Wetlands Effects Database and GIS for the Adirondack Park

Platanthera blephariglottis (Willd.) Lindl.
Barnum Brook Wetland, Paul Smiths, NY

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Summary

The purpose of this project was to create an integrated geographic information systems (GIS) database for the entire Adirondack Park. The Wetlands Effects Database Project is one of a series of U. S. Environmental Protection Agency funded State Wetlands Protection Program grants awarded to the Adirondack Park Agency (the Agency) to date. The project incorporates previous EPA-funded projects that have resulted in the successful mapping of almost 75% of the Park's wetlands and watersheds.

The primary objectives of the study were to:

- **Data Development and Assessment** - identify and locate natural resource GIS data layers and incorporate them into a database for the entire Adirondack Park to be used in the determination of environmental effects to wetlands;
- **Data Dissemination** - make the data publicly available and promote the use of the data.

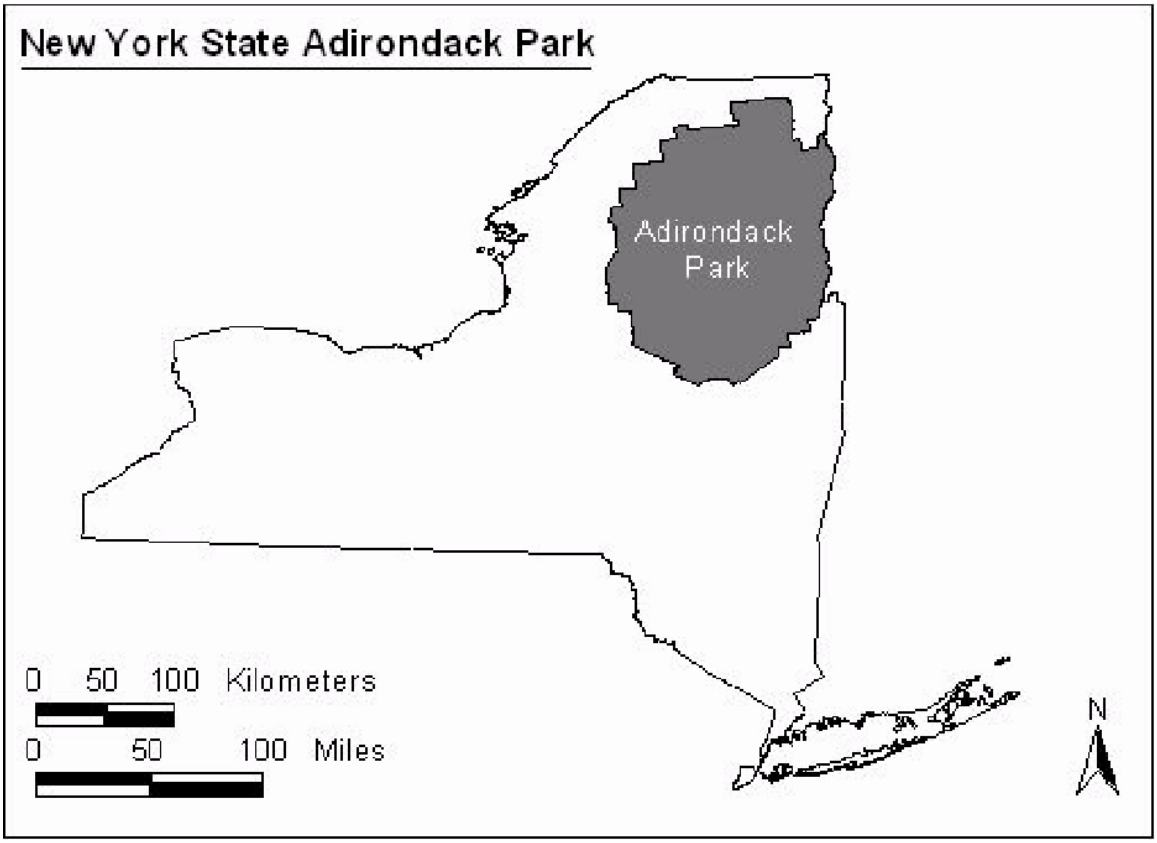
The Agency worked with its consultant, Applied GIS, Inc., to assemble GIS data and metadata and add it to the Agency's Look-Up System, a GIS interface available to all staff. Staff distributed these datasets, along with others from other State and federal agencies, on the publicly available *Shared Adirondack Park Geographic Information CD-ROM*. Staff also developed a webGIS application to allow the public to access the digital version of the Adirondack Park Land Use and Development Plan Map that was created through this project.

A number of educational meetings were held with different groups interested in the data on the *Shared Adirondack Park Geographic Information CD-ROM*. These outreach sessions led to the development of a formal GIS Users Group for the Adirondack Park that continues to hold training workshops and conferences. Another project outgrowth was the creation of a Charismatic Megawetlands map, which displays large expanses of intact wetlands and can be used to identify significant habitats and landscape protection priorities. In addition, the project also resulted in the creation of an Activity Tracking System (ATS), an intranet database that allows staff to store, retrieve and share information related to EPA-funded projects and other on-going Agency activities.

