WI DNR Lake Planning Grant
Project Number LPL-832-02

Geneva Lake Conservancy

Priority Areas Inventory and Protection Plan

Final Report

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TABLE OF CONTENTS

Figures

Tables and Charts

Appendices

Summary

The Geneva Lake Conservancy's (GLC) mission is promoting responsible growth and development of the region while protecting natural resources and historical sites. To this end, GLC is continuously seeking tools to aid in their protection. During this project, GLC staff, technical assistants and an intern from the University of Wisconsin-Madison developed a geographic information system to inventory areas for protection. A decision support tool (model) based on geospatial data and a survey of GLC Board and land committee members' protection concerns was developed to assist in defining a process to prioritize areas in need of protection. Special care was used to ensure that the geospatial analyses can be transferred to other organizations who could benefit from the GLC's work. Using the model and a draft "vision map" which was taken to various public forums for discussion, the project manager created a series of maps and charts identifying specific properties, their locations, ownership and environmental attributes and then assigned recommended protection measures to each of the prioritized areas. Finally, some management and public education tools are recommended.

Description of project area

The project area for this work encompasses all of the Geneva Lake watershed in southeastern Wisconsin and extends to the eight townships of southern Walworth County, Wisconsin – Darien, Sharon, Lyons, Bloomfield, Geneva, Linn, Delavan and Walworth (*See Figure 1*). Geneva Lake has a surface area of 5,245 acres. The Geneva Lake watershed is approximately 12,806 acres in size and includes the municipalities of Fontana, Williams Bay, Walworth, and Lake Geneva. The White River corridor (Lower Fox River watershed), identified as a Land Legacy area by the DNR, extends to the northeast of Geneva Lake. Other lakes in the project area include Delavan, Como and Comus. Other important surface water resources include a portion of the Turtle Creek valley, Nippersink, Southwick and Van Slyke Creeks. The southern boundary of this area is the Wisconsin-Illinois state line. Residential, commercial, and recreational land uses are focused around the lakes. Agriculture dominates the surrounding landscape

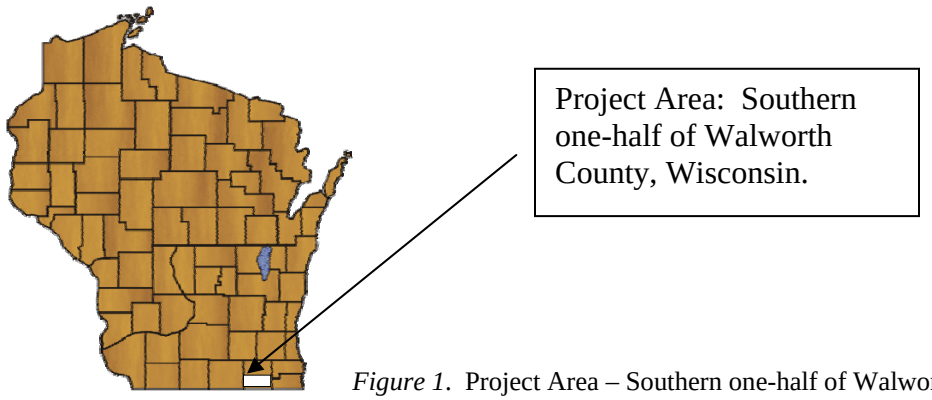


Figure 1. Project Area – Southern one-half of Walworth County. Source: Graphic provided by Wisconsin State Cartographer's Office.

The area, often called the Geneva Lakes region, is located about 65 miles northwest of Chicago, 30 miles east of the Janesville-Beloit area and 45 miles west of the Milwaukee metropolitan area. It has long been a recreational and second home location for visitors from these nearby urban areas, but recently year-round residential, commercial and industrial development in the region has been increasing rapidly.

Introduction

Balancing urban and economic growth with conservation is one of the most difficult challenges facing land use planners. Rapid and unplanned development can translate into environmental damage and threaten traditional rural landscapes. Although urban sprawl is generally associated with booming suburbs adjacent to major cities, some of the fastest growing areas in Wisconsin are historically quiet communities located adjacent to scenic lakes. According to the 2000 US Census Bureau report Walworth County was the third fastest growing county in the state, but in 2002 the rate of growth slowed, placing Walworth County in the fifth position. In a January 1999 study entitled UNDER PRESSURE: Land Consumption in the Chicago Region 1998 – 2028 the Chicago-based Openlands Project, produced maps showing much of the Geneva Lake area under "high"(*Figure 2* – shown in red) or "medium" (*Figure 2* – shown in yellow) risk for development within the next ten to thirty years (*Figure 2*).

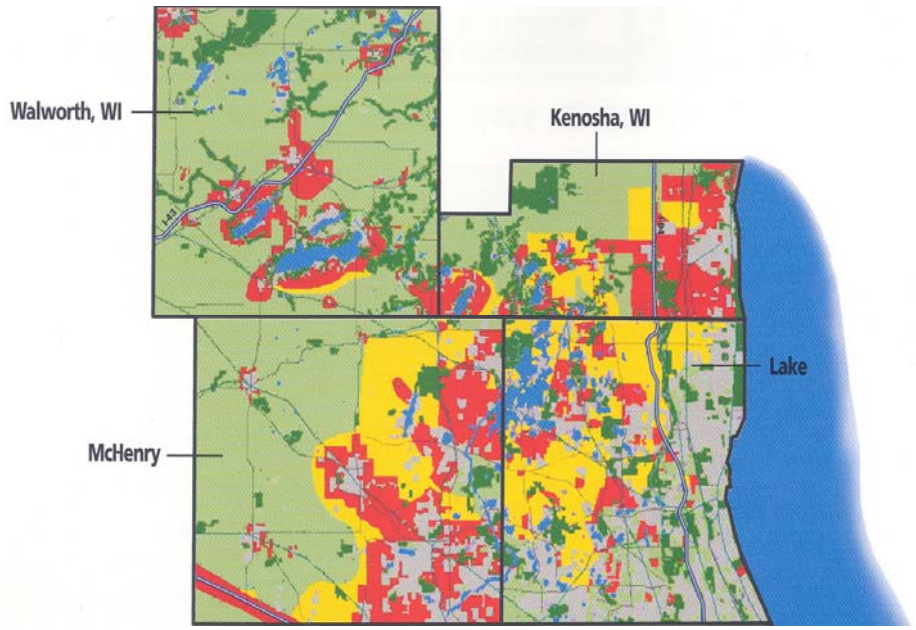


Figure 2: Openlands Project map excerpt from UNDER PRESSURE Land Consumption in the Chicago Region 1998 – 2028 the Chicago-based Openlands Project, January, 1999.

A Walworth Co. Economic Analysis, produced by TIP Development Strategies in April, 2002, cited a 27% population growth rate in the county from 1990 -2000, yet stated that of the 7 SE WI counties, Walworth is still the most rural. Newspaper articles have cited approximately 50% growth rates for Genoa City, Bloomfield township and the Village of Walworth. A Land Use Plan for Walworth County: 2020, by the Southeastern WI Regional Planning Commission (SEWRPC) notes that between 1963 and 1995 residential land increased by 62%, commercial land by 90% and industrial land by 200%. Agricultural land decreased by 7% and natural areas decreased by 3%. According to SEWRPC biologists several of the county's natural areas have been degraded.

Nevertheless, people continue to come to the Geneva Lake region both as visitors and as homeowners. In Recreation and Amenity Migration in Urban Proximate Areas Report of Survey Results, by Kenneth M. Johnson, Loyola University-Chicago, and Susan I. Stewart, North Central Research Station, USDA Forest Service, over 90% of respondents to a survey of second home owners cited environmental quality and recreational opportunities as the major reasons they come to Walworth County. The majority of the second homeowners came from Chicago and northern Illinois (*Figure 3*) so they are comparing a perceived degradation of their quality of life in those source areas to a perceived relatively pristine environment around the lakes of Walworth County.

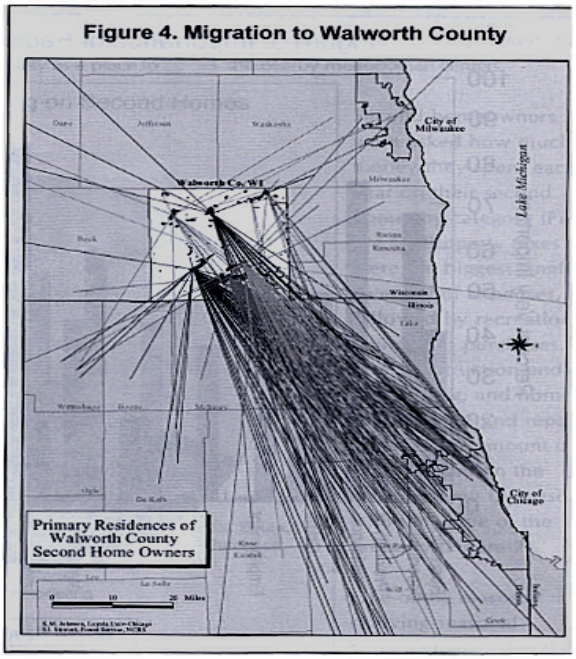


Figure 3: Where do Second Homeowners in Walworth County Come From? Source: Recreation and Amenity Migration in Urban Proximate Areas Report of Survey Results by Kenneth M. Johnson, Loyola University-Chicago, and Susan I. Stewart, North Central Research Station, USDA Forest Service.

The Project

In a recent membership survey conducted by the Geneva Lake Conservancy, 97% of the respondents strongly felt that action should be taken to protect from irresponsible

development. The survey also revealed that the top three land use issues of most concern include lakeshore development, preservation of natural areas, and urban sprawl.
As a non-profit land trust, the Geneva Lake Conservancy (GLC) works to preserve open space, water quality, environmentally sensitive lands, and places of historical significance. To that end, GLC continuously works to create tools to aid public decision makers, educate private landowners, and prioritize areas in need of protection.

Aided by a Lake Planning Grant from the Wisconsin Department of Natural Resources, GLC began a planning activity to identify and prioritize areas for protection. An extensive partnership effort allowed GLC to prioritize area natural resources for protection through 1) the development of a geographic information system, 2) the use of a survey to gauge the Conservancy Board and land committee's concerns and priorities, and 3) development of a computer model to rank areas of concern. The plan would recommend protection of those areas prioritized through the use of various conservation tools, such as acquisitions, easements, conservation development and other conservation tools.

Early on, two requirements were identified which shaped the rest of the project. First, to comply with terms of the DNR grant and to maximize the usefulness of the model, special care was taken to ensure that the process would be transferable to other organizations. Second, GLC and similar groups have limited financial resources (underscoring the need for a prioritization tool in the first place) so it was important to minimize the cost of the overall project. Therefore, the process was designed to utilize publicly-available data sets, some of which were obtained free-of charge through various agencies and project partners including SEWRPC, the DNR, USGS, NRCS, Alliant Energy, the Environmental Remote Sensing Center at UW-Madison, UW-Whitewater Department of Geography and Geology, and the Walworth County GIS Office. Other data, such as the wetland inventory and plat maps from Rockford Map company were purchased.

