Biological Inventory

Hawthorne Crossing Conservation Area
Campbell County, Kentucky

Prepared for
Campbell County Conservation District
Campbell Conservancy
8351 East Main Street, Suite 104
Alexandria, KY 41001

August 4, 2009
Revised October 8, 2009

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I. INTRODUCTION

Third Rock Consultants, LLC (Third Rock) was contracted by the Campbell County Conservation District and the Campbell Conservancy to perform a biological inventory of the Hawthorne Crossing Conservation Area (CCA). The Hawthorne CCA is comprised of 140 acres adjacent to the Licking River. Hawthorne CCA was acquired in 2008 through the combined efforts of the Campbell County Conservation District, the Campbell Conservancy, and the Campbell County Fiscal Court. The Campbell County Conservation District received a grant through the Kentucky Heritage Land Conservation Fund board to purchase 134.6 acres, and the Campbell Conservancy purchased the additional acreage. The property includes 3,000 feet of forested stream bank along the Licking River and over 2,000 feet of stream bank of Riffle Creek, including the confluence with the Licking River. The Campbell County Conservation District anticipates implementing land restoration projects such as forest improvement, exotic species removal, and native plant establishment as well as providing educational and recreational opportunities. This report may serve as baseline data for these management goals.

Prior to field surveys, a desktop review of aerial photographs, topographic maps, and soil survey maps was conducted to delineate general vegetation types and to identify natural features, buildings, and other specific landmarks.

A photo log compiled to document existing conditions during the field efforts and is located in Appendix A.

II. TERRESTRIAL HABITATS

A. Flora

Field visits to identify and delineate the various vegetation communities were conducted by Third Rock biologists on April 24, May 12, and July 28, 2009. During these field surveys the entire project area was examined and the dominant vegetation within the canopy, shrub layer, and herbaceous groundcover was recorded. Aerial photographs and GPS were used to locate the boundaries of vegetative communities. Communities were defined based on canopy species composition, size (diameter at breast height (dbh)), and density, as well as slope aspect, density of the bush honeysuckle (*Lonicera maackii*) understory, and successional stage. Notes on tree canopy size (dbh), exotic species abundance, and ground cover density were recorded for each community when appropriate.

Differences in past land use and timing of maintenance abandonment are major factors that shaped each community. As a result of the land use history, some communities are more homogeneous than others. For example, Areas C and D were obviously crop fields in the past and began natural succession as a unit. Area C is in a late perennial weed stage of succession and is dominated by tall goldenrod (*Solidago canadensis*). Area D is a bottomland forest totally dominated by silver maple (*Acer saccharinum*), with trees almost all the same age despite some differences in tree size. Most of the hill plant communities (Areas F, H, L, P, and Q), on the other hand, were probably pastures and were colonized by trees over a prolonged period, producing a less homogeneous community.

Mapping depicting the delineated boundaries of the various plant communities as they occur within the boundaries of the site is shown on Exhibits 1 and 2, pages 2 and 3. Each distinct plant community has been labeled with a letter that corresponds to a plant dominance list and accompanying narrative contained on the following pages. This map depicts the major plant communities within the site in order to provide a basis for understanding the plants and

Map Document: (P:\Project Files\Kentucky\9109-09_CCCD_Hawthorne\Mapping\GIS\Ex1_Aerial.mxd) 7/31/2009 -- 3:28:07 PM las

County Road mapping was obtained from the Kentucky Transportation Cabinet. National hydrography dataset downloaded from the Kentucky Office of GIS at <http://ogi.ky.gov/gisdata.htm>. 2006 2-foot color aerials obtained from <ftp://ftp.kymartian.ky.gov/FSA_NAIP_2006_2FT/>.

N

TRAPP ROAD

Q

P

G

D

Fish and Macroinvertebrate Sampling Station

Pond

N

M

F

O

L

Log Cabin

Riffle Creek

Old House

Licking River

Pond

B

K

J

Pond

A

H

I

C

E

M

Wetland

915

D

Riffle Creek

Sampling Station

Vegetation Boundary

Site Boundary

300 0 300 Feet

Exhibit 1
Biological Inventory (Aerial)
Hawthorne Crossing Conservation Area
Alexandria, Campbell County, Kentucky

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County Road mapping was obtained from the Kentucky Transportation Cabinet. National hydrography dataset downloaded from the Kentucky Office of GIS at <http://ogi.ky.gov/gisdata.htm>. USGS topographic mapping obtained from the Kentucky Geological Survey for the Alexandria 7.5' quadrangle.

N

TRAPP NURNAN ROAD

TRAPP ROAD

2924

Licking Vall
Ch

Q

P

G

Pond

D

Fish and Macroinvertebrate Sampling Station

N

M

L

F

O

Log Cabin

534

Hawthorne

Riffle Creek

Licking River

Pond

Old House

K

B

A

Pond

J

H

C

I

E

M

Wetland

915

D

600

500

Riffle Creek

Sampling Station

Vegetation Boundary

Site Boundary

500 0 500 Feet

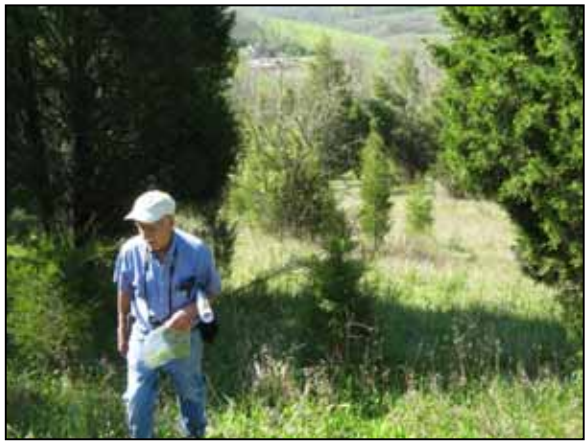
Exhibit 2
Biological Inventory (Topographic)
Hawthorne Crossing Conservation Area
Alexandria, Campbell County, Kentucky

animals that live there, as well as to serve as baseline information for resource management, planning, and development.

1. Plant Communities

Area A (6.14 acres) – Red Cedar/Old Field Grassland

This grassland community is becoming established with shrubs; but the community is still approximately 65 percent open grassland. Dominant shrubs are red cedar (*Juniperus virginiana*), bush honeysuckle, and Osage orange (*Maclura pomifera*). Other shrubs common in the area are rough-leaf dogwood (*Cornus drummondii*), slippery elm (*Ulmus rubra*), hawthorn (*Crataegus* sp.), redbud (*Cercis canadensis*), and plum (*Prunus americana*). Multiflora rose (*Rosa multiflora*) and blackberry (*Rubus* sp.) are common throughout the area. The herbaceous layer is dominated by smooth brome (*Bromus inermis)*, spotted knapweed (*Centaurea maculosa.*), and goldenrod (*Solidago* sp.).



Large Cedar Trees in Old Field Grassland

Area B (2.77 acres) – Pasture/Overgrown Lawn

This grassland community is located in what was once pasture and mowed lawn for the homestead. It is approximately 90 percent open grassland with scattered shrubs and trees. The dominant vegetation is smooth brome, tall fescue (*Schedonorus phoenix*), orchard grass (*Dactylis glomerata*), and moneywort (*Lysimachia nummularia*), with frequent occurrences of Queen Anne's lace (*Daucus carota*), asters (*Aster* sp.), garlic mustard (*Alliaria petiolata*), teasel (*Dipsacus sylvestris*), curly dock (*Rumex crispus*), white clover (*Trifolium repens*), red clover (*Trifolium pretense)*, and wild rye (*Elymus virginicus*).

House and Outbuilding in Area B - Overgrown Lawn and Pasture

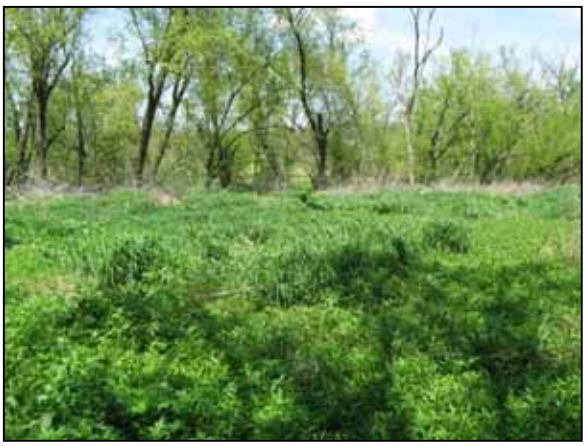
Area C (3.76 acres) – Old Field/Wet Meadow

This grassland/forb community is located in what was once pasture and/or a row crop field and is approximately 95 percent open. The lowest elevations within this relatively flat creek bottom field, which are likely the remains of an abandoned stream channel, are dominated by hydrophytic vegetation, indicating that portions of this area are wetland. An examination of the soil revealed oxidized root zones, indicating that there is standing water for extended periods, resulting in anaerobic conditions. The non-wetland areas are dominated by a community similar to Area B, but with a greater abundance of goldenrod. The wetland portions are dominated by sedges (*Carex* sp.), rushes (*Juncus effusus*), agrimony (*Agrimonia parviflora*), bugleweed (*Lycopus americana*), moneywort, and swamp milkweed (*Asclepias incarnata*).

Area D (5.3 acres) – Bottomland Silver Maple Forest 6-10 inch DBH

This bottomland forest community was most likely used as cropland in the past. This forest is completely dominated by silver maple (*Acer saccharinum*) trees of nearly the same size (dbh). The groundcover within this forest is dominated by honewort (*Cryptotaenia canadensis*), goldenglow (*Rudbeckia laciniata*), giant ragweed (*Ambrosia trifida*), ground ivy (*Glecoma hederacea*), moneywort, and wood nettle (*Laportea canadensis*).

