps necessary to undertake the project.
- **Permit Compliant:** The compliance review determined the permit holder is currently in compliance with the permit. Further review may still be necessary. (eg, A permit not ye undertaken is in compliance, but must still be reviewed once it is underway or

completed)

- **Permit Non-Compliant:** The permit is not in compliance. If this box is checked, the type of non compliance should also be checked. Typically, non-compliant cases are referred to the PRO who wrote the permit, or are referred to enforcement. While the compliance officer may continue to have a hand in resolution, the compliance case is considered closed once it is handed off.
    - **Administrative**: Examples include unrecorded permits or required reports not submitted.
    - **Inconsistent with Permit**: The activity was permitted, but done incorrectly. Example: a boardwalk was built to wide.
    - **Unauthorized Activity**: The activity was NOT permitted. Examples: An unauthorized boardwalk was built, or shoreline cutting occurred.
- **Compliance re-inspection needed:** Another site visit is needed. An appropriate time for the revisit should be indicated in the "Suggested Reinspection" drop down menus. Further timing details can be noted in the "Notes" section.
- **Permit Compliance Closed:** This box should be checked if no more site visits are needed. Can be used for compliant or non-compliant records. Indicates that the final determination has been made. If there are previous records for previous visits, be sure to uncheck the "Compliance re-inspection needed box" on these records. Compliance rates are compiled based solely upon closed cases.
- **Permit Compliance Closed Date:** The date the final determination is made. Often left unfilled, since we found this was often an approximate repreat of the site visit date.
- **Referred to EPS:** Primarily for non-compliant cases which may be handled in discussion between the permit holder and project review/compliance staff. Cases which have been referred should also be marked as "closed".
- **Referred to Enforcement:** For non-compliant cases referred to the enforcement division. These cases should also be marked as "closed"
- **Suggested Reinspection:** Use the drop down menus to select a season and year for the reinspection (or initial visit) to take place. Try to get this information from the permit holder when possible. These dates will aid in creating a work flow schedule for initial visits and revisits.
- **Notes:** (limited to 200 characters) Include the name of the permit holder, a brief description of the project, contact information and the status of the project. If substantial additional documentation exists, make a note to check the link for further information.
- **EPA Wetland Study Fields:** These fields were included to track wetland and shoreline related statistics for the EPA grant. Most of the data comes directly from the permits themselves. This field was no longer tracked after the completion of the historical permit review.
    - **Wetland Loss Permitted (sq ft):** The amount of wetland loss allowed by the

permit. Typically listed within the body of the permit. If this value is listed in acres, convert it to square feet.

  - **Wetland loss not permitted:** The amount of wetland lost due to non compliance.
  - **Wetland Mitigation Required:** The amount of wetland mitigation that the permit states as a condition.
  - **Wetland Restoration:** The amount of restoration required as the result of a non compliance activity. For example a boardwalk that is not permitted had to be removed as restoration.
  - **Shoreline Conversion Permitted (ft) :** The amount of shoreline that is permitted to be altered. Examples: boathouse, rip-rap.
  - **Shoreline Conversion not permitted:** The amount of shoreline altered due to non compliance.
  - **Shoreline Restoration:** The amount of restoration required as the result of a non compliance activity.

- **Link to Folder:** The link to the photo and documentation database. The file path is: **\\apawork\epa$\permit reviews photographs\permit number**

New MAD records are most easily created when the bi-monthly mailing is being prepared. Since you're already working with the list of newly issued permits, populate the new MAD records at the same time. It will save the trouble of going through the entire list multiple times, and the MAD records will already be prepared when permit holders begin calling in response to the mailing.

PHOTO AND DOCUMENTATION DATABASE

Located on the EPA drive, the folder titled "Permit Reviews Photographs" holds information from compliance reviews. The folder contains three subfolders: Compliance Photos, Documentation and Pre Permit Photos.

Documentation

Save any pertinent communications with the permit holder, including email threads and mailings, in the "Documentation" subfolder. Any letters sent to the permit holder should be saved in PDF format. Also save any non-compliance memos and PVR's in this folder.

