Perennial Stream Survey
Field Sample Protocol (version 1.21)

1.0 Introduction

This field sample protocol was developed to provide a consistent repeatable method to evaluate the locations in stream systems where continuous perennial flow and where spatially intermittent perennial flow are found and to develop a program to test whether the 12 (Sitka spruce zone), 52 (western WA), and 300-acre (eastern WA) basin area threshold relationships are correct. The protocol is intended to ensure that data collected in the summer of 2001 by various parties is comparable, that data collected in those programs is quantitative and repeatable, that data will be useful in addressing regulatory issues regarding perennial flow, and that site selection meets minimum requirements for random site selection. Ultimately,

The developers of this protocol recognize that additional work needs to be done to:

a) Develop a systematic statewide site selection process, including identification of an appropriate site stratification approach for sampling in year 2002.
b) Identify specific hypotheses to be tested and the specific data analysis methods to be used to address those hypotheses.
c) Attain a scientific review of the overall study plan and to fine tune the study protocol for a statewide sampling effort in 2002.

This protocol was developed and released in recognition that data would be collected by many parties in the summer of 2001, regardless of whether a protocol was available. Field data collected in compliance with this pilot protocol in 2001 will be considered to be comparable and thus potentially suitable for adaptive management purposes. Such data is expected to provide useful insight into a) problems with the protocol, b) appropriate sample sizes for the statewide study, and c) variables affecting identified relationships that might be useful in planning for data stratification. Individual cooperators may choose to collect additional information not described here, so long as the additional effort required is not supported by CMER funding. Efforts conducted in 2001 are primarily intended as a pilot effort for the larger statewide program projected for 2002.

1.2 Objective

The primary objective of the protocol is to generate data to support adaptive management related to water typing in headwater streams, particularly related to identification of perennial/nonperennial breaks. Please note that this protocol is specifically not to be used as an operational protocol for harvest unit application or water typing.

2.0 Overview

This protocol was developed to guide the collection of quantitative, repeatable data in the field. It is intended to document physical hydrologic breaks, regardless of whether fish are present or absent.

A method is provided to guide random selection of streams where the data is to be collected. Once randomly selected streams have been identified, the field crew will proceed to a site that is easily found again (bridge, confluence of tribs, etc) that is near or within the stream segments to be surveyed. Several types of flow have been defined. The field crews will work upstream, measuring the distance at which the character of flow per the definitions changes. Several ancillary variables are recorded at each change in flow category, which may be useful in defining field criteria for identifying these sites off-season, may be used in developing relationships that predict the locations of interest, and/or may be used to guide site stratification.

No procedure is provided for interpretation of data because it has not been determined yet.

3.0 Definitions

Definition of Flow Categories .

NOTE: Flow going under organic cover, such as logs, trees, stumps, and soil- or vegetation-covered root mats does not represent a break in flow class, except for circumstances defined by "Obscured" or "Unknown" below. As a rule of thumb, imagine the stream without its organic cover, when describing its flow definition.

Flowing Water (FW): Any segment of channel upstream of the point of continuous flow that is greater than five meters in length, where water exposed at surface shows any signs of flow. The width of the flowing water is not a defining criterion.

Standing Water (SW): Larger pools or areas of standing water (regardless of depth but not saturated ground), greater than five meters in length. TEST: If dry dust or small pine needles placed anywhere on the surface of the pool move without the aid of wind, it is flowing water, not standing water. Width is not a defining criterion.

Flowing Pocket Water (FP): Pools of water, in which flow is visible in at least some parts of the pool, separated by less than five meters of dry channel bed. Any unit of continuous surface water greater than a 10 cm by 10 cm square qualifies as a pocket. In those situations where both the upstream and downstream segment has 'Flowing water', 'Standing water' or 'Dry ' for over 5 meters, the FP unit can be as short as 0.1 meters.

Standing Pocket Water (SP): Pools of water, in which there is no discernable flow, separated by less than five meters of "Dry" flow (see below for definition). Any unit of continuous surface water greater than a 10 cm by 10 cm square qualifies as a pocket. In those situations

where both the upstream and downstream segment is 'Flowing water', 'Standing water' or 'Dry ' for over 5 meters, the FP unit can be as short as 0.1 meters.

Dry (D): The streambed or area between or above defined channels shows no area of surface water greater than a 10 cm by 10 cm square for a minimum of five meters. This includes dry, moist and saturated substrates.

