Knox County Adopt-A-Watershed Visual Stream Assessment Reporting Form

Watershed: _____

Teacher:_____

Course/Block/Period:_____

Data Collectors (include first/last names & any class/investigative team name):
_____

_____

Date: _____

Time of Sampling: _____

Ecoregion: Ridge & Valley **Stream Name:** _____ **Stream Mile Marker**: _____

Location (specific road directions to the site & its location on stream – include landmarks. Example: 100 ft. below crossroads of Main and Second Streets):

_____

_____

Weather in past 24 hours	**Weather now**	**Physical Measurements**
□ Storm (heavy rain) □ Rain (steady rain) □ Showers (intermittent rain) □ Overcast □ Clear/Sunny	□ Storm (heavy rain) □ Rain (steady rain) □ Showers (intermittent rain) □ Overcast □ Clear/Sunny	Water Temperature: _____ °C Turbidity: _____ (cm) Flow: _____ ft^3/s (attach stream flow calculations)
Water Odors *Check all that apply* □ Normal □ Sewage □ Petroleum □ Chemical □ Other: _____	**Water Color/Appearance** *Check all that apply* □ No unusual color □ Multi-colored (oily sheen) □ Brown/muddy □ Milky/white □ Foam/Suds □ Other: _____	**Algae** *Check all that apply* □ Minimal growth □ Covers substrate □ Floating in spots □ Thick mats

Site Observations (Describe any notable physical (e.g., bends in stream; eroded banks) and/or biological (e.g., lacks riparian cover; recently cut trees) features

_____

_____

Active Channel Width: _____ **Length of Walk:** _____	**Dominant Substrates** *Select no more than two* □ Boulder/Cobble □ Gravel □ Sand □ Silt □ Mud

Latest Revision: 10/7/02

Assessment Scores

Channel Condition		Riparian Zone	
Bank Stability		Canopy Cover	
Riffle Embeddedness		Pools	
Water Appearance		Instream Fish Cover	
Nutrient Enrichment		Invertebrate Habitat	

Overall Score *(Sum of assessment scores divided by # of characeristics assessed)*:

< 6.0 = poor; **6.1 – 7.4 = fair;** **7.5 – 8.9 = Good:** **> 9.0 Excellent**

Site Diagram

Site Problems and Possible Solutions: Describe any conditions at this site that may pose major threats to stream health and list any possible solution to improving these conditions.

Latest Revision: 10/7/02

Scoring Descriptions

Each stream characteristic is rated on a scale of 1 to 10. Record the score that best fits the observation you make based on the narrative descriptions provided.

Channel Condition

Streams tend to meander (form snakelike curves) more as the gradient (steepness) of the terrain over which it flows decreases. Development often alters streams including how it naturally meanders. These changes may affect a stream in the way it transports sediment or develops and maintains habitat for fish, aquatic insects, and aquatic plants. Some modifications to stream channels have more impact on stream health than others. For example, concrete dikes or dams along a stream bank affect streams more than pilings or other supports used for road crossings. Active bank down-cutting or erosion on stream banks also impairs a streams ability to maintain itself. Both situations indicate stream channel instability. Extensive bank armoring, like rip rap, usually leads to more problems downstream.

Scoring Criteria	
10	Natural channel; no structures like dikes or dams. No evidence of erosion.
7	Evidence of past channel alteration but with significant recovery of banks.
3	Altered channel; <50% of reach with riprap or channelization. Braided channel. Excess sediment accumulation in the channel.
1	Channel is actively eroding. >50% of reach with riprap or channelization

Bank Stability

The stability of the banks of a stream can be determined by examining the extent to which sediment has been detaching from the banks and entering the stream channel. Some erosion is normal in a healthy stream, especially around stream bends. Excessive bank erosion may occur when riparian vegetation has been degraded or the stream hydrology and/or sediment load has been modified. High and steep banks are also more susceptible to erosion or collapse.

