

SUMMARY OF THE MIDDLE COLDWATER RIVER WATERSHED ASSESSMENT BARRY, MICHIGAN

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INTRODUCTION

The middle area of the Coldwater River watershed is located in the north-central Barry County and in southeastern Kent County. From Bullhead Drain, the main stem of the Coldwater River flows west where it is joined by Messer Brook, Duck Creek, and Tyler Creek. It flows through the shrub land, wetland, and forested area surrounding Freeport in Barry County. This middle portion of the Coldwater River Watershed drains a predominantly rural and forested area with low density residential uses that include the town of Freeport. 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 Middle 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, eight road/stream crossing locations were surveyed during the assessment of the Middle 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). Eight locations, including three along the main stem of Coldwater River, were measured for temperature, dissolved oxygen, and pH. pH values ranged from 7.54 to 8.09, which were not outside of the normal range for streams within Michigan. Overall the average temperature was 59.8°F, with most stations between 55 or 65° 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 6.5 ppm; it varies from 9.66 ppm at station MCR-08 to a measurement of 0.14 ppm in a stagnant tributary. The dissolved oxygen requirement for native bass and crappie growth and well-being was 5 ppm and for trout it was at least 6 ppm. In the main stem of the Middle Coldwater the DO was around 8 ppm, which could support abundant riparian 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, 16 substrate observations were recorded at eight 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 31% were dominated by silt, detritus or muck (50 to 100% covered), 38% were dominated by sand, and 12% were dominated by gravel. 19% of the observations had an equal distribution of silt, sand, and gravel. One site had some boulders present, and all of the sites were represented. Refer to Figure 2 for substrate data for the Middle Coldwater River subwatershed.

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 16 observations made, 94% of the sites had overhanging vegetation and woody debris, and 44% had deep pools. Sites also display boulders, undercut banks, 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, 16 upstream and downstream sites were assessed for physical appearance; observations were recorded and rated as either present or abundant. No oil sheens, floating algae, or trash were observed at any of the sites. Approximately 63% exhibited turbidity, and 25% show filamentous algae. Three sites had aquatic plants and one site had foam and trash. 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. Eight survey locations were assessed, resulting in 32 observations of riparian vegetation width recorded. The observations fell most commonly into all four width categories: 22% had <10 feet, 25% had between 10 and 30 feet, 19% had between 30 and 100 feet, and 34% had >100 feet of riparian vegetation.

The streamside land cover, estimated bank erosion and percent stream canopy were evaluated at each of the eight survey locations for both the upstream and downstream stretches. In all, 16 observations were made for each of the above listed characteristics. Of the survey locations, 62% were recorded as having streamside land cover predominantly trees, 31% had mostly shrubs, and one site 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 had moderate streambank erosion and many 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 12 observations at 6 sites assessed, 69% had greater than 50% cover, 25% had between 25 and 50% cover and 6% 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 and shrub/old field followed by a lesser number of observations for pasture, impervious surfaces, maintained lawn, cropland, wetland and disturbed ground. 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 weighted 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 crop related sources, transportation was the most serious while urban/residential runoff was also considered a possible source of NPS pollution. There were also a few instances of grazing, upstream impoundment, and streambank erosion that 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

Middle Coldwater River and Tributaries

Stations in the Middle Coldwater River subwatershed are denoted by MCR 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:

MCR-01: Fighter Road south of Sisson Road

Water temperature was ~61°F, pH was measured at 7.56, and the DO was 0.14 ppm. Silt, detritus, and muck dominated the substrate. Some overhanging vegetation, deep pools, aquatic plant cover, and woody debris were available for in-stream cover. Some turbidity and aquatic plants were also observed. Little riparian vegetation (<10 ft) was observed upstream which consisted of grasses. Downstream had abundant riparian vegetation (>100 feet) consisting of shrubs. Adjacent land uses included shrub/old field, forest downstream, and pasture upstream. Potential non point source pollution (NPS) was categorized as moderate for grazing upstream and slight for transportation. Comments were: *Stream flows through pasture on upstream side; low flow.*

MCR-02: Freeport Road east of Fighter Road

Water temperature was ~52°F, DO was 0.83 ppm, and pH was measured at 7.54. Silt, detritus and muck appeared to dominate the substrate. Some overhanging vegetation and woody debris were available for in-stream cover.

