appendix C - stream inventory methodology

Appendix C describes the methodology used by the f eld crew during the Lake County Stormwater Management Commission 2001 stream inventory. Though the content here is labeled as Appendix D, this was taken from another document and is, in fact, Appendix C for this watershed-based plan.

Appendix D: Stream Inventory Procedures and Form

D.1 STREAM INVENTORY PROCEDURE

During summer 1997, the Lake County Stormwater Management Commission conducted a stream inventory of the three forks of North Branch in Lake County. Water quality sampling was not performed as part of the stream inventory, but the sources and causes of water quality impairment in the streams were investigated. An important component of the assessment process is the evaluation of current hydraulic, geomorphic, and aquatic stream characteristics. The major stream characteristics that were assessed and noted include:

- channel conditions such as bank height, erosion problems and bank vegetation
- hydraulic structures such as bridges and culverts in the river or floodplain
- point discharges into the river
- land use and vegetative cover in the riparian corridor
- channel substrate and degree of sedimentation.

These characteristics were identified for each stream reach using the stream inventory procedure described below. Several procedures were considered self-explanatory and were therefore not described. The discussion below is organized in the same order as the data was collected on the stream inventory report form (SIRF).

D.1.1 Stream Inventory Report Form

D.1.1.1 Reach Boundaries

A stream reach is defined as a stream segment having fairly homogenous hydraulic, geomorphic and riparian cover and land use characteristics (such as all ditched agriculture or all natural and wooded). Reaches generally should not exceed 2,000 feet in length. Where possible, beginning and end stations should be established along the stream using permanent physical landmarks such as bridges that are readily recognized.

D.1.1.2 Channel Flow Status (Stream Stage)

The degree to which the channel is filled with water. The flow status will change as the channel enlarges (e.g., aggrading stream beds with actively widening channels) or as flow decreases as a result of dams and other obstructions, diversions for irrigation, or drought. When water does not cover much of the streambed, the amount of suitable substrate for aquatic organisms is limited. In high-gradient streams, the decrease in water level exposes logs and snags, thereby reducing the areas of good habitat. Channel flow is especially useful for interpreting biological condition under abnormal or lowered flow conditions. This parameter becomes important when more than one biological index period is used for surveys or the timing of sampling is inconsistent among sites or annual periodicity.

D.1.2 Channel Conditions (SIRF Section A)

D.1.2.1 Channelization

Channelization refers to channel modifications performed by humans. 'The one-third rule should be applied again where low means < 33% of the reach is channelized, moderate means 33 to 66% and high means > 66% of the reach is channelized. The presence of a pilot channel should be noted under 'Pilot Channel Formed' for channelized streams. A narrow, meandering pilot channel may develop within the wide and flat trapezoidal ditch that was excavated during channelization. A pilot channel is indicative of recovery

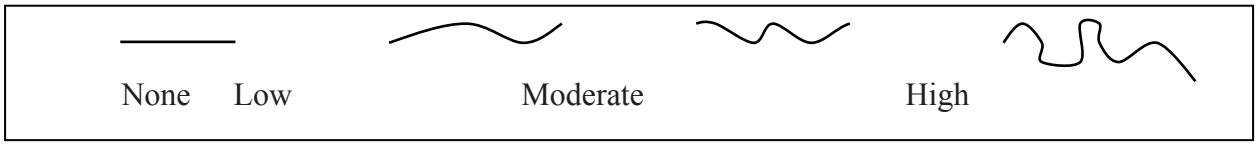
from channelization. Spoils piles refer to any excavated or dredged materials that have been deposited along the banks. If present identify which bank is affected.

D.1.2.2 Sinuosity

Sinuosity is dependent on the stream stage in many channelized reaches. For instance, in many cases a narrow, highly sinuous pilot channel has developed during low stream stage within a wider, non-sinuous channel that was excavated during channelization. Therefore, sinuosity should be estimated for both baseflow conditions (describing sinuosity in the pilot channel) and for the bankfull-flow events. However, if the stream inventory report form is completed during bankfull flow, then sinuosity during baseflow conditions will be difficult to estimate. Figure D-1 should be used for estimating the degree of sinuosity.