Unknown (U): Areas which could not be accessed (i.e., you did not walk the channel). For example, this may be a result of landowner restrictions, current operations such as timber harvest or blasting, steep inaccessible terrain, etc. Describe the situation in the notes. Estimate length and gradient of segment.

Obscured (O): Segments longer than 5 m that could not be typed because visibility is obscured by slash, debris, or dense vegetation. In cases where you can hear the stream flowing or can see it flowing through breaks in cover, record as F not O. If you cannot see or hear the stream, record as O. If the channel does not re-emerge at the end of the obscured segment, end the survey and describe the situation in the notes. Record the end distance and gradient of segment.

Please use your best judgment to identify the flow category. If it does not seem to fit any of the above categories, describe the situation in your notes, consult with your team leader and make your best estimation of a flow category.

Definitions of Channel Categories:

Defined Channel (DC): A stream channel defined by sharp incision into the substrate where water and mineral sediment are (or have been) transported in concentrated flows and vegetation and organic detritus is generally absent. Channels form as a result of downslope hydraulic (water-powered) scour into mineral substrate. For purposes of this survey, the low flow sections of the streambed must be mostly mineral substrate, comprised of sand, gravel, cobble, boulders, or bedrock. The boundary between the defined channel and surrounding riparian area is clear and usually abrupt. Woody debris or root mats suspended over the stream are not part of the streambed.

Comment [mkl1]: May be confused by valleys or swales

Poorly Defined Channel (PDC)– This is a stream channel with evidence of scour or deposition via past or present flowing water, but is poorly defined. Substrate material may include organic detritus, fine sediment deposits, or live vegetation, often in a patchy distribution. The boundary between the stream and riparian area is difficult to identify or patchy.

Modified channel (MC): All channels in culverts and following road ditch lines are in this category. Other circumstances, such as recent forest practices or dirt bike activity, that make it difficult to classify natural channel type should be classified as modified channel. The details must be recorded in the notes.

Piped Channel (PC): Channels conveying flowing water in a tube(s) or pipe(s) in the soil. Often, no expressed channel is defined at the surface. Pipes can often be observed through "holes" or "windows" that partially expose the channel. Piping DOES NOT include places where water simply disappears into the substrate (see Dry). Generally associated with

established vegetation (i.e. tree or other roots), small channels covered by canopy litter, macropores in the soil, or lava tubes.

No Channel (NC): An area or swale with no observable evidence of scour or erosion that defines it's boundary with riparian or upslope areas.

Comment [mkl2]: It's quite common in headwater streams to have situations where the channel completely disappears into a wetland. Since wetland is now an associated feature, we need to keep the option to include "no channel" for these situations.

Other Definitions

General Channel Width: Where a floodplain is present, the edge of the bank is characterized by 1) a berm or other break in slope from the floodplain down to the streambed; 2) a change in vegetation from trees, and perennial vegetation (brush) to bare surfaces and annual or water tolerant vegetation, and; 3) a change in substrate from fines or organic cover to sand, gravel, boulders or bedrock. For purposes of this survey, take a representative measurement of this width.

General Channel Depth. Channel Depth is the average distance from the bankfull width water surface elevation to the substrate. For purposes of this survey, take the average of three readings at ¼, ½ and ¾ intervals across the channel.

Stream Bed Substrate: F =silt/muck/mud, less than 0.625 mm grain size including organic component; **S** = sand, material 0.625 to 2 mm grain size with no organic component, **G** = gravel 2.0 to 64.0 mm (i.e., rocks smaller than a baseball), **C** = cobble 64.0 to 256.0 mm (i.e., rocks larger than a baseball and smaller than basketball), **B** = boulder > 256.0 mm (i.e., rocks larger than a basketball), **R** = bedrock.

Wetland: (WE): Wetlands are typically low gradient, and may have, deep organic muck, and wetland vegetation such as cattails or skunk cabbage. They may or may not have surface water visible or a discernable channel.

Seep (SE): Seeps are areas adjacent to the channel where water, which slowly oozes from the ground, does not form a Defined or Undefined Channel (defined above). These areas may have wetland vegetation and fine to coarse substrates.

4.0 Protocol Details

4.1 Sample Site Selection:

Site selection must be random within the area of interest, and three alternative methods have been identified. The methods below choose which streams will be included. The protocols will further direct them to the appropriate starting point for each chosen stream. It is important to define the area from which random selection will be made. This boundary defines the area that inferences can be made from your data assuming that the selection from the population of potential study sites (type 4 streams) is random. In other words, if you plan to pick streams at

random from an area comprised of three WAUs, then you must initially specify the names and locations of those WAUs.

