

Appendix A Methodology to Develop Chagrin Watershed Critical Parcels Inventory

The Maps: The seven (7) maps in Appendix E illustrate the Chagrin Watershed Critical Parcels Inventory by 14 digit HUC watersheds. In addition to proposed acquisition parcels, these maps show the currently protected properties in the watershed and include parcels owned or protected by conservation easements held by the following organizations:

- ❑ Cleveland Metroparks
- ❑ Lake Metroparks
- ❑ Geauga Park District
- ❑ Chagrin River Land Conservancy
- ❑ Holden Arboretum
- ❑ The Nature Conservancy
- ❑ Gates Mill Land Conservancy
- ❑ Russell Township Park Commission
- ❑ Cleveland Audubon Society
- ❑ Cleveland Museum of Natural History
- ❑ Ohio Department of Natural Resources
- ❑ Willoughby Natural Areas Cooperative
- ❑ Waite Hill Land Conservancy

Please note that the protected parcels data also includes recreational parks, vacant municipal land, cemeteries, closed landfills, institutional developments, airports, camps, golf courses, and hunt and gun clubs.

The Methodology: The Chagrin Watershed Critical Parcels Inventory was developed through the following steps in the Chagrin River watershed Geographic Information System (GIS):

1. Parcels of 20 acres or larger were included.
2. Currently protected parcels were removed.
3. Parcels that include streams, wetlands, and/or floodplains were included.
4. Parcels that did not include streams, wetlands, and/or floodplains were removed.

These steps resulted in a total of 804 parcels in the Chagrin Watershed Critical Parcels Inventory, comprising over 36,000 acres.

Please note: The Chagrin Watershed Critical Parcels Inventory is periodically reviewed and updated as information regarding parcel status, natural resource value, and water quality contribution becomes available. This review is done by CRWP in concert with the other conservation organizations listed above.

Appendix B Chagrin River Land Conservancy 2003 Anchor Methodology



By Anne Murphy, Director of Stewardship and Conservation Resources

Project Summary

The Chagrin River watershed encompasses nearly 200,000 acres in northeast Ohio and spans portions of four counties. The watershed is characterized by high quality water and exceptionally diverse habitats ranging from mature forests, prime agricultural land, glacial kettle hole lakes, to emergent marshes and fens. But this unique landscape is facing intense development pressures from urban and residential sprawl.

Chagrin River Land Conservancy (CRLC) was established in 1987 and seeks to preserve “the scenic beauty, rural character, and natural resources of the Chagrin River watershed through direct land protection and promotion of the responsible use of land and water resources.” Preserving the watershed offers many benefits to the environment such as the filtering of pollutants from soil and water, degradation of organic wastes, pollination of food crops, and maintenance of a clean source of drinking water. With the addition of GIS technology, CRLC has taken a very proactive approach to conservation by targeting critical areas in need of protection. The need to prioritize individual parcels to reduce the watershed to meaningful, manageable areas is great.

Developing a model of prioritization using GIS enables the selection of individual parcels for specific criteria such as acreage, proximity to protected lands, proximity to the Chagrin River and its tributaries, and occurrence of wetlands. Conducting overlay analysis and running various queries provides a list of priority properties that meet the criteria of land protection. The initial prioritization project in 2000 created a hierarchy of A, B, and C priority parcels where A parcels represented the highest priority, B parcels represented medium priority, and C parcels represented the lowest priority. Properties were ranked according to the presence of the following characteristics: river, lake, and tributary frontage, 100-year floodplains, national wetlands, Ohio wetlands, Ohio rare, threatened, and endangered species, steep slopes greater than or equal to 12%, adjacency to CRLC protected properties and area open space, prime agricultural soils, rock and hydric soils, and mature forest cover. Each property was given one point for each of the above characteristics it contained. Because acreage was, and still is, considered a highly important feature, a weighting factor of $(\text{number of acres}/50)*2$ was used. Overall, there were 26 possible points for each parcel. The resulting list of parcels was classified by natural breaks to produce a hierarchy of A, B, and C priorities, where A priorities were the highest. Nearly 50,000 acres with 650 landowners comprised the original Land Protection Priority List (LPPL).

