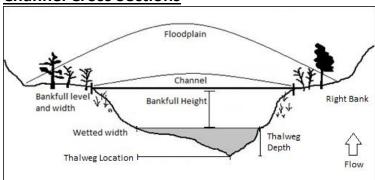# HSI Definition Sheet

The site length should be at 5-7 channel widths of the site bankfull width, which is calculated using the annual runoff and watershed area. Transects should be taken approximately every 2 bankfull widths and each pool within the site length should also be sampled. Measure three transects each time there is a 20% change in stream width, a tributary, change in substrate composition or large change in slope. Take one set below and one set obove each tributary or road crossing. Remember to take pictures upstream and downstream of each transect, built structures (beaverdams, bridges, outlet pipes, etc.), erosion and pointbars.

Stream Order – determine the stream order by labeling the first stream at the head of the watershed as 1 and increasing the order by 1 each time two streams of the same order join until you reach the sampling area

Channel Cross Sections

Measurements for ¼, ½ and ¾ widths, as well as thalweg location are to be taken left to right looking downstream. Left and right banks used on the form are from a viewpoint looking downstream.

Floodplain width – the distance from bankfull level to where the slope steepens or the area that would be covered by 30cm of water above bankfull (use >10m if floodplain is larger than 10m)
Bankfull Width – the width of stream at the highest water level before it spills into the floodplain, which can be identified as the point where the slope becomes flatter and is often where shrubs begin growing
Bankfull Height – the height of the bankfull level above the water surface
Wetted depth – the depth from the stream bottom to the current water level
Thalweg depth – the depth of the deepest part of the transect below the wetted surface
Thalweg location – the distance of the thalweg from the left bank at current water level

Substrate and Cover

Habitat Type – riffle, run, pool, or step (area just before a drop in a step-pool sequence)
Substrate – record the percentage of each substrate size according to the adjacent chart using the 20 square (5%) grid for estimations
% Embedded – lift up several top rocks in the thalweg and estimate % fines underneath them. If the top rocks are cemented in fines then it is considered 100% embedded

Substrate	Size (cm)
fines (sand, silt)	<0.2
gravel	0.2-6.4
cobble	6.4-25.6
boulder	>25.6

Instream Cover includes undercut banks, unembedded substrate, and aquatic vegetation. It is measured within 50cm along each side of the entire transect
Instream cover for juveniles – # of places that can provide cover one 10cm long fish (use 5/16" eye bolt)
Instream cover for adults – # of places that can provide cover one 20cm or larger fish (use ¾" dowel)

Riverbanks and Riparian Area

The **% of trees, shrubs, grass and bare soil** are observed on vegetation within 10m of the banks and can add to more than 100%.

% eroding – this is the percentage of the bank which is actively eroding into the stream (take pictures)

% Stable ground - this includes rocky ground (> 65% boulder and/or cobble) and areas with rooted (alive) vegetation. (% eroding and % stable ground may add to less than 100%)

% of stream shade - this is the canopy cover created by riparian vegetation within 1m above the stream and is preferably measured between 10:00am and 2:00pm.

Ice scar height - the height above the bank full mark where there is scarring along riparian trees and shrubs

Ice Scarring

Pool Measurements

Max depth – the deepest part of the pool

Depth of pool tail – the thalweg depth at first downstream riffle or step

Average Length and Width – to visualize pool size take away the depth of the pool tail from the wetted depth of the pool to determine the length and width in low flows

% pool cover – the percentage of the pool bottom which is obscured by depth or color

Spawning Areas

*If unsure about where to find spawning areas chose the tails of pools for both brook trout and salmon

Brook Trout – prefer to spawn in areas of groundwater upwelling which contain 2.5-6cm gravel substrate. These areas are often located near the head of pools, on the inside corners of river meanders or ground water springs anywhere in pools or lakes. In warmer water they can be identified as areas where cooler groundwater is coming up through the substrate.

Salmon – spawn in areas of downwelling, such as the tail of a pool (most downstream end of a pool) or above a digger log.

Avg. Substrate Size in Spawning Areas – this is the average substrate size in cm for spawning areas of both Brook trout and Atl. Salmon

% Fines - To determine the percent fines in spawning areas lift the top rock and determine the percentage of fines below.

Point Bar Presence/ Condition – This is an area where sediment is deposited on the inside of bends. Record the slopes (gradual or sharp) of the downstream end in the notes section.

Point Bar

Rock Grab or 3 min Rock Kick

Rock Grab - Choose the rock grab method when there are greater than 10 cobbles at the riffle to be sampled. Randomly select 3 cobble sized rocks and identify all benthos on the selected rocks. Check the rock grab box and tally the numbers from each sample rock in the table.

3 min Rock Kick - When there are less than 10 cobbles chose the 3 min rock kick method. Select 1m x 1m area, place the net downstream and proceed to kick and disturb the substrate for 3 minutes. Then remove the net from the river and identify all benthos, recording their numbers on tally section. Remember to check the 3 min kick box and record the net type and mesh size.