Background and Study Area

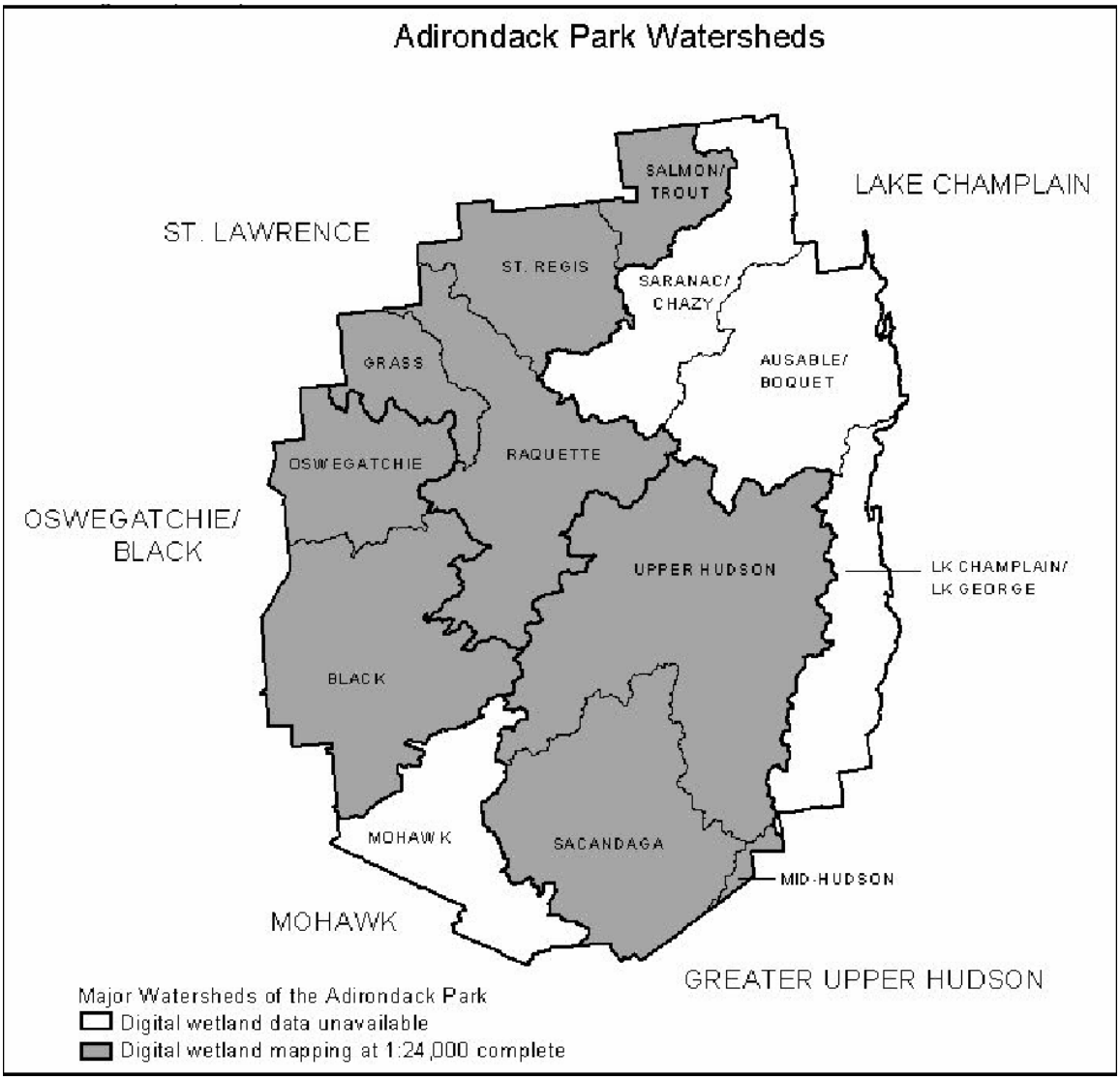
The Adirondack Ecological Zone, corresponding to the legislatively defined New York State Adirondack Park, comprises a 6 million-acre (2.4 million-ha), predominately forested region of northern New York (Figure 1). Nearly 850,000 wetland acres (340,000 ha), including deepwater marshes, rich fens, kettlehole bogs and over 11,000 associated lakes and ponds are situated in the region. Approximately 43% (2.5 million acres, 1 million ha) of the Park is owned by the State of New York and is constitutionally protected as "forever wild" Forest Preserve. Private lands devoted principally to forestry, agriculture, and open space recreation account for 52% of the Park (3.5 million acres, 1.4 million ha). The Park contains the largest wilderness acreage east of the Mississippi River as well as numerous settlement areas with attendant use conflicts. Because of the biological diversity in wetlands and the range of land uses, a Park-wide perspective of natural resource conditions is necessary to begin to understand environmental effects to wetlands.

Figure 1. Location of the Adirondack State Park in New York State



The Adirondack Park is divided into 5 major watersheds, 4 of which have had detailed wetlands and watersheds mapped through funding from the EPA's State Wetland Protection Program. They are, in order of completion: Oswegatchie/Black, Greater Upper Hudson, St. Lawrence, and the nearly complete Mohawk (Figure 2). When combined these watersheds total approximately 4.4 million acres (1.8 million ha), or approximately 75% of the entire Park.

Figure 2. Major watersheds in the Adirondack Park. Currently, EPA-funded State Watershed Protection Program grants have enabled the mapping of three of the major watersheds of the Park for sub-watersheds and wetlands at a scale of 1:24,000. These major watersheds are the Greater Upper Hudson, the Oswegatchie/Black, and the St. Lawrence watersheds.



Objectives

The primary goal of this study was to develop and integrate a consistent database for the entire Adirondack Park to enable the determination of environmental effects to wetlands based on natural resource conditions such as landcover, soils, slopes, past disturbances, nearby water quality, and geology. The underlying objectives to meet this goal were:

1) Identify appropriate data layers such as wetlands, bedrock geology, surficial geology, soils, burned areas, forest disturbances, upland landcover, APA land classifications, parcel ownership data, hydrology, and current land use.
2) Locate available data.
3) Obtain and integrate the data into the Agency's existing ARC-INFO GIS.
4) Assess the consistency of the data at the boundaries of source and match data.
5) Report on the ability to use the Park-wide data in the cumulative effects methodology.
6) Make the data available to the public via the world-wide-web and/or on CD and publicly promote its use.
7) Report on the Park-wide data, identify data gaps and methods for obtaining those data.

Data Development and Assessment

For the first step of the project, the Adirondack Park Agency requested sealed bids from several independent GIS firms. Each bid was evaluated based on the firm's ability to produce the required data in the most time efficient and cost effective manner while maintaining the highest level of quality in the finished product. After extensive evaluation of the proposals submitted, the Agency contracted Applied GIS, Inc. of Schenectady, NY to produce the desired Park-wide data layers and to then integrate those data into the Agency's existing GIS.

With input from the Agency, Applied GIS, Inc. compiled appropriate data layers including:

- APA land classification
- parcel ownership centroids
- 10-meter digital elevation models
- 1916 Fire Map
- surficial geology
- bedrock geology
- Mesosoils
- Lake Champlain Basin land cover
- State Forest Acquisition map

In all, Applied GIS, Inc. processed sixteen datasets.

The APA land classification maps and the digital elevation models were tiled by 7.5-minute quadrangle and had to be merged into seamless coverages for the Park. The 1916 Fire Map, 1950 Blowdown and the State Forest Acquisition Map datasets had to be digitized from original hardcopy sources (Figure 3). Applied GIS, Inc. also performed a suitability analysis to see how well some existing datasets, such as the Adirondack Park Mesosoils map from 1975 and the Lake Champlain Basin Landcover map, matched with others in our GIS system.

Applied GIS, Inc. prepared a detailed report explaining their data manipulation methods, quality assurance tests, and any problems they had with the data. The report explains how they searched all data layers for glitches, inconsistencies, and anomalies, comparing the original maps to the merged or digitized final products. Attribute fields and coverage descriptions were also checked and rectified accordingly. Metadata were created for all data layers explaining how the data was developed, the appropriate use of the data, and who to contact for more information.

