Application of GIS to Rapid Inventory for Unit Management Planning

Year 2 Summary Report

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Background

The Adirondack Park consists of a patchwork of publicly- and privately-owned land. The New York State Department of Environmental Conservation (DEC) is responsible for stewardship of units of publicly-owned land collectively called the Forest Preserve. Stewardship of the units is guided by a Unit Management Plan (UMP), which conforms to guidelines set forth in the Adirondack Park State Land Master Plan (APSLMP). An inventory of the natural resources and physical characteristics of a unit is required to provide an understanding of the significant biological resources the DEC is charged with managing, and to ensure optimal siting of proposed facilities such as trails and campsites. Only after inventory has been completed can DEC planners identify management objectives to protect the resources and allow public use consistent with the unit’s carrying capacity. The UMP-GIS Consortium arose from the need to assemble existing digital data into a Geographic Information System (GIS) and develop datasets and tools to facilitate the inventory portion of the UMP process in the Adirondack Park.

Overview

We report here on the second year of the five-year cooperative UMP-GIS project. The objectives were to:
1. Assemble the GIS database describing the ecological content of the units and adjacent lands.
2. Interpret the context of the unit within the surrounding landscape.
3. Provide training to DEC planners to enable future interpretation of GIS data.
4. Ensure protection and archival of the data.

Year 2 was a period of implementation for the UMP-GIS project. We focused on transfer of GIS technology to the DEC planners, building upon work completed in year 1. We improved upon the system developed to access existing inventory data and bring natural resource expertise and analyses into the decision-making process. Tools such as Cost Path Analysis, Site Selection Analysis, and Conservation Planning (CCP) now enable planners to evaluate inventory information for Forest Preserve units, as well as compare units and contrast them with the surrounding matrix of land. During year 2 we strengthened relationships with Consortium partners and spent considerable time conducting in-depth, hands-on training. We distributed the tools, data layers, and results of contextual analyses to planners. This report contains summaries of the tools and datasets developed during year 2 and recommendations for year 3.

Standardized maps began to be included in draft and final UMPs in year 2. We initiated analyses to identify areas within the Adirondacks that contain important suites of species, areas at risk of degradation, and other management priorities were included in the process, if not always directly output as maps. A variety of resources is now available and the project is successful due to the continued interest by DEC planners in applying natural resource inventory information. This would not be possible without the support of DEC officials and the participation of the UMP-GIS Consortium.

The GIS database is a tool that provides a “first cut” at a comprehensive natural resource inventory. The database allows planners to characterize the natural resources and biodiversity within a unit and in the surrounding area, something that the DEC has recognized as integral to good Forest Preserve stewardship. Although existing GIS data will not address every data requirement for comprehensive inventory, the UMP-GIS database will allow DEC planners to focus on filling in information gaps and access an objective information base to support the decision-making portion of the UMP process.

If there is a unifying theme to the master plan, it is that the protection and preservation of the natural resources of the state lands within the Park must be paramount. Human use and enjoyment of those lands should be permitted and encouraged, so long as the resources in their physical and biological context as well as their social or psychological aspects are not degraded.

~ Adirondack Park State Land Master Plan, Introduction page 1
Summary Report

The goal of the Unit Management Plan-GIS (UMP-GIS) Project is to augment the state land planning process in the Adirondack Park by increasing the quantity and improving the quality of geographical, ecological, and recreational data available to the DEC. The approach is to assemble existing digital data into a GIS database, to develop products to facilitate the inventory portion of the Unit Management Plan process, and to increase communication between planners and technical experts from universities, state agencies and non-government organizations that cooperate via the UMP-GIS Consortium. This group formed under the auspices of the Adirondack Research Consortium. To meet the goal, we modified the four objectives addressed in year 1.

1. **Assemble a GIS database describing the ecological content of the units and significant ecological attributes of immediately adjacent public and private lands.**

*Action:* Deliver a set of data layers in a consistent, easy to use format.