Figure D-1

SINUOSITY ESTIMATION GUIDE



D.1.2.3 Pool/Riffle Development

The proportion represented by riffles, runs, and pools should be noted to describe the morphological heterogeneity of the reach. Pools should be well-defined areas of deeper than average water. Pools generally do not extend in length more than three or four times the stream width. Pools should almost immediately be followed by a riffle environment for the stream to be characterized as having high pool/riffle development. A riffle is characterized by shallower water and higher velocities with rippling or disturbances to the surface water tension that allow turbulence and mixing to occur. Many streams in Lake County will have low or no pool/riffle development.

D.1.2.4 Bank Erosion

Severe bank erosion is a significant concern for Lake County's stream and rivers. Severely eroded banks have exposed soil on nearly vertical banks extending from the top of bank to the low water mark so erosion is constantly occurring. Highly eroded streambanks contribute heavy loads of sediment and erode during times of higher flows. Active slumping and sloughing may be apparent where fresh, moist, loose soil and other signs of recent bank movement such as exposed tree roots or suspended fences extending into the stream are found. Eroded areas are most prevalent in the outer edges of bends and meanders. All cases of severe erosion should be photographed and noted on the form and the map or aerial photo. If the photo is taken looking up/down stream the aspect should be noted. Structures that are present and threatened by slumping should also be recorded. Right and left bank are determined by facing upstream.

On impounded areas of streams, the absence of bank or littoral vegetation along the normal water mark resulting in constant erosion would also be considered severe.

D.1.2.5 Armoring

Armoring refers to the placement of gabions, wood, metal, riprap or other similar artificial materials along the streambank to reduce bank erosion. The one-third rule should be applied again where low means < 33% of the reach is armored, moderate means 33 to 66% and high means > 66% of the reach is armored. Portions of armoring that are failing should be noted.

D.1.2.6 Sedime nt Accumulations

Sediment accumulations that affect the channel capacity and flow conveyance should be described. Sediment deposition measures the amount of sediment that has accumulated in pools and the changes that

have occurred to the stream bottom as a result of deposition. Deposition occurs from large-scale movement of sediment. Sediment deposition may cause the formation of islands, point bars (areas of increased deposition usually at the beginning of a meander that increase in size as the channel is diverted toward the outer bank) or shoals, or result in the filling of runs and pools. In some cases, sediment accumulations may not impact channel conveyance.

D.1.2.7 Mid-Stream Bars and Islands

Record whether exposed mid-stream bars or islands are present. Although these structures may increase habitat availability for organisms, they also reduce the unobstructed stream width and may enhance the debris-accumulating potential of the stream reach.

D.1.2.8 Mean Water Depth

Water depth should be measured at the deepest portion of the channel cross section (known as the thalweg) with a sturdy 4- to 5-foot rod inscribed with depth marks in inches. The range of water depths should reflect the variation between the deepest and shallowest portions of the channel cross-section in the reach.

D.1.2.9 Mean Bank Height, Top Mean Channel Width and Bottom Mean Channel Width

Mean bank height should be measured from the top to the bottom of the streambank. The top of the bank occurs where there is a convex-shaped transition in bank slope between the stream bank and the outlying floodplain. The bottom of the bank occurs where there is a concave-shaped transition in slope between the stream substrate and the stream banks, and it may be below the water level.

Top and bottom mean bank widths refer to the mean bank-to-bank width across the top and across the bottom of the banks. If the top of one bank is higher in elevation than the top of the opposite bank, the top mean channel width should be measured from the elevation of the lowest bank. In estimating these and other values, the investigator should be conscious of longitudinal changes in bank dimensions in order to arrive at estimated values.

D.1.2.10 Beaver Activity

Low beaver activity includes an occasional bank slide or chewed stump within the reach. These features must become progressively more apparent to rate as moderate activity. High activity is characterized by almost constant activity in the wooded areas with felled trees in excess of 12 inches; slides and beaver cut brush being common in the stream. All dams and lodges should be noted and indicate high beaver activity.