Option 1: GIS or hand mapped random selection of intersections between Type 3 and 4 streams. Using a GIS system or a water type map, identify and number all Type 3/ 4 breaks within the area of interest. Using a computerized random number generator, a random number generator on a hand held calculator, or random number tables available in statistical texts, select sites to be sampled.

Option 2: Using the same procedures in Option 1, randomly select points at where streams intersect section boundaries. From the intersections selected, identify the closest type 3/4 break. This will represent the stream to be sampled.

Option 3: If a DNR stream type map is not available, randomly select locations where two, second order streams come together. Follow the procedures described in Option 1 for the random selection.

Option 4 (2001 only): Revisit sites that have been visited during perennial flow surveys in prior years. These sites should be surveyed using this protocol and subject to all QA/QC requirements.

The area within which sites can be selected will be restricted to lands managed under Forest Practices Rules or other lands with similar site conditions. The intention of this restriction is to avoid spending time sampling site conditions that are rare or absent on FFR lands (e.g. agricultural or high alpine areas).

Once the first 50 field sites have been identified, sub-samples for QA/QC and optional Total Tributary surveys (more description provided later in the report) should be selected randomly. The QA/QC sub-sample requires at least 10 sites, or 10% once more than 100 sites are chosen. If the optional Total Tributary survey will be undertaken, randomly identify the 50% of all sites (can overlap with QA/QC sites) for this.

If a site is encountered that was randomly selected and cannot be sampled (e.g. access denied), move to the next type 3/4 break that can be sampled to the east. If this site cannot be sampled, then move to the next site south. Make sure to document situations where the pre-selected site could not be sampled, the reason it could not be sampled, and the process used to determine the next accessible site.

4.2 Equipment and Materials

1:24,000 scale (or larger) maps or air photos of the sample area
Flagging
Permanent marker
Hip chain or hypsometer
Field forms on rite-in-the-rain paper
Pencils

Watch
Compass
Clinometer
GPS with good resolution (±3meters) (Optional)
Tape measure or graduated rod
Spare batteries for hypsometers
Gloves
Coin

4.3 Sample period

The intent of the surveys is to identify the end of continuous and spatially intermittent perennial flow during the dry period. Hence, surveys are to be conducted during the dry season in summer. This is defined as August 1 through September 30. The field season can be extended if weather data suggests that the dry period lasted longer. For instance, field sampling can continue until fall rains begin, provided that documentation of weather conditions are provided with the data set. Whenever rain falls continuously for more than a 24-hour period, discontinue sampling for at least 2 days after rains cease. The suspension of surveys due to rainfall from sudden summer thunder storms will depend on the frequency or duration of the storms. Crews will need to use their judgment and record weather and precipitation conditions. Include flow observations such as measured increase in water elevation (mark a stick), presence of overland flow, or length of time a dry channel flows if at all.

4.4 Procedures

4.4.1. Starting Point along Stream:

The surveys may be conducted in either an upstream or downstream direction. Either way, the starting location is based on the mapped type ¾ break location. Although most of the subsequent guidance is oriented toward the upstream approach, most can be applied to the downstream method using common sense.

4.4.1.1 Upstream Method

The upstream method begins on a point along the stream where the surveyor is confident that continuous perennial flow to the mouth of the tributary is present. Go to the Type 3/4 break selected in the site selection process. If the stream flow at this location is clearly continuous to the mouth, start the survey at a location downstream that is readily mappable (e.g. road crossing, junction of two tributaries that are shown on a map, GPS point). If the stream does not have continuous flow, move downstream to a point where the field crew is confident that flow is continuous to the mouth. Then start the survey at a location downstream that is readily mappable (e.g. road crossing, junction of two tributaries, GPS point). If you do not know if flow is continuous to the mouth from your stating point, then you should assume it is continuous if you document that flow is continuous for 200 m downstream of that point.

4.4.1.2 Downstream Method

Starting from the initial ¾ break, the headwater tributary where the downstream survey begins is chosen using a map of the stream network. On the map, follow the stream upstream to each mapped tributary (assume all are flowing), then choose which tributary to follow using a coin toss. As you move up the selected branch, repeat this process at each subsequent tributary junction until you reach a first-order channel. This channel will be the site where the survey will begin. The field survey should begin at the channel head and proceed downstream.

