A Guide to Classifying Selected Fish Habitat Parameters in Lotic Systems of West Central Alberta

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Foothills Model Forest
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foothills model forest
a growing understanding

ACKNOWLEDGEMENTS

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There are a number of people who contributed to the success of this project. Glen Clements, Paul Hvenegaard, Jordan Walker, George Sterling and Gordon Stenhouse provided guidance and critical reviews of draft copies of the visual guide. Their comments were much appreciated. Crews of the Foothills Model Forest Fish Inventory and the Cooperative Fisheries Inventory Programs, and the Northern Alberta Institute of Technology (Hinton) forestry students provided comments and suggestions on early drafts of the manual.

In particular, we would like to thank Laurie Hunt and Chris Davis for their efforts both in the field and out. Their hard work helped us in both the development and testing of this guide. Thanks.

1.0 PURPOSE

The purpose of this guide is to reduce observer variability of some estimated habitat parameters. These habitat parameters are difficult to consistently qualify and expensive to quantify. The guide defines each parameter, assigns a categorical rating to each and visually depicts the variation for each category using photographs. It is intended to be used for small streams in west central Alberta, but could be adapted to streams in other areas. The guide is composed of sections that describe different habitat parameters. A suggested data collection methodology and definition is provided for each parameter.

1.1 Authors' Note

We recognize that the parameters presented are not an exhaustive list of fish habitat types that could be collected during an inventory project. The original intent of this project was to develop a concept where one could use photographs of habitat types to improve the precision of data that are collected to describe them. The original set of habitat types was selected as many inventory projects were collecting these data. However, there was some concern that these data would not be comparable because of the error associated with between-observer differences. The habitat parameters included in this guide were determined by comparative means to be statistically improved when estimated with the aid of this visual guide (Jones, et al. 1998 *In Prep*.). Other habitat parameters, such as substrate composition, was collected using both the traditional method of visually estimating with a written description (i.e. fines <2 mm) versus the visual aid of photographs with no improvement in precision (Jones, et al. 1998 *In Prep*.). We hope that this guide serves to improve between-observer precision on the habitat variables presented and as a methodology for future work to improve the quality of visually estimated data. It is likely that different habitat parameters may be collected as part of the sampling protocol of other projects. We do not feel that this will lessen the usefulness of this guide, but rather that it be considered a work-in-progress that may be added to or modified by others as required.

2.0 COLLECTION OF FISH HABITAT DATA

2.1 Suggested Methods for Data Collection

Six habitat variables using pictures and definitions are contained in this guide. Although the method of data collection may vary depending on the variable being estimated this section describes a suggested methodology for collecting these types of habitat data. An example of a hypothetical site is presented in Figure 1. The number of transects and their positions presented here are an example and may vary between projects. For the first transect, estimates are made either along the transect or by looking upstream. A similar approach is used for the last transect where estimates are made along the transect or by looking downstream. For all other transects, habitat data are estimated either along the transect or looking both upstream and downstream. Data are estimated by looking as far as one can see. This is done to reduce observer variability in estimating distances and eliminates the need to remember values for each parameter between transects. Figure 2 is an example of a data form that may be used to record data collected using the manual. All observations made looking upstream and downstream are made while standing in the thalweg. This standardizes the distance that is viewed.

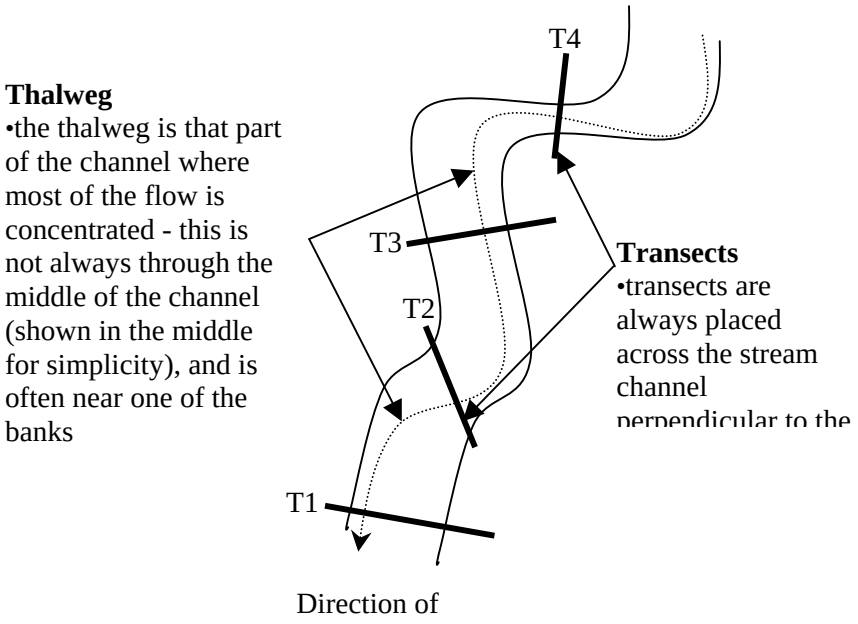


Figure 1. A typical site with transects indicated for fish habitat inventory. Spacing and number of transects will be dependent on specific project objectives.