Some turbidity was observed. A moderate amount of riparian vegetation (30-100 feet) was observed which consisted of shrubs and trees on all stream sides but the downstream right, which has more than 100 feet of riparian vegetation width. Adjacent land uses included shrub/old field, cropland d/s, forest, and a maintained lawn d/s. Comments were: *Extremely low flow; large plunge pool downstream, reduced to a tickle during investigation.*

MCR-03: Fighter Road south of Vedder Road

Water temperature was ~65°F, DO was 7.86 ppm, and pH was measured at 7.94. There were similar parts of gravel, sand, and muck. Some overhanging vegetation and woody debris were available for in-stream cover. Abundant turbidity and some foam and filamentous algae were observed. Little riparian vegetation (<10 ft) was observed upstream which consisted of trees. Downstream had moderate riparian vegetation (10-30 feet) also consisting of trees. Adjacent land uses included forest, disturbed ground d/s, forest, and a maintained lawn u/s. Upstream, potential non point source pollution (NPS) was categorized as slight for transportation. Downstream, potential non point source pollution (NPS) was categorized as slight for transportation and moderate for urban residential runoff. Comments were: *Sawmill on downstream left hand side categorized as disturbed ground; water is flowing muck faster on the downstream side- due to slop and boulder under bridge.*

MCR-04: Freeport Avenue south of Wolf Road

Water temperature was ~65°F, pH was 8.03, and the DO was measured at 8.55 ppm. Gravel appeared to dominate the substrate with lesser amounts of silt, detritus, and muck, and sand also present. Some overhanging vegetation and woody debris were available for in-stream cover. Abundant filamentous algae and some turbidity were observed. A moderate amount of riparian vegetation (10 to 100 feet) was observed which consisted of trees was available upstream left and downstream right. On the downstream left and upstream right side the vegetative width was little (<10 feet) and it also consisted of trees. Adjacent land uses included forest and maintained lawn. Non point source pollution (NPS) was categorized as moderate for urban/residential runoff and slight for transportation and upstream impoundment. Comments were: *Very old impoundment structure upstream; although, stream looks great here.*

MCR-05: Baker Road north of 108th Street

Water temperature was ~65°F, pH was 8.08, and the DO was measured at 8.30 ppm. Sand appeared to dominate the substrate with lesser amounts of silt, detritus, muck, and gravel. Some overhanging vegetation, woody debris and undercut banks upstream were available for in-stream cover. Some

turbidity and filamentous algae and trash downstream were also observed. Moderate riparian vegetation (10-30 feet) was observed on all stream sides. All stream sides consisted of trees. Adjacent land uses included forest. Potential non point source pollution (NPS) was categorized as slight for transportation. Comments were: *Little erosion; water has cleared up significantly compared to upstream sites.*

MCR-06: Parmalec west of Wood School Road

Water temperature was ~59°F, pH was 8.24, and the DO was measured at 9.24 ppm. Upstream, there were similar parts of gravel, sand, and muck; boulders were also present. Downstream, silt, detritus and muck appeared to dominate the substrate with lesser amounts of sand and gravel also present. Some overhanging vegetation, deep pools d/s, boulders, and woody debris were available for in-stream cover. Abundant riparian vegetation (more than 100 ft) was observed which consisted of trees. Adjacent land uses included only forest. Potential non point source pollution (NPS) was categorized as slight for transportation and for streambank erosion downstream. Comments were: *Extremely large plunge pool; 3-12 inch perch.*

MCR-07: Eckert west of Wood School Road

Water temperature was ~56°F, pH was 7.93, and the DO was measured at 6.98 ppm. Gravel appeared to dominate the substrate with lesser amounts of sand also present. Some overhanging vegetation, deep pools d/s, undercut banks d/s, and woody debris were available for in-stream cover. A moderate amount of riparian vegetation (10-100 feet) was observed which consisted of shrubs and trees on all stream sides but the upstream right, which has more than 100 feet of riparian vegetation width. Potential non point source pollution (NPS) was categorized as slight for transportation. Comments were: *Good substrate; lots of cobbles and riffles.*

MCR-08: 108th west of Wood School Road

Water temperature was ~55°F, pH was 8.09, and the DO was measured at 9.66 ppm. Sand appeared to dominate the substrate with lesser amounts of silt, detritus, and muck. Some undercut banks, overhanging vegetation, deep pools, boulders upstream and woody debris downstream were available for in-stream cover. Upstream some aquatic plants were observed. Abundant riparian vegetation (>100 feet) was observed which consisted of shrubs and trees on all stream sides but the downstream right, which has 30-100 feet of riparian vegetation width. Adjacent land uses included wetland, shrub/old field, maintained lawn d/s, and an impervious surface d/s. Potential non point source pollution (NPS) was categorized as slight for transportation and slight

for urban/residential runoff downstream. Comments were: *Nice sandy substrate; water is extremely clear.*

The majority of the impacts to the stream in this area seem to result from transportation non point source pollution with a few cases of urban/residential runoff. Also, in some areas streambank erosion, grazing, and impoundment mining could also potentially impact the stream.