Habitat Mapping Technique for
Reconnaissance Survey of Souhegan River, NH

1.0 Purpose

This protocol describes the first reconnaissance survey to be performed on the Souhegan River to determine general habitat attribute distribution to be used for further surveys of this river system.

2.0 Scope

2.1 This protocol applies to persons who will be performing the reconnaissance survey.
2.2 This protocol will be used to assess the general habitat attributes and distribution of the river system.
2.3 The collected data will be used to select representative sites for more detailed habitat mapping.

3.0 References

3.1 Parasiewicz, P. 2001. MesoHABSIM: A concept for application of instream flow models in river restoration planning. Fisheries. 26:9, pp. 6-13.

4.0 Equipment

The following equipment is required for the survey.

4.1 2 each Hewlett-Packard iPAQ h1945 palmtop computers and Navigation system with Bluetooth GPS receivers.
4.2 Each loaded with ArcPAD 6.0.3 software with orthophotos of the Souhegan River system with forms for data entry.
4.3 2 each Dipping Bars (measures depths as well as average column velocity, which is calculated from a torque reading read from the bar when placed in the water).
4.4 2 each Field notebook.
4.5 Canoe with oars and life preservers.
4.6 RDI StreamPro Acoustic Doppler Current Profiler covering the velocity measurement range from 0.15 m/s to 3.0 m/s and depth from 0.05m to 9.0m.

5.0 Procedure

Survey:
Comment: Because of the preliminary reconnaissance character of this survey, the emphasis is on scouting as much of a river length as possible, rather than collecting high precision hydraulic measurements. The latter will be taken within representative sites that are one result of this survey.
Therefore a continuous survey of the entire river is planned; however the feasibility of such a survey is still being determined. For this purpose a test survey is planned for the week of June

28, 2004. If necessary due to the inability to do a continuous survey, stratified, random mapped area selection or reduction in velocity measurements will be pursued. If these measures do not allow mapping the river in reasonable time, river sections will be selected for mapping based on available remote sensing information that describes channel morphology (sinuosity, etc.) and location of IPUOCRs. The river will be delineated into macroscale strata and mapped in approximately one mile long sites selected within each strata. Selection will be based also on easy access to the sites.

Survey: During the mapping survey we will determine the patterns of hydromorphologic units, cover parameters (e.g. shading) and average dept and velocity. Average stream width will be estimated and also incorporated into the protocol.

Two teams of two, with two nearly complementary sets of equipment will perform the reconnaissance survey of the river. Both teams will use a GPS enabled iPAQ for habitat mapping; one team will assess non-navigable areas on foot, using a Dipping Bar to measure depths and velocities, and the other team will canoe navigable sections using the ADCP to continuously record depths and velocities, but also carrying a Dipping Bar to provide supplemental measurements in shallow sections.

5.1.1 At the start of each day, prior to field mapping, flow data will be recorded from USGS station 01094000 and noted in the field book. Other information added into the field book will be data collector's names, data, time on and off the study site, discharge, and gauge height.

5.1.2 At the start of the project area, the person with the iPAQ will log the coordinates with GPS receiver and enter as a point into a shapefile overlaying the orthophoto marking the beginning of a river section. The person will walk up and down a section to identify common features listed below. The field personnel will walk the section until one of the common features no longer exists (e.g. high shading changes to no shading, gradient becomes ponded from rapids, significant amounts of woody debris to very little, etc.).

5.1.2.1 Presence or abundance of canopy cover/shading.

5.1.2.2 Gradient in three possibly categories: ponded, medium gradient, or rapids/cascading.

5.1.2.3 Percentage of hydromorphological units (HMU) distributions, which may be any one or combination of the following: backwater, cascade, fast run, glide, plunge pool, pool, rapid, riffle, ruffle, run, shoal, sidearm.

5.1.2.4 Directly adjacent land use which may be any one of the following, and will be indicated for both sides of the stream: field, forested, pasture, residential, road, or urbanized.

5.1.2.5 Estimated entrenchment of low flow channel.

5.1.2.6 Percentage of substrate types (using choriotop classification according to Austrian Standard OEN M6232 which is specifically developed for benthic habitat classification)

5.1.2.7 Presence and abundance of other attributes such as boulders, rip rap, overhanging vegetation, submerged vegetation, undercut banks, woody debris, and shallow margins.

5.1.2.8 The second field technician will use the dipping bar to acquire randomly selected depths and mean column velocities to determine an average for the section. Two-digit random numbers are calculated from statistical tools from within MS Excel on the palmtop computer.

5.1.2.8.1 In the canoe survey, the ADCP will be continuously collecting the depth and velocity data for each section. Data for each section will be recorded in a separate file on the iPAQ. The measurements used for calculation of average section velocity will be randomly selected from the continuous data set. The number of these measurements will be proportional to the length of the section but no less than 7.

5.1.2.8.2 In the foot survey, the team will wade through the stream taking depth and velocity only with the dipping bar. They will use two-digit random numbers to define a position of velocity measurements in the section. First digit is used to define approximate distance in flow direction between measured verticals and second the location of measurement point across the river (in units equal to 0.1 of estimated river length).

5.1.2.9 When a river section is determined to change common attributes, the endpoint is marked with GPS on the orthophoto. The field crew will then proceed to the next river section, continually mapping habitat data and sections for the rest of the project river.

6.0 Quality Control

6.1 This protocol will be performed by personnel specifically trained or experienced in this survey procedure. Each person will receive at least 4 hours of training. First half of the first survey days both teams will map together to assure consistency of mapping. Previously conducted parallel surveys have shown that this is sufficient to assure data consistency.

6.2 All data will be submitted at the end of the day to the NEIHP ftp server for quality analysis and to ensure the data is complete and reasonable, legible, and is verified by the investigator(s).

7.0 Reporting

7.1 All data acquired in the field will be reported in accordance with study specifications.

8.0 Records

8.1 Data will be maintained at the NEIHP office in digital form, which will include:

8.1.1 Raw data.

8.1.2 QA/QC data.

8.1.3 Field book data, hard copy, and in digitized form.

8.1.4 All data will be backed up onto another medium or hard drive.