D.1.2.11 Stream Debris Load

1. Instream Debris Load
Stream debris load refers to natural and man-made debris including leaves, sticks, logs, lumber, trash and sediment. The one-third rule should be applied again where low means < 33% of the reach contains debris obstructing or deflecting flow, moderate means 33 to 66% and high means > 66% of the reach is characterized by large accumulations of lodged and partially compacted debris spanning the entire stream width.
2. Overbank Debris Load
The overbank debris load refers to loosened, floatable materials that are prevalent enough to potentially cause debris jams at culverts and bridges during high flows events. The locations and types of debris as well as how it may impact the reach should be noted. Similarly to the instream debris load section, the one-third rule should be applied.

D.1.3 Hydraulic Structures (SIRF Section B)

Hydraulic structures include low head dams, weirs, bridges, levees, and culverts. Dimensions as well as construction materials should be measured and recorded. Structures should be photographed and their locations should be recorded by taking a GPS waypoint. Elevations will be determined from existing data or field survey dependent upon the approved scope of work. Notes should include condition, drop or change in elevation, blockages and other characteristics.

D.1.4 Point Discharges (SIRF Section C)

Point discharges include all sanitary, storm sewer and agricultural drainpipes greater than 4 inches in diameter. They also include open channels, swales, gullies and other significant tributaries. Locations of all point discharges should be recorded by taking a GPS waypoint. Check the problem column (see SIRF) if the condition of the discharge point is blocked, cracked, etc. The volume of flow should be noted in the appropriate column using the following categories: none, trickle, moderate, substantial, other. Notes should include comments on odors, sheens or high turbidity if present.

D.1.5 Vegetation and Land Use (SIRF Section D)

D.1.5.1 Floodplain Vegetation (within 100 ft of stream)

For the respective banks the land use and vegetative cover should be noted as percentages of the floodplain surface area (note: percentages should total 100%). The vegetated buffer is given a score from 0-10 (see SIRF for specific criteria).

D.1.5.2 Predominant Bank Vegetation (%) and Predominant Tree/Shrub Species

These measurements provide an indication of bank stability and the potential for the development of debris blockages in the channel. For the respective banks the predominant vegetation type should be noted as percentages of the bank surface area (note: percentages should total 100%). Due to the rapid colonization capabilities of some tree and shrub species, the presence or absence of tree and shrub types should be documented even if trees or shrubs were uncommon in the stream reach. Also, where possible, tree and shrub species included in the 'Other' category should be identified. Canopy cover should be estimated as a percentage of shaded coverage of the channel.

D.1.5.3 Aquatic Vegetation

The general type and relative dominance of aquatic plants are documented in this section. Besides being an ecological assemblage that responds to perturbation, aquatic vegetation provides a refuge and food for aquatic fauna. Filamentous algae can grow in fast or slow flowing streams over solid surfaces within the stream channel. Extensive filamentous algae coverage is indicative of excessive nutrient levels. Submergent, emergent, free floating, rooted floating or no vegetation should also be considered when estimating percentage of aquatic vegetation over the total area of the reach.

D.1.6 Substrate and Water Quality (SIRF Section E)

D.1.6.1 Substrates

The substrate in the stream channel should be classified using the following definitions:

1. Claypan (Hardpan)

Claypan is made up of particles less than 0.0002 inches in diameter, which forms a dense, gummy surface that is difficult to penetrate.

2. Silt
Silt particles are between 0.0002 to 0.002 inches in diameter. Silt is a fine material that generally feels "greasy" when rubbed between fingers.

3. Sand
Sand is made up of materials from 0.002 to 0.08 inches in diameter. Sand exhibits a gritty texture when rubbed between fingers.