Given CRLC’s limited staff and financial resources, the LPPL was overwhelming. It lacked the focus necessary to systematically direct our limited resources. In 2003, CRLC developed a new concept based on large critical resource areas connected by corridors of protected properties. Because the large resource areas serve as “anchors” in the landscape, the new prioritization is called the anchor strategy. Looking at the map of CRLC’s protected properties, together with area parks and open space, a pattern started to emerge. The protected properties and parks form corridors of preservation throughout the Chagrin River watershed. From an ecological standpoint, corridors are not only important but necessary for the movement of wildlife and the establishment of territories and nesting habitats. Corridors and large tracts of protected land also provide the greatest potential for groundwater recharge, filtering of nutrients and pollutants, and scenic beauty. Creating large tracts of protected, relatively undeveloped parcels has greater benefits than isolated pockets of protected lands. Focusing on anchors and the connections via corridors to other anchor properties will enable CRLC to connect the natural landscapes in the Chagrin River watershed to create the greatest ecological and scenic benefit and most manageable goals for land protection.

Data

All of the data necessary for this project are housed in CRLC’s custom GIS. ArcView 3.2 and 3.3 were used to prioritize the Chagrin River watershed. Multiple layers were incorporated, including individual property parcels, municipality boundaries, FEMA floodplains, Chagrin River and all major tributaries, slopes greater than 12%, inland lakes, agricultural soils, hydric soils, rock soils, North American Wetlands Inventory (NWI), Ohio Wetlands Inventory (OWI), Ohio Natural Heritage Species Inventory, and northeast Ohio open space. All layers include those portions of the watershed in Cuyahoga, Geauga, Lake, and Portage counties.

The data in ArcView are projected in State Plane 1983, Ohio, North. The following table provides a brief description of the source of each layer or shapefile.

SHAPEFILE	SOURCE	DESCRIPTION
Rivers	Ohio EPA River Reach, Lake County GIS Dept., Geauga County Auditor	Delineated tributaries of the Chagrin River
Floodplains	FEMA	100-year designated floodplain
National Wetlands Inventory (NWI)	National Wetlands Inventory	Limited source of wetlands from national surveys
Ohio Wetlands Inventory (OWI)	Ohio Wetlands Inventory	More complete source of the state’s wetlands
Rare, Threatened, and Endangered Species	Ohio Natural Heritage Species Database	Coordinate locations of rare, threatened species
CRLC Protected Properties	Chagrin River Land Conservancy	Locations of CRLC’s protected properties
Inland Lakes	Ohio DNR	Inland lakes of northeast Ohio
Open Space	Northeast Ohio Regional	Areas of open space (park,

	Parks Consortium	conservation) in NE Ohio
Steep Slopes	USGS Topographic Maps	Steep slopes greater than 12%
Tax Parcels – Geauga County	Geauga County Auditor’s Office	Individual landowner information, including acreage
Tax Parcels – Lake County	Lake County GIS Dept.	Individual landowner information, including acreage
Tax Parcels – Cuyahoga County	CRLC digitized tax maps	Individual landowner information, including acreage
Tax Parcels – Portage County	CRLC digitized tax maps	Individual landowner information, including acreage
Municipalities	CRLC	
Soils – Bogart Loam	Ohio Capability Analysis Project (OCAP)	Prime agricultural soil
Soils – Wooster Silt Loam	Ohio Capability Analysis Project (OCAP)	Prime agricultural soil
Soils – Lordstown Rock	Ohio Capability Analysis Project (OCAP)	Rock outcroppings
Soils – Orville Silt Loam	Ohio Capability Analysis Project (OCAP)	Hydric soil (indicates water)
Soils – Sebring Silt Loam	Ohio Capability Analysis Project (OCAP)	Hydric soil (indicates water)
Soils – Canadice Silt Loam	Ohio Capability Analysis Project (OCAP)	Hydric soil (indicates water)
Soils – Carlisle Silt Loam	Ohio Capability Analysis Project (OCAP)	Hydric soil (indicates water)
Soils – Damascus Silt Loam	Ohio Capability Analysis Project (OCAP)	Hydric soil (indicates water)
Soils – Holly Silt Loam	Ohio Capability Analysis Project (OCAP)	Hydric soil (indicates water)
Soils – Sheffield Silt Loam	Ohio Capability Analysis Project (OCAP)	Hydric soil (indicates water)
Soils – Wallkill Silt Loam	Ohio Capability Analysis Project (OCAP)	Hydric soil (indicates water)
Soils – Willette Silt Loam	Ohio Capability Analysis Project (OCAP)	Hydric soil (indicates water)