**Deliverables:** Data layers provided to the planners include:

- Transportation & Recreation
- Hydrography
- Significant Natural Areas
- Aquifers
- Watersheds
- Land Use & Landcover
- Forest Disturbance
- Geology
- Topography

We created templates for consistency in map creation for UMPs (Box 1; Appendix 1). The map extent for each unit matches the extent created by DEC Cartographer Brian Finlayson and used in the UMPs. We converted Finlayson’s symbology to a format compatible with ArcMap 9.1 so planners can create identical maps to those that are found in final, published UMPs. Advantages of these templates are that the maps are pre-defined with the correct colors, fonts and legends, and the planner can print maps easily. Maps can be inserted directly into the text if desired.

The set of data layers is the map template upon which the planner can build an analysis, add additional data, etc. As a way to introduce planners to ArcGIS 9.1, a free program called ArcReader was used to view data layers in the template. With ArcGIS, planners have full editing, analysis and attribute/table data viewing capability. Raster (grid) data such as land cover can be manipulated in ArcGIS, in contrast to the older ArcView software which required an additional extension, Spatial Analyst not available to planners.

Electronic maps and UMPs are much easier to update or revise. Hardcopy UMPs are expensive and difficult to redo in response to new data availability or information requests from APA. Digital UMPs allow inclusion of a greater number of detailed, color maps than most paper copies of UMPs contain. Furthermore, public website users could print out any or all maps desired, reducing DEC’s printing and copying costs. It is possible to create Adobe Acrobat-viewable documents for a larger audience and distribute the documents via either 1) the DEC website or 2) on CD-ROM. These PDF files are in a format which anyone can read and would not contain sensitive or proprietary data. To
produce PDFs, map scale/printer resolution and accessibility (for the visually-impaired) would need to be considered.

ArcReader can also be used to freely distribute maps to the public. ArcReader is for display only and analyses are not possible (e.g., one cannot add new data layers or calculate areas). The user can use the Identify tool to click features, but cannot view or modify the attributes in the raw data.

**Action:** We gathered experts and planners to transfer information and technology for Unit Management Planning. The UMP-GIS Consortium consists of members of universities, state agencies, and non-governmental organizations to serve as a technical advisory group. The list of partners and experts has largely remained unchanged from year 1. Steven Signell replaced the departing Jennifer Gagnon as the full-time GIS specialist in May 2005.

**Deliverables:** The Consortium convened its annual meeting in September 2005 as well as meetings of technical and ecological experts (see ELU/Ecosystems map) and with DEC planning staff (Appendix 2).

**Action:** We developed tools and maps to assist planners with the development of Unit Management Plans, working with GIS software (ESRI’s ArcGIS and ArcView platforms).

**Deliverables:** Several tools created in year 1, including Cost Path Analysis, GPS Data Dictionary, land cover summaries, a potential deer winter yard habitat map, Site Selection Analysis, were implemented. Updates are described below.

**Cost Path Analysis:** Least cost path analysis, or CPA, is an ArcINFO model designed to determine the least expensive path from one point to another. CPA is more fully described in the year 1 report. This analysis is particularly useful for new trail siting and is iterative (e.g., drop out all areas with slope >10%, then re-run with slope >15%). CPA was used in Vanderwhacker and Shaker Mtn. WF.

Planners wishing to utilize the CPA tool provide our GIS specialist the input values. The GIS specialist changes the parameters and reruns the tool, providing the resulting output alternatives to the planner. Currently, CPA runs quickly in ESRI ModelBuilder but is hard-coded to set pathways of data locations, and is not user-friendly. Planners indicated a preference for the option to run CPA themselves rather than have the GIS specialist as the “go-between” to run the tool. In response, we have begun to automate the CPA tool using Visual Basic for Applications to provide a user interface with input windows. Planners will be able to browse to data via flexible pathways, choose the input data layers, reclassify the values, and clip by the selected unit boundary.