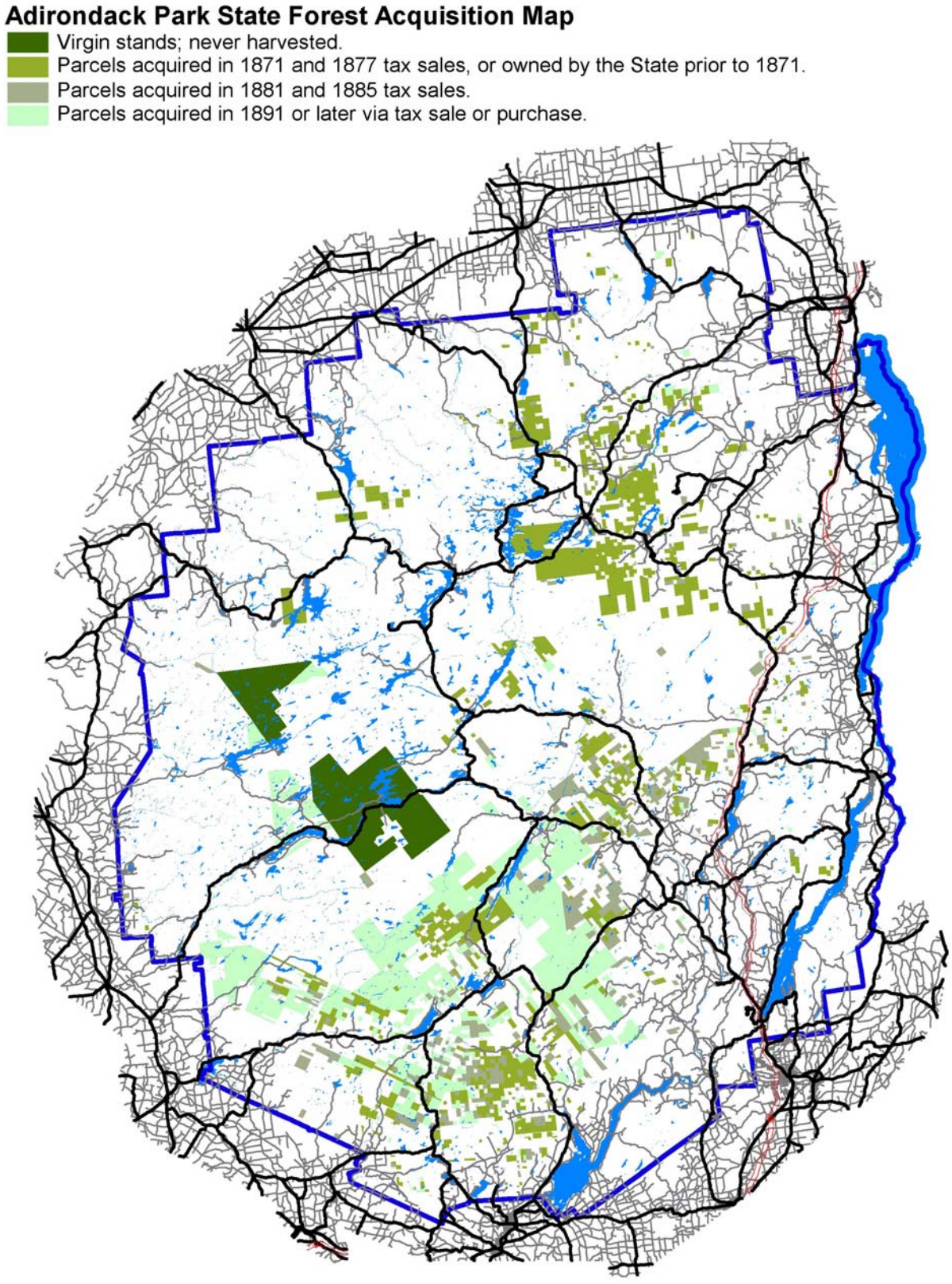
Once Applied GIS, Inc. had produced all the desired park-wide data layers, the data layers were then integrated into the Agency's existing Arc Info GIS Look-Up System. The Look-Up System is an easy-to-use GIS interface accessible to all Agency staff on their desktop computers through a central server. Staff can perform searches by tax parcel number and retrieve spatial information for a wide variety of natural resource data layers. For regulatory staff, the Look-Up System serves as a "first-cut" in understanding the natural resources of an area of interest before conducting field visits.

Cumulative Effects and Watershed Responses

One of the goals of this project was to develop a database that would allow users to predict and/or determine the effects of natural and anthropogenic impacts upon wetlands based upon their natural resource condition. Work on this method reflects the next logical steps in advancing the ability to assess cumulative effects to wetlands.

A cumulative impact assessment method has been an elusive goal for many years because of the complexity of natural systems, the myriad of resource condition metrics, and data storage and manipulation limitations. Though elusive it has long been Agency staff's opinion that collecting and understanding as complete a resource data set as possible about an individual project site and its surroundings and using best management practices (BMP's) when applying permit conditions for proposed development will, in essence, achieve large scale resource protection from cumulative impacts.

Figure 3. Data digitized for the Wetlands Effects Database Project. A section of the State Forest Acquisition Map is shown in which state land is categorized into four parameters, including code 'X' representing untouched virgin timber.



All jurisdictional projects require a permit from the Agency. Project review staff utilize available resource condition data to depict the setting of the project in the local and regional landscape. Throughout the history of the Agency, staff have attempted to access, array and analyze resource data layers to build a picture of the proposed project in a landscape context and to assess potential impacts. However, it was common for staff to find that data layers were missing, inaccurate, or widely scattered in incompatible or difficult to access formats. The enhanced Park-wide GIS database created through the project compiles all the known data layers and gives staff access at their desktop PC's which solves many of the earlier problems.

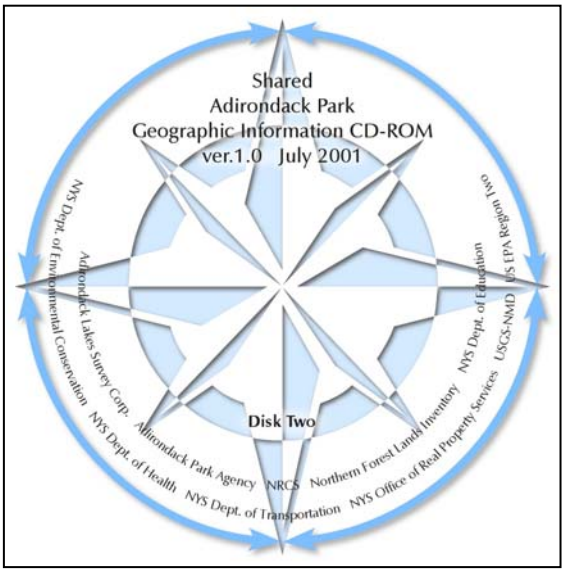
Routinely, staff overlay soils, topography, wetlands, real property and other layers to determine what resource features exist on a project site, on adjacent lands, within an individual subcatchment, and the relative rarity of the resource features when viewed on a local, watershed or regional scale. Using the Agency's Look-Up System has begun to build a "land use history" for parcels in the Park and will create a chronology of development for individual project sites.