Renae Prell-Mitchell, Ph.D. in geography, was project manager and Lydia Demcuk of the GLC staff was program assistant. A GIS technician, Kim Lein, who formerly worked for the Walworth County GIS Office was hired to input and convert the GIS data. A UW-Whitewater undergraduate student, Jarome Christiansen, was hired to collect spatial data regarding participants in the state's farmland preservation program. An internship was arranged to assist GLC with the development of a decision-support system and modeling project. The intern, Jeff Maxted, was a master's degree candidate in the Environmental Monitoring program at the University of Wisconsin-Madison. The Environmental Monitoring program focuses on the research and application geospatial tools with an emphasis on remote sensing data. Netspatial, Inc., a non-profit organization that provides GIS assistance and education, was very helpful in setting up the internship and guiding the approach used by Jeff and GLC.

Once the modeling was completed a "vision map" and narrative were combined into a brochure for what became known as the "Green and Gold Belt Project" of the Geneva Lake Conservancy -- so named because on a generalized scale the natural areas were seen

as creating a “greenbelt” and the recommended farmland preservation areas formed what was termed a “goldbelt” protection area. The identification of the green and gold colors with Wisconsin’s famous Green Bay Packers was considered to be a useful catch phrase that people would remember.

A Power Point presentation describing the development of the GIS, the modeling and the conservation tools which could be applied to the priority areas shown on the “vision map” brochure was presented to over 20 groups across the entire project area. The brochure’s centerfold “vision map” was used to elicit comments on the feasibility phase of the Green and Gold Belt Project. Comments received helped the project manager develop recommendations for land protection measures on identified priority properties.

Issues to be Addressed by Project

The following issues were also detailed in the original grant application and will be addressed in the results and recommendations sections of this report:

- Urbanization within the region and its effects on Geneva Lake
- Increasing rural density within the region and its effects on Geneva Lake
- Protection of Natural Areas and Critical Species Habitat
- Shoreland Buffer Zones
- Public Education and Participation

Project Objectives

The goals and objectives of the entire project are as follows: To develop a series of maps useful for long-range conservation planning.

1) To develop a series of maps useful for long-range conservation planning by developing a rich set of GIS data that contains as much information as possible about the natural resources and land use plans of the project area. Minimize cost by utilizing publicly available data sets when possible.

2) Interview and meet with landowners, farmers, developers and local government officials individually and in small focus groups to gauge their willingness to participate in the protection of certain land parcels through a variety of conservation tools. Obtain community feedback through a series of presentations and meetings across the entire project area.

3) Select and prioritize areas (Priority Landscapes) for various forms of protection with a simple, flexible, and transferable model that provides a “big picture” sense of where lands significant to the mission of the Geneva Lake Conservancy are located within the project area. Identify a process for prioritizing parcels for land protection initiatives (i.e. the model). Train GLC staff with enough GIS capability to adjust the model and approach GIS analysis from a process-oriented viewpoint.

4) Recommend management plans for chosen areas. Examples of the specific objectives for watershed and land use management, and possible tools for their accomplishment are:

a) reduction of sediment loading
b) acquisitions and a purchase of development rights (PDR) program
c) lake/land management ordinances
d) management plans for chosen wildlife habitat sites
e) development of a county conservation subdivision ordinance and assisting developers in planning and implementation
f) encouraging shoreline buffer zone plantings.

5) Develop a long-range plan and innovative vision that provides specific tools and timetables for protection efforts. Share the vision with others. Follow up through acquisition, easement, farmland preservation and other efforts to implement the vision. This phase would likely become a permanent part of the Conservancy's work. Document the progress and prepare a final report for the DNR, project partners and other interested parties.

Methods

While the project manager has an advanced degree in environmental geography and a good understanding of how GIS could be applied to the needs of this project, neither she nor other staff has had technical training in GIS. The Conservancy sponsored her attendance at a one-day workshop on "GIS and Geography for Land Trusts" at the Land Information Access Association in February, 2002. Through a partnership with the University of Wisconsin-Whitewater Dept. of Geography and Geology we were able to utilize their Advanced GIS Research Laboratory at a reduced rate ($500 for the year, including all map printing). A team was assembled consisting of Renae Prell-Mitchell, project manager and Lydia Demcuk program assistant to GLC staff; GIS technician, Kim Lein, who formerly worked for the Walworth County GIS Office; UW-Whitewater undergraduate student, Jarome Christiansen; and intern, Jeff Maxted, a master's degree candidate in the Environmental Monitoring program at the University of Wisconsin-Madison.

To facilitate the future use of the decision-support system and model, Jeff Maxted provided three training sessions for the GLC staff on the University of Wisconsin-Whitewater campus. The first session focused on a general description of the methods used for this project with Renae Prell-Mitchell. The final two sessions involved Renae and Lydia Demcuk.. The second session answered questions regarding the use of Arc View 3.2a, a popular GIS software package developed by the Environmental Systems Research Institute (ESRI). During the final session, the GLC staff was trained to use Spatial Analyst, an extension to the Arc View GIS software that is useful for working with raster (grid) data sets.

Facilities

Development of the GIS and subsequent mapping and Power Point presentations for this project was performed at the Dept of Geography and Geology at UW-Whitewater. The modeling project was done at ERSC, located on the University of Wisconsin-Madison

campus. Computers and GIS software were utilized at both UW-Whitewater and ERSC. Computers were used at the Geneva Lake Conservancy to develop the Green and Gold Belt project publications and several of the maps.

Hardware and Software Donations Leveraged as a Result of Grant

During most of the year that this project was occurring the Conservancy did not have the hardware or software capabilities for GIS. However, upon researching the requirements for the hardware, a local donor provided a computer system and large format color printer that exceeded the requisites for the software. They also provided GLC with a digital camera and hand-held GPS unit so we could establish photo points and other GPS locations for baseline documentation and easement monitoring (see example Appendix H). The total value of their donations exceeded $8,000.

In February, 2002 the Geneva Lake Conservancy project partners presented a seminar about our case study at the Wisconsin Land Information Conference. The Conservancy requested a donation of software from the Environmental Science Research Institute (ESRI) – Minneapolis. ESRI offered to donate one license each of the newest versions of the software which have recently been released as ArcView 8, Spatial Analyst 8 and 3-D Analyst 8. This package has a total $5,500 value (see attached letter Appendix C – supporting documents). The GLC Board has agreed to maintenance and three training courses for each of two staff on the new software. The DNR lake planning grant was critical in leveraging these donations.

Development of a Geographic Information System

GLC has been fortunate to have a wealth of publicly available GIS data at their disposal. In addition, most of these data sets are available free of charge. Other organizations within Wisconsin are generally able to find similar sources, although availability will vary significantly. Digital plat maps and the wetland inventory were purchased. Publicly available spatial data were obtained from the following sources (see Appendix B for metadata):

- Alliant Energy – River Land Conservancy Project
- Southeast Wisconsin Regional Planning Commission (SEWRPC):Land use and environmental data
- Wisconsin Department of Natural Resources (DNR): Environmental data
- Walworth County: Land ownership and parcel data
- U.S. Geological Survey Bureau (USGS): Base data, elevation model

Data layers developed include:

- Digital elevation model
- Shaded relief
- Base maps
- Regional roads and railroads
- Municipalities
- Ortho-photo 2000 (mapable aerial photos)

- Parcel maps linked with ownership/acreage/property values
- Hydrology
- Watersheds
- Original vegetation
- Current land cover
- Forest land categorizations
- SEWRPC and DNR critical natural areas (delineated by hand onto ortho-photos)
- SEWRPC and DNR environmental corridors
- Walworth County Land Use Plan: 2020
- Prime agricultural soils and land enrolled in farmland preservation
- NRCS soil categories
- Wetland inventory
- Viewsheds
- Satellite imagery

Other maps and data layers were created through the modeling process which will be described in the next section.

Prioritization Model

Although the following discussion describes the technical details of how the final maps and model for this project were produced, it is important to focus on the *process* – not the final products. This process has been designed to be transferable and flexible so that the final products are capable of reflecting new and/or different priorities. In addition, the final products are meant to serve as a tool for decision-making; this process should not be viewed as a "black box" technology with the ability to unilaterally direct the allocation of resources.

The following sections describe the methods and GIS analysis conducted to answer two questions, 1) Which lands within the project area are most important to preserve and 2) which of the most important lands are likely to be converted to an urban use if not protected?

❖ **Land Characteristics Survey**

Determining an objective measure of the "most important" lands proved to be the first challenge during the project. To accomplish this task, a survey was developed and administered to the GLC Board and the land committee. The land committee was created for the project and consisted of GLC Board members (including a farmer), two local realtors, a developer, two local officials, a county land conservation officer and staff of the Geneva Lake Environmental Agency. It is expected the committee will continue to oversee and advise during the implementation phase.

The survey included a list of land characteristics that may affect the value of an individual piece of land to the survey respondents. Examples of these characteristics included land cover (forest, wetlands), proximity to major hydrologic features,

zoning, and terrain. Critical natural areas were designated as including all of those in the project area that had been identified as important by SEWRPC and DNR biologists in A Regional Natural Areas and Critical Species Habitat Protection and Management Plan for Southeastern Wisconsin, SEWRPC Planning Report No. 42, September 1997. Each characteristic was ranked on a scale from 1 to 5, with a score of one meaning that the characteristic was not important when choosing which lands to protect and a score of five meaning that the characteristic was very important.

Input of publicly-available data sets was completed before the survey was distributed. Each land characteristic included in the survey was worded so that it could be easily expressed with a spatial theme (data layer). For example, it is reasonable to believe that the survey respondents may place more importance on areas close to a major lake as opposed to areas that are far away from a major lake. Distance to a lake is a land characteristic that can be expressed with a publicly available hydrology theme and a GIS calculation. Similarly, an environmental corridor is a land characteristic that can be expressed as a spatial theme that is defined and maintained by SEWRPC. A total of 14 surveys were returned and a formerly developed membership survey which had 200 respondents was also represented. The average score for each characteristic was calculated to determine which factors are most important to the Board, land committee and membership when determining which lands to protect. The results are presented in Table 1.

Table 1. Results of Land Characteristics Survey

Land Characteristic	Score	Spatial Theme Used to Express Characteristic
Inclusion in a critical natural area	4.79	Critical Natural Areas
Presence of wetlands	4.64	Wetlands
Inclusion in an environmental corridor	4.50	Land Use Plan / Environmental Corridors
Presence of forest	4.21	Land Cover – Forests
Location on a stream that flows into Geneva Lake	4.14	Hydrology
Prime agricultural soils	3.86	Soils Data
Location near White River	3.79	Hydrology
Presence of open farm fields	3.71	Land Use Plan / Zoning
Adjacency to an environmental corridor	3.64	Land Use Plan / Environmental Corridors
Steep slopes	3.64	Digital Elevation Model
Distance to any lakeshore	3.29	Hydrology
Distance to Geneva Lake	3.07	Hydrology
Distance to Como or Delavan lake	2.93	Hydrology
Inclusion in a proposed urban service area	2.62	Land Use Plan / Zoning
Ability to see large lake	2.36	Digital Elevation Model / Hydrology

Note that alternative statistical calculations, such as standard deviation, can be used for other projects, which increases the flexibility of the overall process.