**Data Dictionary:** This tool allows planners to organize data collected with GPS units. It is a text file that, when loaded into a Trimble GPS unit, structures data in the proper format as it is collected (and ultimately exported into the GIS). The format is consistent with the DEC State Forest Infrastructure Development Handbook. To date, most planners have located a majority of existing facilities with GPS to an acceptable degree of spatial accuracy; these data are collected, error-checked, and integrated into the Lands and Forests GIS Infrastructure Database. Facilities data need to be served from a centralized database (the Master Habitat Data Bank) to the planners in regional offices. As GPS data are collected, there is also a need to archive the metadata and information on data quality (e.g., type of GPS receiver used, was differential correction applied).

**Potential Deer Yard Model:** This overlay analysis includes suitable elevation, slope and land cover types using criteria based on published deer research and deer studies conducted in the central Adirondacks. This data layer can also be compared with historic (1960s-70s) and current (2003-04)
deer yards (J. Hurst, SUNY ESF, 2004). This model is useful for evaluating possible disturbances to a yard (Fig. 2). Plans should consider potential habitat on state land within the context of the adjacent suitable habitat. Blue Ridge W was just one of the UMPs where potential deer yards were analyzed.

Site Selection Analysis: We developed a method of identifying potential areas for campsites or new facilities. Like CPA, the SSA would be even more useful if the inputs were made user-friendly for the planners.

2. **Interpret the context of the unit with the surrounding landscape.**

**Action:** We developed data layers that allow the planners to assess and inventory natural resources and possible impacts of land use on adjacent lands.

**Deliverables:** These data layers are described below.

**Breeding Bird Atlas:** New York is the first state in the country to have two Breeding Bird Atlases by which to compare distributional changes. The two atlas periods (1980–1985 and 2000–2005) represent a unique opportunity for DEC planners to gauge long-term changes in Adirondack bird composition and distribution at a park-wide scale. Using preliminary data, roughly 758 blocks (88%) within the Park were sampled adequately in both Atlas surveys (i.e., over 20 species were recorded in each of the two Atlases).
We found that of the well-sampled blocks, 42% (n = 321) showed a net increase in species richness and 56% (n = 421) demonstrated a net decrease. These changes are not occurring randomly, but are spatially clustered throughout the Park (Fig. 3). However, it is likely that a variety of causes are responsible, including changes outside the Adirondack breeding ground, requiring further investigation of habitat and landscape features.

We will use the BBA analyses to help planners interpret the changes in the composition of avian communities within and surrounding Forest Preserve units over the last twenty years. Our focus will continue to be on identifying areas of high species richness and diversity, and those units that serve as important habitats for particular species and guilds (ecological groups of species). The two BBA surveys allow us to identify changes in “hot spots” that can be linked to both local events and possibly to regional events for migratory species.


*Figure 3. Breeding Bird Atlas species richness changes, 1980-85 to 2000-05.*
**ELU/Ecosystems Map:** This map is based on an innovative Ecological Land Unit (ELU) approach developed by The Nature Conservancy where environmental information (i.e., elevation, bedrock geology, surficial geology, and hydrology) is used to predict where unique ecological systems occur within the Adirondack Park. This map is an ongoing collaborative effort involving the Adirondack Ecological Center, Adirondack Nature Conservancy, Adirondack Park Agency, and the New York Natural Heritage Program. From the ELU/Ecosystems map we can calculate acreages/percentages for the ecosystem types in the Adirondacks. The Ecosystems map will be useful to compare the Adirondacks to entire Northern Appalachian Ecoregion, and to evaluate rare ecosystem types, with questions such as: Are the types on Forest Preserve or private land? Are these types on Wilderness or Wild Forest? Are there incompatible uses occurring in areas where sensitive protected systems occur?

The next step in map production is accuracy assessment. We plan to utilize US Forest Service Forest Inventory and Analysis (FIA) data for accuracy assessment. Further map corrections will come from expert knowledge and potentially some field collection; experts familiar with ecosystem types on the ground can be convened to accomplish the corrections. Ecosystem types that are difficult to map will be “lumped” into more general classes at higher accuracy levels.