The extent and type of riparian vegetation is important to bank stability. Trees, shrubs, sedges, and rushes have the type of root masses capable of withstanding high stream flow, whereas common turf grass (Kentucky bluegrass) does not. Soil type also influences bank stability. For example, banks with a thin soil over gravel or sand are more prone to collapse than are banks with a deep soil layer.

Bank Stability Scoring Criteria	
10	Banks are stable and low. 33% or more of bank area in outside bends is protected by roots.
7	Banks are moderately stable and low. Less than 33% of bank area in outside bends is protected by roots.
3	Banks are moderately unstable and typically high (but not necessarily). Outside bends are actively eroding and there are signs of slope failures like streamside trees that have fallen into the channel or chunks of banks that have collapsed.
1	Banks are unstable and typically high. Some straight and inside edges of bends are actively eroding as well as outside bends and there are numerous signs of bank failure.

Riffle Embeddedness
Riffles are areas, often downstream of pools, where the water is breaking over rocks or other debris causing surface agitation. This agitation helps to increase the dissolved oxygen levels required for a healthy aquatic animal community. Riffles support a high species diversity and abundance of insects and serve as spawning and feeding grounds for some fish species.

Embeddness measures the degree to which gravel and cobble substrate are surrounded by fine sediment. It relates directly to the suitability of the stream substrate as a habitat for macroinvertebrates, fish spawning, and egg incubation.

Riffle Embeddedness Scoring Criteria	
10	Gravel or cobble particles are less than 20% embedded.
8	Gravel or cobble particles are 20 to 30% embedded
5	Gravel or cobble particles are 30 to 40% embedded.
3	Gravel or cobble particles are greater than 40% embedded.
1	Riffle is completely embedded.

Water Appearance
The water appearance element evaluates the health of the stream by assessing its turbidity and color (and in some instances its smell). Turbidity is the measure of the depth to which an object can clearly be seen. It is caused mostly by soil particles or organic matter that are suspended in the water. Turbidity increases with storm events or any other form of turbulence.

Streams may be naturally tea-colored if they are in watersheds with extensive wetland areas. Streams with slight nutrient enrichment may support free-floating algae that give the water a greenish appearance. When nutrient loads are high, there may be thick coatings of algae on rocks. In degraded streams, floating algal mats, surface scum, or pollutants, such as dyes or oil, may be visible and/or may smell.

Water Appearance Scoring Criteria	
10	Very clear or clear but tea colored; objects visible at depth 3 to 6 ft; no oil sheen on surface; no noticeable film on submerged objects or rocks.
7	Occasionally cloudy especially after a storm, but clears rapidly; objects visible at depth 1.5 to 3 ft; no oil sheen on water surface.
3	Considerable cloudiness most of the time; objects visible to depth 0.5 to 1.5 ft; bottom rocks or submerged objects covered with heavy green or olive-green film OR moderate odor of ammonia or rotten eggs.
1	Very turbid or muddy appearance most of the time; objects visible to depth less than 0.5 ft; flow moving water may be bright-green; other obvious water pollutants; floating algal mats, surface scum, sheen or heavy coat of foam on surface OR strong odor of chemicals, oil, sewage, other pollutants.

Nutrient Enrichment
Nutrient enrichment is often reflected by the types and amounts of aquatic plants in the water. High levels of nutrients, especially nitrogen and phosphorus, promote an overabundance of algae and floating and rooted macrophytes. The presence of some aquatic vegetation is normal and provides habitat and food for all stream animals. An excess of aquatic vegetation, however,

can be harmful to stream life. Plant respiration and decomposition of dead vegetation consume dissolved oxygen in the water. The decrease in dissolved oxygen creates stress on aquatic organisms and, if low enough, can lead to massive fish kills.