4. Gravel
Gravel is a mixture of rounded coarse material from 0.08 to 2.5 inches in size.

5. Cobble
Cobble is made up of stones from 2.5 to 10 inches in diameter.

6. Boulder
Boulders are defined as rounded stones over 10 inches in diameter or large "slabs" over 10 inches in length.

7. Organic
Organic substrate refers to living or decaying plant material.

8. Concrete
Channels lined with concrete or other man-made materials should be noted.

D.1.6.2 Substrate Stability

Substrate stability will be assessed according to how well the stream substrate supports the weight of the observer walking within the stream. Assessing substrate stability requires that the observers walk through representative lengths of the stream channel in the reach. To help ensure the safety of the observers, waders should be worn at all times to prevent cuts and infections, and at least two observers should walk each reach together. Stream channels should not be walked if the safety of the recorder is in jeopardy at any time because of strong current, deep-water sections, soft substrate, or any other potential danger. Substrate stability classified as 'None' indicates that the substrate can't support the observer's weight and the observer quickly sinks into the substrate. These substrate types are usually deep silts that for obvious safety reasons must not be walked in. 'Low' substrate stability can be walked over, but the observer will sink several inches into the substrate if he stands for an extended time period. These substrates may include silts and loose sand or gravel. 'Moderate' substrate stability would describe substrate that can be walked over without sinking more than an inch or two into the substrate and may include coarse gravel, cobble, perhaps mixed with some boulders. 'High' substrate stability can be readily walked on without sinking into the substrate. 'High' substrate stability often occurs when cobble, boulders, shale or claypan covers the stream bottom.

D.1.6.3 Substrate Embeddedness

Substrates should be considered embedded if more than 50% of the surface of the substrates are surrounded, impacted in or covered by unnatural accumulations of fine material such as sand or silt. Embedded substrates can't be easily dislodged. Naturally silty or sandy streams are not considered embedded; however, if sedimentation has buried the natural coarse substrates with sand or silt then the stream reach should be considered embedded. The degree of embeddedness can often be determined by jabbing a sturdy rod into the stream bottom to determine whether the underlying stream substrate is coarse material, or sand and silt. Embeddedness is the extent to which cobbles, gravel, and boulder substrates are embedded. High embeddedness would occur if over 66% of the site area was embedded (as defined above), moderate embeddedness would occur if from 33 to 66% of the site area was embedded and low means less than 33% of the area was embedded. 'N/A' ratings should be applied to stream channels that are naturally composed of silt and sand, because in such channels embeddedness of coarse substrates is 'not applicable.'

D.1.7 Instream Cover (SIRF Section F)

All types of cover present should be noted. Cover should not be counted when it is in areas of the stream with insufficient depth. General comments on perceived abundance of various cover types should be reported.

D.1.8 Aquatic and Terrestrial Organisms (SIRF Section G)

Some measurements for the Aquatic and Terrestrial Organisms section (SIRF Section G) require that riffles be distinguished from runs and pools. Pools and riffles were defined in section D.1.2.3. Runs are deeper than riffles, have relatively rapid, non-turbulent flow and are generally located downstream from riffles where the stream narrows. The streambed is often flat beneath a run and therefore the water surface is not visibly broken.

Biological information (versus chemical or physical information) is widely regarded as the most reliable type of data collection for evaluating the ecological conditions of stream reaches. For a very basic yet somewhat informative assessment of ecological conditions, the following procedures should be followed. For fish and macroinvertebrate sampling, the sample locations, the type of gear used for the sample collection and the approximate sample effort (in minutes or feet of stream reach) should be noted. Although SMC did not sample for fish, macroinvertebrates or birds in the North Branch, their presence was noted when they were encountered in a stream reach.

D.1.8.1 Macroi nvertebrates

If sufficient flow exists, macroinvertebrates should be sampled by kick net (approximately 3' x 3' screens) in riffle areas at least once per reach. The observer should stand upstream of the kick net and use one or both feet to disrupt the substrate and dislodge macroinvertebrates from the substrate so that they drift downstream into the kick net screen. If sufficient flow does not exist for the effective use of kick nets, macroinvertebrates should be handpicked from rocks in riffle areas. The presence should be noted of major groups of macroinvertebrates such as stonefly, mayfly and caddisfly larvae, snails, water pennies, riffle beetles, damselfly and dragonfly nymphs, isopods and sowbugs, leeches, and worms. If riffle areas and rocks do not exist such as in recently channelized streams, impounded streams, or under low-flow conditions, then macroinvertebrates should be sampled from vegetation, debris or other instream material.

D.1.8.2 Fish

Fish sampling should be performed with a seine (or ideally, electroshocking equipment) at three or more stream locations. The types and relative abundances (percent composition of the catch by species) should be noted for each fish species captured. However, high flow may in some circumstances not permit safe and effective seining. In such instances, visual observations of types of fish present should be made where water clarity permits. Based on past experience, some species or groups that can be tentatively identified by visual observation alone without sampling gear include carp, goldfish, minnows, panfish and bass. In all biological evaluations, presence of rare or threatened and endangered animal and plant species is of great interest.