Silver Maple Forest in Bottomland Near Licking River



Old Field Opening in Bottomland Forest. Reed Canary Grass on Floodplain of River

Area E (0.59 acres) – Opening (Old Field) in Bottomland Forest

These narrow bottomland forest openings, which were crop fields in the past, are still in an early stage of succession. They are dominated by giant ragweed, hop vine (*Humulus japonicus*), reed canary grass (*Phalaris arundinacea*), stinging nettle (*Urtica dioica*), and poison hemlock (*Conium maculatum*).

Area F (26.17 acres) – Large Red Cedar/Bush Honeysuckle Forest

This forest is located on a dry, west- facing slope and is dominated by large red cedar and Osage orange trees, plus scattered scarlet oak (*Quercus coccinea*), chinquapin oak (*Quercus muhlenbergii*), and white ash (*Fraxinus americana*). The understory is a dense stand of bush honeysuckle, and scattered muliflora rose (*Rosa multiflora*) is also common. Other species present in the understory include small pignut hickory (*Carya glabra)*, sugar maple (*Acer sacharum*), redbud, white ash, rough-leaf dogwood, poison ivy (*Toxicodendron radicans*), and chinquapin oak. The thin groundcover consists of Virginia creeper (*Parthenocissus quinqefolia*) and Canada moonseed (*Menispermum canadense*)

Area G (7.29 acres) – Cedar/Bush Honeysuckle Forest

This hill forest is similar to F with a canopy dominated by red cedar and scattered Osage orange, but it lacks the native tree seedlings mentioned above. The understory is densely crowded with bush honeysuckle.

Area H (8.78 acres) – Black Locust/Bush Honeysuckle Forest

This hill forest has a canopy dominated by black locust (*Robinia pseudoacacia*), with some silver maple near the base of slope. Scattered box elder (*Acer negundo*), Osage orange, pignut hickory, black cherry (*Prunus serotina*), white ash, and slippery elm are also present in the overstory. Large bush honeysuckle shrubs dominate the understory, along with scattered Osage orange, mulitflora rose, box elder, spicebush (*Linderia benzoin*), and coralberry

(*Symphoricarpos orbiculatus*). The herbaceous groundcover is dominated by white snakeroot (*Eupatorium altissima*), ground ivy (*Glecoma hereracea*), garlic mustard, Virginia creeper, and scattered colonies of May apple (*Podophyllum peltatum*).

Area I (0.25 acres) – Ravine (Breached Pond) Forest

In the past, portions of this area may have been a pond, and remnants of the dam are present. The overstory in this area is sparse and consists of box elder, Osage orange, black walnut (*Juglans nigra*), and buckeye (*Aesculus glabra*). The understory is multiflora rose, grape (*Vitis* sp.), bush honeysuckle and pawpaw (*Asimina triloba*). The herbaceous groundcover in this forest is dominated by corn salad (*Valerianella radiata*), smartweed (*Polygonum persicaria*), wild rye, white snakeroot, wingstem (*Verbesina alternifolia*), and Japanese stiltgrass (*Microstegium viminum*).

Area J (6.16 acres) – Buckeye/Hackberry River Slope Forest

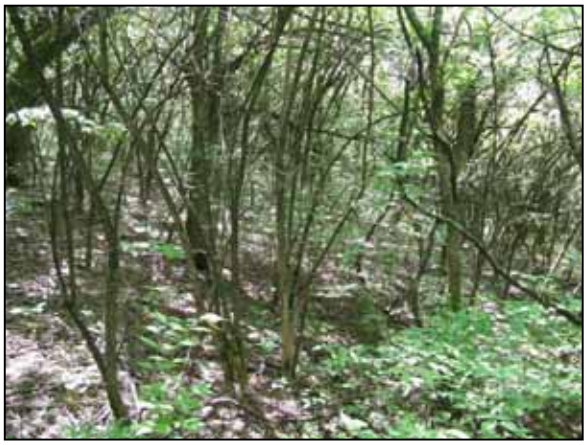
This forest is located on the steep lower slope immediately above the Licking River terrace but is more mesic than the upper slope forest in areas F and G. The overstory is dominated by hackberry (*Celtis occidentalis*) and buckeye, with some box elder, Osage orange, hawthorn, and red mulberry (*Morus rubra*). The understory is less dense, but still dominated by bush honeysuckle with scattered buckeye and coralberry. The herbaceous groundcover consists primarily of garlic mustard, with some ground ivy, violet (*Viola* sp.), wood nettle (*Laportea canadensis*), white snakeroot, and wild rye.

Area K (3.77 acres) – West Facing Osage Orange/Bush Honeysuckle Forest

This forest consists of trees that vary from 4 to 10 inches dbh and has a more diverse canopy than F or G. The dominant overstory consists of large red cedar and Osage orange, but also contains black locust, black walnut, chinquapin oak, hackberry, and slippery elm. The understory is densely crowded with bush honeysuckle. The understory contains coralberry, spicebush, multiflora rose, sugar maple, and white ash. The groundcover in this forest consists of white snakeroot, garlic mustard, lyre-leaf sage (*Salvia lyrata*), and common groundsel (*Senecio vulgaris*).

Area L (17.79 acres) - East Facing Osage Orange/Bush Honeysuckle Forest

This forest consists of trees that vary from 4 to 10 inches dbh. The dominant overstory species are Osage orange, black locust, red cedar, box elder, slippery elm, and white ash. The understory is densely crowded with bush honeysuckle, but also contains multiflora rose and bittersweet (*Celastrus scandens*). The groundcover in this forest is almost absent due to the dense bush honeysuckle, but scattered Virginia creeper, garlic mustard, and mock strawberry (*Duchesnea indica*) does occur.



Bush Honeysuckle in Forest Understory

Area M (6.18 acres) – Box Elder/Silver Maple Riparian Forest

This forest is located along the riparian area of Riffle Creek. The trees vary in size from 4 to 14 inches dbh. The overstory is dominated by

box elder and silver maple, but other trees present in the overstory include cottonwood (*Populus deltoides*), buckeye, black walnut, Osage orange, hackberry, sycamore (*Platanus occidentalis*), and slippery elm. The understory is dominated by small buckeye and has scattered bush honeysuckle. The herbaceous groundcover is diverse and includes phlox (*Phlox divicarta*), dwarf larkspur (*Delphinium tricorne*), wingstem, wild rye, white snakeroot, ground ivy, garlic mustard, violet, bedstraw (*Galium aparine*), Star-of-Bethlehem (*Ornithogalum umbellatum*), wild bean (*Phaseolus polystachios*), common groundsel, wild ginger (*Asarum canadense*), waterleaf (*Hydrophyllum* sp.), corn salad, and goldenglow. Trumpet creeper (*Campsis radicans*) occurs on the forest edge.

Area N (0.4 acres) – Opening in Riparian Forest

This narrow opening in the forest was used for agriculture in the past. Wild rye, yellow wingstem (*Verbesina occidentialis*), fleabane (*Erigeron philadelphicus*), mock strawberry, phlox, and violets dominate the opening with scattered, small black walnut and box elder. Scattered multiflora rose is also present.

Area O (1.62 acres) – Hill Top Old Field/Successional Scrubland

This open area is in a mid-stage of old-field succession and is dominated by shrubs and saplings. The dominants are rough leaf dogwood and Osage orange. Other saplings and shrubs present are honey locust (*Gleditsia triacanthos)*, coralberry, white ash, red cedar, box elder, black haw (*Viburnum prunofolium*), black walnut, and bush honeysuckle. The groundcover is dominated by goldenrods (*Solidago* sp.), knapweed (*Centaurea* sp.), and poison ivy, with common milkweed (*Asclepias syriaca*), blackberry, wild rye, grape (*Vitis* sp.), and dewberry (*Rubus* sp.) also common.

Area P (5.97 acres) – Young Red Cedar/Osage Orange/Bush Honeysuckle Forest

This partially open canopied forest is dominated by red cedar, Osage orange, and white ash. Some chinquapin oak, honey locust, and persimmon (*Diospyros virginiana*) also occur. The understory is densely crowded by bush honeysuckle, multifora rose, and poison ivy, but also has bittersweet, privet (*Ligustrum sinense*), coralberry, and Japanese honeysuckle (*Lonicera japonica*). The herbaceous groundcover is thin and consists of lyre leaf sage, common milkweed, knapweed, and Virginia creeper. Seedling sugar maples are also present.

Area Q (15.11 acres) –Osage Orange/Bush Honeysuckle Forest

This forest has older scattered overstory trees of Osage orange, honey locust, slippery elm, and white ash. The understory is dense bush honeysuckle with white ash and multiflora rose. Some small pignut hickory and chinquapin oak saplings are present in the understory as well. The herbaceous groundcover is thin due to dense shade from the bush honeysuckle. The species present include white snakeroot, common groundsel, and ebony spleenwort (*Asplenium platyneuron*).

2. Invasive Species

Invasive plant species are found throughout the property. Some of the more common species are discussed in greater detail below.

In particular, amur honeysuckle (*Lonicera maackii*), commonly known as bush honeysuckle, dominates the shrub layer in nearly all forests within the property and is invading most of the open communities. This species is native to Asia and is now naturalized in much of the eastern and mid-western United States. This exotic species occurs so densely within the forests that only herbaceous plants that tolerate nearly complete shade are present, and in most areas the ground is bare. Walking through the forests

is difficult due to the density. Because bush honeysuckle is well established, it leaves little opportunity for seedlings of native tree species to develop, indicating that these forests will remain choked by this aggressive exotic species unless management actions are taken.