When the ELU/Ecosystems map is suitable we will provide each planner with this data layer at various scales: unit, unit plus adjacent lands or inholdings, watershed, Adirondack Park, and beyond the Park boundary where appropriate. The map will help planners identify areas of unique natural resources as well as similar ecosystems found in different Forest Preserve units.

Figure 4. Draft Ecological Systems/ELU map showing unique ecological communities in Adirondack Park.
GIS Tools for Conservation Planning: This software package consists of three tools developed by the USGS for conservation planning (called CCP). The tools are freely available and downloadable to the ArcView 3.3 platform; a version for ArcGIS is forthcoming. The goal of CCP is to allow planners the ability to rapidly assess landscape attributes and link these attributes with species-habitat information.

Using the 1992 National Land Cover Data (and the 2001 NLCD data when released), CCP will allow planners to interactively make specific changes to a land cover map and re-examine species-habitat relations. We have adapted the New York State Gap Analysis species-habitat relation dataset for use with these tools. The NY-GAP database contains species-habitat associations for every native bird, mammal, amphibian, and reptile species breeding in New York State but is not in an easily-accessible format for planning.

The CCP tools provide the planner with automated graphic output, tabular summaries, and summary figures and graphs. We are developing the use of the New York Gap Analysis land cover map and species-habitat relation data for integration into this software. These tools and extensions will allow planners to interactively make specific changes to a land cover map and re-examine species-habitat relations. We will provide these tools, land cover, and habitat relation data to allow planners to evaluate the merits and possible effects of proposed management scenarios on multiple wildlife species.

Figure 5. Predicted habitat (public land only) for the Redstart in Raquette-Boreal WF.

The CCP tool allows a planner to generate a map of the predicted distribution of species within a set area. First, the planner interactively selects from a list of candidate species (currently limited to birds). For example, a planner may want to know the predicted distribution of the American Redstart within public lands of the Raquette-Boreal Unit. With CCP the planner can examine the potential occurrence of the Redstart on selected parcels of land (Figure 5). The planner can select multiple species or groups of species and create maps depicting species richness patterns to identify potential “hot spot” areas of high species diversity. Note that this tool is using the GAP predicted species distributions data not the NYS Breeding Bird Atlas. GAP data are more appropriate for UMP decision-making, because 5km BBA blocks are too big for individual Forest Preserve units or smaller-scale planning.
3. **Provide training to DEC planners to enable efficient use and interpretation of GIS data.**

   **Action:** We conducted a survey of DEC planners (Appendix 3). They indicated interest in the current suite of available tools and datasets, suggesting that the UMP-GIS project is meeting the stated objectives. Planners’ needs include: simple GPS data collection, consistent data format, and keeping metadata on accuracy of facilities/infrastructure data as well.

   While the GIS skill level varies among planners, the past two years of training resulting from the UMP-GIS project has resulted in increased familiarity with software, data and tool application. DEC Lands and Forests GIS provided complementary training. The DEC Regional Offices now have ESRI ArcGIS 9.1 software which enables the planners to have complete access to all datasets and tools. DEC will phase out support of ESRI ArcView but not for several years. We will continue to work with planners to ensure they are able to use inventory data efficiently and fully, in either software platform.

   **Deliverables:** We conducted training during year 2 based on needs identified through review of the surveys, planners’ comments, and our year 1 experiences. We used a more informal, one-on-one approach to training by visiting planners in their offices. We provided specific datasets or tools and guided planners through their usage, with follow-up visits or calls as needed. We typically worked with one or two planners at a time to maximize hands-on experiences and deal with differences between Regional Office computer systems (each planner keeps data in a different place on the computer). Consequently, training must be tailored to the abilities of the individual planner. We also respond to all inquiries from planners by phone or e-mail. Throughout the duration of the project, we will be available to assist all planners with data interpretation and analysis services.

4. **Ensure protection and archival of the data.**

   **Action:** We maintained a timeline for scheduled updates and data review.

   **Deliverables:** APA, DEC, and NHP data are housed centrally at AEC on a protected external hard drive. This drive contains the entire Master Habitat Data Bank and is updated at least quarterly, unless significant changes to a data layer occurs, in which case the drive is updated as needed.

   Scheduled updates to datasets are variable, as listed in metadata. Datasets will be revisited when new base layers are made available (e.g., new land cover or updated soils datasets).

**Future Recommendations and Solutions – Beyond Year 2**

We developed priorities, recommendations and solutions to current challenges for the next project phase. Communication remains a key to successful planning. Forest Preserve Bureau staff should ensure that planners receive timely updates on software and data changes. The Master Habitat Data Bank (MHDB) underwent an update to ArcGIS 9.1 that, in tandem with the restructuring of DEC databases to be served from Central Office in Albany, will result in improved access to data agencywide.

   **Action:** We regularly communicated with DEC planning staff to understand their needs.

   **Evaluation:** We identified a number of GIS inventory data and software needs and possible solutions that would greatly improve state land planning and stewardship if addressed.
Data sharing and updating is a top priority for successful creation of UMPs. Serving the MHDB from the Central Office will ensure that all planners have the most recent data. The MHDB will function in ArcGIS 9.1 as it has in ArcView, and DEC will continue to support both versions for the foreseeable future. However, the proliferation of datasets in the MHDB and the inevitable changes to them results in a need for a revision date in a more visible place than buried in the metadata file. DEC GIS staff may consider sending a message to planners that a dataset has been updated, though this may prove time-consuming. **Solution:** DEC GIS staff can include a revision date in the one-sentence description of each dataset in the Data Selector window, changing it each time the dataset is updated.

Accurate unit boundaries are critical as we develop statistics on land cover, species distribution, and linkages between Forest Preserve and private lands. The DEC boundaries were suitable for map generation but were deemed inaccurate for GIS analysis. We worked with Brian Finlayson at DEC and John Barge at APA to rectify the boundaries, so that the APA Land Use and Development Plan Map and the DEC unit boundaries match accurately and all have the same set.

Land cover/ecosystem data have been provided by us, using the National Land Cover Data set, but the dataset is over a decade old and fairly coarse in resolution. **Solution:** the U.S. Geological Survey release of a new land cover data set is expected soon. The Ecosystems/Ecological Land Unit map will be more detailed and will fill this need (see Objective 2, Ecosystems Map).

Recreational use information is more fully available than a year ago as Dr. Chad Dawson has compiled information for some areas of the Forest Preserve. Recreational use assessment is a subject of obvious importance to planning for the future of the Forest Preserve and the Park. Snowmobile trail mapping was specifically identified by DEC as a need. **Solution:** We recommend that a plan be developed by DEC to systematically gather information on recreational use on Forest Preserve lands.

Snowmobile trail location is a controversial issue in land use planning for the entire Park. We met with Jim Jennings, the director of the New York State Snowmobile Association, who is helping DEC identify Park-wide snowmobile corridors by mapping trails on private lands with assistance from local snowmobile clubs. The potential corridors will be used in planning trail location alternatives on state land. Connections between state and private land are identified by existing road networks and rarely include assessment of environmental variables. **Solution:** We recommend using the Cost Path Analysis tool where suitable to identify trail alternatives, and also recommend including additional data in the connection analysis, such as the APA Land Use and Development Plan map, land parcel boundaries, slope, aspect, and other environmental factors important to trail placement. At this time mapping is proceeding; we will provide assistance with UMPs if needed.

Accurate, updated facilities data should be rapidly available to planners. The current dataset compiled in the State Forest Infrastructure Database (SFID) is still under development by DEC but should be available to all planners via the MHDB. Collection of new or changed infrastructure data is also critical. Comments to date indicate that the SFID is too detailed to be efficient when collecting GPS data. **Solution:** We are working with DEC Lands and Forests GIS staff to ensure the SFID is accessible to planners via the MHDB. Turnaround time of error-checked data should be as fast as is feasible. There may also be a need to make the GPS Data Dictionary (see Objective 1, Data Dictionary) more functional and streamlined. This is dependent upon the acquisition of new field computers by DEC that would require an alternative SFID application to the Data Dictionary. Fountains Spatial was contracted to create the SFID and may be involved in future applications and training.
**Action:** We identified additional challenges to successful Unit Management Planning and offer possible solutions as follows:

**Communication:** Planning in such a diverse, complex region as the Adirondacks requires constant communication. The multiple-level organizational structure of the DEC can hinder information transfer to and from the planners and Forest Preserve Bureau, Lands and Forests GIS, Wildlife Habitat Inventory Unit, and other Central Office staff. Statewide decisions sometimes influence Forest Preserve planning yet are not communicated to the planners or the UMP-GIS project team. **Solution:** DEC Forest Preserve Bureau should ensure that key staff, including the UMP-GIS project team, are aware of new data availability, system changes, or new protocols before or as they are implemented.

**Tool and Data Usage:** GIS tools and datasets received wider application in year 2 of the project. Because of the varied nature of resource management issues on different Forest Preserve units, all data and tools will not be necessary for all UMPs. However, there still remain more opportunities for tool application. If technical hurdles remain, the likelihood of a planner using a tool is low. **Solution:** We will continue to visit and train planners, run tools in consultation with planners, and develop more user-friendly “front ends” for existing tools.

**Context:** Contextual analyses are a critical component of future Unit Management Planning efforts. Because Forest Preserve boundaries are not “hard,” and are undoubtedly influenced by land uses and changes on adjacent lands, we will continue to pursue the development of innovative data layers and approaches. **Solution:** Roads analysis will be of great value to state lands planning. The new statewide roads data layer (the ALIS or Accident Location Information System roads) is more comprehensive than previous versions. We will incorporate the ALIS roads data as well as other datasets that reflect ecosystem processes or system-wide impacts, such as air pollution and acidic deposition, to enhance land planning.

**Summary**

The Adirondack Park contains the largest and most intact forested ecosystem in the eastern U.S. UMPs are the documents guiding stewardship of the natural resources on public land and are key to maintenance of ecosystem health and retention of the variety of recreational opportunities available.

We improved upon the system developed in year 1 to access existing inventory data and bring natural resource expertise and analyses into the decision-making process. Tools such as Cost Path Analysis, Site Selection Analysis, and Conservation Planning (CCP) now enable planners to evaluate inventory information for Forest Preserve units, as well as compare units and contrast them with the surrounding matrix of land. During year 2 we strengthened relationships with Consortium partners and spent considerable time conducting in-depth, hands-on training.

We distributed the tools, data layers, and results of contextual analyses to planners. Standardized maps began to be included in draft and final UMPs in year 2. We initiated analyses to identify areas within the Adirondacks that contain important suites of species, areas at risk of degradation, and other management priorities. A variety of resources is now available and the project is successful due to the continued interest by DEC planners in applying natural resource inventory information. Year 3 of the UMP-GIS project promises to be an exciting time for planning in the Forest Preserve.
Appendix 1. ArcGIS 9.1 template provided to DEC planners showing the structure and partial list of data layers.
Appendix 2. Meetings with DEC staff and Consortium Members.

9-9-04 Jenny met with Tad Norton to discuss Siamese Ponds W. and test Data Dictionary.

9-16-04 Newcomb
Jenny met with Mike Curley to discuss input parameters for Cost Path Analysis for alternative trails in Vanderwhacker WF and a report on use of the Data Dictionary. Also began work on Wilcox WF data reformatting.

9-21-04 Jenny met with Warrensburgh planners about integrating consultant-derived data.

9-24-04 Lake Placid
Jenny and Stacy presented the UMP-GIS project at the Northeastern Arc User’s Conference.

11-17-04 Albany
Stacy, Jenny and Ben presented the UMP-GIS progress to the Forest Preserve Advisory Committee. We identified deer yards as an issue that required GIS data.

1-13-05 Ray Brook
Jenny and Stacy presented the CPA tool and UMP-GIS project to APA Commissioners.