❖ Map Algebra and Overlay Analysis

The most time-intensive portion of the project involved translating the survey results into a map that can be used for decision making. The following sections describe the process used to develop a meaningful and flexible decision-making tool that can be used by professionals with minimal GIS training.

This analysis was performed using a grid that spanned the entire project area. Each land characteristic was mapped as a grid with a 30-meter grid cell size across the entire project area. The table on the left of *Figure 4* is a 3-cell by 3-cell representation of such a grid. The actual grid is comprised of thousands of cells.

The analysis was conducted in Arc View 3.2a, a popular GIS software package produced by the Environmental Systems Research Institute (ESRI), with the aid of the Spatial Analyst extension. The work was performed by GLC Intern Jeff Maxted under the supervision of the project manager, with technical assistance from Tim Olsen, UW-Madison, and NetSpatial, Inc.

Assigning weights to features within individual themes

Figure 4 demonstrates the calculations used to construct a weighted grid for an individual theme. The table on the left of *Figure 4* is a 3-cell by 3-cell representation of a grid for an individual theme. Then, relative weights *within* the theme were assigned to the features on individual layers. The example above applies a weight of 5.0 to the cells where the feature is most important (e.g. primary environmental corridor), a weight of 2.5 to the cells where it is less important (e.g. secondary environmental corridor), and a weight of zero to the cells where the land characteristic is not present. Maps of each individual theme can be found in Appendix A.

Assigning relative weights between themes

The survey results that describe the relative importance of each land characteristic were incorporated into the model by assigning a weight to the individual themes. This was accomplished by multiplying the value of each grid cell by the average survey score for that particular theme (*See Figure 4*). For example, the value in each grid cell for the critical natural area theme was multiplied by 4.79 (*See Table 1*). This value was then normalized by dividing by 5.0, the maximum possible score, to produce the weighted grid for the individual theme.

5.0	5.0	2.5
2.5	2.5	2.5
0.0	0.0	0.0

$$\times \frac{\text{SURVEY RESULT}}{5.0} =$$

4.0	4.0	2.0
2.0	2.0	2.0
0.0	0.0	0.0

Figure 4. Map algebra. In this example, the 3x3 grid on the left contains three different weights depending on the presence and importance of a particular feature. The value of each grid cell is multiplied by the survey score for that feature (in this example, a value of 4.0 was used) and normalized by dividing that value by the maximum possible score. The result is a weighted grid for the individual theme.

Final map calculation

After each theme has been produced and weighted, a composite map is produced. This is accomplished by taking the value of each grid cell and adding it to the values of corresponding grid cells in the other themes. For example, the value for a grid cell in the far northwest corner of the weighted environmental corridors theme would be added to the value for the grid cell in the far northwest corner of the forest theme (and all of the other themes). The sum of all of these values is placed into the grid that is displayed as the final results. A higher final grid cell total denotes a higher level of importance for that piece of land.

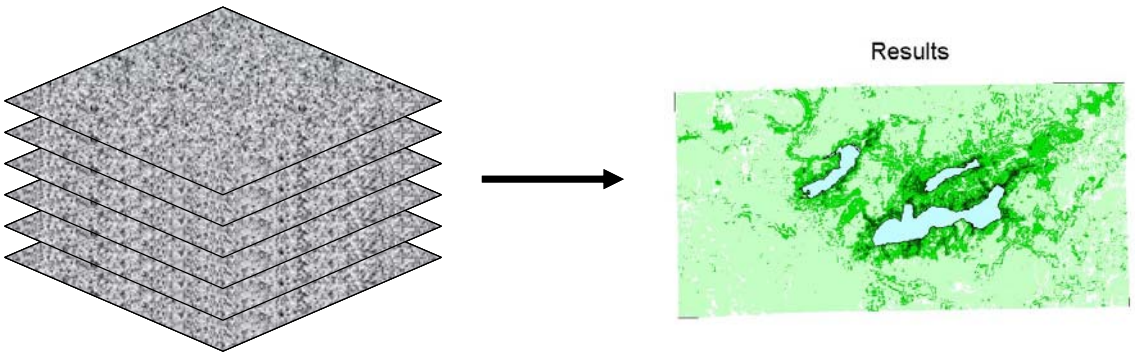


Figure 5. Addition of individual themes to produce composite map. After each theme has been produced and weighted, a composite map is produced. The value of each grid cell is added to the values of corresponding grid cells in the other themes to construct the final results. A higher grid cell total denotes a higher level of importance for that piece of land and is displayed as a darker shade of green in the map on the right. A larger version of the final model results is displayed in *Figure 6*..

Results

Figure 6 is the result of combining all of the individually weighted themes into a single grid. Darker shades of green represent areas of higher importance and lighter shades of green represent areas of lesser importance, based on the responses on the land characteristics survey. As expected, areas near the largest lakes generally contain higher composite values. The highest grid cell values are along streams that lead into Geneva

Lake. Grid cells in agricultural areas that are relatively distant from the major lakes generally contain lower composite values.

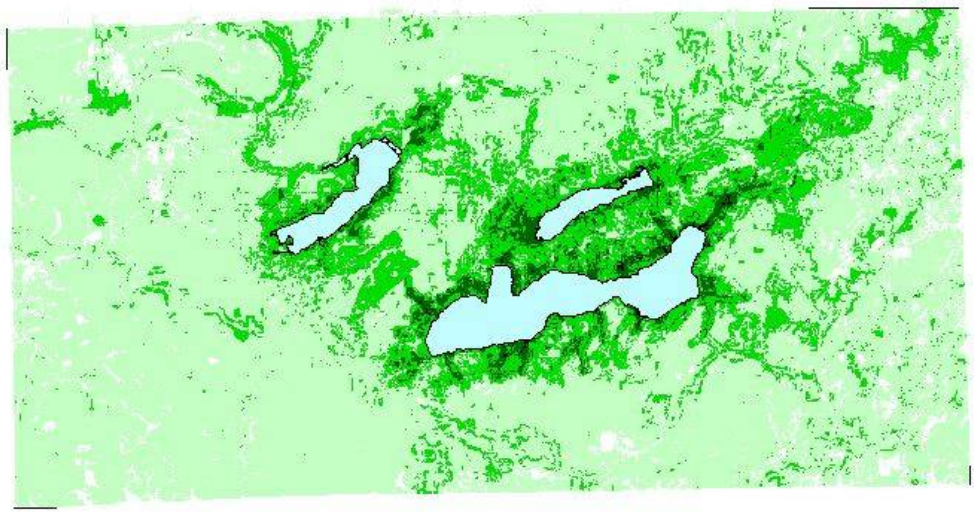


Figure 6. Model results – all factors. The darkest shades of green represent areas that are "most important" based on the survey results and the weighting in this particular version of the model. As expected, areas near Geneva Lake are generally believed to be more critical than other agricultural areas. Note that the weights and layers can be adjusted to reflect changes in priorities.

Part of the flexibility in this process is demonstrated in *Figure 7*. This map represents a grid that was constructed using only the hydrology and critical natural areas themes. Although the weights from the land characteristics survey were unaltered, this map places greater importance on riparian areas. Notice the darker green areas in the northwest portion of the project area compared to *Figure* 6. Adding and removing themes from the composite grid allows GLC to focus on subsets of land issues, such as agricultural land preservation, forestry, or water quality concerns.

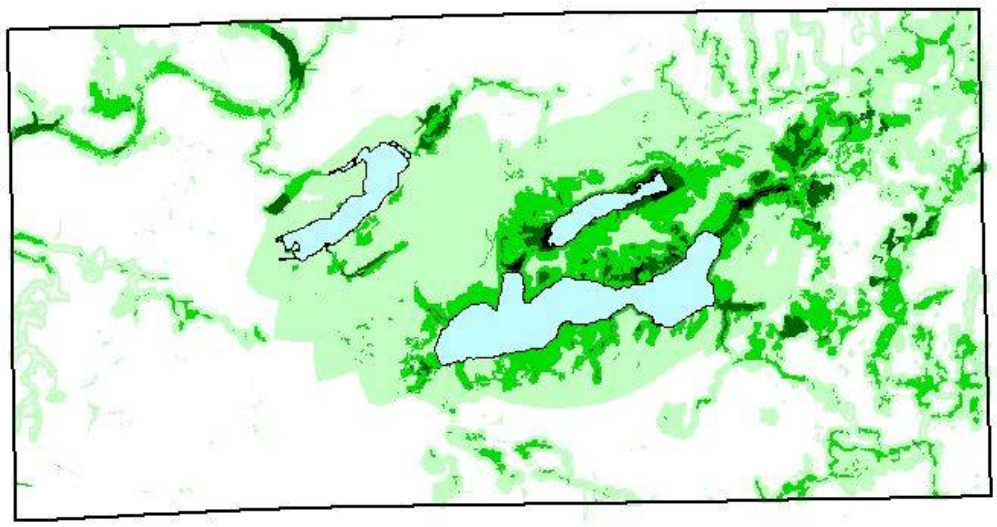


Figure 7. Model results – water quality factors only. This map shows areas of greatest importance in dark green when only the hydrology and critical natural areas are included. Notice that the critical areas in the northwest portion of the project area are emphasized in this map.

❖ Prioritization Analysis

The maps in the previous section were developed to show which areas within the project area are the most important based on the survey administered to the GLC Board and the GLC land committee. This section describes how to focus conservation efforts by identifying the areas that are most important **and** most threatened.