The data assembled for this project have also been used in an interactive watershed water quality model called "STELLA" to predict nutrient concentrations in water bodies. With refinement this model may help the Agency make lake management decisions.

Data Dissemination

Geographic Information CD-ROM

The data that were developed for this project, along with other datasets from eleven other State and federal agencies, were distributed on the publicly available *Shared Adirondack Park Geographic Information CD-ROM*. The CD set contains over 50 geographic natural and cultural resource data layers. The free GIS data viewer, ArcExplorer, is provided on the CD for those users who may not have access to GIS software. Since its release in July 2001, the Agency has distributed over 500 copies of the *Shared GIS CD*.



Agency staff used the *Shared GIS CD* as a tool to encourage local governments, Forest Preserve foresters, and others to begin to use GIS as a decision-making tool. Staff held numerous workshops and outreach sessions on how to use the CD set:

- Workshop for NYS Department of Environmental Conservation foresters who develop Unit Management Plans for the Forest Preserve, February 2002
- Workshop for local Code Enforcement Officers, February 2002
- GIS "Map Station" featuring data from the CD at the Agency's Local Government Day, March 2002 and March 2003
- Explanatory session about the CD-ROM at the Adirondack Research Consortium meeting, May 2002
- Two-day workshop for local governments in partnership with the Wildlife Conservation Society's Adirondack Communities and Conservation Program, June 2002

Much of the high start-up cost of a GIS originates with data development. The *Shared GIS CD* gives new users, especially local governments with financial challenges, the advantage of an instant, comprehensive database for the Park. Feedback from users has been extremely positive and enthusiastic.

The creation of the *Shared GIS CD* has had many benefits. In addition to serving as a focal point of GIS training sessions, it has led to the creation of the Adirondack GIS Users Group (www.adkgis.org), a partnership of State, local, not-for-profit, and for-profit organizations. The Adirondack GIS Users Group is a forum for sharing data, providing assistance/training, sharing new research projects and ideas, and keeping the Park's GIS community updated. The group has held meetings in June and November 2003 to discuss GIS in natural resource planning, emergency management, tourism promotion, and K-12 education. Another meeting is planned for March 2004 specifically focused on GIS applications for Local Governments.

webGIS Application

The Agency developed a webGIS application in ArcIMS (Internet Map Server) allowing individuals all over the world to access the Park-wide APA Land Classification data layer compiled from this project. The web address of this site is www.maphost.com/adirondacks.[1] A variety of Adirondack stakeholders, including realtors, lawyers, and surveyors, have said that the site is very useful. The website is one of four sites featured on New York State's Web Banner "Map-NY" button.

[1] The site is currently unavailable because the application is being upgraded to load more quickly for users with slow internet connections.

Project Outcomes

Tracking System

One outcome of the Parkwide Wetlands Database Project is the development of an Activity Tracking System (ATS), an intranet database that organizes deadlines, correspondence, milestones, and other information related to an activity, provides consistent E-mail notification to predefined project team members of accomplishments, stores information about specific [e.g. wetland] sites on a central server, and outputs monthly, quarterly, and annual reports of staff accomplishments. This activity was instituted to achieve the objectives of this project and in response to the need for a better system of communication among those Agency staff members involved with wetland project management, for example. In our meaning of the term, management of a specific wetland could be as straight forward as review of a regulatory permit affecting that wetland. Other activities which need to be tracked include scientific studies, experiments, cultural and historic data extrapolation, and other EPA funded wetland and watershed work.

The three primary objectives of the ATS are to:

1. Improve Internal Communication: Provide a place to store documentation, while maintaining a retrievable record of communication related to a particular project
2. Improve External Communication: allow the natural resources unit to report on activities and accomplishments and time investment during any given time period
3. Improve efficiency: keep track of deadlines

In day-to-day use, the ATS is used to access information about specific wetlands, to track progress on our EPA-funded projects, and to help organize private land project review and State Land Unit Management Plan actiions which impact any Park wetland. This sytsem has been very successful in accomplishing the project objectives..