A second prevalent exotic species within the forested communities is Osage orange (*Maclura pomifera*), which is native to the southern Great Plains but not to Kentucky. This spiny, branching tree is also known as "hedge apple" for its large, uniquely shaped fruit. Similar to bush honeysuckle in its ability to block sunlight from reaching the ground, very little ground cover or seedlings of native trees or shrubs are present where it is dominant. In most of the hill forests within the property, the tree canopy is partially dominated by Osage orange, which also dominates the understory.

Within the riparian forests of the Licking River and Riffle Creek the exotic Japanese stilt grass (*Microstegium vimineum*) dominates the ground cover in many areas. This annual plant is native to Asia and has become common in riparian habitats, lawns, woodlands, wetlands, and roadside ditches. It is capable of invading natural areas and swiftly replacing natural communities with nearly monospecific stands. Japanese stilt grass prefers moist shady conditions, and has become established in the forested riparian areas of the streams adjacent to the property.

Garlic mustard (*Alliaria petiolata*) is a biennial herb native to Europe that invades and dominates the understory of forested areas in North America. It occurs within the Hawthorne CCA property in the hill and riparian forests of the Licking River, growing in the dense shade of the bush honeysuckle understory. Garlic mustard tolerates cool winters, grows early in the spring, and continues to produce seed into the fall when native species are dormant. Garlic mustard is considered a threat to some species of butterfly because they lay their eggs on the plants but the larvae do not mature. Garlic mustard serves as a population sink for these species.

Spotted knapweed (*Centaurea maculosa*) is common in several of the open, old-field communities. This European native is a biennial or short-lived perennial, which spreads by seed and contains allelopathic compounds that suppress other plants.

Within the narrow bottomland forest openings along the Licking River are colonies of the aggressive reed canary grass (*Phalaris arundinacea*), a persistent grass that forms dense monotypic stands in wetlands, moist meadows, and riparian areas. Reed canary grass spreads by rapidly growing underground rhizomes that quickly exclude native species, creating areas of little use to wildlife. It is difficult to eradicate and new seed may be introduced by floodwaters.

Also associated with these openings is Japanese hop vine (*Humulus japonicus*), which forms a dense tangle of vines that cover the ground and low-growing vegetation. This annual spreads by seeds that may have been brought in by river floodwater as well.

Multiflora rose (*Rosa multiflora)* is a perennial shrub native to Japan with compound leaves and small white or pink flowers. The plant is extremely prolific and invades pastures and other unmaintained areas, crowding out existing vegetation and creating dense impenetrable thickets. This species, which is common in the grassland/shrub communities within the property, is also scattered throughout the forests and riparian areas of the Licking River and Riffle Creek.

Winter creeper (*Euoynmus fortunei*), an Asian evergreen vine, covers the north slope that begins at the edge of the lawn and drops down to

the riparian forest along Riffle Creek. It can tolerate a wide range of light and soil conditions and will out compete native species. This is a species that will readily spread and is difficult to eradicate.

The grassland/shrub land communities within the property are frequently dominated by smooth brome (*Bromus inermis*), which is a Eurasian cool season grass that is widely planted as a forage and cover crop. It is a highly persistent species that forms a dense sod that can exclude other species contributing to the reduction of species diversity in natural area.

Growing with the smooth brome in the grassland/old field habitats is tall fescue (*Schedonorus phoenix*), another cool season grass native to Europe. Kentucky 31 fescue has been widely planted and is considered valuable as a turf and forage grass. However, this persistent perennial competes strongly with native species, especially where burning is suppressed.

Other exotic species that occur within the various plant communities that are common but less abundant include teasel, Queen Anne's lace, Japanese honeysuckle, privet, poison hemlock, Star-of-Bethlehem, self-heal, ground ivy, moneywort, red and white clover, and tree of heaven (adjacent to the cabin). A complete list of plants observed is included in Appendix B, and all non-native plants are marked with an asterisk.

B. Fauna

During the April 24, May 12, and July 28, 2009 field visits, Third Rock biologists recorded the occurrences of mammals, birds, reptiles, and amphibians. The field effort included listening for and identifying bird and frog calls, as well as identification through observation. Mud near streams and ponds was searched for animal tracks and animal scat was identified. Existing tin, lumber, boards, logs, and rocks were turned when encountered to search for reptiles and amphibians. The various old houses, barns, and outbuildings were examined with a spotlight for bats, guano, and bird nests.

Animals that were observed, or determined present on site by the observation of feathers, tracks, scat, etc., during the field surveys include: wild turkey (*Meleagris gallopavo*), white tailed deer (*Odocoileus virginianus*), grey squirrel (*Sciurus carolinensis*), raccoon (*Procyon lotor*), garter snake (*Thamnophis sirtalis*), green frog (*Rana clamitans*), box turtle (*Terrapene carolina*), cardinal (*Cardinalis cardinalis*), red-tailed hawk (*Buteo jamaicensis*), gold-finch (*Carduelis tristis*), barn swallow (*Hirundo rustica*), phoebe (*Sayornis phoebe*), crow (*Corvus brachyrhynchos*), mourning dove (*Zenaida macroura*), indigo bunting (*Passerina cyanea*), turkey vulture (*Cathartes aura*), and blue jay (*Cyanocitta cristata*). Additionally, bat guano was observed within one of the outbuildings near the old home site, but no roosting bats were observed. Several larval salamanders were observed within Riffle Creek and reptile egg casings were observed from a recent snake or turtle hatching.

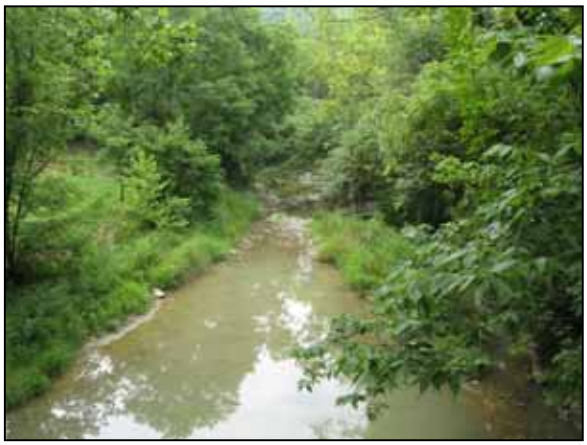
II. AQUATIC HABITATS

A. Riffle Creek

During the July 28, 2009 field visit, Third Rock biologists sampled Riffle Creek for fish, collected samples to identify macroinvertebrates, and performed a habitat assessment using the *High Gradient Field Data Sheet* from EPA's *Rapid Bioassessment Protocol* (RBP). The sampling station location on Riffle Creek is shown on Exhibit 1 (page 2).

Riffle Creek was sampled using a seine, and eight species of fish were collected. These species include: creek chub (*Semotilus atromasulatus*), blunt nose minnow (*Pimephales notatus*), emerald shiner (*Notropis atherinoides*), rose fin shiner (*Lythrus ardens)*, striped shiner (*Luxilus chrysocephalus*), central stoneroller

(*Campostoma anomalum*), spotted bass (*micropterus punctulatus*), and rainbow darter (*Etheostoma caeruleum*).



Riffle Creek with Forested Riparian Zone

Macroinvertebrate sampling consisted of both quantitative and qualitative methods. Twenty-eight taxa (taxa richness) were identified from the samples collected. The macroinvertebrate biotic indices (MBI) score for the Riffle Creek sample is 56.2, which is considered a "fair" rating for this bioregion. The percentage of Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (cadisflies) (modified %EPT), which are considered pollution intolerant species, is 5.7%. The results of the macroinvertebrate sample identification are located in Appendix C.

The RBP habitat assessment of Riffle Creek resulted in a total score of 165 out of a possible 200 points on the ten parameter rating form. A score of 165 indicates that this stream has excellent habitat for macroinvertebrates. Riffle Creek scored highest in those parameters that involved frequency of riffles and bends, bank stability, and riparian vegetation. The lowest scores were in categories that involved available cover (due to lack of woody debris) and velocity depth regime and channel flow status (the channel was mostly pooled). The completed RBP form is located in Appendix C.

B. Licking River

No aquatic sampling was conducted on the Licking River during the field effort. The Licking River is deep, with steep forested banks on the water's edge. No relic mussel shells were observed on the banks of the river; however, the Licking River is known to be habitat for many mussel species, making it an important habitat for these rare organisms. Within the Licking River near the confluence with Riffle Creek, a wide riffle with exposed cobble and a large patch of water willow (*Justicia americana*) is present. This feature is commonly associated with mussel beds. The Licking River not only provides the Hawthorne CCA with an aesthetically pleasing aspect and recreational opportunity, but also provides habitat for fish, mussels, benthos, aquatic turtles and other reptiles, beaver, muskrat, and numerous other aquatic and riparian species of plants and animals.

Gravel Bar and Water Willow in Licking River near the Mouth of Riffle Creek

C. Ponds

Three ponds are located on the Hawthorne CCA property. These ponds are manmade and were likely used previously as water sources for livestock. The margins of these ponds have some wetland vegetation, such as black willow (*Salix nigra*), sedges (*Carex* sp.), moneywort, pond weed (*Potamogeton nodosus*), and spikerush (*Eleocharis ovata*). These ponds

serve as water sources and foraging area for terrestrial animals, such as bats and turtles, and they also provide breeding areas for amphibians such as frogs, toads, and salamanders. During the field surveys, frogs were observed in these ponds. Insects that spend part of their life cycles in aquatic environments, such as dragonflies and damselflies, use these ponds as well.