Identifying parcels likely to be converted to an urban use

For this report, it was assumed that all non-urban areas within ½ mile of an urban use (as defined by SEWRPC data) are the most likely to become near-term development targets. In other words, new urban growth is most likely to occur near recent urban growth. (*Note*: More accurate and reliable models exist and, as discussed in the "future tools" section, it is recommended that GLC continue to explore their applicability.) All parcels greater than 50 acres that intersect the future growth zones are shown in *Figure 8.*

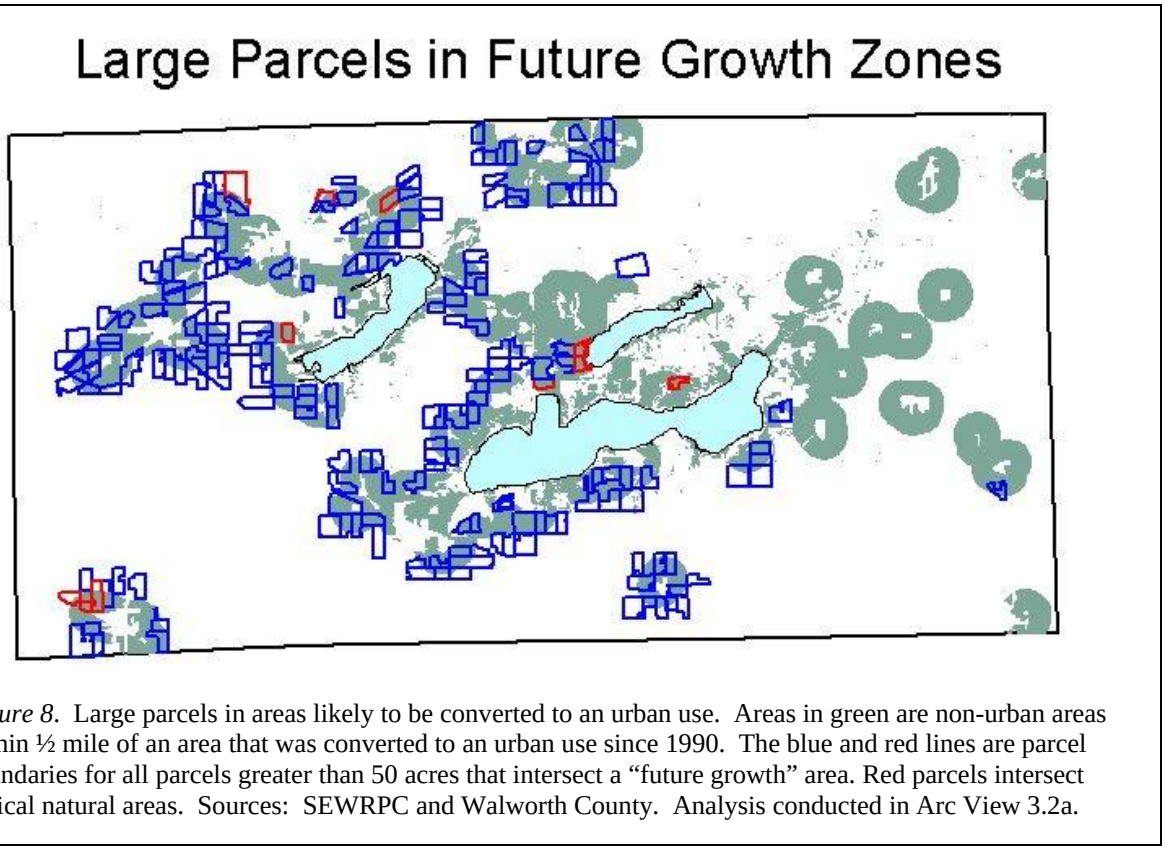


Figure 8. Large parcels in areas likely to be converted to an urban use. Areas in green are non-urban areas within ½ mile of an area that was converted to an urban use since 1990. The blue and red lines are parcel boundaries for all parcels greater than 50 acres that intersect a "future growth" area. Red parcels intersect critical natural areas. Sources: SEWRPC and Walworth County. Analysis conducted in Arc View 3.2a.

Identifying high priority parcels

Parcels greater than 50 acres that intersect a "future growth zone" and an area of "high importance" (the dark green areas in *Figure 6*) are designated as areas of concern called critical parcels in this scenario. In this theoretical example, the GLC would place the highest priority on these parcels because they represent the areas that are the most important to the GLC Board and are the most threatened by new urban development. This analysis can be adjusted to select parcels of different sizes or other attributes such as ownership or value.

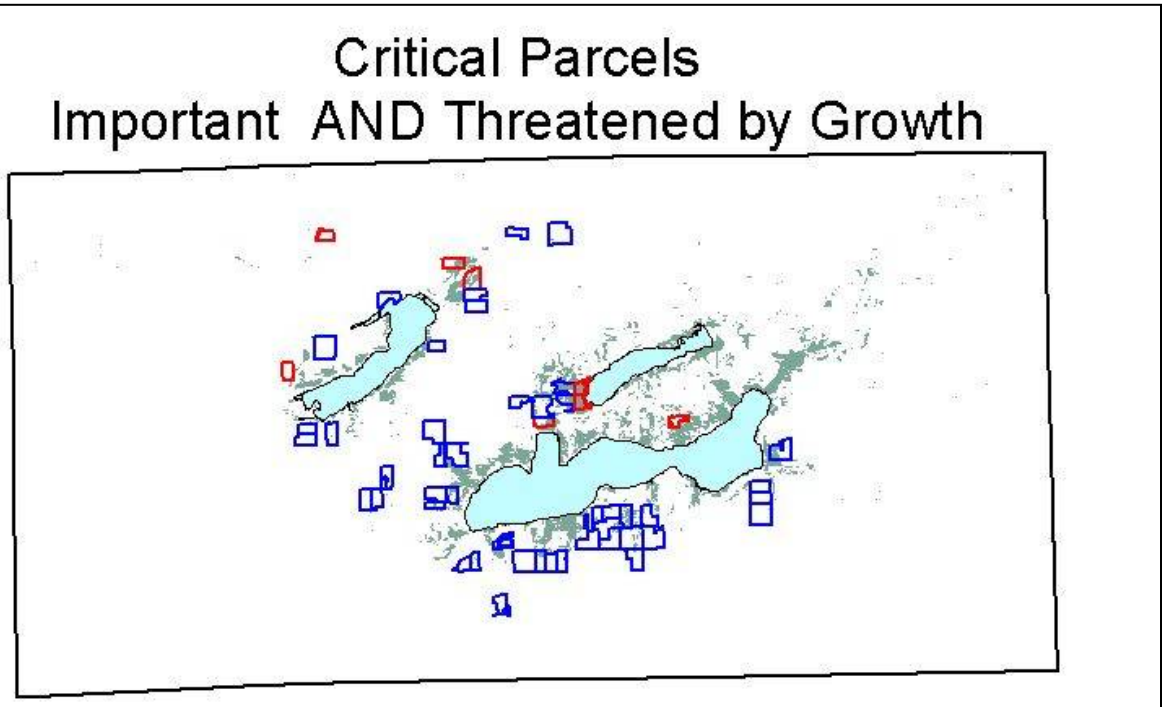


Figure 9. Critical parcels as Areas of Concern. The blue and red lines are parcels greater than 50 acres that intersect a "future growth" zone (*See Figure 6*) and also intersect an area of "high importance" (*See Figure 4*). Red parcels intersect critical natural areas. In this theoretical example, GLC would place the highest priority on these parcels when allocating resources for conservation purposes.

Transferability

There are two components that enhance the transferability of this model. First, the weighting process is flexible, which allows users in a different project area to use different themes and assign different weights, depending on the local circumstances and availability of data. For example, economic development factors can be given a greater weight or be added multiple times to reflect the priorities of the decision makers in a given location. Second, this analytical process can be performed by practitioners with basic GIS software and a minimal amount of GIS experience. Some training is necessary, but this process is straight-forward compared to other complex statistical models that require a greater time investment and more powerful software packages.

Other organizations are encouraged to implement the process described in this report. In addition to the information provided in this document, interested parties can learn more about the GLC project when these results are presented at a workshop being planned for Wisconsin Land Trusts by Gathering Waters, an umbrella organization for the state's 43 land trusts. More information on enhancing GIS capacity can also be obtained by contacting the non-profit consultancy NetSpatial (http://www.netspatial.net).

Future Tools Related to Modeling and GIS Use

The focus of the initial phase of the project was to develop a low-cost, useful, and transferable tool for GLC. During the development of the model and training of GLC staff, additional tools were identified that may be of use to GLC in the future. These include:

- *Enhanced land use forecasting* – A wide variety of models to predict the location and rate of urban growth have been developed by academic institutions across the country. The data requirements, price (these models are typically software-based), and transferability of each of these models varies widely. The U.S. Environmental Protection Agency published a document in September, 2000 comparing 22 models that could be useful when researching the appropriateness of a given model. The document is entitled "Projecting Land-Use Change: A Summary of Models for Assessing the Effects of Community Growth and Change on Land-Use Patterns." EPA Document # EPA/600/R-00/098. It is available free of charge and can be requested online at:

  http://www.epa.gov/ncepihom/ordering.htm#order

- *Satellite and aerial image analysis*- Aerial photos have been used for decades to interpret land use and inventory natural resources. In recent years, satellite technology has become more prevalent and less expensive and has been used more frequently for commercial purposes. Together, these tools could prove to be valuable to GLC for the development of additional GIS themes, identifying land use changes over time, and monitoring lake water quality.

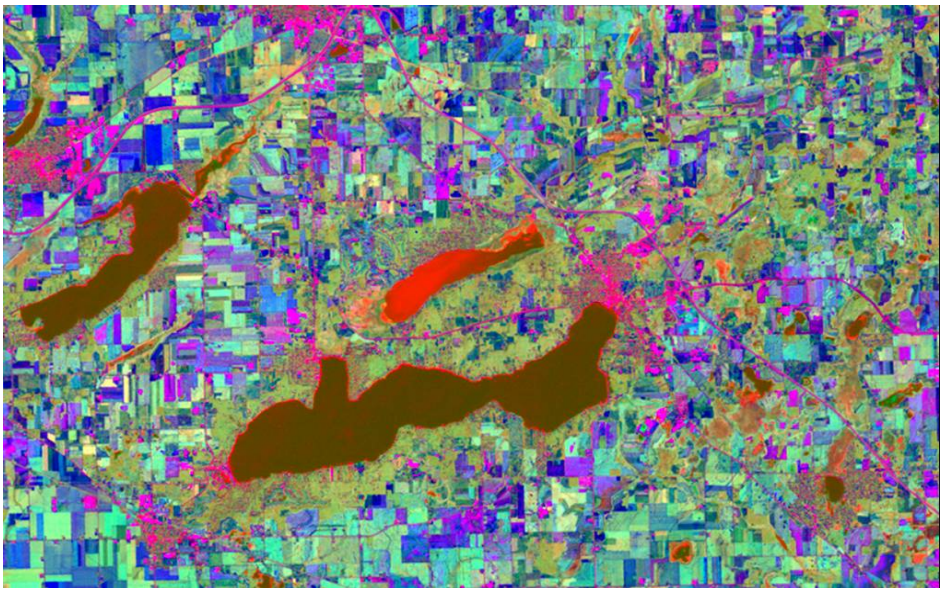


Figure 10. This image is a composite of two Landsat scenes showing the Geneva Lake region. Satellite imagery can be used for many applications, including the development of additional GIS themes, identifying land use changes over time, and monitoring lake water quality. The purple color in this image generally represents urban areas in the scene. The green and blue squares are crops and pastures. Red denotes algal growth in the lakes. Sources: EROS Data Center and Environmental Remote Sensing Center

- *3-D Visualization (fly-through)* – Using a digital elevation model and either a satellite image or aerial photographs, an animated 3-D "fly-through" can be constructed for the Geneva Lake region. This tool helps planners, officials, and landowners visualize the impacts of land use decisions by incorporating topography (hills and valleys) into the analysis. A simple 3-D fly-through was produced for GLC as an example.