LOOKUP SYSTEM (LUS)

Site visits should be logged into the Lookup System (LUS). This provides a geographic reference to all compliance site visits, accessible at the desktop of all APA employees.

If more than one site visit exists for a given project site (multiple revisits), avoid clutter by logging just the initial visit. Visits to multiple lots in a subdivision should all be logged.

Loading Data to the Lookup System

- Open "APA Lookup"
- Click "Identify Map Layers" and be sure "Compliance Sites" is selected. Then click "Draw Map"
- Insert the desired project number in the APA# field and press enter
- Click "Identify Map Features", then "Manage APA Site" and "Add Site"
- Insert the password (available from the Agency's Mapping Technologist 3)
- Move the window "transactmenu" to the side for the moment
- Return to the "transactmenu"
- Check the "Compliance Check" box, and fill in the compliance number in the boxes provided
- Select "digitize site on map"
- Click on the location of the compliance site visit
- Click "Save My Site" if the placement is accurate or "Delete My Site" if you need to make a change.

CREATING EXCEL SPREADSHEETS FROM THE MAD

It can be useful to export data from the Compliance Section of the MAD to an Excel spreadsheet. This will allow you to compile statistical information, create a workflow schedule of site visits, and view multiple records simultaneously. Follow these steps to do so:

- Open the compliance section of the MAD
- In the search box, select the attributes in which you're interested.
- Click "OK"
- Click "File" > "Send"
- When prompted, select "Microsoft Excel" as the send format
- A Groupwise email window will popup. It contains an Excel file attachment. Open this attachment.
- Select "Select the program from a list" and click "OK"
- Choose "Microsoft Excel"
- The data will appear in an Excel spreadsheet
- Use the Excel spreadsheet to arrange the data appropriately.

Creating a Workflow Schedule of Site Visits

Follow the steps listed above. In the second step, select either "Initial Visit Needed" or "Revisit Needed". Then follow the remaining steps. In the resulting Excel spreadsheet, you can sort the records by year and season of suggested reinspection, and also by town or watershed. The resulting list will provide a snapshot of project sites that need attention in a given area at a given time.

COMPILING STATISTICAL INFORMATION

Compile compliance statistics using a series of MAD searches, as shown below. Permit compliance statistics are compiled based only upon closed cases with final determinations.

Note: Following each step, you must completely close and reopen the MAD before proceeding. This is necessary to reset the search form.

- Begin by noting the total number of records in the Compliance MAD. Click "OK" on the empty search form.
- After reloading the MAD, check and then uncheck the box marked "Permit Expired" to remove expired permits from your tally. Then check the box marked "Permit Compliance Closed". Click "OK" and note the total number of closed cases.
- After reloading the MAD, again omit the expired permits, and check the boxes marked "Permit Compliance Closed" and "Permit Compliant". This gives the total number of cases that are closed and compliant cases. Divide this number by the total closed cases for a percentage.
- Follow the same steps for the non-compliant stats. You may also wish to sort out the number of cases sent to Enforcement or referred to Project Review Staff

PUBLIC RELATIONS & COMMUNICATIONS

Permit compliance staff should be polite, explaining their role as a reviewer, gather as much information about the situation at hand, and then discuss the matter with other appropriate Agency staff.

Similarly, official Agency letters to permit holders should bear the signature of an Agency employee. Such letters may be drafted by the permit compliance staff person for signature by other Agency staff. Examples include letters of compliance/non-compliance, recommendations, and final determintations.

Should a landowner ever become hostile during a site inspection or refuse entry to their property, permit compliance staff should simply leave. Even though permit conditions authorize property visitation, staff should not endanger themselves in any way. Report any hostile encounter to your supervisor once back at the Agency.

COMPLIANCE MANUAL APPENDIX A: Sample letter of introduction to permit holders. To be sent on Agency letterhead.

ADDRESS **DATE**

Dear _____,

Recently, Adirondack Park Agency Permit _____ was issued by the Adirondack Park Agency (APA) for new land use involving property with which you are associated. That permit includes a project description and conditions set by the Agency*.