Table 1. Chagrin River Watershed Sources and Description of Data

Protecting the Chagrin River and its tributaries is one of the foremost goals of CRLC. Rivers are the lifeblood of the region, supplying water to plants and animals and shaping the landscape. The

rivers shapefile provides a very extensive collection of all the Chagrin River's branches and regions of flow throughout the four county area. Floodplains are sensitive habitats that support fragile plants and animals. Because damage to floodplains destroys the river and tributaries by adding sediment and silt and thus offsetting nature's balance, floodplain protection is essential. Likewise, lake frontage is considered equally important as river frontage and floodplains. Wetlands are typically found surrounding rivers and floodplains. Many types of wetlands exist, including swamps, marshes, fens, and scrub/shrub wetlands. Wetlands act as sponges and filters, absorbing runoff and sediment from human development, recharging groundwater supplies, and purifying drinking water. Many national agencies, such as the US Environmental Protection Agency (EPA) and the Army Corps of Engineers, have delineated the different types of wetlands throughout the country. Since these agencies act on a national level, the National Wetlands Inventory (NWI) is lacking local designations. As a result, state agencies have developed local wetlands inventories, such as the Ohio Wetland Inventory (OWI). Rivers, floodplains, and wetlands are unique and varied ecosystems and provide excellent habitats to many rare, threatened, and endangered species. Because people value the scenic views of rivers and their floodplains, these areas are many times the first to be developed. Sensitive plants and animals that depend on the ecosystems are thus pushed out of their natural range or are destroyed altogether. The species shapefile comes from Ohio's Natural Heritage Species database.

Throughout the watershed, steep slopes represent a significant feature of the landscape. Because the geology of this area is predominantly sandstone and shale with some glacial erratics, the slopes are subject to rockslides and erosion. Development stresses these slopes further, causing extensive erosion. Plants cannot take root in slopes that continually fall apart, and the erosion of sediments flows into the rivers and tributaries disrupting water quality. Because geologists have determined steep slopes in the area to be greater than or equal to 12%, only these slopes were examined. With the bedrock composition of the rivers and the steep slopes of sandstone and shale, soils play an important ecological role in the watershed. Prime agricultural soils, such as Wooster silt loam and Bogart loam, are essential to farming in northeast Ohio. Thus, these soils were given precedence. In addition, Lordstown rock is type of soil characteristic of rock outcroppings. Rock outcrops not only provide a scenic viewshed, but they also form denning sites and nesting sites for animals. Coyotes and foxes seek out rock dens for shelter to raise their litters. Many raptors, such as turkey vultures, need rock ledges for nesting. Hydric soils are extremely important in the watershed as they indicate the presence of water. Many different types of hydric soils are found throughout the area. These include Orville, Sebring, Canadice, Carlisle, Damascus, Holly, Sheffield, Wallkill, and Willette silt loams.

County Auditor's offices provide data on parcel information. Geauga County has a very complete GIS called the Geauga Public Access System (PAS) and they provide CRLC with monthly updates of parcel information. The Lake County GIS Department recently completed a comprehensive GIS database, which was shared with CRLC. Cuyahoga County and Portage County information were digitized from tax parcel maps. The parcel information contains the landowner name and address and permanent parcel numbers, as well as accessory information such as acreage and tax and school districts. The municipality layer identifies the watershed's thirty-one communities.

Creating corridors or large contiguous blocks of land are essential for establishing an unfragmented habitat for plants and animals. Therefore, parcels are considered important if they adjoin already protected properties. A recent northeast Ohio study digitized the locations of all open space lands in the area, including parks and conservation areas. In addition, CRLC has protected 4,700 acres to date and these lands are included in the GIS.

Methods

The first step of prioritizing the watershed involved consulting CRLC staff and ecologists to ascertain the most important ecological factors in the watershed for which data were available. The factors were determined to be river, lake, and tributary frontage, floodplains, national wetlands, Ohio wetlands, Ohio rare, threatened, and endangered species, steep slopes greater or equal to 12%, adjacency to CRLC protected properties and open space, prime agricultural soils, and rock and hydric soils. Each of these factors existed in digital form in CRLC's custom GIS. Each factor was a separate shapefile or layer projected into State Plane 1983, Ohio, North. Also in the GIS were individual parcels of Cuyahoga, Geauga, Lake, and Portage counties overlaid with the thirty-one municipalities of the watershed. Discussion with CRLC and their Board of Trustees revealed acreage to be the most important factor in prioritization.

Since CRLC has become a large conservation organization in northeast Ohio, we must focus our efforts on large tracts of land since these areas are the first to be developed and have the potential to create the most destruction of the natural resources of the watershed. CRLC wanted to focus only on properties greater than or equal to 25 acres. In addition, we wanted to create a weighting factor so that very large properties of several hundred acres were given a higher rating than small properties between 25 and 50 acres. A weighting factor was then established to be: $(\text{number of acres}/50)*2$.

In ArcView 3.2 and 3.3, a query was first run on the individual parcels of Cuyahoga, Geauga, Lake, and Portage counties to create a set of properties greater than or equal to 25 acres. With these parcels highlighted, the "select by theme" feature was run for parcels that intersected rivers and these highlighted parcels were added to the first set. With these parcels highlighted, a new number column was added to the river attribute table called "RIVER" and each highlighted parcel was given a rank of one while the remaining parcels received a zero. The select by theme feature was run in similar fashion for inland lakes, floodplains, National Wetlands Inventory (NWI), Ohio Wetlands Inventory (OWI), Ohio Natural Heritage Species, steep slopes greater than or equal to 12%, adjacency to CRLC protected properties, adjacency to open space park and conservation areas, and Bogart loam, Lordstown rock, Wooster silt loam, Orville, Sebring, Canadice, Carlisle, Damascus, Holly, Sheffield, Wallkill, and Willette silt loam soils. Each parcel that intersected a factor was given a rank of one. The final highlighted parcels were converted to a new shapefile. Because all properties that fit the ecological criteria were selected by the queries and select by theme actions, a final select by theme operation had to be completed to eliminate those areas already protected. All CRLC protected properties and open space park and conservation areas had to be removed from the final selection. There were 1,127 properties in the final list.

In the attribute table of the new priority parcels shapefile, the calculator was used to sum the ranks of each of the 21 ecological criteria in a column called "SCORE". Finally, a new column

was created for weighting acreage. Using the field calculator, the weighting factor of (number of acres/50)*2 was applied to determine the ranking of acreage for each parcel. This weight was then added to the sum of ranks from the score column into a new column called "RANKS". The resulting ranks ranged from 1 to 26. The parcels were classified by equal interval into three classes. The three classes became the hierarchy of high, medium, and low priority properties.

In 2003, the above priority model using high, medium, and low classes was revised. The new anchor strategy focuses not only on high ecological value, size, and degree of threat, but also on building corridors of protected land. Under the anchor model, the highest rated parcels are adjacent to properties preserved with conservation easements, parks, and other conserved lands or are themselves anchors of exceptional ecological value and size. Connections are made between these lands. The result is large blocks of critical resources connected by corridors.

Each year, CRLC identifies its top priority properties that are the most significant properties in need of protection. The Top 15 Priority Properties of 2003 became the Anchor TP properties on the anchor priority list, where they function as large anchors or key connectors of preservation in CRLC's service area. The Anchor TP properties have the highest overall ecological value and size. The remaining properties on the anchor list are divided into two categories, Anchor Adjacent and Anchor. Anchor Adjacent properties are directly adjacent to already preserved land, including CRLC's protected properties and area parks and open space. These properties represent the most important priorities aside from Anchor TP's. The protection of Anchor Adjacent properties will directly add to and expand an existing block of protected land. The remaining Anchor properties on the priority list represent all the other priority parcels that form corridors or links to blocks of protected land.

In addition to our extensive computer analysis, we also conduct "on the ground" research that is done by staff biologists and contract biologists. This research is especially important in establishing our Anchor TP properties. For example, based on an ecological survey of the Mayer property in Chester Township, we learned that it contains nearly three miles of the highest quality streams in the state of Ohio, category 3 wetlands, several state listed species, and an extensive mature hardwood forest.

Results

Nearly 24,000 acres with 250 landowners comprise the new anchor strategy. Many "A" priority parcels from the previous prioritization scheme are incorporated into the new anchor priority list. The anchor list, including Anchor TP, Anchor Adjacent, and Anchor, is meant to be a "moving target". As lands become developed or preserved, or if no progress is made with landowners of priority properties, the Anchors will shift to properties that enable a connection or link to areas of preserved land.