- *Interactive land use planning* – A land use planning tool recently developed at the University of Wisconsin – Madison Land Information & Computer Graphics Facility allows planners and citizens to develop a range of land use scenarios. This tool, in the form of an Arc View-compatible software package, enables users to easily identify preferred growth (or conservation) parcels in the GIS. When a user selects a parcel for allocation, the system will provide a warning if the selected parcel is already developed or within an environmental corridor or farmland protection area. Selected parcels can be fed into Arc View summary tools generating simple statistics on the type and amount of land to be converted from current uses. These data can also be linked to impact assessment models such as water quality models, transportation congestion predictions, fiscal impact reports, and so forth.

Geneva Lake Conservancy Green and Gold Belt Protection Plan Development and Public Presentations

Out of the GIS, survey and model development processes came the "vision map" and feasibility phase of the "Geneva Lake Conservancy Green and Gold Belt Protection Plan". As the project manager and land committee studied the final model map (*Figure 6*) it became apparent that the light green areas still covered too much area to protect realistically and the farmland areas seemed to need further refinement. Through a series of meetings and discussions it was decided to break out the farmland into two categories and separate them from the other natural areas of concern. The two categories became "fragmented farmland" - representing areas with more relief and more soils that are prime for agriculture only if drained and that are often broken up by more rural residential development (shown in yellow on the vision map *Figure 11*) and "exclusive agricultural districts – representing the best, most fertile and flat lands in the region (shown in gold on the vision map, *Appendix D*).

The map of the desired protection zones and agricultural districts defines the GLC's vision for the project area. As symbolization developed it was decided to emphasis the critical natural areas (as designated in A Regional Natural Areas and Critical Species Habitat Protection and Management Plan for Southeastern Wisconsin, SEWRPC Planning Report No. 42, September, 1997), by outlining them in red. Furthermore, environmental corridors and forested land in or out of the corridor areas were shown in both a more generalized format than in SEWRPC reports and a more detailed format than had been shown in the model.

An ortho-photo was used for the background with the following themes showing: hydrologic, municipal, major roads and lands in DNR and conservation easements. The ortho-photo was chosen because it provides the most realistic feeling for the lay of the land and identifiable features for use in public meetings. At one of the first land committee meetings a laminated ortho-photo was used as an interactive device to have participants express their vision of where development was likely to occur and which natural areas and farmland was most crucial to protect. Participants were asked to draw on the laminated ortho-photo and it seemed to work very well.

The full-color project brochure (Appendix D) was written and 1,000 copies were printed. In addition, four color coded insert sheets gave further explanations about the three major aspects of the program – critical natural areas, open space and farmland protection.

The feasibility phase of the Green and Gold Belt Protection Plan has been conducted during the last few months of the project (more presentations are still scheduled even after this report is completed). The following individuals and groups have been or will be shown the Power Point presentation and given the brochure explaining the project and the conservation "toolbox.". Participants are asked for feedback to help determine individual or political will, recommended changes to the map and their ideas about protection priorities.

Green and Goldbelt Protection Plan – Presentation and Meeting Schedule
* denotes meetings open to the public

<u>January</u>
15 Fontana Park Committee meeting to protect Van Slyke Creek – Hildebrand property, Conservancy office

16 ERSC Madison final review of internship report and presentation of project

28 John Golitz – realtor and concerned citizen in Geneva Lake Area

<u>February</u>
7 Gathering Waters WI Land Trusts Retreat

11 WI Land Info. Assoc. Conference

13 Audrey Green, Walworth County

24 Linn Town Plan Committee

<u>March</u>
18 presentation to UW- Whitewater Dept of Biology

27 Diane Colecroft – Realtor and concerned citizen near Como Lake

28 Mike Peters – farmer

<u>April</u>
2 Walworth Co. Conservancy Board mtg.

3* Walworth Co. Conservation Subdivision Ordinance meeting

9 Charles Colman – major land owner of Peninsula Woods critical natural area

14 Jim Feeney – Glenwood Springs

<u>April</u>
16 meeting of Walworth County conservation coalition members

30 Upper Fox Watershed Alliance – Green Infrastructure Project

May
5* Bloomfield Town Board

6* Darien Plan Commission

12* Sharon Town Board

13 Openlands - Green Infrastructure Workshop, County Annex, Elkhorn

13 Walworth Town Board

14 Lakeland Builders Assn. Board mtg.

15 phone mtg. American Farmland Trust

19* Geneva Town Plan Commission, Town Hall

20 Walworth County Farm Bureau, FSA

28 Sarah Baughman – Geneva Bay Estates Neighborhood Assn.- possible easement to protect significant watershed and Wychwood critical natural area

June
2 Delavan-Darien Rotary 12 noon, Lake Lawn Resort, Delavan

2* Linn Town Plan Committee
3* Delavan Plan Commission, Town Hall

4 Big Foot Farms land manager and Applied Ecological Services to discuss possible conservation subdivision design

9* Lyons Plan Commission

19 Walworth Rotary Club 11:45 Abbey Springs Country Club

19 Walworth County Land Conservation Committee of the Board of Supervisors.

19 Geneva Lake Environmental Agency Board Mtg, City Hall

July
9 Lakeland Realtors Assn. Breakfast

August
5 Lake Geneva Rotary Club, Grand Geneva

Feedback from Presentations

Feedback from the presentations has been helpful and is on-going with phone calls and other contacts expected to continue as participants absorb the possibilities of the Green and Gold Belt. In addition specific actions have been taken to implement conservation practices on certain properties. Among the most useful comments and specific results accomplished through this series of meetings were the following:

- "If the model results were shown as is, it would look like the Conservancy was trying to protect everything and people wouldn't understand it." The vision map was adjusted to be more detailed and specific.
- The Village of Fontana with urging from the Conservancy and funds from the Community Development Authority, purchased the 14 acre Hildebrand property and another property which together protect the headwaters of Van Slyke Creek

(a Class 1 trout stream running into Geneva Lake) and established a trail easement on a new conservation subdivision going in to connect trails along the Hildebrand properties, Fontana Fen and the existing Duck Pond Nature Area (both of which the Conservancy was instrumental in protecting through earlier actions).

- Conservation Subdivision Design Workshops, featuring Landscape Architect Randall Arendt, were organized by the Conservancy and other sponsors for the County and for the Village of Fontana. Conservancy Executive Director, Chris Goebel also served as a citizen representative on the which recommended a new County-wide conservation subdivision ordinance be adopted. Walworth County developed a model ordinance and is now in the process of holding public forums to gain input on the ordinance which is being refined. Special attention is being given to protecting surface water resources and wetlands and possibly even significant groundwater recharge areas.
- WI land trusts participating in the Gathering Waters staff retreat were excited to learn if the ways they could use GIS and expressed an interest in having a more intensive one or two day workshop.
- Approximately 50 WI land information officers who attended a two hour seminar on this project given at their annual conference. Conservationists representing 15 different organizations from the Upper Fox watershed of northern Illinois and southern Wisconsin, and representatives of NE Illinois and SE Wisconsin conservation and land use planning agencies attending a Green Infrastructure workshop organized by Openlands expresssed an interest in applying these tools to their own prioritization projects.
- Shoreland vegetation restoration and the creation of buffer zones along lakes is one of the protective tools proposed and the Conservancy referred interested shoreline owners to Audrey Green, Walworth Co. Lakes Specialist, and Pam Schense, DNR. GLC proposed a rain garden around a spring leading into the lake (now completed) and for a stream restoration project, both at Glenwood Springs on Geneva Lake. We are also working with the Geneva Bay Estates Association to protect a stream through a conservation easement on wooded lots upstream as well as the park and stream outlet on Geneva Lake. Unfortunately useful information on stream restoration is scarce and it is more difficult to interpret DNR regulations for these projects than for shoreline restoration.
- The Town of Linn is in the process of updating it's land use plan and the GLC has met with planner, Matt Peters, of Foth and Van Dyke, to discuss how it could incorporate ideas from the Conservancy's Green and Gold Belt Project.
- Three groups sometimes adversarial to conservation organizations in the project area are the Lakeland Builders Assn., Lakeland Realtors Assn. and the Farm Bureau. By including representatives of these interests on the land committee GLC was able to engage them early on. The Conservancy presented the Green and Gold Belt project at their meetings. In general they were impressed with our more scientific approach, the use of innovative solutions like conservation subdivisions, easements and proposing new

farmer-friendly policies in the exclusive agricultural zones. Suggestions made to us were not to push the conservation subdivision ordinance as mandatory for all properties, to educate realtors and others more about how easements work, not to use the term “factory farms” and to perhaps include data layers showing power and gas lines in our GIS.

- A coalition of local land trusts in the county has met a few times with SEWRPC biologists to discuss ways to best protect the critical natural areas, which are also a focal point of the GLC plan. At the last meeting it was decided to write a letter to all the conservation organizations in the county (hunting, fishing, Audubon, etc.) to create a strong coalition to represent our interests in meetings such as those regarding the conservation subdivision ordinance and the upcoming comprehensive Smart Growth planning processes the county will undertake in 2005. The Conservancy has written a draft of the letter.
- Two important landowners of significant properties – one a series of lots in a critical natural area and one of the largest farms in the region were given personal presentations regarding the Green and Gold Belt Project and how their lands fit into the bigger picture. Both are considering conservation measures and the Conservancy has established a strong relationship with them. A builder and his partners who are developing former lakefront estates on both Geneva Lake and Delavan Lake have recently negotiated easements with the Conservancy on four lots with lake frontage and wooded portions off the lake.
- Two townships that are mostly covered by the proposed “exclusive agricultural zones,” Darien and Sharon, were surprisingly supportive of the proposed upzoning of prime agricultural land from 35 acres to 50 or 80 acres. They also thought that even in these difficult times the County and conservancy groups should consider a purchase of development rights program citing both a County and their own township surveys in which people expressed a willingness to raise taxes to protect farmland. Darien was also interested in purchasing parkland and apparently has the funds to commit to it. Turtle Creek Valley has been partially protected by the DNR but the Township was made aware of it as a critical natural area with some areas still unprotected.
- In Bloomfield and Lyons townships there was much more interest in conservation subdivisions because they see the natural beauty/topography of their areas as an amenity for development but don’t want houses everywhere. As of May, Lyons has a new land use plan and their own conservation subdivision ordinance but no new sites have come up for consideration since. A Town Board member in Bloomfield, one of the major farmland owners in the region expressed an interest in an agricultural easement but thought it might only apply to low ground.
- Delavan Township and the Delavan Rotary both expressed concern that the name of the Geneva Lake Conservancy made people from other areas hesitant to contact the organization for easements. However, both recognized our

efforts to reach out to them and were happy to hear of recent easements negotiated on Delavan lakefront properties.

- Representatives of the American Farmland Trust who attended one of our presentations called to suggest that we work together on purchasing agricultural easements using some of the federal funding that has recently become available. The County Farm Bureau sent a letter (see Appendix C).
- The project manager walked the length of the stream running from the Wychwood critical natural area through the Wrigley Estate and into Geneva Bay Estates. Severe erosion and flooding problems have plagued their watershed and the neighborhood association is interested in putting a conservation easement on properties they own and on finding ways to protect and restore the stream. GLC has been in contact with Pam Schense regarding this.
- The Geneva Lake Environmental Agency was instrumental in assisting the DNR in a study to delineate navigable streams running into the lake last summer. They have offered to share the GIS data but currently the DNR and County are working to refine some questionable streams. In the meantime GLC used topographic maps and hydrology layers to interpret where all the streams are.