In an effort to ensure compliance with these conditions and to assist permit holders with any questions that arise during the implementation of their projects, I have been contracted by the APA to monitor the status of all issued permits, park-wide. In some cases, this may require a site visit to document the project site. Towards this end, **I would very much appreciate an update on the status of this project** to determine if and when a site visit might be appropriate.

You are welcome, but not obligated, to accompany me during any potential site visit. I will make every attempt to accommodate your schedule within regular working hours.

I would also remind you, if you have not already done so, that this permit must be recorded in the appropriate County Clerk's office if so required on page one of the permit.

Please call or email me to provide an update on the status of your project, if you would like to arrange an appointment, or if you have any questions regarding your permit.

Sincerely,

Name
Title

**As stated in the conditions of the permit, the Agency may conduct such on-site investigations, examinations, tests, and evaluations as it deems necessary to ensure compliance with the terms of the permit. Such activities shall take place at reasonable times and upon advance notice where possible.*

COMPLIANCE MANUAL APPENDIX B: Sample language to be used for the pre-mailing list review email for staff.

Hello All,

It's permit compliance mailing time again. I've compiled a list of permits issued during the months of _____ for the next permit compliance program notification mailing. Please find the attached excel file containing this list, and peruse the entries for any permits with which you are familiar, and which may require special attention (delicate histories, special circumstances). The list is sorted by PRO code number, and then by permit number for ease of reference.

I realize many of these projects are not yet underway, but I'm asking permit holders for a status update on their projects in order to determine if and when a site visit is appropriate. This is also an opportunity to remind permit holders to file their permits if they haven't already done so, and to offer assistance with any questions or concerns they may have.

Permit holders with projects consisting of simple subdivisions will not be offered a site visit, but will be reminded of the recording requirement if they haven't already taken care of it.

If you have any particular information on the current status of these projects or the intentions of the permit holders, that also would be helpful.

I'd like to send the mailing by _____, so please notify me of any concerns before then.

Thank you,

Name
Title

COMPLIANCE MANUAL APPENDIX C: Permit recordation reminder letter to be sent on Agency letterhead.

Date

Dear _____,

In researching APA permit _____ for compliance purposes, it has been discovered that the permit was not recorded in the _____ County Clerk's Office. As explained on page one of the permit:

> *"This project may not be undertaken until this permit is recorded in the _____County Clerk's Office. This permit shall expire unless so recorded on or before _____in the names of all persons listed on the first page hereof and in the names of all owners of record of any portion of the project site on the recordation date."*

Before proceeding with the project as described in P_____ the permit will need to be reissued and properly recorded in the _____ County Clerk's office.

Please do not hesitate to contact me with any questions you may have.

Sincerely,

Name
Title

COMPLIANCE MANUAL APPENDIX D: Project descriptions template for mailings

APA Permit Number:
Town:
Project Sponsor:
Authorized Representative:

Project Description:

APA Permit Number:
Town:
Project Sponsor:
Authorized Representative:

Project Description:

APA Permit Number:
Town:
Project Sponsor:
Authorized Representative:

Project Description:

APA Permit Number:
Town:
Project Sponsor:
Authorized Representative:

Project Description:

APA Permit Number:
Town:
Project Sponsor:
Authorized Representative:

Project Description:

COMPLIANCE MANUAL APPENDIX E: Note to be left on project site when contact with landowner is unsuccessful to be printed on Agency letterhead.

Dear Sir/Madam:

This is to inform you that a permit compliance site visit has been conducted on this property, as per the letter sent to you, dated _____.

A permit was issued by the Adirondack Park Agency (APA) for new land use involving this property. The permit includes specific use restrictions and conditions which were the subject of this visit.

If you have any questions regarding this project or today's site visit, please do not hesitate to contact me at the address or telephone number below.

Sincerely,

Name
Title

COMPLIANCE MANUAL APPENDIX F:

Permit Compliance Monitoring Form

GENERAL INFORMATION

Compliance Check # _____
APA Permit # _____ Permit Tax parcel # _____

Watershed Code ____ Current Tax parcel # _____
Town _____ County_____

Date of site visit _____ Survey Map ? Y N
Name of Monitor _____ Engineer Plans ? Y N

Landowner Name _____
Address _____
_____
Telephone _____
Email _____

Is the landowner accompanying the monitor? Y N

Is the landowner the original permit holder? Y N

Does the landowner have a copy of the permit? Y N

Does the landowner want additional clarification on the conditions of the permit?