Willows on Margin of Old Farm Pond

IV. CONCLUSION

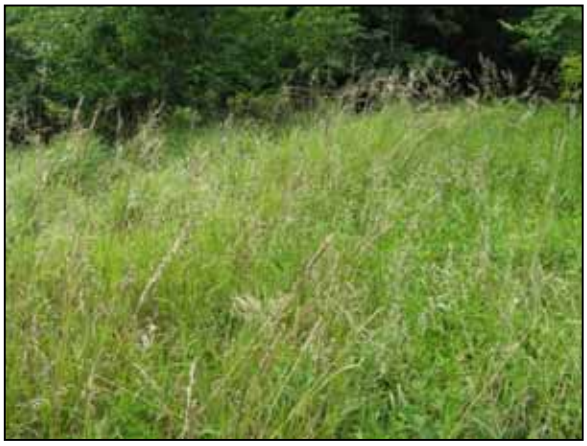
The vegetative community assessment resulted in the identification of 17 distinct communities, the majority of which were dominated by early successional species that are commonly found in areas that have recently been disturbed by agricultural uses. The forested bottomlands are predominantly silver maple, hackberry, and box elder forests. These are all species that have wind disseminated seeds, which allow early colonization. Exotics and native trees that can withstand thin soils and disturbed conditions, such as black locust and red cedar, dominate the forested hillsides and ridges within the property. The dense understory of bush honeysuckle and Osage orange has resulted in low species diversity throughout the property as shade provided by these species reduces tree regeneration and native herbaceous plant growth. The forests, shrublands, and grasslands have low species diversity and do not have high wildlife value.

A variety of aquatic habitat exists throughout the property due to the presence of the Licking River, the perennial stream Riffle Creek, several old farm ponds, and one wet meadow wetland. The Licking River provides high quality habitat in this location. Riffle Creek has abundant habitat for aquatic organisms due to the well established riparian zone, stable banks, abundant cobble, and perennial flow. The benthic community did not contain high numbers of pollution intolerant species. The fish community consisted of common species of fish, which may be an indication that the watershed is not in excellent condition.

The wildlife observed during the field effort were common species known to be tolerant of habitats with obvious man-induced influences, such as old pasture and farmland that has been colonized by exotic plant species.

APPENDICES

APPENDIX A – PHOTO LOG

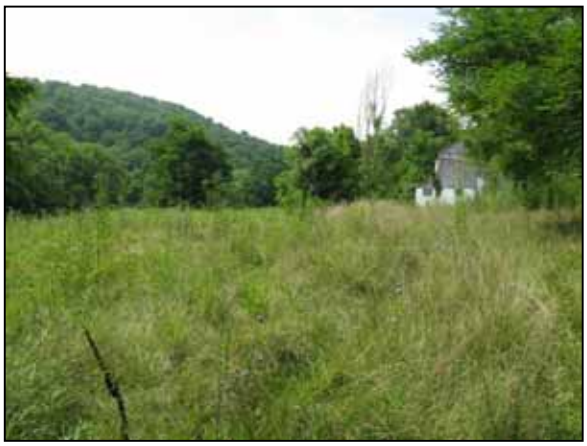


Area A - Exotic Brome Dominates Grassland Near Old Roadway, July 28, 2009

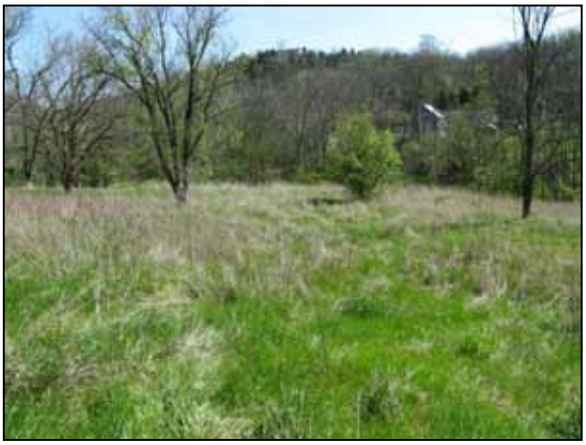
Area A - Large Red Cedar in Old Field Grassland, July 28, 2009

Area A - Old Field Grassland, July 28, 2009

Area B - Overgrown Lawn, July 28, 2009

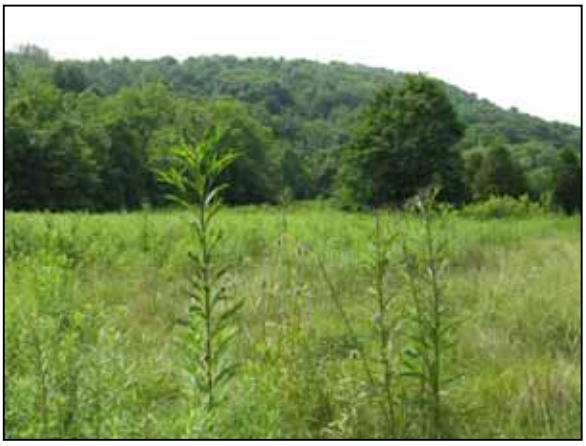


Area B – Pasture, July 28, 2009



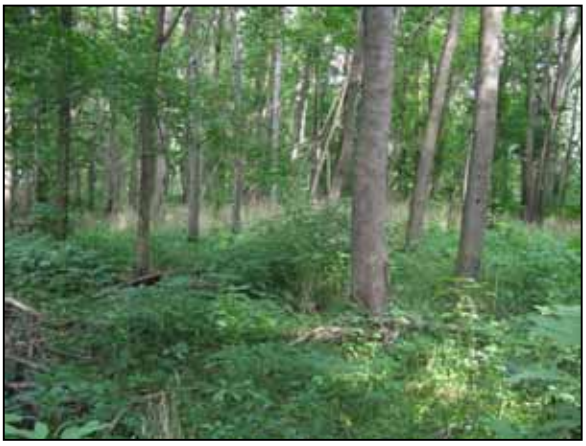
Area B – Pasture, April 29, 2009

Area C - Examining Soil In Wet Meadow, July 28, 2009

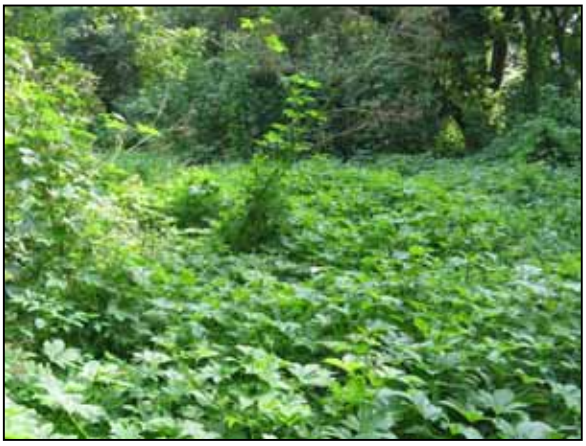


Area C - Old Field, July 28, 2009

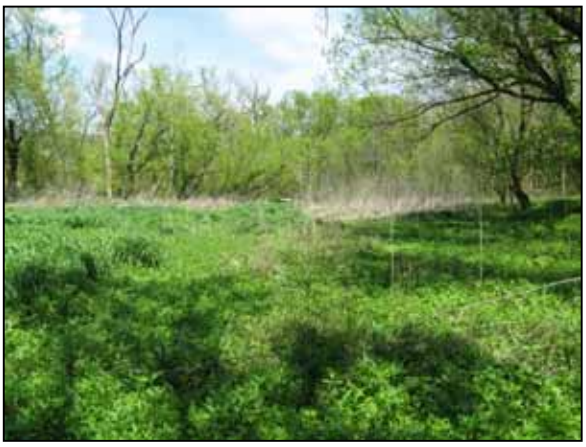
Area D - Bottomland Silver Maple Forest, July 28, 2009



Area D - Bottomland Silver Maple Forest, July 28, 2009



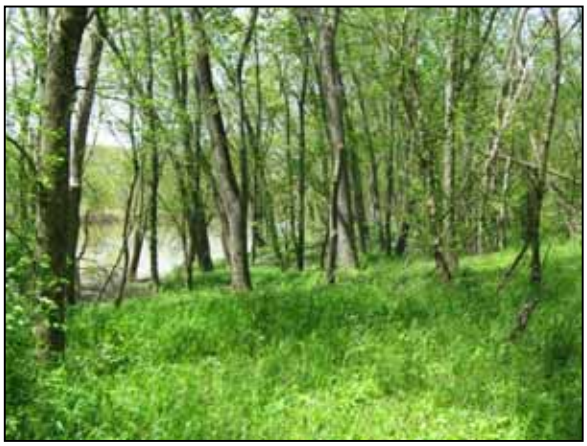
Area E - Old Field Opening in Bottomland Forest, July 28, 2009



Area E - Old Field Opening In Bottomland Forest, April 29, 2009

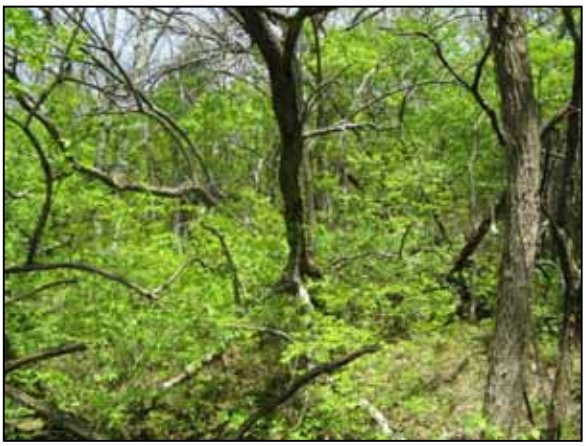
Area G - Cedar And Bush Honeysuckle Forest, April 29, 2009