Prioritization and Recommended Protection Measures for Selected Parcels and Landscape Level Areas

Mapping and Charts

Using the GIS, maps were made showing parcels that intersected with various features of concern such as the high priority areas identified in the model, critical natural areas and streams flowing into Geneva Lake. A “conservation blob” map (Figure 11) was also made for the Conservancy’s use internally to generally designate areas of opportunity. Some individual parcel maps were also made for specific properties of interest (Appendix H) as examples of what can be done whenever a property comes up for review for a possible easement or conservation subdivision, or to utilize when managing a property. The maps showing sets of properties intersecting with a feature at a landscape level are also useful, for example, in protecting a stream or natural area that has several adjoining landowners. These landscape level maps can be expanded to include a buffer zone by asking the GIS for a certain distance, for example 100 feet, around the feature. This capability is built into the software and is also useful for designating shoreland buffer zones.

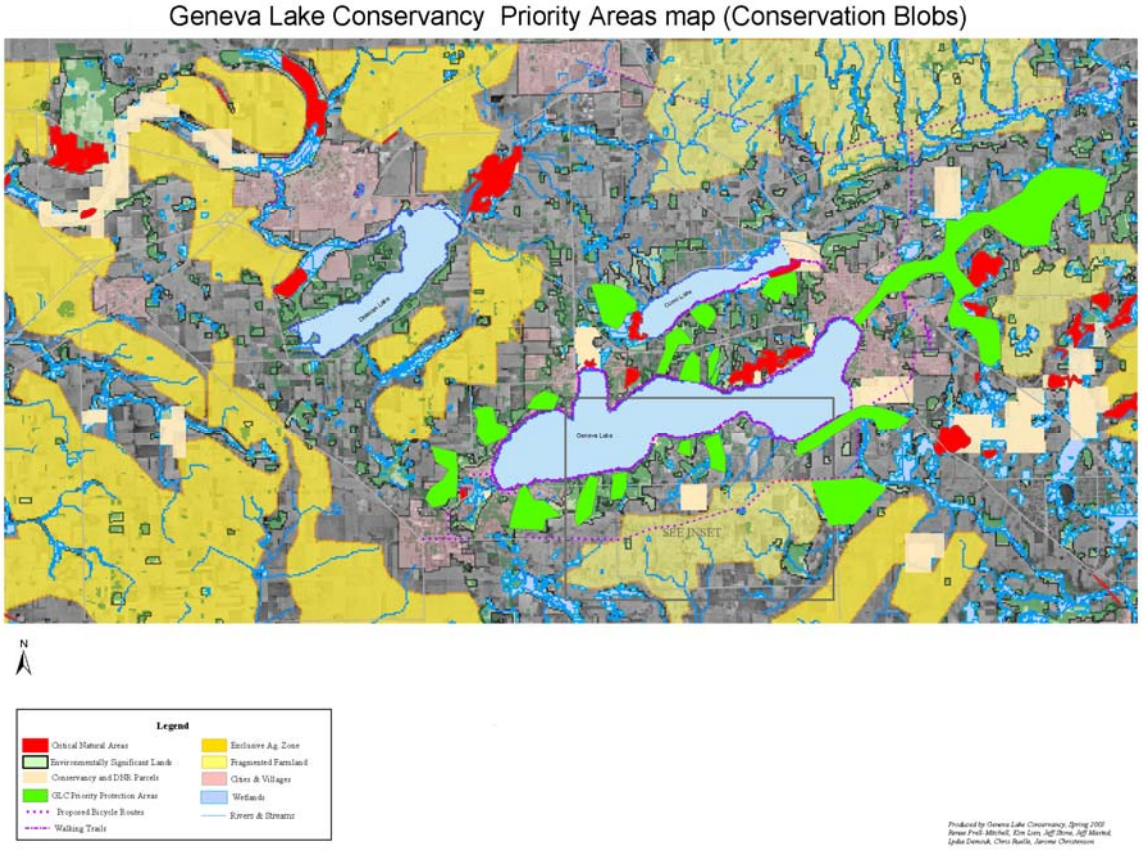
Walworth County utilized a consultant to provide parcel maps and these are not finished for portions of Geneva and Lyons Township, nor for the northern half of the County. As this data becomes available it will be incorporated into the system. The County does however have the landowner/tax key information for each parcel in the county and this data has been linked in the GLC GIS to make portions of the charts cited in the next section.

Mapping for all areas was accomplished using selected layers. Each township shown on the vision map was broken out and the layers of “rural residential” and “rural holding district” zoning were added to show lands likely to be developed first under current County zoning. Once all of the maps of priority parcels, landscape level features and townships were created, field checking occurred for each township. The project manager drove as many township roads as possible to view potential protection zones and get a better understanding of which protection measures might be most appropriate. Usually the field checking was done just prior to giving a presentation to that particular town board or plan commission so that specific properties could be discussed if referred to. It was surprising that more town boards and plan commissions do not display plat maps or other maps with which to refer to land issues at their meetings. One township which has been undergoing great development pressure is Walworth yet when asked why they do not have a plan committee or land use plan, a township official said they were “too small”. Darien and Bloomfield townships requested copies of the maps of their townships. Some townships also requested extra copies of the Green and Gold Belt brochure.

Mapping

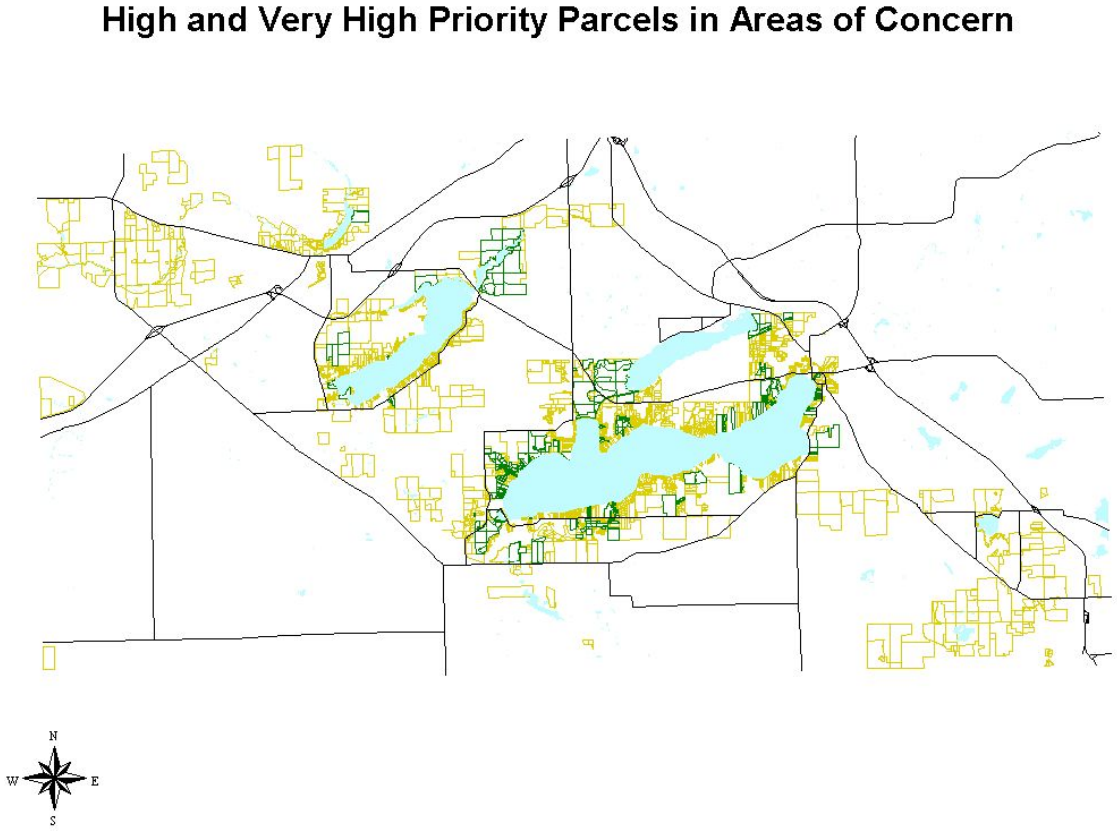
Internal Geneva Lake Conservancy Priority Areas map (*Figure 11*), also known as the conservation blob map. This map shows the critical natural areas in red, priority protection zones in bright green and areas already protected by Conservancy easements, DNR ownership or other means in buff. The bright green blobs are not distinguished according to the type of applicable protection measure on this map. That is accomplished in Tables 2 and 3 (Appendix L).

Figure 11: Conservation blobs shown in light green represent stream tributary buffer zones and environmental corridor areas of particular concern to the Geneva Lake Conservancy. Areas in red represent the critical natural areas of concern to the Conservancy.



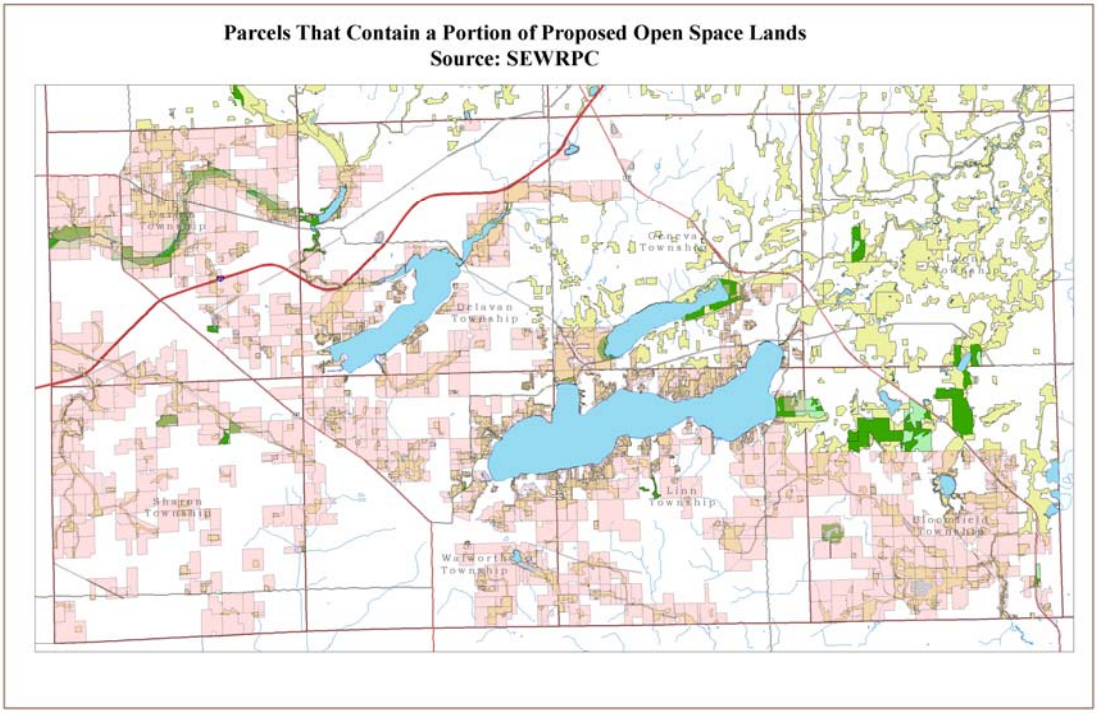
Parcels of 50 acres and above intersecting with high and very high priority areas from model (*Figure 12*). This map was useful initially in determining zones of importance and facilitated decisions about areas of concern. These parcels are looked upon as potentially becoming subdivided for large developments and are therefore mapped as an aid to vigilance on the part of the Conservancy. One of the sets of parcels which shows up on this map)and another similar map including parcels of 35 acres or more, had recently been the focus of a major development effort called Geneva Ridge which the Lake Geneva City Council considered for annexation. Geneva Ridge would have placed 1,200 units on 700 acres of mixed agricultural and upland and lowland conservancy zoning in a seniors-only, gated golf course community. The Conservancy opposed the annexation citing a lack of environmental, social and economic impact study. The Conservancy was able to rally public support and defeat the annexation. It is expected the developers will bring forward another proposal.