1-19-05 Minnowbrook Conference Center
Jenny, Stacy and Ben presented the first year of results of the UMP-GIS project to the DEC Forest Preserve Bureau staff, with additional DEC and APA staff attending. Also received feedback on future tool needs, and on benefits and issues with current data and mapping requirements. There was much discussion of the GIS tools, deer yard mapping, and especially the Cost Path Analysis. Afterward, we received at least two additional requests for tools and data from planners with whom we had not yet worked.

2-3-05 Northville
Jenny met with Rick Fenton to follow up from Minnowbrook meeting, provide deer yard layer and finalize set of maps for Blue Ridge W.

2-9-05 Newcomb
Jenny and Stacy met with John Gibbs and Greg Rutle to discuss easements and road access in the Raquette-Boreal unit.

2-15-05 Northville
Jenny met with Tom Kapelewski to continue map creation for Shaker WF and Jessup River WF.

3-21 and 3-22-05 Newcomb
Ben, Jenny and Stacy hosted the second Ecosystems/ELU mapping meeting.

5-11-05 Ray Brook
Jenny met with Brian Finlayson (DEC Cartographer) to discuss mapping standards. Also met with DEC Planner Dan Levy.
Appendix 2. Meetings with DEC staff and Consortium Members, continued.

5-18-05 Northville
Steve & Jenny met with Tom Kapelewski. Delivered files for Jessup River WF hydrology, habitat and hydrology. Also tutored Tom on using ArcGIS 9.0—symbology, legends, north arrows, etc.

5-25-05 Lake Placid
Jenny and Stacy presented the UMP-GIS project to the Adirondack Research Consortium; Steve attended and met with many Consortium members and DEC planners.

6-7-05 Ray Brook
Steve and Jenny met with Brian Finlayson. Delivered habitat maps for Shaker Mt. WF and Jessup River WF. Installed ArcGIS 8.3 on Brian's computer. Jenny introduced Steve to John Barge at APA.

6-9-05 Ray Brook
Steve and Jenny met with Sean Reynolds & Rob Daley for basic GIS troubleshooting. Delivered ArcReader Templates for Jay, Hurricane and Debar units.

6-15-05 Warrensburgh
Jenny introduced Steve to Stu Brown and discussed map creation.

6-21-05 Warrensburgh
Jenny met with Tad Norton to correct the Lake George WF trails data.

6-23-05 Warrensburgh
Jenny met with Stu Brown to work on Wilmington WF and Split Rock WF potential for mountain bike trails.

7-12-05 Albany
Steve met with Steve Hurst to discuss possible use of Bureau of Fisheries Modern Statewide database and with DEC Wildlife Habitat Inventory Unit staff Katherine Barnes and Bob Sanford regarding MHDB data and DEC plans to transition to ArcGIS 9. Katherine agreed to share their ArcView Training materials with the UMPGIS project.

7-14-05 Ray Brook
Steve facilitated a GPS seminar and general help session for Ray Brook planners Sean Reynolds, Rob Daley, Steve Guglielmi, Kris Alberga.

8-18-05 Warrensburgh
Steve met with Nathan Ermer to deliver map template and data layers for Wilcox Lake WF.

9-15-05 Newcomb
UMP-GIS Annual Meeting of Partners to share update on progress to date and plan future tasks.
Appendix 2. Meetings with DEC staff and Consortium Members, continued.

10-04-05 Herkimer
Steve met with Eric Kasza to deliver map templates and data layers for W. Canada Lakes Wilderness, Ferris Lake WF and Silver Lake Wilderness. Also installed ArcGIS 9.1 on his computer and gave brief tutorial. Discussed GIS analysis of ecological effects of possible Cedar Lakes Dam failure.

10-20-05 Potsdam
Steve met with Pat Whalen and John Gibbs to deliver map templates and data layers for Whitehill, Raquette Boreal and Aldrich Pond WFs. Steve provided a brief tutorial on ArcGIS 9.

10-24-05 Newcomb
Steve and Stacy met with DEC Regional Biologist Paul Jensen to show various data layers and tools and discuss how best to share ecological GIS data.
Appendix 3. Results from survey of DEC planners, August 2005.

1. N/A

2. GIS software access, skill level and training needs.

<table>
<thead>
<tr>
<th>GIS Software</th>
<th>Access to the program (%)</th>
<th>Skill level (0-5)</th>
<th>Interest in further training (0-5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ArcInfo Workstation</td>
<td>10%</td>
<td>0.20</td>
<td>1.25</td>
</tr>
<tr>
<td>ArcView</td>
<td>100%</td>
<td>2.55</td>
<td>4.40</td>
</tr>
<tr>
<td>ArcGIS 9</td>
<td>0%</td>
<td>0.20</td>
<td>2.40</td>
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<tr>
<td>Spatial Analyst Extension</td>
<td>10%</td>
<td>0.60</td>
<td>2.00</td>
</tr>
<tr>
<td>Trimble Pathfinder Office</td>
<td>90%</td>
<td>1.70</td>
<td>3.67</td>
</tr>
</tbody>
</table>

3. Percentage of facilities that have been located with <5m accuracy using a GPS unit.

67%

4. Brand and model of GPS receiver are you using to collect GPS data?

Most use Trimble

5. Ability to post-process GPS data to improve accuracy.

73%

6. Planners whose UMPs contain proposals for new facilities.

<table>
<thead>
<tr>
<th>Facility</th>
<th>% Planners Proposing new</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campsites</td>
<td>82%</td>
</tr>
<tr>
<td>Boat Launches</td>
<td>36%</td>
</tr>
<tr>
<td>Roads</td>
<td>36%</td>
</tr>
<tr>
<td>Cross-country Ski Trails</td>
<td>73%</td>
</tr>
<tr>
<td>ATV Trails</td>
<td>18%</td>
</tr>
<tr>
<td>Snowmobile Trails</td>
<td>64%</td>
</tr>
<tr>
<td>Hiking Trails</td>
<td>91%</td>
</tr>
</tbody>
</table>

Other (1 UMP only): Fishing Access, Universally accessible site, Mt Bike, Lean-to, Horse Trails.
Appendix 3. Results from survey of DEC planners, August 2005, continued.

7. Usefulness of following data layers to planners. (1=not useful, 5=very useful)

<table>
<thead>
<tr>
<th>Data Layer</th>
<th>Utility (1-5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential Deer Yards</td>
<td>4.00</td>
</tr>
<tr>
<td>Potential Spruce Grouse Habitat</td>
<td>3.80</td>
</tr>
<tr>
<td>30 m Land Cover (e.g. NLCD)</td>
<td>3.80</td>
</tr>
<tr>
<td>Distance to roads</td>
<td>3.50</td>
</tr>
<tr>
<td>Important Bird Areas</td>
<td>3.91</td>
</tr>
<tr>
<td>Fish Inventories*</td>
<td>3.60</td>
</tr>
<tr>
<td>BBA</td>
<td>3.90</td>
</tr>
<tr>
<td>ELU</td>
<td>4.09</td>
</tr>
<tr>
<td>Forest Disturbance</td>
<td>4.18</td>
</tr>
<tr>
<td>Water Chemistry*</td>
<td>3.20</td>
</tr>
</tbody>
</table>

*selected lakes & streams

8. Other requested datasets.

Invasive Plant Locations, historic Deer yards, wetlands, significant habitats.

9. Usefulness of the following GIS tools. (1=not useful, 5=very useful)

<table>
<thead>
<tr>
<th>Tool</th>
<th>Score (1-5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trail/Road Placement</td>
<td>3.7</td>
</tr>
<tr>
<td>Campsite Selection</td>
<td>3.7</td>
</tr>
<tr>
<td>CCP Tool</td>
<td>4.1</td>
</tr>
</tbody>
</table>

10. Other ways UMP-GIS could assist.

Produce wetland, significant habitats, other "standard" maps for UMPs. More training on how to use GIS.