Area J - Snag With Exfoliating Bark Provides Bat Habitat, July 28, 2009

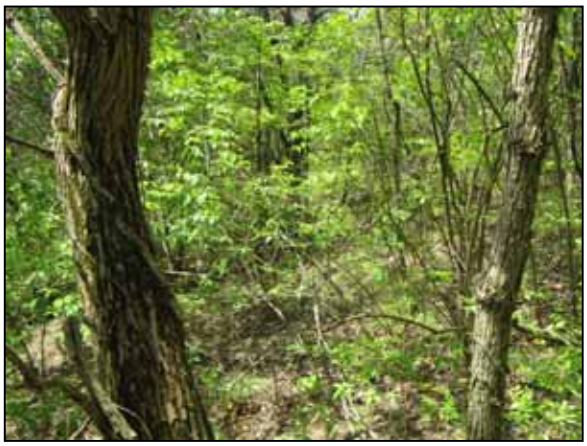


Area J – Buckeye/Hackberry River Slope Forest, April 29, 2009

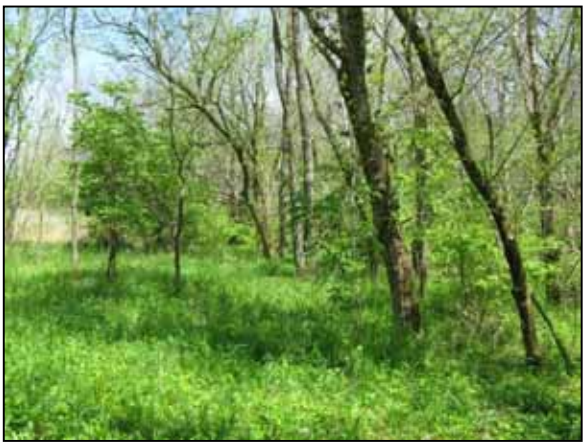
Edge of Area A and K, July 28, 2009



Area K - Osage Orange And Bush Honeysuckle Forest, April 29, 2009



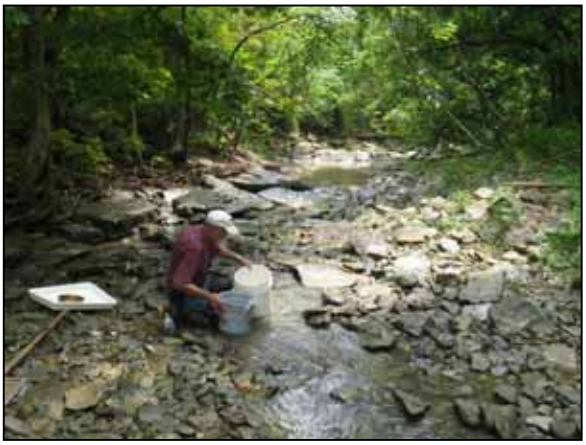
Area K - Osage Orange And Bush Honeysuckle Forest, April 29, 2009



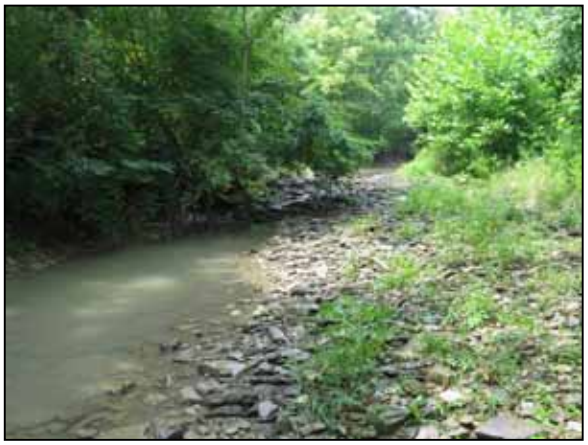
Area M – Box Elder, Silver Maple Riparian Forest, April 29, 2009

Area R - Forest Along Gravel Road, July 28, 2009

Licking River from Hawthorn Property, July 28, 2009

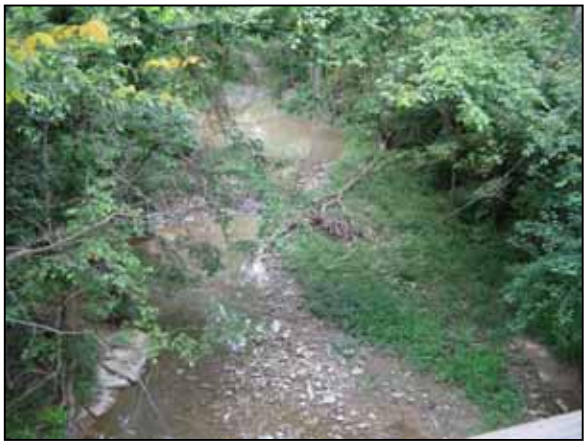


Riffle Creek At Fish And Macro Sampling Station, Downstream View, July 28, 2009

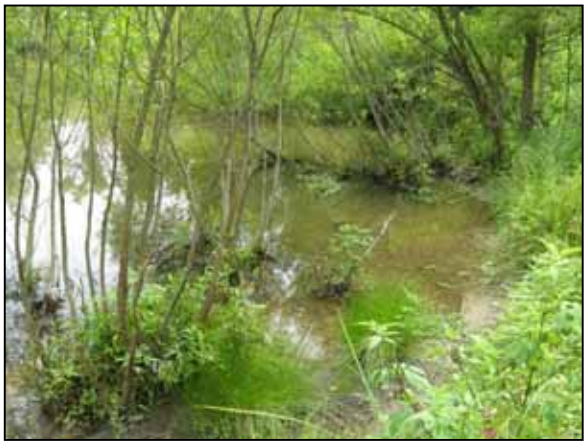


Riffle Creek At Fish And Macro, Upstream View Sampling Station, July 28, 2009

Riffle Creek, Downstream View From Foot Bridge, July 28, 2009



Riffle Creek, Upstream View From Foot Bridge, July 28, 2009

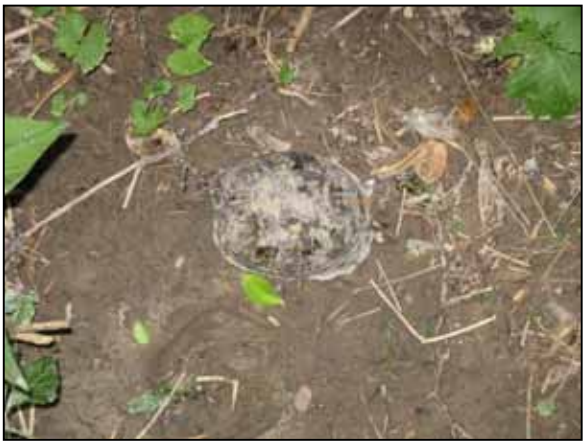


Pond Wetland Edge, July 28, 2009

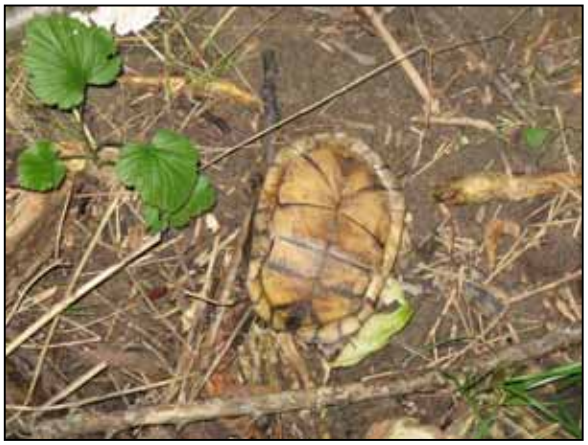
Pond Behind Old House Site, July 28, 2009