Figure 12: Parcels of 50 acres and above intersecting with high and very high priority areas. Darker Green indicates very high priority, lighter green high priority.



Parcels intersecting with environmental corridors (*Figure 13 and Appendix F*). All three categories of primary and secondary environmental corridors and isolated natural areas as designated by SEWRPC are combined into one layer called environmental corridors or environmentally significant lands.. There are too many parcels, over 3,500 in this category to make it particularly useful or worthwhile to chart. However this illustrates it is helpful when considering sites for conventional or conservation developments because it informs the viewer of the placement of the property in relation to these corridors.

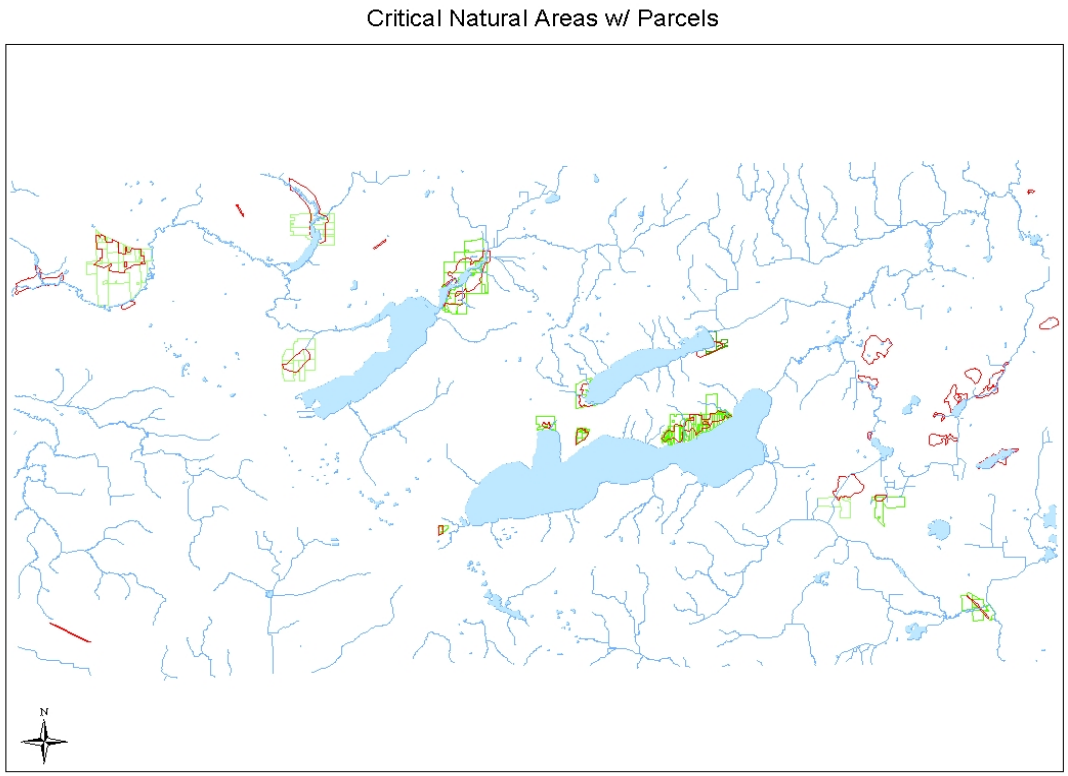
Figure 13: Parcels Intersecting All Environmental Corridors and Isolated Natural Areas (except areas of Geneva and Lyons township lacking parcel data)



Ideally County and municipal ordinances would protect the environmental corridors (especially primary environmental corridors) from development few communities have such protections. Fontana has protection for primary environmental corridors and the County is considering making it mandatory to at least review intersecting parcels proposed for subdivision to see if a conservation development might be more appropriate than traditional developments. The Conservancy now has the capability of using the GIS to indicate which parcels intersect and these have been mapped (Appendix F). The landownership information for each is also accessible in the system.

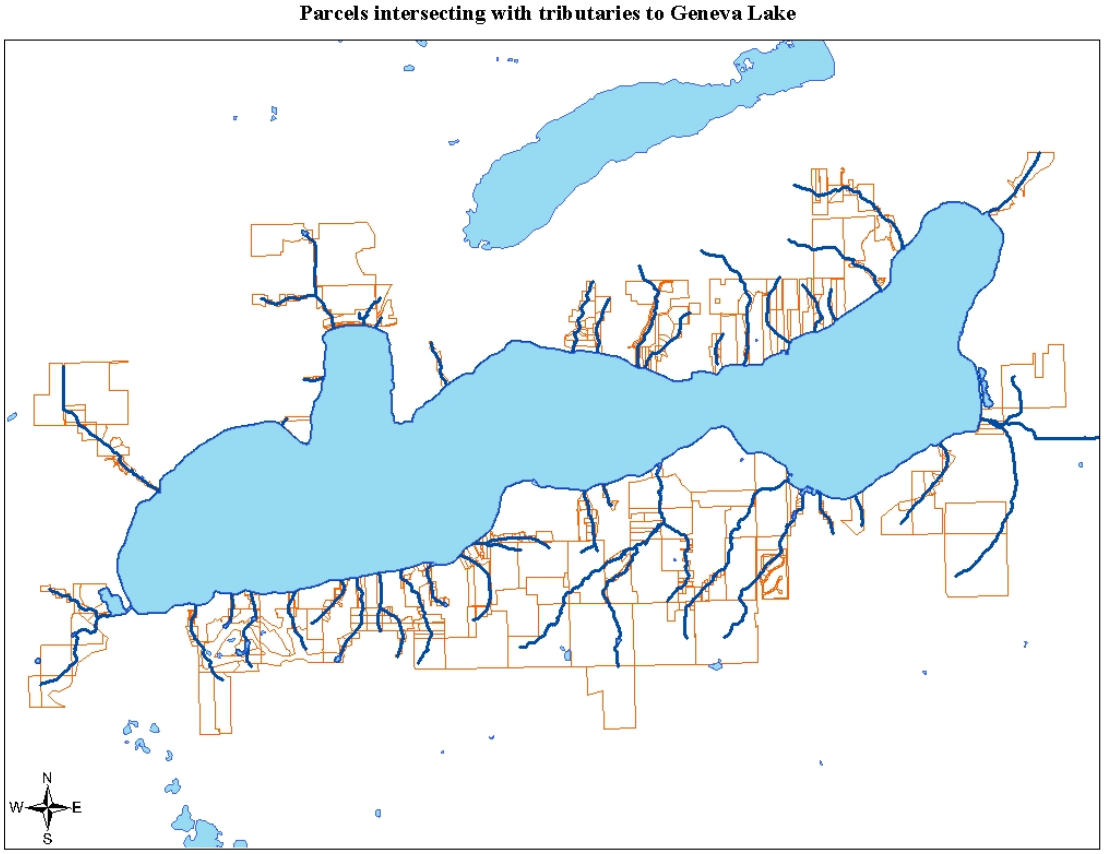
Parcels intersecting with critical natural areas (Figure 14 and Appendix E). Since these were considered the most crucial areas to protect it was important to find all the parcels and landowners intersecting critical natural areas and map them (Appendix E). In the future the Conservancy could also identify a buffer zone around these areas and look at parcels within those zones as well.

Figure 14: All Parcels and Critical Natural Areas identified in SEWRPC Report No. 42 (see Appendix E for specific properties intersecting each critical natural area)



Parcels intersecting with tributaries to Geneva Lake (*Figure 15 and* Appendix G). In order to facilitate on-going and future discussions with landowners and neighborhood associations bordering streams running into Geneva Lake this series of maps was developed along with charts illustrating ownership.

Figure 15: Parcels intersecting with Tributaries to Geneva Lake (parcels in brown)



Individual sets of maps for specific properties

Priority Protection Examples (Wrigley, Big Foot Farms) Appendix H.
Two of the largest sets of properties of concern in our project area are the Wrigley Estate on the north shore of Geneva Lake, encompassing 166 acres and the Big Foot Farms properties, 1000 acres which have been accumulated over the years by the owner, initially as a cattle and horse farm but recently being explored for development, although they are mostly zoned A-1 prime agriculture. The Wrigley property makes up a large portion of the Wychwood critical natural area.

Big Foot Farms are actually in 2 sections in Linn and Walworth townships and both have some environmental corridor but particularly the parcels near Lake Petite contain some important wetlands. Due to the owner's position as president of Waste

Management International, and the properties proximity to northern Illinois which generate much of the waste coming into Walworth County landfills currently, it has long been a community concern that Big Foot Farms could be intended for development as a landfill. During the course of this project, meetings were held with the owner's land manager and an ecological consultant which has been hired to assess the site for a residential development. The Conservancy has expressed to them our interest in retaining an agricultural and /or conservation easement while recognizing a portion of the property may be developed in the future. In general however, we oppose rezoning of prime agricultural land.

Easement Example (Peterson easement) Appendix I. Recently the Conservancy acquired a conservation easement on the 87.4 acre Peterson property in Lyons Township. Since this area has not been parcel mapped yet by the County's consultants, maps were made using the plat map information which is not as exactly matched to the ortho-photo and other map layers. It is recommended that a new set of maps be made once the parcel data becomes available. This set of maps provide an example of the utility of the GIS for contacting potential easement donors, establishing baseline information to include in the easement documents. establishing photo points for monitoring, and for historical ortho-photo documentation of land use changes as new aerial photos are taken in the future.

Site Management maps (Hildebrand Nature Area and Town of Linn Nature Park) *Figures 16 and 17*.

The Conservancy urged the Village of Fontana to purchase the Hildebrand property parcels in order to protect the Class 1 trout stream resource and spring which form part of the headwaters of Van Slyke Creek, a major tributary to Geneva Lake. By providing this map (*Figure 16*) of the environmental corridor and wetland areas the Village was able to better determine the value and management of the property. The property has been acquired, and the Conservancy has assisted in trail building and has proposed the possibility of a conservation easement on portions of the property.