Y N

SITE VISIT

STATUS OF WORK - Check all that apply
Descriptions specified in Instructions document

Initial Visit ___ Compliance re-inspection ___ Non-compliance re-inspection ___

STATUS OF PERMIT

Permit Compliant _____ Permit non compliant _____

Type of non-compliance
Administrative _____ If Administratively non-compliant:
Exceeded permit _____ Not Recorded _____
Unauthorized Activity_____ Reports not Filed _____

EFFECTS ON RESOURCE

Habitat Lost? **Y** **N**

Habitat Degraded

Silt/sedimentation introduced	
Undisturbed Vegetative capacity reduced	
Introduced invasive species	
Shoreline stability impaired	
Habitat fragmentation	
Hydrology altered	
Other	

DIMENSIONS OF IMPACT (MEASUREMENTS IN FEET)

Habitat Loss	
Habitat Degradation	

Duration of Effect

Permanent	
Short term (estimate)	
Long term (estimate)	

Referred to EPS (date)_____ **Referred to Enforcement (date) _____**

Compliance re-inspection needed ____ **Permit Compliance closed _____**

If re-inspection is needed, suggested date or time period _____

Contractors Name and information if applicable:

Photographs Taken?

Notes & Diagrams: _____
_____
_____
_____
_____

Appendix I. History of EPA grants awarded to the APA.

	Adirondack Park Agency			
	Federal EPA Grants			
Grant #	**Title**	**Amount**	**Status**	**Year awarded**
X0027701	Oswegatchie Basin 1 - Watershed Protection for Adirondack Wetlands: A Demonstration-Level GIS Characterization of Subcatchments of the Oswegatchie/Black River Watershed	$ 198,270.00	Complete	1993
CD99208701	Oswegatchie Basin 2 - Influences on Wetlands and Lakes in the Adirondack Park of New York State: A Catalog of Existing and New GIS Data Layers for the 400,000 Hectare Oswegatchie/Black River Watershed	$ 129,215.00	Complete	1993
CD99229001	Watershed Scale Protection for Adirondack Wetlands: Implementing a Procedure to Assess and Predict Cumulative Impacts from Development Activities to Wetlands andWatersheds in the Oswegatchie, Black and Greater Upper Hudson RiverWatersheds of the Adirondack Park, New York State, USA	$ 555,298.00	Complete	1995
CD92244301	Hudson River Watershed River Watch Program	$ 84,295.00	Complete	1996
CD99244101	Watershed Protection of the St. Lawerence River Watershed with Special Consideration to Large Wetlands and Large Landownerships, Part 1: The St. Regis River Basin	$ 99,485.00	Complete	1996
CD99264401	Watershed Protection of the St. Lawerence River Watershed with Special Consideration to Large Tracts of Land, Part Two: The Salmon/Trout, Raquette, and Grasse Watersheds	$ 358,948.00	Complete	1996
CD99299201	Wetlands Effects Database and GIS for the Adirondack Park	$ 80,844.00	Complete	1999
CD98224301	Wetlands Status and Trends Analysis of the Adirondack Park: Mid 1980's to Mid 1990's	$ 66,000.00	Complete	2000
CD98224601	Watershed Protection of the Mohawk River Watershed - Phase I	$ 35,000.00	Complete	2000
CD98248101	Coordination for Region-wide Monitoring of Invasive Wetland Plants in the Adirondack Park	$ 74,975.00	Complete	2001

CD98282101	A Biological Assessment Method to Protect and Restore Wetland Communities in the Au Sable and Boquet River Watersheds of the Adirondack Park	$ 179,000.00	Complete	2003
CD97294801	Wetland Invasive species Monitoring and Control in the Mohawk River Watershed - Phase II	$ 131,000.00	Complete	2005
WL97267806	Effectiveness of and Enhancements to the Adirondack Park Agency's Wetland Protection Program	$ 698,876.00	Currently underway	2006
	TOTAL	**$ 2,691,206.00**	EPA funded since 1993	