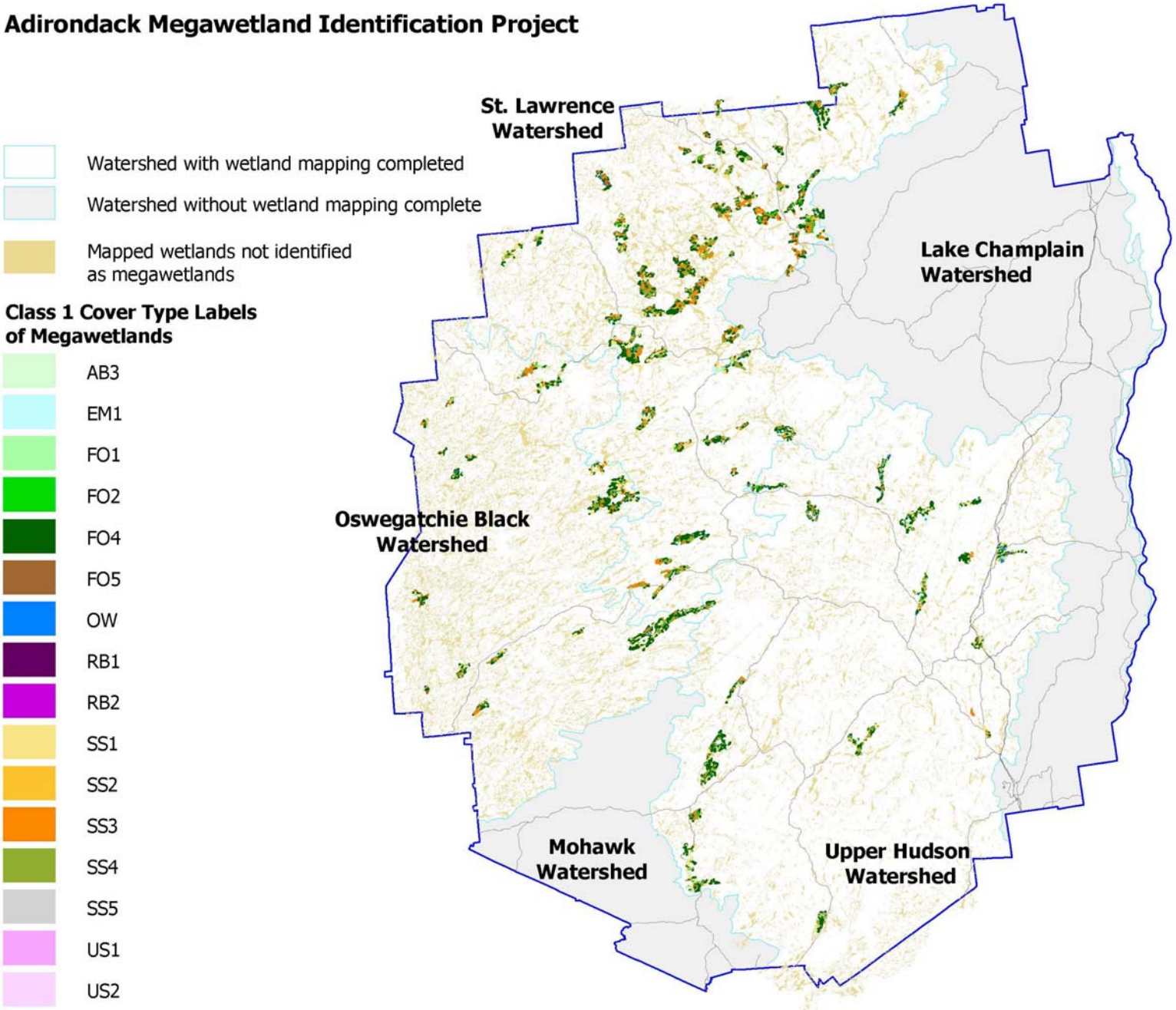
Landscape-Scale Wetlands

Another outcome of this project has been the identification of Charismatic Megawetlands within the 75% of the Park for which cover type wetland mapping is complete. Staff used these data mapped in previous EPA-funded projects, along with aerial photos and topographic maps, to locate and quantify the largest wetlands(Figure 4, Appendix 1). Staff presented this analysis at the 2003 Adirondack Research Consortium Meeting.

Outside groups have already begun to use the database for large scale screening assessments. The NYS Department of Environmental Conservation is

using the data to help build a statewide database for identifying, evaluating and rating the quality of surface waters (including wetlands) as the first step toward prioritizing State expenditures for resource protection. Dr. Glenn Johnson from SUNY Potsdam is using the data study potential habitat for Spruce Grouse, an endangered species in New York State. These data could also be useful for Forest Preserve planning, which, according to the State Land Master Plan, must take into account the significant natural features within a State land unit. It would also be useful for identification of additional New York Natural Heritage Program significant natural communities.

Figure 4. Large wetland complexes, also know as "Charismatic" Megawetlands, in the St. Lawrence, Oswegatchie-Black, and Upper Hudson Watersheds.



Data Gaps and Information Needs

While a great deal of available information has been assembled significant data gaps in the geographic watershed based information have been identified that remain to be filled.

Chief among those are the following digital geographic elements:

- Watershed boundaries for ponded waters in the Mohawk and Lake Champlain watersheds
- Digital wetland polygon information for the Mohawk and Lake Champlain Drainage basins
- Digital county-level comprehensive soils mapping for interpretation and modeling purposes.
- Detailed land cover information for watershed modeling purposes
- Land use change information to predict changing ecological effects

Conclusions

The public dissemination of the data results in better appreciation and understanding of the wetlands of the Adirondack Park. Decision makers and the public have increased information at their disposal, resulting in the ability to make better decisions for resource protection.

This project developed a consistent natural resource database for the Adirondack Park, which is of tremendous value to wetland research and protection and sets highly relevant groundwork for future projects (such as the work proposed for the Lake Champlain Basin wetland mapping which identifies appropriate wetland restoration targets based on historic factors and hydrogeomorphic characteristics). The project was highly successful in storing and sharing current information, and providing for future retrieval through various publicly available media.

APPENDIX 1 – Megawetlands Table

Wetland	River Basin	Size (Ha)	Size (Ac)	Description
Albert Marsh	Grass/Raquette	173.9	429.8	Located in a large bowl-shaped depression associated with the north branch of the Grass River and bisected by an abandoned railroad grade. Complex of deciduous shrub swamp and coniferous forested swamp.
Angelfish Bog	Raquette	156.0	385.5	Small open bog mat in a mixed conifer swamp/shrub swamp on a large flat associated with Brandy Brook, a trib to Carry Falls Reservoir.
Barnum Pond Bog	St. Regis	75.0	185.2	Poor fen with Carex lasiocarpa, sphagnum and black spruce. Associated with the outlet of Barnum Pond.
Bay Pond Bog	St. Regis	43.1	106.5	Nutrient-poor, sedge-*Sphagnum* patterned fen and low-shrub raised bog.
Bear Brook Bog	Raquette	303.5	749.9	Large conifer flat with scattered open bog mat forming the headwaters of Bear Brook and associated with the Jordan River
Beaver Brook Swamp	St. Regis	285.9	706.5	Large spruce-fir flat perched above significant permanent stream with large willow and alder-dominated wetlands.
Benwood Bog	Greater Upper Hudson	28.9	71.5	Open bog mat.
Big Pond Bog	Greater Upper Hudson	188.7	466.3	Open bog mat with coniferous forested swamp associated with Big Pond.
Big Swamp	Grass	39.5	97.7	Located in complex outwash terrain and relatively isolated. Complex of deciduous and coniferous forested swamp. No permanent surface water detected.
Bog Stream Bog	Raquette	316.3	781.5	Occurs on both sides of Bog Stream. Possible poor or perhaps medium fen.
Browns Tract Inlet Fen	Raquette	155.1	383.3	Large open peatland. Probably fen with Thuja occidentalis.
Cedar Swamp	OB	72.8	179.9	Small open bog mat with coniferous swamp and deciduous shrub swamp. Headwater to South Creek Lake.
Chaumont Swamp	OB	313.1	773.6	20-20 site with emergent marsh, tamarack swamp, poor fen.
Cheney Pond Swamp	Greater Upper Hudson	562.3	1389.4	Deciduous shrub and coniferous forested swamp associated with Cheney Pond, the Boreas River and Lester Flow.
Cold Spring Creek Bog	OB	53.6	132.5	Small open bog mat embedded in deciduous shrub swamp in the riparian zone of Cold Spring Creek.
County Line Flow Swamp	Raquette/Greater Upper Hudson	278.5	688.1	Deciduous shrub riparian zone associated with Fishing Brook. Coniferous forested swamp and emergent marsh present as well as small scattered open peatland.
Dead Creek Bog	Raquette	369.2	912.4	Deciduous shrub swamp riparian zone along Dead Creek, tributary to the Racquette River. Open peatland and coniferous forested swamp present.
Deer Pond Marsh Complex	Raquette/Saranac	348.7	861.6	Complex wetland system with deep organic deposits.
Desert Swamp	OB	165.8	409.6	Complex terrain with small open bog mat, coniferous forested and deciduous shrub swamp, and several streams and ponds.
Dexter Lake Bog	St. Regis	101.6	251.1	Poor fen with stream tributary to Dexter Lake. Sedges dominate.
Dexter Road Bog	St. Regis	174.7	431.8	Open bog mat in conifer swamp/deciduous shrub swamp complex.