4.4.1.3 General Notes

Use ample flagging to mark the start point. If in an area with abundant cattle or elk, make sure to leave flagging as high as possible. Mark the flagging with the site number, date (mm/dd/yy) and START using permanent indelible marker. Record GPS position. This protocol may require starting in an unusual situation. Since this is a pilot protocol, we expect that unanticipated situations will arise. Please do not be tempted to diverge from the above selection protocol**.** It is necessary that selection criteria are consistent to assure that planned statistical techniques are valid. In these cases, please continue to collect and report the data following the protocol as best as possible. You may document why it was a "weird" site. During analysis, a determination about suitability of each site will be made based on the description, and possible modification to future protocol may be necessary.

4.4.2 Selecting the Tributaries to Follow Along the Survey

There are two types of surveys: a Main Thread Survey and a Total Tributary Survey. The total tributary survey is a voluntary component of this pilot study. If you choose to do both types of surveys, each survey type should be conducted at one-half of the study sites in your sample population chosen at random. In a Main Thread survey you will make a decision at each tributary junction that will eventually lead you upstream to **one** headwater point in a stream network. In the Total Tributary Survey you will end up surveying the channel length to the headwaters of **all** tributaries in a stream network that occur upstream of the point where stream flow changes from F to another flow category.

Main Thread Survey

We are interested in two fundamental pieces of information about each stream segment: flow and channel category. We may have flow but no channel or a channel with no flow, or a combination of conditions. The selection criteria for which tributary to follow at a junction will be based on flow categories described below.

As you move along the stream, you may encounter junctions between two channels. If you are uncertain of the distinction between channel, seep and wetland, review the definitions carefully.

If you encounter a dry tributary junction, record the distance and flow type of this tributary on the data form. Note the location on a map and distance from the starting point of the junction and then continue moving on up the wet stream. It may be necessary to confirm the flow category of the tributary junction by walking at least 15 meters upstream.

If you encounter two tributaries with the same flow type for the first time, flip a coin. If 'heads', the survey proceeds up the right tributary. If "tails", the survey proceeds up the left tributary. Record results of the coin toss in the NOTES on the bank of Form b. The relative size of the two tributaries has no bearing on the decision. Only the flow type and coin toss. For subsequent tributaries where both streams have the same flow category, alternate the previous direction (e.g. if the coin flip said go Left at the first tributary, go RIGHT at the second). Continue to alternate directions until the survey is complete.

If a junction of two streams with different flow categories is encountered, follow the tributary with the "higher" flow category. Flow categories in descending order are:

Flowing water
Standing water
Flowing Pocket Water
Standing Pocket Water
Dry

In all cases, record the distance, flow type, and channel type of each tributary on the data form. Note the location of the stream that was not followed on your map. Where side channels (i.e. sections where channel diverges into two or more sub-channels, then recombines below) are encountered, follow the larger branch.

Total Tributary Survey

Start the survey in a flowing (F) stream as described for the Main Thread Survey. Proceed up- or downstream using the same tributary decision process for the junction of two streams that are flowing. If you encounter a junction of a flowing stream and a stream with a lower flow category, continue up the flowing stream, but record the distance and flow type for the stream that was not followed as described above. Continue this process until you pass the point where flow changes to a lesser category. Upstream of this point every tributary that you encounter that is not dry will be surveyed up to the point where the stream is dry. If you encounter a dry tributary, record the distance and flow type on the data form and continue surveying in the wet tributary

Assign a tributary number to all tributaries that are surveyed (not dry tribs) starting with the main thread, which should be tributary number one (see Figure 2). Assign a tributary number at each junction that is upstream of the main thread flow change.

4.4.3 Measurements

Two data forms are provided at the end of this document. Form A provides overall summary information and is discussed under Section 5.0. Form B is used to record field data.

Prior to starting data collection, fill out the header information on Form B. This information includes:

- Organization (e.g. name of tribe, company, agency collecting the data)
- Site number
- Township, section, and range of starting point
- Topo quad name
- Surveyors name(s)
- Stream name or name of nearest named tributary downstream
- Date
- Landowner(s)
- WAU
- Description of starting point (e.g. bridge at Mile Post X.X on road Y).
- Vegetation category that applies to the majority of the watershed above each tributary selected (None, sparse, moderate, dense, clear cut, partial cut, mature, … – use the watershed analysis, hydrology module definitions)
- Precipitation for the 2 days previous to the survey (qualitative or from nearby weather station)
- Survey type (circle either Main Thread or Total Tributary)
- Tributary number (use only when doing Total Tributary Survey)
- Name of study area from which random samples were drawn.