Likewise, the Conservancy brokered the purchase of the 160 acre Town of Linn Community and Nature Park upon which it holds a conservation easement. This property contains significant portions of two streams which were previously the focus of a joint study between GLC, Geneva Lake Environmental Agency and the USGS entitled "The Use of the AGNPS Model within the Geneva Lake Watershed, Walworth County, Wisconsin, March, 1994 (Appendix J –AGNPS Model). These streams form The Birches subwatershed and the Town's park committee is now working with the USFish and Wildlife Service to restore portions of the property into prairie, oak savanna and wetlands (*Figure 17*). The Conservancy GIS contains a layer obtained from the DNR showing "original vegetation" which will be useful in management and restoration efforts.

Charts of Parcels in Protection Zones and Recommended Protection Measures

These charts are designed to assist the Conservancy Board in making decisions regarding which lands to protect and by what means, and in setting goals and timetables for future efforts.

Ownership and Recommended Protection Measures for Highest Priority Parcels of ten acres or more in size (Table 2 in Appendix L). These parcels carry specific protection recommendations based on mapping and site visits and the internal priorities of the Conservancy as interpreted by the Director of Land Protection.
Stream Protection Parcel Ownership (Table 3 in Appendix L). These charts will assist the Conservancy in identifying potential sites for shoreland buffer zone plantings (where streams enter the lake), stabilization plantings and possibly the restoration of aquatic vegetation. Efforts to assist landowners have been informed by working closely with Audrey Green, Walworth County Lakes Specialist and Pam Schense of the DNR, and by utilizing information in the Geneva Lake Environmental Agency's lake management study and shoreland planting guides from the DNR. However it has been particularly difficult to find clear guidelines on how to restore eroding stream banks in wooded areas or how to deal with strong flood events and scouring along streams in residential neighborhoods.

It was helpful that the DNR and GLEA worked to establish which streams running into the lake are navigable however the information has not yet become available for inclusion in the GIS because the county found some discrepancies with the designations. The Conservancy will continue communicating with GLEA and DNR representatives regarding this. We recommend that informational materials, such as those the DNR recently developed for shoreland buffer zone plantings, be developed for streamside landowners with clear explanations of what can and cannot be done. This would be of great assistance to organizations wishing to help landowners thorough the regulatory process to find an environmentally correct way of dealing with eroding stream banks, localized but severe flooding and unstable delta areas. There are some extreme cases on Geneva Lake and very little assistance is available for correcting the problem.

Site Management Recommendations. Currently the Conservancy manages one site, the 15 acre Hermansen Woods, which it owns. The woods contains two unnamed tributaries to Como Lake which flow under a maple forest through some fairly rugged topography. Former gravel mining and recent selective cutting in the forest do not appear to have a current impact on the streams except for some downed trees creating temporary damming of portions of the stream during rain events. The streams are intermittent but appear to be spring fed. After flowing through the Hermansen property they flow into a culvert running under the lake road and into the lake below the French Country Inn.

There is a low wet area of about two acres in the center near the north end of the property which forms a peat-filled pond in wet years. Mary Linton, a wetland biologist with the UW-Whitewater Department of Biology, is conducting an

inventory to see if salamanders might utilize this area and recommend management practices to protect them if they are found to use the pond area.

Trails have been built away from the streams except for one crossing point. Since the program is enrolled in the Forest Management Program selective cutting of the hardwoods is again scheduled to occur again within the next 20 years and some selective cutting of undesirable understory species has been on-going. The site contains many woodland wildflowers, including meadow rue, hepatica, trillium and skunk cabbage in the pond area. Pulling of garlic mustard by volunteers is recommended for protection of these species.

Overall Recommendations

Watershed and Land Use Management Recommendations

Watershed

a. Reduction of sediment loading

The Conservancy has repeatedly advocated better stormwater management when municipalities around the lake are considering approving new developments. The image of Geneva Lake becoming a detention pond for new development within the watershed has been evoked at local government meetings to emphasize the importance of considering alternatives to conventional drainage systems. The Conservancy's efforts at promoting the development of a conservation subdivision ordinance at the County level have been partially motivated by this attention to our water resources. GLC has also recently pushed for the notion of including designations of important groundwater recharge areas in any considerations for future subdivision sites.

GLC has obtained information regarding how neighborhoods along streams can band together to have landowners sign voluntary agreements to protect the stream and keep adequate buffer zones. The Conservancy could develop a brochure or pledge sheet which neighbors could sign as a means of educating and obtaining some level of commitment to prevent excess sediment loading to the Lake.

Conservancy staff and members have been vigilant in reporting when sediment fencing at construction sites is lacking or inadequate.

GLC has assisted a neighborhood in Fontana in dealing with a landowner who has been cutting all the trees and causing great amounts of erosion into a local stream. Pam Schense has been made aware of the situation and DNR may be issuing a citation. In this case no matter what educational efforts were made this particular person chooses to ignore them and the pleas of his neighbors.

b. Intergovernmental agreements
More research is needed on the deficiencies of current stormwater and shoreland ordinances in the municipalities surrounding Geneva Lake. During the course of this grant, the Conservancy has become aware of how city and village ordinances are often much more liberal than county ordinances regarding the construction of seawalls, cutting of trees along shorelines and even building setbacks. We have held meetings with our local County Board representative on the DNR's committee to develop new shoreland regulations, Nancy Russell, to help us both in understanding the issues and provide policy recommendations.

Land Use Management

a. **Acquisitions through WI Stewardship Fund –**When parcels containing critical natural areas become available for sale, the Conservancy has the opportunity to work with local government bodies and other conservation groups to apply for Stewardship grant funds and help raise matching funds. Recently the Stewardship fund has been proposed for massive budget cutting and the Conservancy has worked with other organizations to avert the proposed measures. We have also encouraged local and County government bodies to pass resolutions to that effect.

b. **Purchase of Development Rights (PDR) Program proposal –** In several meetings and seminars held with farmers over the years there does seem to be an interest in this type of program. However, due to the expense, it is clear a successful PDR program would require public funding. Surveys conducted by the County and by some Townships have shown support for raising taxes up to ten cents per thousand for farmland preservation. Another consideration may be the idea of a voluntary surcharge on purchases at recreational facilities as a way to raise revenue for such a program. A combination of state and federal funding might also be available under existing programs for purchasing agricultural easements. Conservancy has discussed these with the American Farmland Trust.

The GIS project would recommend that large active farms existing in the fragmented farmland zones would have priority for a PDR program whereas farms in the exclusive agricultural zones could perhaps be adequately protected through a combination of up-zoning and other farmer-friendly policies that would help the farm economy and better conform to the logistics of agricultural operations that might require movements of large machinery and some noxious emissions.

c. Lake/land management ordinances – Communities around Geneva Lake have been adopting some innovative ordinances such as those designed to limit light pollution and restrict tree cutting. The Conservancy has long discussed encouraging an ordinance regarding limitations on the use of jet skis but has not felt the political climate was conducive. Another ordinance GLC would like to encourage would deal with municipalities whose shoreland regulations regarding

seawalls and other forms of erosion control do not reflect the more stringent regulations of the County. The GLEA and GLA would be likely partners in this process.

d. Wildlife habitat sites – Refer to the management recommendations for the Hermansen property above.

In its efforts to protect environmental corridors and link corridors that should be protected by adjoining conservation subdivisions, the Conservancy recognizes the importance of maintaining or creating linkages for wildlife movement and migration. We have worked closely with DNR wildlife biologist Jim Jackle to identify and assist in protection of corridors adjoining current and proposed DNR wildlife areas.

e. County conservation subdivision ordinance and pending developments – Seminars jointly supported by the Conservancy, Walworth County, development interests, and citizens have resulted in an inter-active process whereby the county is soliciting public input into the development of a conservation subdivision ordinance. The Conservancy has worked with three developers to redesign their sites to better reflect the conservation values and conditions of the properties and to better deal with stormwater management.

The GIS is helpful in determining which properties might be suitable for conservation developments and what site characteristics should be considered, but field checking is essential for correctly determining features such as viewsheds and small unmapped features such as stone walls. A GIS layer which would be helpful to the Conservancy and the County in their determinations would be groundwater recharge areas which may soon become available through either the DNR or the State Natural History Survey. Finally, while land trusts generally would not want the responsibility of maintaining retention ponds or natural areas within conservation developments, groups like the GLC can play a role in both protecting the designated open space from future subdivision through conservation easements and by linking one development's open space to that of an adjoining property or development.

f. Shoreline buffer zone plantings – The Conservancy has promoted shoreline buffer zone plantings and removal of exotic species in the newsletter and by examining sites with landowners and neighborhood associations. See discussions of Glenwood Springs and Geneva Bay Estates above. GLC has also recommended native plantings at the 700 club, Driehaus Estate and South Shore Club. GLC also refers groups to Audrey Green at the Walworth County Land Conservation Dept. The Conservancy has annually held shore path walks to encourage local interest in protecting the shorelands.

Recommendations for Implementation phase

"Share the Vision" and Revision

Materials such as brochures, folders and the newsletter developed for the Conservancy all carry the by-line "Share the Vision", but in the past the vision the Conservancy had of clean lakes surrounded by greenspace and rolling farmland was hard to quantify. With the GIS and calculations of acreage to protect using Spatial Analyst 8 the Conservancy can continually refine its vision and better present it to the general public.

A GIS is like any other database in that it is only as good as the information that it contains, and since land ownership changes hands, annual or biannual updates of the tax key parcel data should occur as well as adding any cultural and historical spatial data that might become available in the future.

Internal GLC tools and timetable

Training of staff and continued use of the GIS is recommended once the donated software has been installed. The land protection committee of the Conservancy should be consulted regularly and should learn to ask questions of the GIS as it has incredible capabilities. The committee should also work on setting timetables for priority property protection. Much of the groundwork for engaging community support for a green and gold belt has been laid (Appendix K - Lake Geneva Regional News and Janesville Gazette articles and Conservancy Newsletter article) but future publicity through various media and displays at community events may be necessary.

Budget and Expenses (See Appendix M)

Conclusion

The project provided GLC with a flexible, inexpensive, and transferable analytical tool that will allow the staff to efficiently focus their conservation efforts. GLC is pioneering the use of GIS among the land trust and conservation communities in Wisconsin and Northern Illinois and is making every effort to encourage their adaptation of the technology.

The process-oriented approach to development of the model and training of the GLC staff empowers GLC with the ability to adjust to changing land use, update and integrate new data and create new program initiatives. In addition, the products will aid land protection and fundraising efforts by helping to communicate the GLC mission and activities, assisting landowners with visualization of land use possibilities, and conveying the spatial distribution of important land characteristics.

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For more information on GIS in Wisconsin, contact NetSpatial, a non-profit organization that specializes in promoting geospatial technology in new application areas and enhancing existing GIS capacity in small businesses and non-profit organizations:

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