Rock Cistern Interior, July 28, 2009

Barn Swallow Nest in Dairy Barn, July 28, 2009

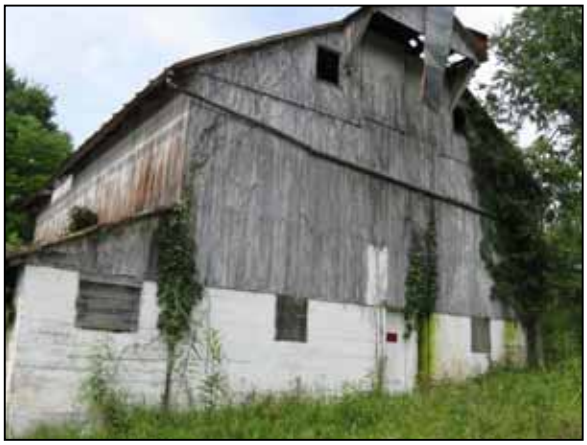


Box Turtle Shell, July 28, 2009

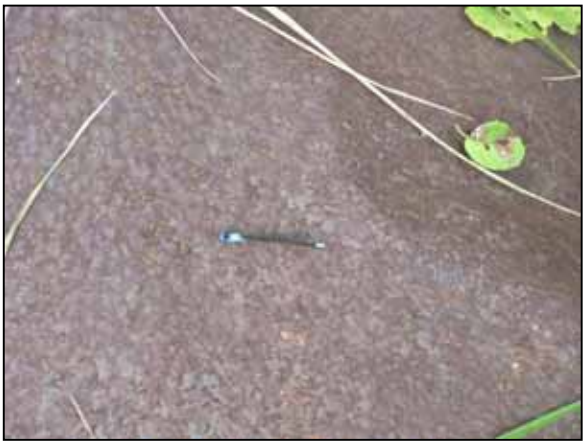


Box Turtle Shell, July 28, 2009

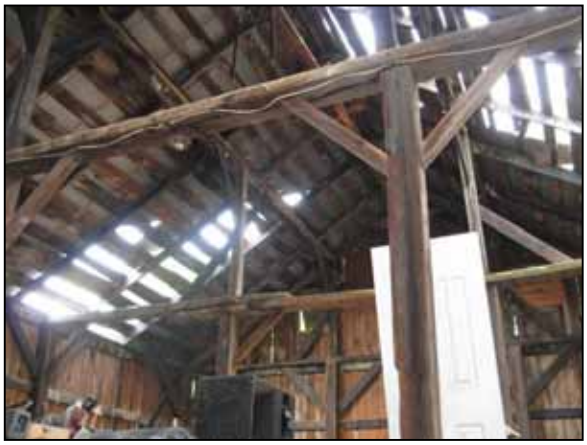
Butterfly Weed, July 28, 2009



Dairy Barn, July 28, 2009



Damselfly, July 28, 2009



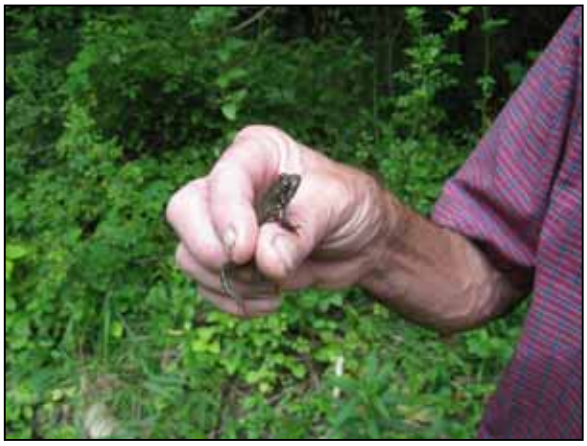
Searching Barn Ceiling For Bats And Nests, July 28, 2009

Searching Ceiling Of Diary Barn For Bats And Nests, July 28, 2009

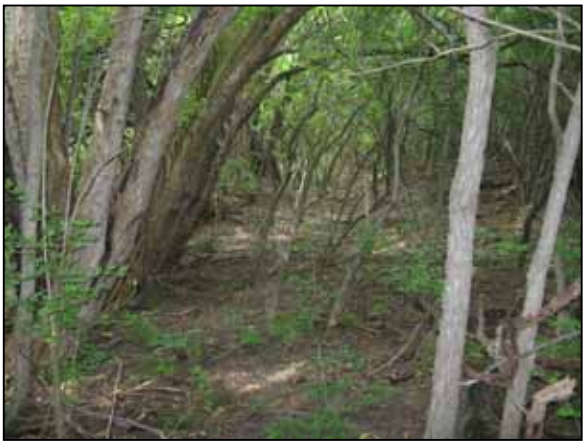
Fish Captured In Seine, July 28, 2009

Grain Trolley And Wood Silo, July 28, 2009

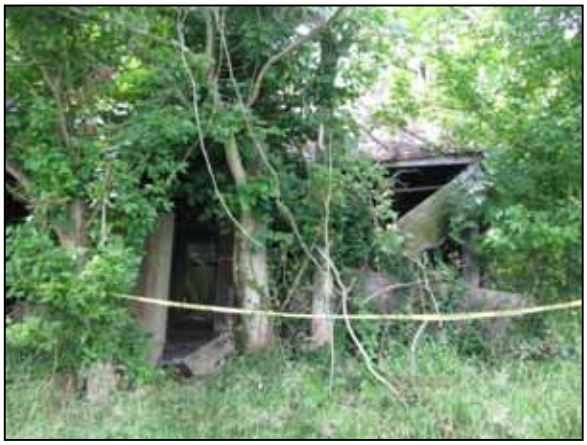
Garter Snake Location Under Old Tin, July 28, 2009



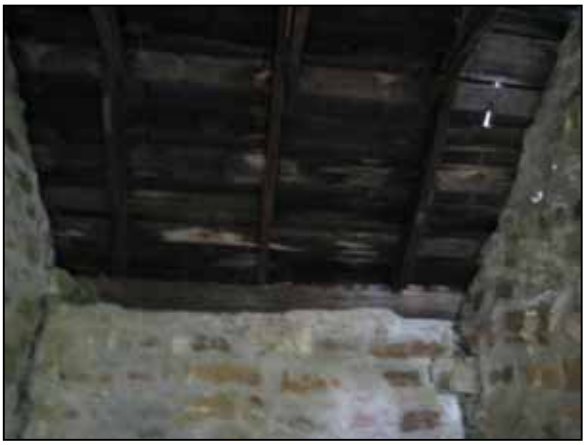
Green Frog in Riffle Creek, July 28, 2009



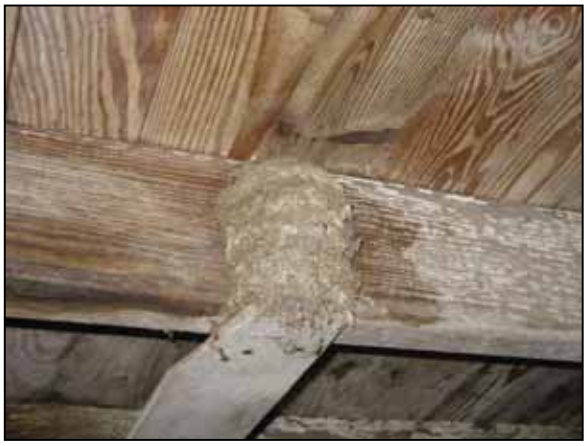
Large Osage Orange Trees Along Old Fence Row, Dense Bush Honeysuckle, July 28, 2009