Start measurements at the starting point and walk upstream 30 meters, until the flow category changes, or until you reach a tributary junction, whichever is less. **In cases where you encounter a modified channel, start a new segment at the beginning and end of the Modified Channel.** Record the distance from the starting point, the flow category, and other information listed on Form B. Data to record include

- Segment Number (number each segment continuously from the start point)
- Distance from start point (meters, measured on the slope. Note that this measure will be translated into horizontal distances by using mapped gradient information.
- GPS location (optional)
- Flow Category (see above definitions)
- General Channel Width (meters)*
- General Channel Depth (meters)*
  * if at a flow change, take channel measurement 10 meters downstream of break.
- Channel gradient in percent: take measurements looking upstream and downstream. This should represent the 30 m segment . Dominant substrate (silt/muck/mud = F , sand = S , gravel = G, cobble = C, boulders = B, bedrock = R) – call should represent the majority of the overall condition of segment below the point recorded.
- Dominant channel type. Record the dominant channel category for that segment (i.e., channel category that makes up highest percentage in a segment): Defined channel = DC, Poorly Defined Channel = PDC, Modified channel = MC, Piped Channel (PC), or Covered Channel (CC), No Channel (NC),
- Feature (if any) associated with flow category changes. These may include
  - Spring
  - Seep
  - Intersection with perennial stream

- Wetland
- Beaver pond (active or breached)
- Gradient break (change of at least 10 degree)
- Evidence of debris slide (deposition, scour, etc.)
- Road crossing
- Visible road drainage Inputs
- Water intake or diversion
- "wet-site" vegetation patches (e.g. devil's club, willow, etc.)
- Significant change in substrate characteristics
- Other items potentially affecting the change in flow category

- Trib Flow and Channel Categories (for tributaries that are not surveyed as main thread)

Continue moving along the channel recording information at tributary junctions, changes in flow and category and, where distances between changes are greater than 30 m, every 30 m within a flow category. Distances are to be cumulative. In other words, all distances recorded are to be the distance from the starting point. Record whether the following features are present at each change from any category to dry as you move upstream:

At each change in flow category, attempt to locate the change on the topographic maps. This may be done using GPS and/or orienteering methods. You may only be able to locate some changes due to scale (100 feet equals 0.05 inch on a 7.5' topo sheet) or lack of orienting features. Keep in mind that these headwater streams may not be present on topographic maps. Hence, crews may have to map the stream as they travel along it. We encourage use of multiple orienteering tools (compass, orientation to mapped features) to locate sites on the maps. Protected aerial photographs are often a better tool for locating features that can then be transferred to a map, but care should be taken because of the scale differences.

Along the way, make notes on the back of Form B regarding location of major seeps, spring, lakes, emergent wetlands, etc. Also note whether fish, tadpoles or other amphibians are observed casually during the survey. Record the distance along the channel that the note refers to. If unusual situations are encountered, make a sketch in the space provided on the back of Form B.

When a site is complete, make sure to fill in the page numbers and the total pages on the bottom of each form.

4.4.4. Determining the end point

The survey will end once 200 meters of continuous dry (or flowing for downstream surveys) channel has been observed or the channel ends (see definition of channel). At the end point, flag the site with flagging marked END. Also mark the site number and date (mm/dd/yy) on flagging.

If piping continues upslope >200 meters beyond the last window, the survey ends 200 meters upstream point from the last window.

4.4.5 Unusual situations

If, during the survey, a manmade water diversion (other than roads, skid trails) or a spring development or other manmade structure that is diverting water from the stream, stop the survey of the stream and move on to a new site (see directions for selecting alternative sites when the pre-selected random site cannot be sampled). Drainage modifications from forest roads, skid trails, and landings are not considered unusual and should be surveyed according to the protocol: please note on data forms where these features exist and how they interact with the stream. In any situation that is somewhat "odd" (including stream segments designated as unknown), provide a sketch map of the site, which will help to clarify the situation to others.

4.4.5 QA/QC

A sub-sampling of sites should have been selected to test the: a) adequacy of the 200 meter distance used to determine a stream is dry or has continuous perennial flow, b) changes in flow within the defined sample period, and c) variability between field crews.

