SUMMARY OF EGYPT CREEK WATERSHED ASSESSMENT
KENT, MICHIGAN

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INTRODUCTION

The Egypt Creek watershed is located in central Kent County in northern Ada Township. DESCRIPTION: It originates south of the Cannonsburg ski area in a primarily suburban, rural, and forested area and flows west towards Grand Rapids where it joins the Grand River. Michigan Department of Environmental Quality (MDEQ) field staff surveyed road/stream crossings within the watershed to quickly assess the health of the watershed. The survey combined both qualitative and quantitative assessment of Egypt Creek and its tributaries and provided a basis upon which to identify any potential sources of non point source pollution negatively affecting the watershed. In total, 5 road/stream crossing locations were surveyed during the assessment of the Egypt Creek Watershed. Refer to the Road Stream Crossings Inventory for a summary of the survey locations conducted during June of 2004, as well as survey location maps. Site identification codes were developed using two letter identifiers for the subwatershed followed by the two digit site location number. Sites were numbered successively from the mouth to the headwaters.

METHODS

The DEQ's stream crossing watershed survey procedure was developed as a quick screening tool to assess general water quality and possible pollutant sources, causes and problems within the watershed. The survey procedure provides standardized visual assessments that can be conducted by DEQ staff or trained volunteers. Only observations that can be made from the road stream crossings are recorded; recording "educated guesses" or suspicions is prohibited. Because this assessment is based on visual observations, designed to be conducted quickly and by many different types of people and knowledge backgrounds, the survey results are only qualitative in nature.

A minimum of 30% of the road stream crossings within a watershed are to be surveyed with attention given to balanced geographical coverage and assessment across major land use changes and possible pollutant sources. Surveys are always conducted in one general direction (either upstream to downstream OR downstream to upstream), and the attempt is made to keep the surveyors and weather conditions consistent to limit bias and subjectivity between surveyors. This survey was conducted from the upstream to downstream direction and was completed in one day by two DEQ field staff. The right and left bank designations are always assigned based on looking downstream at each road stream crossing location.

At each survey location the following stream conditions are visually assessed:

- Weather and any event conditions
- Culvert/bridge conditions
- Channel conditions (width, depth, high water mark, riffles, pools, natural, maintained, recovering)
- Stream appearance (color, turbidity, algae, aquatic plants, trash, oil sheen, bacteria, foam)
- Substrate composition (boulder, gravel, silt, sand, unknown)
- In-stream Cover (undercut banks, overhanging vegetation, woody debris, pools, boulders, plants)
- Stream corridor (riparian vegetation type and width, bank erosion, canopy cover, adjacent land use)
- Potential Pollutant Sources (source and pathway identification)

At each survey location the following stream conditions are directly measured:

- Water temperature
- Dissolved oxygen content
- pH
- flow velocity
- latitude and longitude coordinates (GPS)

In addition each site was photo-documented with a digital picture taken in the downstream direction, upstream direction and of the road crossing. Refer to the DEQ's *Stream Crossing Watershed Survey Procedure* for further information and a complete description of the above conditions.

OBSERVATIONS

Water Temperature, pH, and Dissolved Oxygen

Survey locations were assessed in the order of upstream sites (in the headwaters) to downstream sites (towards the mouth). 5 locations were measured for temperature, DO, and pH. pH values ranged from 7.26 to 8.52, which were not outside of the normal range for streams within Michigan. Overall the average temperature was 69.8°F. Normal stream temperatures capable of supporting a coldwater fishery with few diseases are below 57°F. Walleye, northern pike and some trout are adapted to temperatures between 57° to 58°F while temperatures over 58°F are characteristic of fish communities characterized by bass, crappie, bluegill, carp and sucker with occurrence of fish disease high. The warm summer temperatures in Egypt Creek could be a limiting factor to some species. The average dissolved oxygen content is 6.46 ppm; it varies from 9.40 ppm at station EC-05 to a measurement of 2.69 ppm at EC-01 where there is very low flow. The dissolved oxygen requirement for native bass and crappie growth and well-being is 5 ppm and for trout it is at least 5 ppm. Given the relatively high average oxygen content, at most locations, Egypt Creek is a comfortable environment for aquatic life. Refer to Figure 1, which depicts the temperature and pH levels at all locations and Figure 2 for only main stem measurements.

Substrate

Substrate was observed and quantified for both the upstream and downstream stretch at each survey location. In all, 10 substrate observations were recorded at 5 locations. Substrate type is important when considering habitat suitability for desired species within the system (i.e. trout and other fish species). Cobble and gravel substrate with a low degree of embeddedness are the most suitable for reproduction in many fish species and is important for macro invertebrates as well. Evidence of silt and sand dominated substrate could indicate problems within the watershed such as erosion and sedimentation. Among the survey locations within the Egypt Creek Watershed, 2 sites were dominated (50 to 100% covered) by sand, 4 were dominated silt, detritus or muck, and 1 site was dominated by gravel (note: some sites had equal amounts of sand and silt). Refer to Figure 3 for a graph depicting the substrate composition for those survey locations located along Egypt Creek.

In-Stream Cover

The presence of in-stream cover was assessed at each location for both the upstream and downstream stretches. In-stream cover, such as overhanging vegetation, undercut banks, deep pools, boulders, plant cover and large woody debris provide habitat for macro invertebrates and aquatic organisms such as amphibians and fish. Of the 10 observations made, 100% of the sites had overhanging vegetation and woody debris; 20% of the sites had undercut banks and boulders. Aquatic plant cover was each found in 1/10 of the sites. Refer to Table 1 for a summary of the in-stream cover observations made at each survey location.

Physical Appearance

The physical appearance of the stream at each survey location was assessed based on the presence or absence of aquatic plants, floating algae, filamentous algae, bacterial slimes, turbidity, oil sheen, foam and/or trash. In all, 10 sites were assessed for physical appearance; observations were recorded and rated as either present or abundant. No oil sheens or filamentous algae were observed at any of the sites. Aquatic plants and floating algae were at 60% of the sites, and turbidity, bacterial sheen, foam, and trash were at 40% of the sites each. Refer to Table 2 for a summary of the physical appearance observations made for each survey location.

Stream Corridor

The width of riparian vegetation was assessed at each survey location for the both the right and left banks of the upstream and downstream stretches. The presence of riparian vegetation reduces the amount of surface water runoff to streams, provides a filter strip for nutrients within runoff waters, provides overhanging vegetation for stream habitat, provides a source of woody debris, stabilizes stream banks against erosion and determines the availability of sufficient stream canopy cover for temperature regulation. 5 survey locations were assessed, resulting in 20 observations of riparian vegetation width recorded. The observations fell into three width categories: 70% had less than 10 feet, 15% had between 10 and 30 feet, and 15% had between 30 and 100 feet of riparian vegetation. The streamside land cover, estimated bank erosion and percent stream canopy were evaluated at each of the 5 survey locations for both the upstream and downstream stretches. In all, 10 observations were made for each of the above listed characteristics. Of the survey locations, 5% were recorded as having streamside land cover predominantly shrubs, 5% predominantly grasses, and 80% were dominated by trees. In general, vegetation such as grasses and shrubs and residential and agricultural land uses, are associated with narrow riparian widths. More extensive riparian vegetation is usually associated with forests and old fields. Overall erosion of the banks was not a problem in the Egypt Creek Watershed with all of the sites described as having little or no bank erosion. Refer to Table 3 for the distribution of riparian width and vegetation observations made for both the right and left bank at each survey location.

Stream canopy cover is important for providing shade and maintaining cool temperatures within the stream. Cooler temperatures also helps keep dissolved oxygen levels from depleting, an important habitat requirement for many fish species and other aquatic organisms. Of the 10 sites assessed, 1 had less than 25% cover, 8 had between 25 and 50% cover and 1 had over 50% cover.

Adjacent Land Uses

Adjacent land uses were recorded at each survey location for both the upstream and downstream stretches as well as both the right and left banks. Because the entire section of stream that can be seen from the road crossing is evaluated, multiple land uses can be recorded for each site. Land uses within the watershed play an important role in nutrient input, erosion, and in-stream conditions that affect water quality, quantity and habitat. Refer to Table 4 and Figure 4 for a summary of all the adjacent land uses recorded within the watershed. The adjacent land uses were maintained lawn, shrub/old field, impervious surfaces, and forest.

Potential pathways of non-point source pollution

During the completion of the road stream crossing surveys, field staff also evaluated the *potential* for non point source pollution. This assessment focuses on the severity of potential pollutant *inputs*, not pollutant *impacts*. As part of this evaluation process field staff look for 1.) a possible pollutant source, 2.) a potential pathway to the water body and 3.) potential severity of the input. Because each potential source was given a ranking of slight, moderate and high for severity, the values recorded were weighted before they were summed for each category (Refer to Figure 5). Observations recorded as slight were considered to be the basis for comparison, therefore observations recorded as moderate were multiplied by 1.5 and observations recorded as high were multiplied by 2. In Egypt Creek, the potential non point source pollution from transportation, and urban/residential runoff were the most serious while hydrology, crops, riparian vegetation removal and streambank erosion were also considered possible sources of NPS pollution. Refer to Table 5 for a summary of the non point source pollution observations identified for each survey location.

RESULTS

Egypt Creek originates south of the Cannonsburg ski area in Kent County in a primarily suburban, rural, and forested area and flows west towards Grand Rapids where it joins the Grand River. Stations in along Egypt Creek are denoted by EC prefixes. Refer to Attachment C for site photos and to Attachment D for site survey forms. The following conditions and comments were recorded on the survey forms:

EC-01: 4 Mile east of Honey Creek

Water temperature was 70º F, pH was 7.18, and the DO was recorded as 2.69 ppm. Sand and silt appeared to dominate the substrate with lesser amounts of gravel also present. Overhanging vegetation were available for in-stream cover. Some aquatic plants and turbidity were observed. Little to moderate riparian vegetation width was available. Trees made up the land cover. Adjacent land uses included shrub/old field, forest, maintained lawn, and impervious surfaces. Potential non point source pollution (NPS) was categorized as slight for transportation and moderate for crops. Comments were*: No specific comments were recorded for this site.*

EC-02: Honey Creek Ave. south of 3 Mile

Water temperature was 75º F, pH was 7.26, and the DO was recorded as 4.32 ppm. Silt and gravel appeared to dominate the substrate with lesser amounts of sand also present. Overhanging vegetation and aquatic plant cover were

available for in-stream cover. Abundant aquatic plants and some floating algae and turbidity were observed. Little to moderate riparian vegetation width was available. Trees and shrubs made up the land cover. Adjacent land uses included forest and maintained lawn. Potential non point source pollution (NPS) was categorized as slight for transportation and high for urban/residential runoff. Comments were*: Upstream side almost choked with aquatic plants, very little buffer from maintained lawn*

EC-03: 4 Mile west of Dursum

Water temperature was 72º F, pH was 7.86, and the DO was recorded as 7.79 ppm. Silt appeared to dominate the substrate with lesser amounts of sand and gravel also present. Overhanging vegetation were available for in-stream cover. Abundant aquatic plants and some filamentous algae, turbidity, and bacterial sheen were observed. Little riparian vegetation width was available. Trees made up the land cover. Adjacent land uses included maintained lawn and impervious surfaces. Potential non point source pollution (NPS) was categorized as slight for riparian vegetation and downstream transportation and moderate for upstream transportation and urban/residential runoff. Comments were*: Culvert partially filled with debris and leaves; on downstream side impoundment is causinging water to pool; downstream side has gravel on streambanks with no vegetation near culvert.*

EC-04: 3 Mile west of Egypt Valley

Water temperature was 65º F, pH was 8.52, and the DO was recorded as 8.10 ppm. Sand and silt appeared to dominate the substrate with lesser amounts of gravel also present. Overhanging vegetation and undercut banks were available for in-stream cover. Some aquatic plants and turbidity were observed. Little to moderate riparian vegetation width was available. Trees made up the land cover. Adjacent land uses included shrub/old field, maintained lawn, and impervious surfaces. Potential non point source pollution (NPS) was categorized as slight for transportation, streambank erosion, urban/residential runoff, and hydrology. Comments were*: No specific comments were recorded for this site.*

EC-05: Pettis north of Knapp

Water temperature was 67º F, pH was 8.26, and the DO was recorded as 9.40 ppm. Gravel appeared to dominate the substrate with lesser amounts of sand and boulders also present. Overhanging vegetation and boulders were available for in-stream cover. Some filamentous algae and turbidity were

observed. Little to moderate riparian vegetation width was available. Trees and grasses made up the land cover. Adjacent land uses included shrub/old field and maintained lawn. Potential non point source pollution (NPS) was categorized as slight for upstream transportation, moderate for downstream transportation and high for urban/residential runoff. Comments were*: Downstream side: limited riparian buffer from maintained lawns; looks terraced on downstream side.*

The majority of the impacts to the stream in this area seem to result from transportation erosion or erosion due to the road stream crossing (sand/gravel roads, road washout) and maintained lawn. Crop related sources riparian vegetation removal, stream bank erosion, and hydrology also account for some pollution in this tributary to the Grand River.