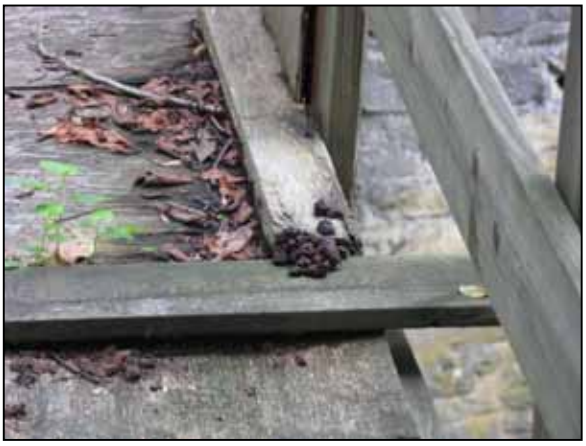
Log Cabin, July 28, 2009



Outbuilding of Log Cabin, interior, July 28, 2009

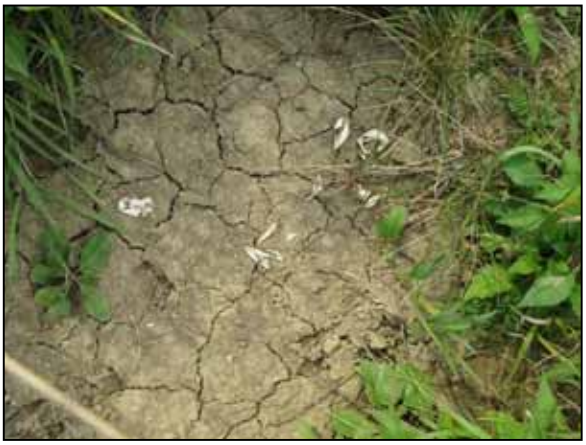


Phoebe Nest in Dairy Barn, July 28, 2009

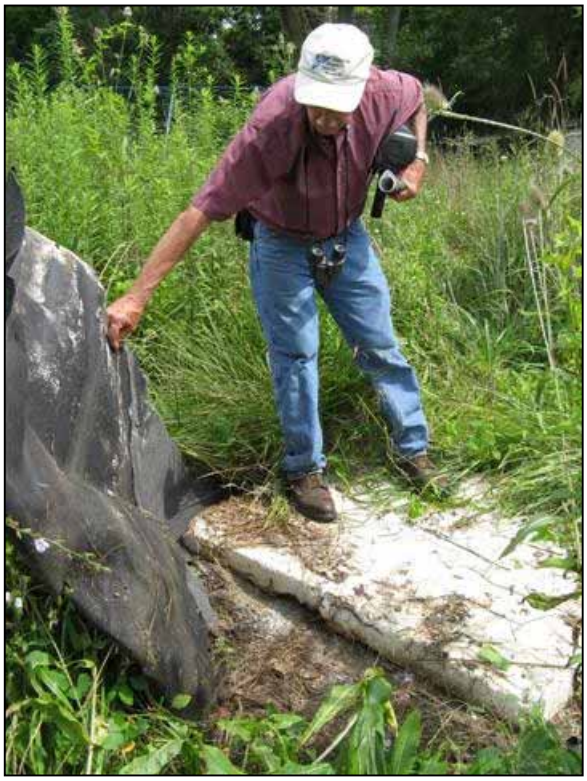


Raccoon Scat, July 28, 2009

Rainbow Darter, July 28, 2009

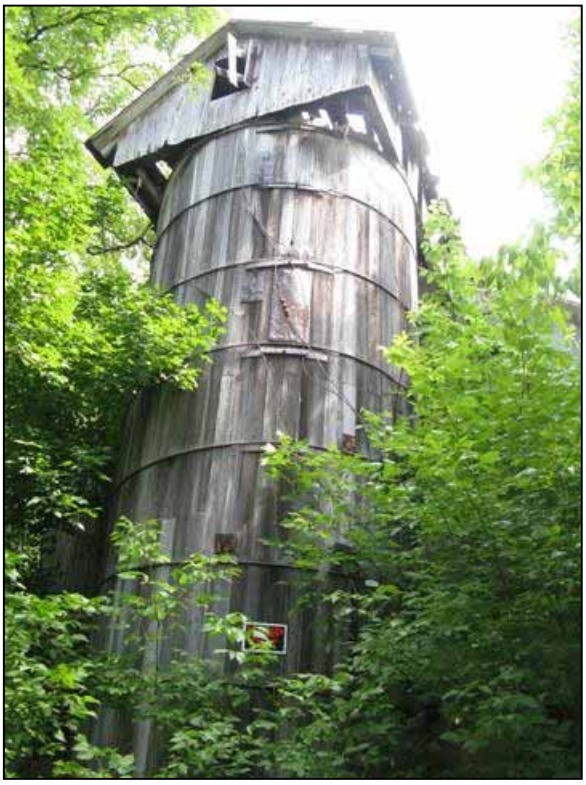


Reptile Egg Shells, July 28,2009

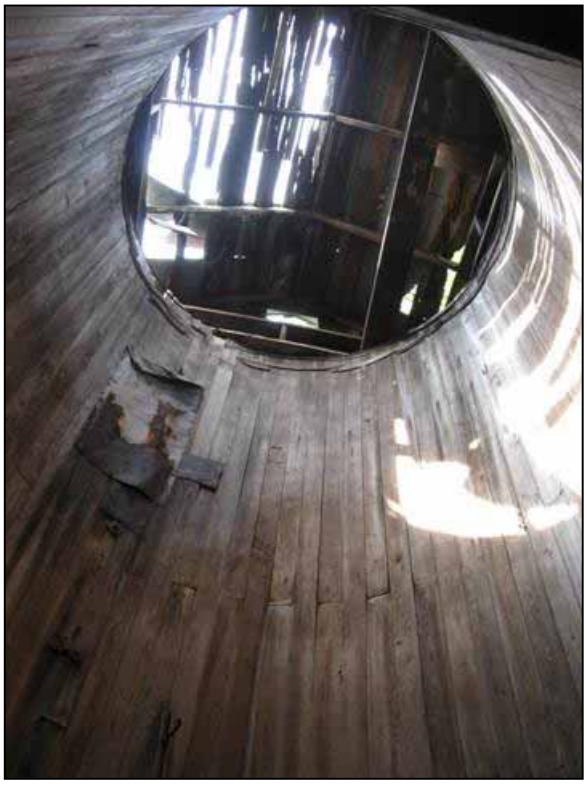


Searching For Reptiles Under Roofing Paper, July 28, 2009

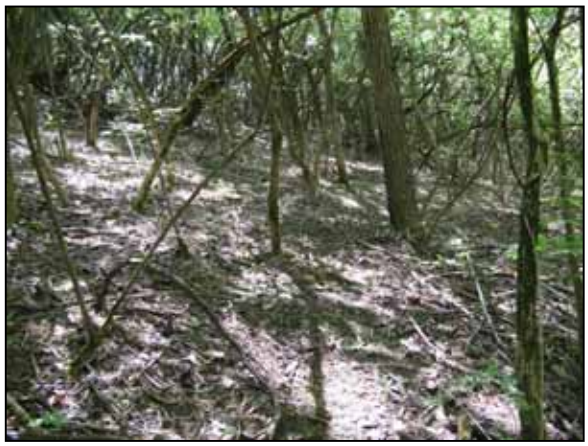
Searching Under Rocks For Salamanders, July 28, 2009



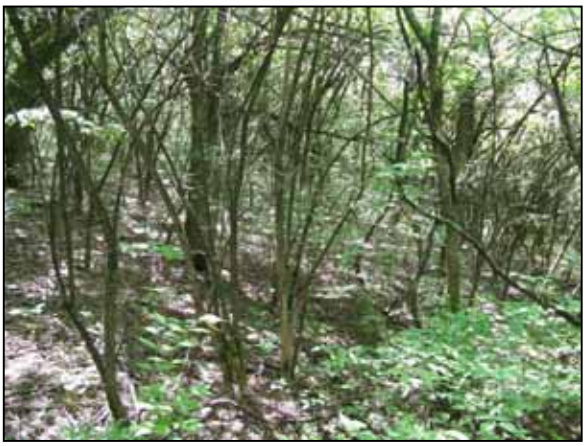
Wood Silo, July 28, 2009



Silo Interior, July 28, 2009



Bare Ground Under Bush Honeysuckle, May 15, 2009



Dense Bush Honeysuckle Understory, May 15, 2009

APPENDIX B – PLANT LIST

COMMON NAME	SCIENTIFIC NAME	PLANT COMMUNITY IN WHICH THE SPECIES WAS OBSERVED																
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
Aster	*Aster* sp.		x		x	x												
Barnyard Grass*	*Echinochloa crusgalli*	x																
Rough Bedstraw	*Galium asprellum*				x													
Bedstraw*	*Galium aparine*						x			x	x			x				
Bee balm	*Monarda fistulosa*	x																
Bittersweet	*Celastrus scandens*							x				x	x				x	x
Black Cherry	*Prunus serotina*								x									
Black Haw	*Viburnum prunofolium*															x		
Black Locust	*Ronina pseudoacacia*	x					x		x				x					
Black Snakeroot	*Sanicula canadensis*									x		x		x				x
Black Walnut	*Juglans nigra*									x		x		x	x	x		
Black Willow	*Salix nigra*	x					x											
Blackberry	*Rubus* sp.		x													x		
Blue Violets	*Viola* sp.				x													
Bluegrass	*Poa pratensis*		x															
Box Elder	*Acer negundo*				x		x		x	x	x		x	x	x	x		
Bugleweed	*Lycopus americana*			x														
Burdock*	*Actium minus*		x															
Bush Honeysuckle*	*Lonicera maackii*	x			x		x		x	x	x	x	x	x	x	x	x	x
Butterfly Milkweed	*Asclepias tuberosa*	x	x	x														
Canada Moonseed	*Menispermum canadense*	x					x											
Catalpa	*Catalpa speciosa*										x							
Cattail	*Typha latifolia*	x																
Chinese Elm*	*Ulmus parvifolia*		x															
Chinquapin Oak	*Quercus muhlenbergii*						x					x					x	x
Clearweed	*Pilea pumila*		x															
Common Groundsel	*Senecio vulgaris*											x						
Common Milkweed	*Asclepias syriaca*	x	x													x	x	
Coralberry	*Symphoricarpus orbiculatus*	x					x				x	x			x	x	x	
Corn Salad	*Valerianella radiata*	x			x					x				x				
Cottonwood	*Populus deltiodes*													x				
Cream Violet	*Viola stricta*	x			x		x		x	x				x	x			
Crown Vetch*	*Coronilla varia*		x															
Curly Dock	*Rumex crispus*		x															
Dandelion*	*Taraxacum officinale*	x																
Day Lily*	*Hemerocallis fulva*													x				
Dead Nettle	*Lamium purpureum*		x															
Deptford Pink	*Dianthus armeria*		x															
Dewberry	*Rubus* sp.															x		

COMMON NAME	SCIENTIFIC NAME	PLANT COMMUNITY IN WHICH THE SPECIES WAS OBSERVED																
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
Dogbane	*Apocymun cannabinum*	x	x															
Dwarf Larkspur	*Delphinium tricorne*													x				
Ebony Spleenwort	*Asplenium platyneuron*																	x
Elderberry	*Sambucus candensis*				x													
False Grape	*Ampelopsis* sp.	x																
Feabane	*Erigeron philadelphicus*				x													
Fescue*	*Shedonorus phoenix*		x															
Fleabane	*Erigeron annuus*	x													x			
Fox Sedge	*Carex vulpinoidea*									x								
Fuller Teasel*	*Dipsacus fullonum*		x															
Garlic Mustard*	*Alliaria petiolata*				x		x		x	x	x	x	x	x				
Giant Ragweed	*Ambrosia trifida*				x	x												
Giant Foxtail*	*Alopecorus* sp.	x																
Goldenglow	*Rudbeckia laciniata*				x	x								x				
Goldenrod	*Solidago* sp.	x	x													x		
Grape	*Vitis* sp.									x						x		
Green Ash	*Fraxinus pennsylvanica*				x													
Groovebur	*Agrimonia parviflora*			x														
Ground Ivy*	*Gecoma hederacea*								x		x			x				
Hackberry	*Celtis occidentalis*						x				x	x		x				
Hawthorn	*Cratageus* sp.	x									x							
Heal All*	*Prunella vulgaris*		x															
Henbit	*Lamium amplexicaule*				x													
Honewort	*Cryptotaenia canadensis*				x													
Honey Locust	*Gleditsia triacanthos*						x									x	x	x
Hop Vine*	*Humulus japonicus*	x																
Horse Nettle	*Solanum* sp.		x															
Ironweed	*Veronia gigantea*		x															
Japanese Honeysuckle*	*Lonicera japonica*	x						x	x								x	
Japanese Stiltgrass*	*Microstedium vimineum*									x								
Jewelweed	*Impatiens* sp.				x					x								
Knapweed*	*Centaurea maculosa*	x														x	x	
Longleaf Pondweed	*Potamogeton nodusus*	x																
Lyre Leaf Sage	*Salvia lyrata*							x				x					x	
May Apple	*Podophyllum peltatum*								x									
Mint	*Mentha* sp.	x																
Mock Strawberry*	*Duchesnea indica*												x		x			
Moneywort*	*Lysimachia nummularia*		x	x	x		x			x								
Multiflora Rose*	*Rosa multiflora*	x	x		x		x		x	x		x	x		x		x	x
Muscadine	*Vitus rotundifolia*	x																

COMMON NAME	SCIENTIFIC NAME	PLANT COMMUNITY IN WHICH THE SPECIES WAS OBSERVED																
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
Orchard Grass*	*Dactylis glomerata*		x															
Ohio Buckeye	*Aesculus glabra*				x		x			x	x			x				
Osage Orange**	*Maclura pomifera*	x					x		x	x	x	x	x	x		x	x	x
Pawpaw	*Asimina triloba*									x								
Persimmon	*Diospyros virginiana*																x	
Phlox	*Phlox divicarta*				x									x	x			
Pignut Hickory	*Carya glabra*						x		x									x
Plum	*Prunus americana*	x																
Poison Hemlock*	*Conium maculatum*		x		x	x												
Poison Ivy	*Tocicodendron radicans*				x		x						x			x	x	
Pond Weed	*Potamegeton nodosus*						x											
Privet*	*Ligustrum sinense*																x	
Queen Ann's Lace*	*Daucus carota*	x	x															
Rattlebox	*Ludwigia alternifolia*			x														
Red Bud	*Cercis candensis*						x											
Red Cedar	*Juniperus virginiana*	x	x				x	x				x	x			x	x	
Red Clover*	*Trifolium pretense*	x	x				x											
Red Mulberry	*Morus rubra*										x							
Reed Canary Grass*	*Phalaris arundinacea*	x				x												
Rough Leaf Dogwood	*Cornus drommondii*	x					x									x		
Rush	*Juncus effusus*			x														
Russion Olive*	*Elaeagnus angustifolia*	x																
Scarlet Oak	*Quercus coccinea*						x											
Sedge	*Carex* sp.	x		x	x		x											
Shagbark Hickory	*Carya ovata*		x															
Shepherd's Purse	*Capsella bursa-pastoris*		x															
Silver Maple	*Acer saccharinum*		x		x				x					x				
Slippery Elm	*Ulmus rubra*	x					x		x			x	x	x				x
Smartweed*	*Polygonum persicaria*									x								
Smartweed	*Polygonum* sp.	x																
Smooth Brome*	*Bromus inermis*	x	x															
Solomon Seal	*Polygonatum biflorum*									x								
Spicebush	*Linderia benzoin*	x							x			x						x
Spikerush	*Eleocharis ovata*	x					x											
Spring Beauty	*Claytonia virginica*				x									x				
Star of Bethelhem*	*Ornithogalum umbellatum*													x				
Stinging Nettle*	*Urtica dioica*				x	x												
Sugar Maple	*Acer sacharum*						x					x		x			x	
Swamp Milkweed	*Asclepias incarnata*			x														
Sweet Cicely	*Osmorhiza claytonii*				x													

COMMON NAME	SCIENTIFIC NAME	PLANT COMMUNITY IN WHICH THE SPECIES WAS OBSERVED																
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
Sycamore	*Platanus occidentalis*													x				
Teasel*	*Dipsacus sylvestris*	x	x															
Timothy*	*Phleum pratense*		x															
Tree of Heaven*	*Ailanthus altissima*	x																
Trumpet Creeper	*Campsis radicans*											x						
Virginia Blue Bells	*Mertensia virginica*		x															
Virginia Creeper	*Parthenocissus quinqufolia*				x		x		x			x	x				x	x
Virgins Bower	*Clematis* sp.				x													
Waterleaf	*Hydrophyllum* sp.													x				
Whilte Snakeroot	*Eupatorium altissima*						x											
White Ash	*Fraxinus americana*	x					x	x	x			x	x			x	x	x
White Avens	*Geum canadensis*				x		x							x				
White Clover*	*Trifolium repens*	x	x															
White Snake Root	*Ageratina altissima*								x	x	x	x		x				x
Wild Bean	*Phaseolus polystachios*				x									x				
Wild Cherry	*Prunus* sp.				x													
Wild Ginger	*Asarum canadensis*									x				x				
Wild Rye	*Elymus virginicus*		x		x					x	x			x	x	x		
Wild Strawberry	*Fragaria* sp.	x						x										
Yellow Wingstem	*Verbesina occidentalis*									x				x	x			
Winter Creeper*	*Euonymus fortuna*						x							x				
Wood Nettle	*Laportea canadensis*										x							
Wood Reed Grass	*Cinna arundinacea*	x																
Yarrow	*Achillea millefolium*							x										
Yellow Mustard	*Barbarea vulgaris*	x																
* Introduced species not native to the US																		
** Species native to the US, but not native to northern KY																		

APPENDIX C – RBP FORM AND MACROINVERTEBRATE BENCH SHEETS

HABITAT ASSESSMENT FIELD DATA SHEET — HIGH GRADIENT STREAMS (FRONT)

STREAM NAME: Riffle Creek	LOCATION:
STREAM WDTH (FT): 24 DEPTH (FT): 0.5 - 2	PERENNIAL ☒ INTERMITTENT ☐ EPHEMERAL ☐
STATION #: RIVERMILE:	COUNTY: Campbell STATE: KY
LAT: 38.983 LONG: -84.421	RIVER BASIN: Licking River
CLIENT: Hawthorne CCA	PROJECT NO. 9109-09
INVESTIGATORS/CREW: R. Storm and E. Hartowicz	
FORM COMPLETED BY: R. Storm	DATE: 7/28/09 TIME:
	REASON FOR SURVEY: Biological Inventory

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient.	40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE: 14	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE: 19	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/depth regime (usually slow-deep).
SCORE: 14	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE: 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE: 14	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET — HIGH GRADIENT STREAMS (BACK)

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE: 18	20 19 **18** 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream < 7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ration of > 25.
SCORE: 19	20 **19** 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. < 5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE: 8 (LB)	Left Bank 10 **9**	8 7 6	5 4 3	2 1 0
SCORE: 9 (RB)	Right Bank 10 **9**	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE: 9 (LB)	Left Bank 10 **9**	8 7 6	5 4 3	2 1 0
SCORE: 9 (RB)	Right Bank 10 **9**	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE: 7 (LB)	Left Bank 10 **9**	8 **7** 6	5 4 3	2 1 0
SCORE: 9 (RB)	Right Bank 10 **9**	8 7 6	5 4 3	2 1 0

TOTAL SCORE: 165

MACROINVERTEBRATE LABORATORY DATA SHEET

THIRD ROCK CONSULTANTS
Lexington, Kentucky

Third Rock Pjt #:	9109-09	Client Name:	TRC In-House/Campbell Co. Conservency
Water Body:	Hawthorne/Riffle Creek	State/County:	KY / Campbell
Sample ID:	Riffle Creek QT	Collection Date:	7/28/2009
Collector:	Ed Hartowicz	Sampling Method:	Kick Net
Sorter:	Tammie Fister	Sample Sorting:	Subsample
Taxonomist:	Bert Remley	No. Grids of 100 Picked:	49
		No. Organisms Picked:	298

Family or Taxon / Genus	No. Orgs.
ANNELIDA	
AMPHIPODA	
Synurella sp	23
ISOPODA	
Lirceus fontinalis	42
DECAPODA	
Cambaridae (Immature)	3
EPHEMEROPTERA	
Baetis intercalaris	3
Leptophlebiidae (Immature)	1
Stenacron interpunctatum	4
Stenonema femoratum	4
ODONATA	

Family or Taxon / Genus	No. Orgs.
PLECOPTERA	
Amphinemura sp	1
TRICHOPTERA	
Ceratopsyche morosa	4
Cheumatopsyche sp	101
MEGALOPTERA	
COLEOPTERA	
Ectopria (L) 4	4
Psephenus (L) 82	82
Stenelmis (A) 12 (L) 2	14

Family or Taxon / Genus	No. Orgs.
DIPTERA (CHIRONOMIDAE)	
Cricotopus/Orthocladius gr	1
Thienemannimyia gr	10
DIPTERA (OTHER)	
MOLLUSCA	
OTHER TAXA	
Turbellaria	1
Number of Individuals	298

THIRD ROCK CONSULTANTS
Lexington, Kentucky

MACROINVERTEBRATE LABORATORY DATA SHEET

Third Rock Pjt #:	9109-09	Client Name:	TRC In-House/Campbell Co. Conservency
Water Body:	Hawthorne/Riffle Creek	State/County:	KY / Campbell
Sample ID:	Riffle Creek QL	Collection Date:	7/28/2009
Collector:	Ed Hartowicz	Sampling Method:	Multihabitat
Sorter:	Tammie Fister	Sample Sorting:	Entire
Taxonomist:	Bert Remley	No. Grids of 100 Picked:	100
		No. Organisms Picked:	NA

Family or Taxon / Genus	No. Orgs.	Family or Taxon / Genus	No. Orgs.	Family or Taxon / Genus	No. Orgs.
ANNELIDA		PLECOPTERA		DIPTERA (CHIRONOMIDAE)	
				Ablabesmyia sp	
				Microtendipes sp	
				Procladius sp	
				Stictochironomus sp	
AMPHIPODA				Tanytarsus sp	
				Thienemannimyia gr	
ISOPODA					
Lirceus fontinalis					
DECAPODA					
		TRICHOPTERA			
EPHEMEROPTERA					
Caenis sp					
Procloeon sp					
Stenacron interpunctatum					
Stenonema femoratum					
				DIPTERA (OTHER)	
		MEGALOPTERA			
				MOLLUSCA	
ODONATA				Corbicula fluminea	
Calopteryx sp (Immature)				Physella sp	
				Sphaerium sp	
		COLEOPTERA			
		Peltodytes (A)			
		Psephenus (L)			
				OTHER TAXA	
				Number of Individuals	-