Nutrient Enrichment Scoring Criteria	
10	Clear water in entire reach. Diverse aquatic plant community includes low quantities of many species of macrophytes; little algal growth present.
7	Fairly clear or slightly greenish water along entire reach; moderate algal growth on stream substrates.
3	Greenish water along entire reach; overabundance of macrophytes and algae especially during warmer months.
1	Pea green, gray, or brown water along entire reach; dense stands of macrophytes clog stream; severe algal blooms create thick algal mats in stream.

Riparian Zone

A riparian zone is the area adjacent to a stream and is one of the most important elements in determining the health of a stream. The quality of a riparian zone in relation to a stream increases with width and vegetation diversity. A high quality riparian zone should contain natural vegetation comprised of a community of trees, shrubs, and herbaceous (non-woody) plants. A wide, highly vegetated riparian zone filters out pollutants in stormwater runoff, controls erosion, provides shade and habitat for terrestrial and aquatic organisms, provides organic food for stream organisms, and dissipates energy during flood.

Scoring Criteria	
10	Natural vegetation extends at least two active channel widths on each side.
8	Natural vegetation extends one active channel width on each side.
5	Natural vegetation extends half of the active channel width on each side.
3	Natural vegetation extends a third of the active channel width on each side.
1	Natural vegetation is less than a third of active channel width on each side.

Canopy Cover

Shading of the stream is important for several reasons. Cool water has a greater oxygen holding capacity than does warm water. When streamside trees are removed, the stream is exposed to more direct sun. This shift in light intensity and temperature causes a decline in the numbers of certain fish and invertebrate populations. Warmer water also promotes excessive growth of submerged macrophytes (plants) and algae that compromise the health of the aquatic community. In estimating the portion of the water surface area that is shaded, assume that the sun is directly overhead and the vegetation is in full leaf-out.

Canopy Cover Criteria	
10	25 to 90% of water surface shaded
7	Greater than 90% shaded; full canopy; same shading condition throughout the reach
3	(intentionally blank)
1	Less than 25% water surface shaded in reach

Pools
Pools are important resting and feeding sites for fish. A healthy stream has a mix of shallow and deep pools. A deep pool is 1.6 to 2 times deeper than prevailing depth. A shallow pool is less than 1.5 times deeper than prevailing depth. Pools are abundant if a deep pool is in each of the meander bends in the reach being assessed. Generally only 1 or 2 pools will typically form within the length being evaluated.

Pools Scoring Criteria	
10	Deep and shallow pools are abundant. Pools are at least 5 feet deep.
7	Pools are present but not abundant. Pools are at least 3 feet deep.
3	Pools are present but shallow and less than 3 feet deep.
1	Pools are absent.

Instream Fish Cover
The instream fish cover element measures the availability of physical habitat for fish. The potential for the maintenance of a healthy fish community and its ability to recover form disturbance is dependent on the variety and abundance of suitable habitat and cover available. Types of fish cover include: logs or large woody debris; deep pools; overhanging vegetation; boulders or cobbles; undercut banks; thick root mats; dense macrophyte beds; riffles; and isolated pools.

Fish Cover Scoring Criteria	
10	8 to 10 cover types available
8	6 to 7 cover types available
5	4 to 5 cover types available
3	2 to 3 cover types available
1	0 to 1 cover types available

Invertebrate Habitat
Invertebrates need stable substrate. Substrate refers to the stream bottom, woody debris, or other surfaces on which invertebrates can live. Optimal conditions include a variety of substrate types located in a relatively small stream length (5 times the active channel width). Stable substrates are also important and are affected by high stream velocities, high sediment loads and frequent flooding. Types of habitat for invertebrates include: fine woody debris, submerged logs, leaf packs, undercut banks, cobbles, boulders, or coarse gravel.

Invertebrate Habitat Scoring Criteria	
10	At least 5 types of habitat available with logs and woody debris not freshly fallen.
7	3 to 4 types of habitat available. Some potential habitat exists such as freshly fallen branches.
3	1 to 2 types of habitat available. Substrate is disturbed, covered or removed by high stream velocities and scour or by sediment deposition.
1	0 to 1 type of habitat available.