D.1.8.3 Birds

During the field investigation, types and numbers of birds that utilize streams and adjacent aquatic habitat should also be noted. Such birds that are common to Lake County include ducks, geese, herons, kingfishers, sandpipers, plovers, gulls, terns, swifts and some swallows.

Note: Any reptiles, amphibians or mammals observed should be noted as specific as possible.

D.1.9 Additional Comments

Additional notes or comments should include any irregularities such as cars in the stream, floodplain construction activity, presence of livestock in the stream, foul smelling discharges, errors in existing mapping or other peculiarities. Opportunities and obstacles to access should also be noted on each form.

D.1.9.1 Suggested Equipment List

- waders (2 pairs)
- digital camera, waterproof recommended
- gps unit
- polarized sunglasses
- 100+ foot tape measure
- 4-foot wood rod with depth marks or metal yard stick
- watch with second hand
- sampling gear

D.1.9.2 Access

Approval for access on private property is important. In the North Branch watershed, SMC met with the four drainage districts to obtain permission to enter their 50-foot easements on the three forks in order to access the river. In addition, SMC staff prepared a permission letter for presentation to members of the public encountered during the stream inventory. The sample permission letter used to access private property for the West Fork assessment is in Figure D-2.

FIGURE D-2 SAMPLE ACCESS PERMISSION LETTER

To Whom It May Concern:

The Lake County Stormwater Management Commission (SMC) is currently working on a comprehensive watershed management plan for the North Branch of the Chicago River in Lake County. As part of this process, we will be performing a complete assessment of the West Fork of the North Branch of the Chicago River. This assessment will examine things such as channel conditions; outfalls; substrate condition and water quality; and instream cover and shading. SMC staff members Sean Wiedel, Watershed Specialist, and Tim Andruss, Watershed Intern, will perform the assessment along with various volunteers. All of the above individuals are authorized by the SMC and the Union Drainage District #1 to gain reasonable access to the North Branch to perform the stream assessment.

The information collected in the field assessment will be incorporated into a comprehensive watershed plan for the North Branch of the Chicago River. This plan will address water quality and flooding problems, natural resource protection and development of greenways in the watershed along with other problems and opportunities.

The anticipated completion dates of the components of the plan are:

- Field Assessment
- Public Meetings
- Draft Plan
- Final Plan

If you would like additional information on the North Branch of the Chicago River watershed project, please contact Sean Wiedel at SMC (847-918-7695). Thank you for your cooperation.

Sincerely,

Ward Miller Gordon McKavanaugh
Executive Director Commissioner
Lake County SMC Un ion Drainage District #1

STREAM INVENTORY REPORT FORM

STREAM NAME:_____ REACH ID:_____ DATE:_____

REACH BOUNDARY- DOWNSTREAM:_____ GPS Ref. #_____

REACH BOUNDARY-UPSTREAM:_____ GPS Ref. #_____

APPROX. LENGTH (ft):_____ TEMP. (°F)_____ TIME:_____

INVESTIGATORS:_____ RECENT RAIN: (Now, 12, 24, 48 hours, week)_____

GAGE READING:_____

A. CHANNE L CONDITIONS:

CHANNEL FLOW (STREAM STAGE):

NONE LOW		MODERATE	NORMAL	HIGH
Very little water in channel and mostly present as standing pools	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed	Water fills > 75% of the available channel; or <25% of channel substrate is exposed	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed	Water levels are higher than the base of both banks
0 1	2 3 4	5 6	7 8	9 10

CHANNELIZATION: NONE_____ LOW____ MODERATE____ H IGH_____

PILOT CHANNEL FORMED (YES / NO)

SPOILS PILES ON BANKS (Left / Right / Both)

BANKFULL SINUOSITY: NONE____ LOW____ MODERATE____ HIGH____

BASEFLOW SINUOSITY: NONE____ LOW____ MODERATE____ HIGH____

POOL/RIFFLE DEVELOPMENT: % POOL ____ % RIFFLE ____ % RUN ____

DEGREE OF BANK EROSION:

NONE LO	W	MODERATE	HIGH
Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems; less than 5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over; 5-33% bank has areas of erosion.	Moderately unstable; 33-66% of bank has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 66-100% of bank with erosional scars.
Left Bank 10 9	8 7 6	5 4 3	2 1 0
Right Bank 10 9	8 7 6	5 4 3	2 1 0

