Completing a Stream Assessment

The following describes the steps each team will follow to complete a reach-focused stream assessment. The approach outlined below is a modified, less detailed version of the USGS NAWQA stream characterization protocols and includes a few characteristics adopted from the EPA Rapid Bioassessment Protocols.

Procedure

1. Assess and characterize watershed and stream segment conditions.

Characterizing watershed conditions provides the necessary background data for understanding watershed processes and observed channel forms. It's important to know the geologic, climatic, hydrologic, morphologic and vegetational setting of a stream within its watershed. Geology influences the shapes of drainage patterns, channel bed materials, and water chemistry. Soils influence infiltration rates, erosion potential and vegetation types. Climate affects hydrologic, morphologic and vegetational characteristics. Vegetation affects a variety of factors, including water loss through evapotranspiration, runoff and channel bank and hillslope stability.

A stream segment is a length of stream that is relatively homogeneous with respect to physical, chemical and biological properties. Segment boundaries may be tributary junctions that contain different streamflow or water-quality characteristics (stemming from substantial changes in upstream watershed characteristics) or major hydrologic or geologic discontinuities, such as waterfalls, landform features, major gradient changes or point-source discharges.

Method: Using the topographic map and available GIS layers, describe the local watershed and segment characteristics. Enter the following data in your field notebook as bulleted info or in paragraph form: Brief location description (include info on tributaries and confluences), approximate drainage area and stream length, drainage aspect, elevational range of stream, stream source, local and upstream geology, dominant soil types, and dominant vegetation types.

2. Select sample reaches.

Selection of samples sites depends largely on the purpose of the study and on the scale of inference. For our purposes, we are interested in describing the physical and biological characteristics of salmonid habitat. Therefore sample sites should represent the types of stream habitats occurring within the reach and segment spatial scales.

Sample sites are usually selected in a stratified-random fashion. Depending on the scale of focus, potential sample sites are first stratified by type, and then randomly selected in proportion to the frequency of type. Due to the nature of our survey trip, we will not be able to follow this procedure, so we will select sample reaches in the field that are as representative of the stream segment as possible. A sampling reach is an arbitrary unit, but by convention, the length is generally defined as 20 times bankfull width, with the exception that small streams generally are surveyed for a minimum of 50 to 100m in length.

Method: Perform a brief stream reconnaissance to evaluate stream access, observe field conditions and characterize general reach types. Select 2-3 sample reaches that represent the dominant reach types present in the survey segment. Flag reach boundaries and flag locations of representative cross-sections.

5. Survey sample reach.

A complete reach assessment includes: a physical habitat characterization, a complete reach sketch detailing all sample locations, cross-sectional and longitudinal surveys, discharge measurements, water quality sampling, a sediment analysis, a macroinvertebrate survey and a fish survey.

Method: Complete each of the following steps using the associated datasheets. The steps are listed in a recommended order, but it's fine to adjust the order depending on stream conditions or personal preferences.

1. Complete a reach sketch using the 'Stream Assessment Field Sketch Form'. Refer to the attached instructions for details to include on the reach sketch.
2. Complete the 'Reach Characterization Field Datasheet'. Refer to the attached instructions for details. TWO people should complete the datasheet in order to discuss the observed stream characteristics and obtain consensus.
3. Survey two channel cross-sections in the two dominant habitat types within the survey reach (ex: riffle and pool). Record data on a 'Channel Morphology Survey Datasheet'; use one datasheet for each cross-section and be sure to label the datasheet accordingly (ex: "Cross-section Profile A – Riffle"). Refer to the USFS stream techniques guide for details on surveying.
4. Survey one longitudinal profile through the thalweg. Record data on a 'Channel Morphology Survey Datasheet'; be sure to use the correctly labeled datasheet ("Longitudinal Profile (Thalweg)"). Refer to the USFS stream techniques guide for details on surveying.
5. Complete the 'Sediment Characterization Datasheet'. Refer to the attached instructions for details.
6. Complete a snorkel survey through the entire survey reach (banks only for larger streams). Record data on the 'Fish Snorkel Survey Form'.
7. Complete a macroinvertebrate survey and record data on the 'Macroinvertebrate Survey Datasheet'. The survey should include 3 kicks, ideally spread throughout the reach in the best available habitat (ex: 2 riffles and a run).

6. Compile and review all data collected.

It is absolutely imperative to compile together all the field forms and datasheets completed each day and review them *BEFORE* leaving the field sample site. Once the crew has left the field site, there may be no opportunity to re-measure conditions or assess the validity of data collected or comments made. If it's not written down, it will not be remembered! If it's not written down correctly, it will have to be thrown out later as invalid data!

7. Analyze and Summarize.

The final step is to analyze the survey results and summarize the data in written and electronic format. It's always best to work up data as soon as possible after returning from the field. Details and impressions formed in the field are often quickly forgotten, so it's best to get thoughts down in writing immediately. We will be spending an hour each evening at camp to process macroinvertebrate samples, process water quality samples, clean up datasheets, ink reach sketches, convert data into electronic format and summarize thoughts, impressions and observations.