

Standard Operating Procedures for Conducting Rapid Visual/Benthic Surveys of Streams.

1. Reporting Forms.
 - a. All surveys will be reported on form MO 780-1196 (12-89), titled Stream Survey form.
2. Office Preparations
 - a. The first three lines of information on the Stream Survey form, with the exception of the measured flow, should be filled out in the office prior to conducting the survey.

Scheduling Trips. Surveys should be done when the stream has not been influenced by stormwater flow within the past two weeks. Realtime streamflow information from the USGS website and recent estimated rainfall totals from Intellicast. com website are good ways to estimate if there has been any recent stormwater flow in the area you intend to work. For recent weekly and monthly rainfall totals by county, <http://agebb.missouri.edu/mass/index.htm>

If rainfall over the past two weeks totals less than 2.5 inches and no 24 hour total exceeds one inch, conditions should be acceptable. Coordinate your schedule with other stream survey personnel if cross-over surveys are desired.

Notify the Regional Administrator of the DNR regions you will be working in of your trip itinerary. If you are planning to bring water samples back to the DNR lab for analysis, notify **Brenda Mace** of the DNR Lab of the number and kind of samples and the expected time of arrival. Special arrangements need to be made with the lab if you are planning on bringing in BOD samples on a Monday or Tuesday.
 - b. Equipment. Standard equipment should include a 2.5 gallon plastic bucket with a bale, conductance meter with thermometer, clipboard, code sheets, ballpoint pens, watch with second hand, yardstick. If water samples are to be taken make sure you have the appropriate preservatives and take the appropriate volume of sample needed for all analyses, DNR sample identification tags and chain of custody forms.
3. Choosing locations to Survey
 - a. Survey the stream at one location upstream of the influence of the facility and enough downstream locations to determine that the stream has returned to a condition where it is apparently unaffected by the discharge. This can be determined by comparing the downstream condition with the upstream condition or with the condition of a nearby stream without a wastewater discharge.
4. Conducting the Survey
 - a. Facility Visit. Locate the facility. If the legal description as listed in WQIS or as plotted on our "facilities" shape file is incorrect, note the correct legal description on the Stream Survey form and write a note in the margin of the form confirming that the WQIS description is incorrect. If the facility is difficult to find, draw a map of how to get to it on the survey form (front or back). Measure the flow from the facility, or if the operator is present and there is an operable effluent flow measuring device, get the flow from the operator. Ask the operator if the flow being discharged from the plant is a typical dry weather flow. If not, ask what the approximate dry weather effluent flow is and note that as well.
 - b. Field Measurements. **Measure conductivity and water temperature at every site and record** in the "Other Observations" block on the stream survey form. All measurements and any water quality samples should be taken from the flowing portion of the stream whenever possible. Flows less than 1 cfs can be estimated, and flows greater than 1 cfs should be calculated by measuring cross-sectional areas and velocities. If measurements of pH or dissolved oxygen are made, meter calibration should be checked at least every two hours. On the bottom margin of the stream survey form, the results of these calibration checks should be noted. If pH or dissolved oxygen values are adjusted after it has been determined that the meter has suffered some drift, the original

measurement value should have a line drawn through it and the adjusted value written next to it. Do not erase the original value.

- c. **Other Field Observations:** All rows in the “Field Observation” portion of the Stream Survey form should be filled out. Please pay particular attention to and note any signs of human use, as this information may lead to changes in our water quality standards.

If a stream crossing looks as though it might present a barrier to fish passage, please make a note of a few easily measured parameters in the “Other Observations” section or on the back of the sheet. These parameters should include the length of the culvert, water velocity, depth at the shallowest point, height of outlet drop, and a description of the culvert substrate. Also, observations of the fish and invertebrate communities should be made both above and below the crossing. Several pools of comparable size should be observed on each side of the crossing in order to be able to draw a general conclusion about possible effects of the crossing.

The first approach to the stream should be a careful stalking of the larger fish that may spook easily. At least three pools or three full minutes should be spent looking for fish at each site. Cobbles, boulders, woody debris, leaf packs and aquatic vegetation, if present, should all be checked for aquatic invertebrate animals. A full five minutes should be spent looking for invertebrates unless at least six taxa can be identified in less than that amount of time. Fish and invertebrates should be identified at the taxonomic level indicated in the coding sheet. The following changes or additions are suggested for invertebrates:

1. No. 5- formerly identified as right-handed snails or Goniobasis sp. Should now be separated into one of the two following right-handed snails- Elimia sp. -only 3-4 whorls and a rounded lip on the operculum; Pleurocera sp. –a long slender snail with many whorls and opercular lip often pointed at the bottom.
2. No.10- Baetid mayflies. Please list Isonychia sp. separately. Isonychia is a large mayfly nymph, very dark with a light colored line running the length of the animal on its dorsal side. It is an Ozarkian species and a good indicator of relatively good water and habitat conditions.
3. No. 6 Other gastropods. Note Helisoma sp. Separately. Helisoma has a completely flattened spiral shell.
4. No. 20 Other beetles. Please separate and note members of the family Gyrinidae (Whirligig beetles, that swim in fast circles on the surface of the water), Hydrophilidae (Water Scavenger Beetles, diving beetles with shallow ventral keels) and Dytiscidae (Predaceous Diving Beetles, diving beetles with a deep ventral keel).
5. Important taxa that should be separately noted under “No.31- Other”, include stoneflies, fishflies, alderflies.

Making the Use Attainment Rating

The lower portion of the stream survey form is for estimating any instream impairment caused by the facility being surveyed. The goal of the original Federal Clean Water Act in 1972, was to make the waters of the US “fishable and swimmable”. In the intervening years, the goal has been expanded, but the goal of all our clean water activities is still to maintain our waters for all the beneficial uses we wish to make of them. In our WQIS database, and in our reporting to USEPA and congress, we use the following categories to describe the water quality condition of streams:

F¹= full attainment of all appropriate beneficial uses (the beneficial uses of specific waterbodies are listed in 10 CSR 20-7.031, Missouri Water Quality Standards). A rating of “F” means the facility discharge has no discernable affect on the receiving stream.

¹ F or F/A ratings can be used on both classified and unclassified waters. N should be used only on classified waters and U only on unclassified waters.

F/A= The facility discharge does affect the receiving water, but it is not serious enough to cause any impairment of beneficial use. One or more of the following conditions exist: a slight to moderate increase in benthic algae growth, a few minor sludge deposits, slight odor.

N= Non-attainment of one or more beneficial uses in a classified water. One or more of the following conditions occur: thick sludge deposits, bad odor, discolored water or noticeable suspended sediments in the water, thick chemical precipitates, anaerobic substrate, thick growths of filamentous algae not present upstream of discharge, aquatic biota dominated by pollution tolerant forms or absent. Chemical monitoring shows exceedence of chronic or acute numeric criteria.

U= Non-attainment of narrative criteria in an unclassified water. One or more of the following conditions occur: thick sludge deposits, bad odor, discolored water or noticeable suspended sediments in the water, thick chemical precipitates, anaerobic substrate, thick growths of filamentous algae not present upstream of discharge. Chemical monitoring shows exceedence of acute numeric criteria.

How to Report Mileages

All estimated distances of stream impacts should be in increments of tenths of a mile. At many facilities, the impacts are apparent for only a short distance below the outfall. You should see at least 100 yards of a particular affect before the stream is judged to be affected. (0.1 miles = 176 yards, and rounding up allows you to report 100 yds. Of stream affect as 0.1 mile which is the minimum length that should be reported.)

Another issue in estimating lengths of affected stream segments is lack of access to a stream. If you find an impact just below the outfall but the next access is 1.5 miles downstream and the stream looks unaffected at that point, what mileage should you report as affected? The best procedure would be to make sure you walk at least 100-150 yards downstream of the outfall. If the appearance of the stream shows improvement over that distance but is still in one of the affected or impaired categories, you can estimate that all effects will probably be dissipated in the next 0.1-0.2 miles and rate accordingly. However, if the appearance of the stream is similar to that at the outfall it would probably be better to assume that the affected portion of the stream probably spans a longer distance, in which case assuming the affect goes halfway down to the next access point is probably a good estimate. If the first access point is more than 2 miles downstream and that point appears unaffected, a better method would be to estimate the minimum distance you believe is affected, based on the appearance of the stream at the outfall and at 100-150 yds. Below the outfall and put a plus sign after this estimate to indicate that it is an estimate of the minimum affected distance.

Quality Control Activities

To reduce the variation in ratings introduced by the bias of individual stream surveyors, a percentage of all surveys will be done independently by two or more surveyors. These surveys are referred to as "cross-over surveys" and for those surveyors with more than 2 years experience, at least 10% of all surveys must be cross-overs. For those with less than 2 years experience, at least 25% of all surveys must be cross-oversee. All cross-overs must be done within 72 hrs of each other with no intervening periods that produced stormwater runoff to the stream.

The Project Officer for the Rapid Visual and Qualitative Benthic Stream Assessment QAPP will compile all cross-over data into an annual report and suggest changes individual surveyors need to make to bring their estimates more into agreement with group averages.

All new personnel should attend Level One and Two Volunteer Water Quality Stream Monitoring Workshops and successfully pass the Level Two proficiency test. All low flow survey personnel should attend the annual Environmental Services Program training program on sampling. All meters should be returned to the Environmental Services Program at least monthly for routine maintenance.

Appendix 1. Data Code Sheet

Appendix 2. Drawings of Major Aquatic Invertebrate Taxa listed on Code Sheet

Appendix 3. ESP SOPs for Calibration and Maintenance of Meters.