We are in the process of developing a QA/QC program for this work. Certain parts of this program will be implemented this year, including the "Test of the 200-meter distance" and the Documentation of changes in flow within the sample period". The process to test variability between crews is voluntary in 2001. We encourage you to collect data on between crew variability, but do not require it. Information on between crew variability is important and, when collected, will be used in the 2002 study design.

Test of 200-meter distance. The validity of the 200-meter distance will be checked in a subset of the sites. At least 10 sites or 10 percent of the total number of sites surveyed (which ever is more, to be chosen randomly) will be sampled to the top of the Defined, Undefined Channel, wet or dry (also referred to as the channel initiation or channel head).

Documentation of changes in flow within the sample period. Ten percent of the sample sites will be revisited at least 3 times during the defined sample period (minimum of one week between visits) to document any changes in flow observed over this time.

Between crew variability. If you choose to do this part of the QA/QC program this year, you should collect data at ten percent of the sample sites by a second, preferably independent, crew. This information should be collected within one week of the original survey and will be used to test the between-crew variability. Obviously survey routes must be identical when testing for between crew variability. Therefore the second crew will need information on which stream and tributaries were surveyed, and the survey stating point. The second crew should not have any additional data (flow, channel, etc.) from the first crew that may compromise their independence.

The random subset of streams for which one element of the QA/QC program is designed will work for other elements of the QA/QC program. For example, the streams randomly picked to do the test of 200-meter distance can be the same streams that are used to determine changes in flow within the sample period.

5.0 Reporting

Data from various sources will be compiled. Prior to submitting data, fill out Form A. Header information on Form A includes the following information:

Organization submitting information
Contact Name
Contact Phone Number
Address
Contact e-mail
Date data is submitted
Total number of pages of data forms (Form B) submitted

Form A also includes a listing of the data submitted. For each site sampled, list the site number, and the date the site was surveyed. It also includes columns for upslope vegetation and data source. Upslope vegetation refers to the overall forest conditions upslope of the sample site. For data collected on the west side of the Cascades, indicate what portion of the upslope forest is 1-15 years, 15-35 years, and >35 years old. For data collected on the eastside, indicate what portion of the upslope forest is sparse, moderate, and mature using the WDNR watershed analysis hydrologic assessment classifications. The source of this data also needs to be described. This information is optional.

Data will be submitted to Darin Cramer, WDNR at:

Darin Cramer
Forest Practices Division
Dept. of Natural Resources
Phone: (360) 902-1088
Fax: (360) 902-1428
darin.cramer@wadnr.gov

Data submittals must be accompanied with Form A and copies of all sheets of Form B. Digital data is also accepted (and encouraged). Please fill out header information on each page to prevent confusion.

6.0 Training

To be developed.

Form A: Summary Information

Organization:	**Contact Name:**	**Address:**
Date Submitted:	**Contact Phone Number:**	
Number of Pages of Data Sheets Submitted:		**E-mail:**

Site Number	Survey Date	Basin Vegetation category	Data Source (for vegetation)	Site selection method (random or revisit of pre-existing site)

Form B: Perennial Stream Survey Field Measurements
Note: Record all Measurements in metric units

WAU:	**Stream Name:**	**T/R/S**	**Topoquad name:**
Organization:	**Description of start point (GPS optional):**		**Landowner:**
Site Number:	**Date:**	**Recorder(s):**	
Precipitation (in mm) for the 2 days prior to survey		**Survey type: Main thread or Total Tributary Tributary Number:**	

Segment Number	Distance from Start (m)	GPS coordinates (optional)	Flow Category	Channel Category	Channel Bankfull Width	Channel Bankfull Depth	Upstream gradient (%)	Down-stream gradient (%)	Dominant Substrate	Associated Feature at flow change	Flow categories of side trib not on main thread	Channel categories of side trib not on main thread	Notes (see also back page)

Codes for Flow Categories: **FW** = Flowing Water, **SW** = Standing Water, **FP** = Flowing Pocket Water, **SP** = Standing Pocket Water, **D** = Dry, **U** = Unknown, **O** = Obscured.
Codes for Channel Categories: **DC** = Defined Channel, **PDC** = Poorly Defined Channel, **MC** = Modified Channel, **PC** = Piped Channel, **CC** = Covered Channel, **NC** = No Channel

Back of Form B

NOTES

SKETCH

Page _____ of _____