Dry Timber Lake Bog	OB	71.6	176.8	Open bog mat with coniferous shrub swamp associated with Dry Timber Lake.
Dugway Bog	St. Regis	98.8	244.2	Open bog mat with coniferous forested swamp, and deciduous and coniferous shrub swamp. Occupies the divide between the East Branch of the Str. Regis River and the Deer River.
Eighty Bog	OB	40.8	100.9	Open bog mat with coniferous forested swamp.
Fall Stream Wetland	Greater Upper Hudson	554.5	1370.1	Large complex occupying the riparian zone of Fall Stream. Coniferous forested and deciduous shrub swamp.
Fawn Lake Vly	Greater Upper Hudson	248.3	613.6	Occupies riparian zone of Willis and Fawn Lake Vly. Predominantly coniferous forested swamp and emergent marsh.
Forked Lake Swamp	Raquette	643.6	1590.4	Coniferous forested swamp.
Goodnow River Floodplain	Greater Upper Hudson	245.6	606.9	Headwater of the Goodnow River and tributary to Goodnow Flow. Complex mix of covertypes including bog, coniferous forested, and deciduous and coniferous forested swamp, and emergent marsh.
Goose Pond Bog	St. Regis	135.7	335.3	Open bog mat with associated Larix laricina.
Granny Marsh	OB	247.7	612.0	Open peatland with upland islands and associated with Bear Creek.
Grass River Bog	Grass	406.8	1005.2	Poor fen on north shore of Grass River Flow.
Hays Brook Swamp	St. Regis/Salmon/Trout	633.1	1564.5	Very complex interdigitation of many wetland cover types in a long linear system with Hays Brook as central core. Significant shrub swamp associated with Hays Brook riparian zone.
Heath Pond Swamp	OB	313.0	773.6	Open bog mat associated with Heath Pond. Forms headwaters of the Little River.
Heron Marsh	St. Regis	59.4	146.7	Poor fen associated with artificial impoundment on Barnum Pond outlet. Former Thuja occidentalis swamp logged out in the 1800's.
Hitchins Bog	Raquette	444.2	1097.5	Poor fen with patterning evident.
Jenks Swamp	Greater Upper Hudson	231.1	570.9	2020 site recommended for acquisition. Mix of covertypes with Thuja occidentalis dominant. Associated with the Schroon River.
Jennings Swamp	St. Regis	123.1	304.1	Small linear bog mat in coniferous shrub complex. Beaver activity.
Joe Indian	Raquette	247.2	610.7	Flow-through shrub swamp with a large peat mat separated by outwash ridges. Edge is associated with Joe Indian Pond Reservoir.
Jones Pond Outlet	St. Regis	54.7	135.3	Floating mat with ericaceous component and cattail component.
Jordan Bog	Raquette	515.5	1273.8	Large open peat mat and mixed conifer swamp separated from Spring Pond Bog by the Jordan River. Occupies the divide between the Jordan River and the Raquette River.
Last Gasp Bog	Raquette	155.3	383.7	Open peatland edged with coniferous forested swamp associated with Boulder Brook. Possible fen.
Lewey Lake Bog	OB	289.3	714.9	Large peatland at inlet to Lewey Lake. Miami River runs through it.
Limekiln Swamp	OB	76.8	189.9	Mix of covertypes including scattered open peatland, coniferous forested and deciduous shrub swamp.
Lyonsdale Bog	OB	214.5	530.1	Open peatland with associated coniferous forested and deciduous shrub swamp.
Madawaska wetland	St. Regis	133.5	329.9	Series of open bogs with *Sphagnum*-sedge-leatherleaf mats surrounded by mature stands of black spruce and tamarack with scattered balsam fir and white pine
Marion River Fen	Raquette	341.1	842.8	One of the Parks largest peatlands embedded in an old growth forest landscape. Spruce-fir swamp, northern white cedar swamp and black spruce-tamarack bog.

Massawepie Creek Bog	OB	83.9	207.4	Open peatland with deciduous shrub swamp associated with Wolf and Massawepie Creeks. Possible fen.
Massawepie Mire	Grass	913.1	2256.3	Largest open heath-*Sphagnum* mats in the Northeast, Estimated peatland acreage: 900 ac (364 ha) (Worley 1982).
Meacham Lake Swamp	St. Regis	185.9	459.4	Located at the intersection of three major surface water systems--the Osgood River, Meacham Lake, and Meacham Lake Outlet. Large expanse of coniferous forested swamp, emergent marsh, and deciduous shrub swamp.
Meno Bog	St. Regis	551.0	1361.6	Large open sphagnum dominated peatland. Associeated with St. Regis River and extensive deciduous shrub riparian zone.
Middle Branch Moose Bog	OB	176.0	435.0	Open peatland associated with the Middle Branch of the Moose River. Possible fen.
Middle Kiln Shrub Karr	Salmon/Trout	403.1	996.1	Mostly deciduous shrub swamp with small open bog mat. Bisected by Middle Kiln Brook and the South Inlet of Upper Chateaugay Lake.
Millington Brook Fen	OB	92.3	228.1	Open peatland associated with Millington Brook. Thuja occidentalis present as a dominant. Also historic population of Arethusa bulbosa.
Moose Creek Bog	Raquette	69.1	170.7	Occurs on both sides of Moose Creek. Possible poor fen or perhaps medium fen.
Mossy Vly	OB	182.5	451.1	Occupies riparian zone of Mossy Vly. Predominantly coniferous forested swamp with emergent marsh.
Moxham Swamp	Greater Upper Hudson	367.7	908.7	Wetland complex including open bog mat, deciduous forested and deciduous shrub swamp. Bisected by Route 28N.
Mud Pond Bog	Raquette	55.0	135.9	Open bog mat associated with Mud Pond.
Nehasne Complex	OB/Raquette	1363.6	3369.5	Huge wetland complex including open peatlan, coniferous and deciduous forested swamp, coniferous and deciduous shrub swamp and emergent marsh. Many streams including Shingle Shanty Brook and associated with the inlet to Lake Lila.
Onion River Bog	St. Regis	257.8	637.0	Large open peatland bisected by the Onion River.
Osgood River Muskeg	St. Regis	709.4	1753.0	Black spruce tamarack swamp.
Owls Head Bog	Grass	313.0	773.5	Largest portion of the bog mat is outside the Park.
Pine Brook Bog	Raquette	462.6	1143.0	Complex terrain withscattered open bog mat, coniferous forested swamp, and emergent marsh. Occupies the divide between Long Lake and Cold River.
Piseco Outlet Bog	Greater Upper Hudson	225.2	556.6	Open peatland associated with Piseco Lake outlet. Possible fen.
Pleasant Brook Bog	St. Regis	124.9	308.7	Open peatland is outside the Park. Possible fen associated with Pleasant Brook.
Porcaville Shrub Swamp**	Grass	699.1	1727.6	Dense shrub and coniferous forested wetland vegetation along several permanent streams arising inside the Adirondack Park, flowing north outside the Park. Substantial peat mat with all cover types showing high degree of interdigitation.
Quebec Bog	St. Regis	484.0	1195.9	Large open peatland with mixed Larix laricina flats. Associated with Quebec Pond and Quebec Brook.
River Road Fen	St. Regis	63.6	157.0	Large wetland associated with the East Branch of the St. Regis River.
Robinwood Bog	OB/Raquette	182.0	449.8	Large open peatland with associated deciduous shrub swamp. Many streams, brooks and ponds present. Occcupies divide between Lake Lila and Bog Lake. Bisected by Adirondack RR.
Roiley Bog	St. Regis	85.6	211.5	Poor fen with areas of Sphagnum bog.

Round Pond Bog	Raquette	188.4	465.6	Large open peatland associated with the outlet of Round Pond. Fen characteristics where close to the outlet.
Salisbury Marsh Complex	Raquette	413.0	1020.5	Possible boreal ecosystem. Scattered open peatland mixed with coniferous forested and shrub flats. Headwater of several streams. Occupies the divide between the Jordan River and the Raquette River.
Sand Pond Brook Shrub Swamp	Greater Upper Hudson	224.7	555.3	Large mixed deciduous forested and shrub swamp in the riparian zone of Sand Pond Brook, headwaters to The Branch.
Schroon River Floodplain	Greater Upper Hudson	483.9	1195.7	Huge riparian complex.
Sevey Bog	Raquette/Grass	220.8	545.5	Poor fen, hemlock hardwood swamp, spruce flats.
Silver Stream Floodplain	Raquette/OB/Greater Upper Hudson	1571.0	3882.0	Huge riparian complex. On Sumner Stream, not Silver.
South Inlet Fen	Raquette	104.4	257.9	Large peatland with bog mat and fen near the open water. Noted Aster uliginosum and Lythrum salicaria.
Spitfire Bog	St. Regis	131.9	325.9	Mixed sphagnum-sedge peat mat with Larix laricina, Picea mariana and common Heath shrubs.
Spring Pond Bog	St. Regis/Raquette	335.2	828.3	Nutrient-poor, sedge-*Sphagnum* patterned fen and low-shrub raised bog with ponds.
Spring Pond South	Raquette	466.8	1153.4	Continuation of Spring Pond Bog to the south associated with Willis, Mountain and Black Brook riparian zones hence more deciduous shrub swamp. Still, has major open peatland.
Stark Falls Bog	Raquette	209.1	516.8	Large sphagnum-leatherleaf dominated open bog draining into Carry Falls Reservoir and into Joe Indian Pond via Kildare Pond outlet.
Stewart Creek Swamp	Greater Upper Hudson	406.5	1004.5	Scattered open peat mat in predominantly deciduous shrub swamp associated with Stewart Creek.
Tahawus Floodplain	Greater Upper Hudson	372.0	919.3	Large wetland complex in the floodplain of the Hudson River. Includes open bog mat (possible fen), deciduous and coniferous forested swamp and deciduous shrub swamp.
Tamarack Swamp	Greater Upper Hudson	475.7	1175.5	Large deciduous shrub and coniferous forested swamp. Cranberry Creek runs through it.
The Stillwater	Grass	316.8	782.9	Major alder and willow-dominated shrub swamp associated with the floodplain of the North Branch of the Grass River.
Tupper Lake Marsh	Raquette	599.5	1481.4	Complex lacustrine/riverine system with deciduous floodplain forest, emergent marsh, deciduous shrub swamp and coniferous forested wetland flats. Most is inundated seasonally.
Twin Brook Bog	St. Regis	150.9	372.9	Significant peat mat and deciduous shrub wetland associated with major tributary to the St. Regis River. Shrub wetland occupies broad riparian zone along permanent stream.
Twin Mountains Bog	St. Regis	39.7	98.0	Large open bog mat.
Two County Bog	St. Regis/Raquette	513.6	1269.1	Complex terrain with scattered open bog mat, coniferous forested and shrub swamp. Many streams and ponds. Occupies the divide between the Jordan River and the St. Regis River.
Watson Bog	OB	230.3	569.0	Very flat terrain. Large open peatland.
Waverly Bog	St. Regis	886.4	2190.3	Flat, continuous, peat mat with abundant sedges.
West Branch Sacandaga Marsh	OB	771.2	1905.7	Very large wetland in the floodplain of the West Branch of the Sacandaga River. Fen, emergent marsh and deciduous shrub swamp.
Wheeler Marsh	St. Regis/Raquette	355.7	878.9	Poor fen.

Windfall Outlet Bog	Raquette	356.8	881.7	Large wetland system with scattered bog mat mixed with coniferous forested and shrub flats associated with the Raquette River.

Appendix 2 – Charismatic Megawetlands Metadata

Identification Information:

Citation:
Citation Information:
Originator: New York State Adirondack Park Agency
Publication Date: 200401
Title of Data Set: Charismatic Megawetlands of the Oswegatchie-Black, St. Lawrence, and Upper Hudson Watersheds, Adirondack Park
Edition:
Presentation Form: map
Publication Information:
Publication Place: Ray Brook, New York State
Publisher: Adirondack Park Agency
Online Linkage:
Description:
Abstract: This shapefile contains the wetland complex polygons derived from data mapped under EPA State Wetlands Protection Program Grants for the Oswegatchie-Black, Upper Hudson, and St. Lawrence watersheds in the Adirondack Park. The wetlands selected for this data layer are large, intact wetland complexes that are significant from a natural resource perspective.
Purpose: This coverage was produced by the Adirondack Park Agency to identify large, significant wetland complexes in the Oswegatchie-Black, St. Lawrence, and Upper Hudson Watersheds.
Supplemental Information: Note that there may be some differences associated with matches across major watershed boundaries. Original cover type wetlands data, from which the Charismatic Megawetlands layer was derived, is available for the Oswegatchie-Black, St. Lawrence, and Upper Hudson Watersheds from the Adirondack Park Agency.
Scale: 1:24,000
Time Period of Content:
Time Period Information:
Beginning Date: 1994
Ending Date: 1999
Currentness Reference: ground condition