***TYPES AND LOCATIONS OF HIGH CASES**:*

GPS#	PHOTO #	Side of Channel (L/R)	NOTES (aspect of photo if applicable):

DEGREE OF ARMORING: NONE____ LOW____ MODERATE____ HIGH____

TYPES AND LOCATIONS OF HIGH CASES:_____

SEDIMENT ACCUMULATIONS:

NONE LO	W	MODERATE	HIGH
Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment depositions	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 20-50% of the bottom affected; slight deposition in pools	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected, sediment deposits at obstructions, constrictions and bends; moderate deposition of pools prevalent	Heavy deposits of fine material, increase bar development; more than 80% bottom changing frequently, pools almost absent due to substantial sediment deposition
10 9	8 7 6	5 4 3	2 1 0

TYPES AND LOCATIONS OF HIGH CASES:_____

MID-STREAM BARS AND ISLANDS: YES: _____ NO: _____

MEAN BANK HEIGHT	HEIGHT (FT)	GPS #	AVERAGE	RANGE
MEAN BANK SLOPE (RUN/RISE)	SLOPE GPS	#	AVERAGE	RANGE
MEAN WATER DEPTH	DEPTH (FT)	GPS #	AVERAGE	RANGE
TOP MEAN CHANNEL WIDTH (FT)	WIDTH (FT)	GPS #	AVERAGE	RANGE
BOTTOM MEAN CHANNEL WIDTH (FT)	WIDTH (FT)	GPS#	AVERAGE	RANGE
MEAN VELOCITY (FT/S)	TRAVEL TIME (sec/ 10ft)	GPS# AVER	AGE	RANGE

BEAVER ACTIVITY: NO NE_____ LOW _____ MODER ATE_____ HI GH_____

DAM/LODGE: YES (NUMBER OF DAMS)_____ NO_____

STREAM DEBRIS LOAD (as defined in methodology):

INSTREAM: LOW _____ MODERATE _____ HIGH _____

OVERBANK: LOW _____ MODERATE _____ HIGH _____

NOTES:_____

_____

IMPOUNDED: YES: _____ NO:_____

COMMENT:_____

SOURCE:_____

B. HYDRAULIC STRUCTURES:

(Note sizes & locations in channel or adjacent floodplain.)

TYPE & MATERIAL	DIMENSIONS (inches)	GPS #	PHOTO #	L/R or Center of Channel	P♣	ASPECT (up/down)	NOTES:

C. DISCHARGE POINTS:

♣ P= Problem (Check for Yes)

(Pipes, ditches, swales, tributaries; note numbers, sizes and locations of discharges with diameters of 4 inches or more.)

TYPE & MATERIAL	DIMEN-SIONS (inches)	GPS #	PHOTO #	L/R or Center of Channel	P♣	FLOW *	NOTES

NOTES (ex: suspicious effluent etc.):_____

_____

♣ **P= Problem (Check for Yes)**

* **None, Trickle, Moderate, Substantial, Other**

D. VEGETATION & LAND USE:

FLOODPLAIN VEGETATION(within 100 ft of stream)

DOMINANT LAND USE (%):

LEFT: AGRICULTURAL:_____ OPEN SPACE:_____ RECREATIONAL: _____
COMMERCIAL/INDUSTRIAL:_____RESIDENTIAL:_____ OTHER:_____

RIGHT: AGRICULTURAL:_____ OPEN SPACE:_____ RECREATIONAL:_____
COMMERCIAL/INDUSTRIAL:_____ RESIDENTIAL:_____OTHER:_____

LAND COVER (%):

LEFT: TREES: _____ LAWN:_____ WETLANDS:_____ CROPS:_____ SHRUBS:_____
HERBACEOUS: _____ IMPERVIOUS:_____ WATER:_____OTHER: _____

RIGHT: TREES:_____ LAWN:_____ WETLANDS:_____ CROPS:_____ SHRUBS:_____
HERBACEOUS:_____ IMPERVIOUS:_____ WATER:_____OTHER:_____

WIDTH OF VEGETATED BUFFER:

NONE LO	W	MODERATE	HIGH
Width of riparian zone <20 feet; little or no riparian vegetation due to human activities	Width of riparian zone 20-40 feet; human activities have impacted zone a great deal	Width of riparian zone 40-60 feet; human activities impacted zone minimally	Width of riparian zone >60 feet; human activities (parking lots, roadbeds, lawns, crops) have not impacted zone
Left Bank 0 1 2	3 4 5	6 7 8	9 10
Right Bank 0 1 2	3 4 5	6 7 8	9 10

Notes_____
_____
_____

BANK VEGETATION (within 10 ft of stream):

PREDOMINANT VEGETATION (%)

LEFT **BANK**: UNMOWED GRASS:___ LAWN:___ WETLAND:___ TREES:___ SHRUB:___
CROP:___ HERBACEOUS: ___ NONE:___ OTHER:_____

RIGHT **BANK**: UNMOWED GRASS:___ LAWN:___ WETLAND:___ TREES:___ SHRUB:___
CROP:___ HERBACEOUS: ___ NONE:___ OTHER:_____

PREDOMINANT TREE/SHRUB SPECIES ON BANKS (CHECK ALL PRESENT)

WILLOWS_____ BOX ELDER_____ HO NEYSUCKLE_____
BUCKTHORN_____ H ARDWOODS_____ OTHER _____

CANOPY (PERCENT SHADED COVERAGE OF CHANNEL):_____

AQUATIC/INSTREAM VEGETATION

VEGETATION (%): ROOTED EMERGENT:_____ ROOTED SUBMERGENT:_____
ROOTED FLOATING:_____ FREE FLOATING:_____ FLOATING ALGAE:_____
ATTACHED ALGAE:_____ NO VEGETATION:_____

E. SUBSTRATE AND WATER QUALITY:

SUBSTRATE COMPOSITION (%): CLAYPAN_____ SILT_____ SAND_____ GRAVEL_____

COBBLE_____BOULDER_____ CONCRETE_____ ORGANIC MATTER_____

CATEGORIZE AS "NONE", "LOW", "MODERATE", OR "HIGH" (Locate worst cases.):

SUBSTRATE STABILITY OF ENTIRE REACH:_____

SUBSTRATE EMBEDDEDNESS OF ENTIRE REACH:_____

GREASE & OIL IN WATER COLUMN_____ GREASE & OIL IN SEDIMENT_____

TURBIDITY (including tributaries, point discharges; LOW, MODERATE, HIGH):_____

WATER COLOR: CLEAR_____ BROWN_____ GREEN_____ GRAY_____

COMMENTS/PROBABLE CAUSES:_____

F. INSTREAM COVER FOR FISH:

(Check all that apply.)

UNDERCUT BANKS_____ POOLS OVER 28" DEEP_____ MACROPHYTES_____ LOGS_____

OVERHANGING VEGETATION_____ ROOTWADS_____ BOULDERS_____ BACKWATERS_____

COMMENTS:_____

_____

G. AQUATIC AND TERRESTRIAL ORGANISMS:

(Check or note all that were observed.)

MACROINVERTEBRATES:

MAYFLIES:_____ CADDISFLIES:_____ DRAGONFLY/DAMSELFLY NYMPHS:_____

SNAILS:_____ SCUDS:_____ SOWBUGS:_____ LEECHES:_____ WORMS: _____

WATER PENNIES:_____ BEETLES:_____ OTHER:_____

FISH:

CARP:____ BLACK BULLHEADS:____ CREEK CHUBS:____ GREEN SUNFISH:____ BLUEGILL: ____

LARGEMOUTH BASS:____ JOHNNY DARTERS:____ FATHEAD MINNOWS:____ GOLDEN SHINERS:

OTHERS:_____

BIRDS:

DUCKS:___GEESE:___ HERONS:___ KINGFISHERS:___ SANDPIPERS/PLOVERS:

GULLS/TERNS:_____ OTHERS:_____

REPTILES:_____

AMPHIBIANS:_____

MAMMALS:_____

MUSSEL BEDS: NO ___ YES ___ IF YES: GPS #'S ____ ____ ____

H. PHOT O LOG: **PHOTOGRAPHER**:_____

GPS #	PHOTO #	L/R or Center of Channel	Aspect (Up/ Downstream)	Photo Description: