

SUMMARY OF THE LOWER COLDWATER RIVER WATERSHED ASSESSMENT BARRY AND KENT, MICHIGAN

BY: MELANIE HAVEMAN STUDENT ASSISTANTS,
AND JANICE TOMPKINS, SENIOR WATER QUALITY ANALYST
FIELD OPERATION SECTION
WATER DIVISION

INTRODUCTION

The lower area of the Coldwater River watershed is located in the north-central Barry County and in southeastern Kent County. The Lower Coldwater River designation begins just east of the Clarke and Bunker Drain. The Clarke and Bunker Drain acts as a tributary to the Coldwater, which continues west until it joins with the main stem of the Thornapple River east of Caledonia. Lower Coldwater River flows through low density residential land, shrub land, and forest. 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 the Lower Coldwater River 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, eleven road/stream crossing locations were surveyed during the assessment of the Lower Coldwater River Watershed. Refer to Attachment A, Road Stream Crossings Inventory for a summary of the survey locations conducted during September of 2004, as well as survey location maps. Site identification codes were developed using three letter identifiers for the subwatershed followed by the two digit site location number. Sites were numbered successively from the headwaters to the mouth.

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, Dissolved Oxygen, and pH

Survey locations were assessed in the order of upstream sites (in the headwaters) to downstream sites (towards the mouth). Eleven locations, including three along the main stem of the Coldwater River, were measured for temperature, dissolved oxygen, and pH. pH values ranged from 7.60 to 8.22, which were not outside of the normal range for streams within Michigan. Overall the average temperature was 61.6°F, with most stations around 60° 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 68°F while temperatures over 68°F are characteristic of fish communities characterized by bass, crappie, bluegill, carp and sucker with occurrence of fish disease high. The average dissolved oxygen content was 7.6 ppm; it varies from 9.83 ppm at station LCR-07 to a measurement of 4.41 ppm in a low flowing tributary. The dissolved oxygen requirement for native bass and crappie growth and well-being is 5 ppm and for trout it is at least 6 ppm. So, the dissolved oxygen content in the lower coldwater is comfortable overall for abundant biota. Refer to Figure 1 in Attachment B, which depicts the temperature, DO, and pH levels at all locations surveyed.

Substrate

Substrate was observed and quantified for both the upstream and downstream stretch at each survey location. In all, 22 substrate observations were recorded at eleven 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 substrates with a low degree of embeddedness are the most suitable for reproduction in many fish species and are 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 Coldwater River Watershed approximately 30% were dominated by silt, detritus or muck (50 to 100% covered), 30% were dominated by sand, and 9% were dominated by gravel. 9% of the upstream and downstream sites had an approximately equal distribution of silt, sand, and gravel, and five sites had unknown substrates. No sites had some boulders present, and all of the sites were represented. Refer to Figure 2 for substrate data for the Lower Coldwater River sub watershed.

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 macroinvertebrates and aquatic organisms such as amphibians and fish. Of the 22 observations made, 95% had overhanging vegetation, and 86% had woody debris. 23% of the observations had deep pools, and 18% had undercut banks. A few sites also display boulders and aquatic plant cover. Refer to Table 1, in Attachment B 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, 22 observations at 11 sites were assessed for physical appearance; observations were recorded and rated as either present or abundant. No oil sheens, floating algae, foam or trash were observed at any of the sites. Approximately 32% of the observations exhibited turbidity, 23% show filamentous algae, and two sites had aquatic plants. Refer to Table 2, in Attachment B 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. Eleven survey locations were assessed, resulting in 44 observations of riparian vegetation width recorded. The observations fell mostly into two width categories: 41% had <10 feet and 34% had >100 feet of riparian vegetation; 16% had between 10 and 30 feet, and 9% had between 30 and 100 feet, and.

The streamside land cover, estimated bank erosion and percent stream canopy were evaluated at each of the eleven survey locations for both the upstream and downstream stretches. In all, 22 observations were made for each of the above listed characteristics. Of the survey locations, 50% were recorded as having streamside land cover predominantly trees, 31% had mostly shrubs, and 18% had mostly grass. 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 major problem in the Coldwater River Watershed; although, one site (LCR-09) had moderate streambank erosion and a few had slight erosion problems. Refer to Table 3, in Attachment B for the distribution of riparian width and vegetation observations made for both the right and left banks 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 11 sites assessed, 55% had greater than 50% cover, 27% had between 25 and 50% cover, and 18% had less than 25% 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. The most common adjacent land uses were forest, shrub/old field, and maintained lawn followed by a lesser number of observations for pasture, impervious surfaces, cropland, and wetland. Refer to Attachment B, Table 4 and Figure 3 for a summary of all the adjacent land uses recorded within the watershed.

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 looks for 1.) a possible pollutant source, 2.) a potential pathway to the waterbody 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 leveled before they were summed for each category (Refer to Figure 5, Attachment B). 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. Potential non point source pollution from urban/residential runoff and transportation were the most serious. There were also a few instances of grazing, crops, and streambank erosion, which are possible sources at a few locations. Refer to Table 5 in Attachment B for a summary of the non point source pollution observations identified for each survey location.

RESULTS

Lower Coldwater River and Tributaries

Stations in the Lower Coldwater River subwatershed are denoted by LCR prefixes. The land use in this area was dominated by forests, low density residential, and shrubland. 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:

LCR-01: Coldwater Avenue south of 100th Street

Water temperature was ~64°F, pH was measured at 8.08, and the DO was 8.36 ppm. Sand dominated the substrate with lesser amounts of gravel and silt, mud, and detritus also present. Some overhanging vegetation, woody debris, and undercut banks upstream were available for in-stream cover. Some turbidity and filamentous algae were also observed. Little riparian vegetation (<10 ft) was present; it primarily consisted of trees. Adjacent land uses included forest, cropland downstream, and maintained lawn upstream. Potential non point source pollution (NPS) was categorized as slight for crop related sources upstream, slight for transportation, and slight for urban/residential runoff upstream. Comments were: *N/A*.

LCR-02: 74th Street west of M-50

Water temperature was ~63°F, DO was 5.34 ppm, and pH was measured at 7.77. Silt, detritus and muck appeared to dominate the substrate with lesser amounts of gravel and sand also present. Some overhanging vegetation and woody debris were available for in-stream cover. A moderate amount of riparian vegetation (10-100 feet) was observed which consisted of shrubs on all stream sides. Adjacent land uses included shrub/old field, pasture d/s, and maintained lawn. Comments were: *Concrete culvert is half full of sediment.*

LCR-03: Timpson Avenue south of 76th Street

Water temperature was ~60°F, DO was 7.78 ppm, and pH was measured at 7.80. There were similar parts of sand and silt, detritus, and muck upstream. Downstream, the substrate was made of primarily silt, detritus, and muck. Some overhanging vegetation and woody debris were available for in-stream cover. Abundant riparian vegetation (>100 ft) was observed on every stream side but downstream left which had little riparian vegetation (<10 feet); all consisted primarily of shrubs. Adjacent land uses included forest, shrub/ old field, and maintained lawn on the upstream side only. Potential non point source pollution (NPS) was categorized as slight for transportation on both stream sides. Downstream, potential non point source pollution (NPS) was categorized as slight for streambank erosion and urban/residential runoff. Comments were: *Culvert is half filled with sediment. Some shrubs have been removed from the downstream side streambanks.*

LCR-04: 84th Street west of Bergy Road

Water temperature was ~67°F, pH was 7.66, and the DO was measured at 4.41 ppm. Silt, detritus, and muck appeared to dominate the substrate with lesser amounts of gravel and sand present downstream. Some overhanging vegetation and woody debris were available for in-stream cover. Abundant riparian vegetation (> 100 feet) was observed on all stream sides but the upstream left side, which had 30-100 feet of riparian vegetation available. Upstream, the vegetation consisted of shrubs, and downstream the vegetation was primarily trees. Adjacent land uses included forest, shrub/old field, and maintained lawn upstream. Downstream adjacent land use consisted of forest and cropland. Non point source pollution (NPS) was categorized as slight for urban/residential runoff upstream, slight for transportation on both stream sides, and slight for crops downstream. Comments were: *Crossing structure is an old steel culvert surrounded by a great deal of cement.*

LCR-05: 84th Street east of Morse Lake Avenue

Water temperature was ~67°F, pH was 7.60, and the DO was measured at 4.46 ppm. Due to level of turbidity and water depth substrate observations were prohibited. Some overhanging vegetation, woody debris d/s and aquatic plant cover d/s were available for in-stream cover. Some turbidity upstream and aquatic plants downstream were also observed. Abundant riparian vegetation (> 100 feet) was observed on all stream sides but the upstream left side, which had 10-30 feet of riparian vegetation available. There were shrubs downstream and forest upstream. Adjacent land uses included forest, shrub/old field downstream and maintained lawn and impervious surfaces upstream. Potential non point source pollution (NPS) was categorized as slight for transportation and slight for upstream urban/residential runoff. Comments were: *Stream flows out of Wilson Lake.*

LCR-06: 92nd Street east of Morse Lake Avenue

Water temperature was ~59°F, pH was 7.95, and the DO was measured at 8.16 ppm. Upstream, sand dominated the substrate with less silt. Downstream, silt, detritus, and muck dominated the substrate with less sand. Some overhanging vegetation and woody debris were available for in-stream cover. Adjacent land uses included shrub/ old field, forest, cropland upstream, and maintained lawn downstream. Potential non point source pollution (NPS) was categorized as slight for transportation, moderate for crop related sources upstream and slight for urban/residential runoff downstream. Comments were: *Only one of two culverts is flowing during low flow periods.*

LCR-07: 100th Street east of Morse Lake Avenue

Water temperature was ~58°F, pH was 8.16, and the DO was measured at 9.83 ppm. Upstream, gravel appeared to dominate the substrate with lesser amounts of sand also present. Downstream, there were similar parts of gravel, sand, and muck. Some overhanging vegetation, deep pools d/s, undercut banks d/s, and woody debris were available for in-stream cover. Downstream, little (<10 feet) riparian vegetation was available that consisted of grasses. A moderate amount of riparian vegetation (30-100 feet) was observed on the upstream left side, and upstream right vegetation was abundant (>100 feet). Upstream riparian vegetation consisted of trees. Adjacent land uses consisted of shrub/old field, forest, and maintained lawns. Potential non point source pollution (NPS) was categorized as slight for transportation and urban/residential runoff. Comments were: *Stream has good substrate as well as good cover. Residence downstream has maintained their lawn right up to the streambanks.*

LCR-08: Morse Lake Avenue south of 100th Street

Water temperature was ~65°F, pH was 8.10, and the DO was measured at 8.05 ppm. Sand appeared to dominate the substrate with lesser amounts of silt, detritus, and muck. Some overhanging vegetation and woody debris downstream were available for in-stream cover. Some filamentous algae and turbidity were observed. Little riparian vegetation (<10 feet) was observed which consisted of trees on all stream sides. Adjacent land uses included only maintained lawn. Potential non point source pollution (NPS) was categorized as slight for transportation, slight for recreational NPS downstream, and moderate for urban/residential runoff. Comments were: *In most area, grass is mowed right up to the edge with a few trees right along the bank; county park on downstream side.*

LCR-09: 108th Street west of Harris Creek Road

Water temperature was ~52°F, pH was 7.87, and the DO was measured at 9.60 ppm. Upstream, substrate observations were prohibited. Downstream,

gravel appeared to dominate the substrate with lesser amounts of sand and silt, detritus, and muck also present. Some overhanging vegetation upstream and deep pools and boulders downstream were available for in-stream cover. Some aquatic plants and filamentous algae were also observed. Abundant riparian vegetation (more than 100 ft) was observed upstream which consisted of shrubs. Downstream, little riparian vegetation was available, and it was primarily grasses. Adjacent land uses included pasture and forest downstream and wetlands and shrub/old field upstream. Potential non point source pollution (NPS) was categorized as slight for transportation on both stream sides and moderate for grazing and streambank erosion downstream. Comments were: *Good flow; unable to determine substrate due to thick vegetation on upstream side.*

LCR-10: 108th Street east of Moe Road

Water temperature was ~57°F, pH was 8.22, and the DO was measured at 9.65 ppm. Downstream, gravel appeared to dominate the substrate with lesser amounts of sand and silt, detritus, and muck also present. Upstream, there were similar parts of gravel, sand, and muck. Some overhanging vegetation, deep pools and boulders downstream, undercut banks, and woody debris were available for in-stream cover. Downstream, little of riparian vegetation (<10feet) was observed which consisted of grasses. On the upstream left side there was >100 feet of riparian vegetation, and on the upstream right side 30-100 feet was present consisting of trees. Potential non point source pollution (NPS) was categorized as slight for transportation and moderate for downstream urban/residential runoff. Comments were: *Stream has good flow with many riffles. Large plunge pool with many fish (brown trout?).*

LCR-11: Whitneyville Road south of 100th Street

Water temperature was ~66°F, pH was 8.19, and the DO was measured at 8.25 ppm. Due to the level of turbidity and water depth substrate observations were prohibited. Some undercut banks, overhanging vegetation, and woody debris were available for in-stream cover. There was also abundant turbidity throughout. Little riparian vegetation (<10 feet) was observed which consisted of trees on all stream sides but the downstream right, which has 10-30 feet of riparian vegetation width. Adjacent land uses included wetland, cropland, and shrub/old field upstream and maintained lawn and forest downstream. Potential non point source pollution (NPS) was categorized as slight for transportation, slight for urban/residential runoff downstream, and slight for crop related sources upstream. Comments were: *Upstream wetland may have some affect on warmer temperatures and increased turbidity?*

The majority of the impacts to the stream in this area seem to result from transportation non point source pollution with urban/residential runoff. Also, in some areas streambank erosion, grazing, and crop related sources potentially impact the stream.