Status:
Progress: Ongoing
Maintenance and Update Frequency: As additional cover type wetlands are mapped for the other major watersheds in the Park (Mohawk and Champlain Basin remain), Charismatic Megawetlands will be identified and added to this dataset.
Spatial Domain:
Bounding Coordinates:
West Bounding Coordinate: 468932.219
East Bounding Coordinate: 641010.500
North Bounding Coordinate: 4984053.500
South Bounding Coordinate: 4759811.000
Keywords:
Theme:
Theme Keyword Reference: NYS GIS Clearinghouse categories
Theme Keyword: Wetlands
Place:
Place Keyword Thesaurus: None
Place Keyword: Adirondack Park, New York State
Access Constraints: Data is available from the Adirondack Park Agency.
Use Constraints: Data is to be used at the scale intended. 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: Nancy Heath, Librarian.
Point of Contact:
Contact Information:
Contact Organization Primary:
Contact Organization: New York State Adirondack Park Agency
Contact Person Primary:
Contact Person: Sunita S. Halasz
Contact Address:
Address Type: Mailing Address
Address: P.O. Box 99, Route 86
City: Ray Brook
State or Province: New York
Postal Code: 12977
Contact Voice Telephone: 518-891-4050
Contact Fascimile: 518-891-3938
Contact Electronic Mail Address: sshalasz@gw.dec.state.ny.us
Native Data Set Environment: Original data created in Windows 2000, ARC/INFO version 8.0, Charismatic Megawetlands derived using ArcView version 3.3.

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Data Quality Information:

Attribute Accuracy Report:

Logical Consistency Report: Topologically Clean

Completeness Report:

Positional Accuracy:

Horizontal Positional Accuracy Report:

Quantitative Horizontal Positional Accuracy Assessment:

Horizontal Positional Accuracy Value:

Horizontal Positional Accuracy Explanation:

Process Description: Cover Type Wetlands data were mapped from color infrared NAPP aerial photos and digitized as ArcInfo coverages for prior EPA-funded State Wetlands Protection Program Grants. Metadata for the Cover Type Wetlands data is available at http://www.apa.state.ny.us./gis/shared/htmlpages/metadata/covertypewetlands.html. Reports for each one of these projects are online at: http://www.apa.state.ny.us./Research/epa_projects.htm. Polygons comprising the known large wetland complexes (i.e. Charismatic Megawetlands) were selected out of the Cover Type Wetlands data based on field knowledge and also wetland areas shown on USGS topographic maps and converted to shapefiles in ArcView 3.3. The shapefiles for each wetland complex were converted back to coverages in ArcInfo as REGION coverages (to create a region subclass that would allow the non-topological shapefile to retain polygon attribution through the various conversions) and appended into one REGION coverage. This was then converted back into the shapefile format to insure cross-platform compatibility.

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Spatial Data Organization Information:

Direct Spatial Reference Method: Vector

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Spatial Reference Information:

Horizontal Coordinate System Definition:

Geographic: Universal Transverse Mercator (UTM)

UTM Zone: 18

Geodetic Model:

Horizontal Datum: North American Datum of 1983

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Entity and Attribute Information:

Overview Description:
Entity and Attribute Overview:

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

SYSTEM	Definition	Can be found in what attribute table
L1	Lacustrine habitat, greater than 8 hectares (20 acres) and more than 2 meters deep	poly
P	Palustrine habitat, non-tidal, less than 8 hectares (20 acres) and less than 2 meters deep	poly,arc
R2	Lower perennial riverine	poly, arc
R3	Upper perennial riverine	poly, arc
R4	Intermittent riverine	arc
U	Upland	poly

Attribute
Attribute Labels: CLASS1, CLASS2
Attribute Definition:
CLASS 1: 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 wetland polygons.

CLASS 2: 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 wetland polygons. 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. [Note: all CLASS2 attributes preceded by "/" to form the concatenated NWILABEL]

Attribute Definition Source: Cowardin *et al.* 1979

CLASS	Definition	Can be found in what attribute table
EM1	Persistent emergent	poly, arc
FO1	Forested, broad-leaved deciduous	poly, arc
FO2	Forested, needle-leaved deciduous	poly
FO4	Forested, evergreen	poly, arc
FO5	Forested, dead	poly
OW	Open water	poly, arc
SB3	Cobble/gravel streambed	arc
SS1	Broad-leaved deciduous scrub/shrub (shorter than 6 meters)	poly, arc

SS2	Needle-leaved deciduous scrub/shrub (shorter than 6 meters)	poly
SS3	Broad-leaved evergreen scrub/shrub (shorter than 6 meters)	poly, arc
SS4	Needle-leaved evergreen scrub/shrub (shorter than 6 meters)	poly, arc
SS5	Dead scrub/shrub (shorter than 6 meters)	poly
UB3	Mud unconsolidated bottom	poly

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

REGIME	**Definition**	**Can be found in what attribute table**
B	Saturated	poly, arc
D	Seasonally flooded - well drained	poly
E	Seasonally flooded - saturated	poly, arc
F	Semipermanent	poly, arc
H	Permanent	poly, arc

Attribute
Attribute Label: SPECIAL1, SPECIAL2, 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

SPECIAL	**Definition**	**Can be found in what attribute table**
b	Beaver	poly, arc
d	Partially drained, ditched	poly, arc
f	Farmed	poly
h	Diked/impounded	poly
x	Excavated	poly, arc
/U	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 this project by Ralph W. Tiner, Jr., U.S. Fish and Wildlife Service.	poly

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 Units of Measurement: Alpha-numeric
Beginning Date of Attribute Values: 1994 (imagery date)
Ending Date of Attribute Values: 1997 (imagery date)
Attribute Value Accuracy Information
Attribute Value Accuracy Explanation: Attributes derived from photointerpretation techniques.
Attribute Measurement Frequency: As needed
Entity and Attribute Detail Citation: Adirondack Park Agency

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Distribution Information:
Distributor:
Contact Information:
Contact Organization Primary:
Contact Organization: Adirondack Park Agency
Contact Person Primary:
Contact Person: Sunita S. Halasz
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Distribution Liability:
Standard Order Process:
Digital Form:
Digital Transfer Information:
Format Name: ARCE
Digital Transfer Option:
Online Option:
Computer Contact Information:
Network Address:
Network Resource Name:
Fees: None

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Metadata Reference Information:
Metadata Date: 200008
Metadata Contact:

Contact Information:
Contact Organization Primary:
Contact Organization: Adirondack Park Agency
Contact Address:
Address Type: Mailing and Physical Address
Address: P.O. Box 99, Route 86
City: Ray Brook
State or Province: New York
Postal Code: 12977
Contact Voice Telephone: 518-891-4050
Contact Facsimile Telephone: 518-891-3938
Contact Electronic Mail Address: jwbarge@gw.dec.state.ny.us
Metadata Standard Name: FGDC Content Standards for Digital Geospatial Metadata
Metadata Standard Version: FGDC-STD-001-1998

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