A Guide to Classifying Fish Habitats in Lotic Systems of West Central Alberta

SAMPLE DATA FORM

Survey date: ____ _____ _____
Day Month Year

Watercourse name: _____
Tributary to: _____
Legal mouth location: _____
Site ID #: _____
Observer : _____

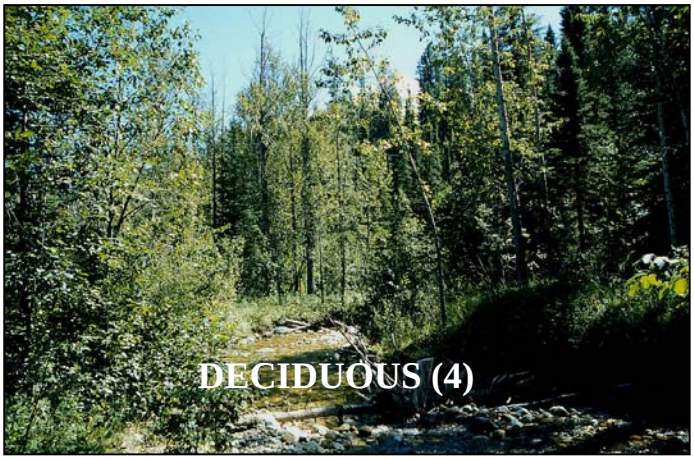
		T1	T2	T3	T4	T5	T6	T7
Dominant Riparian Vegetation[1]	LUB[2]							
	RUB[2]							
Substrate Embeddedness[1]								
Terrestrial Canopy Cover[1]	upstream							
	downstream							
Coarse Woody Material[1]	upstream							
	downstream							
Bank Stability[1]	LUB[2]							
	RUB[2]							
Surface Turbulence[1]	upstream							
	downstream							

[1] Use category values shown in manual
[2] LUB = left upstream bank; RUB = right upstream bank

Comments:

Figure 2. An example of a data form that could be used with: A Guide to Classifying Fish Habitats in Lotic Systems of West Central Alberta.

2.2 DOMINANT RIPARIAN VEGETATION



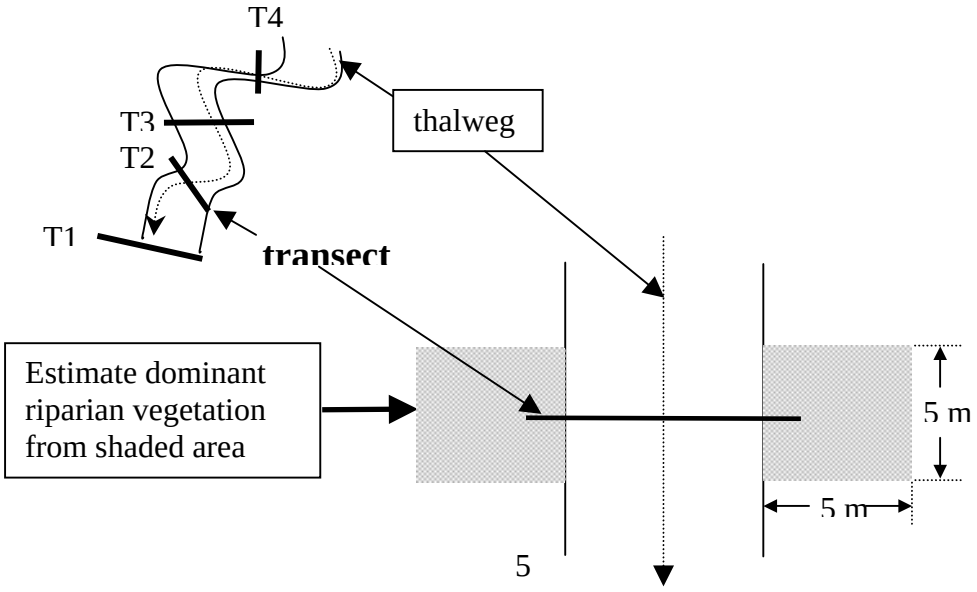
2.2 DOMINANT RIPARIAN VEGETATION

Definition: The dominant vegetation type found along the stream bank within 5m of the wetted perimeter. The deeper and more extensive the root system of the prevailing vegetation the greater stability provided to the stream banks (Stanfield et al. 1996). Therefore tree species are considered dominant over shrub species, which are dominant over grass and forb species.

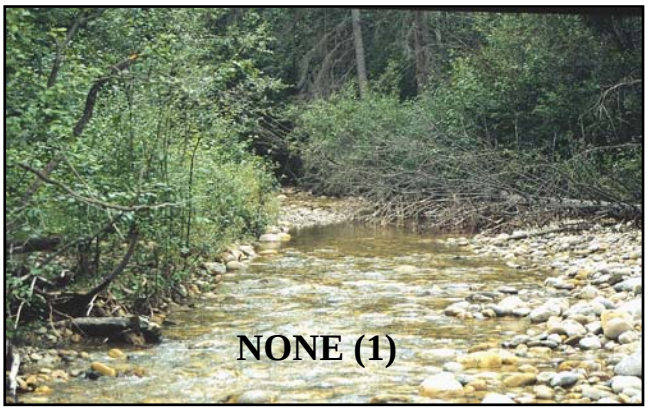
Method: Determine the category of dominant riparian vegetation within 5 m of the wetted width for the left upstream bank (LUB) and right upstream bank (RUB) separately at each transect.

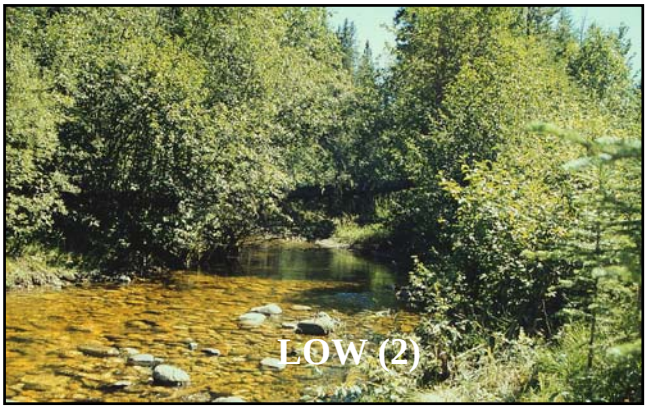
Classification System:

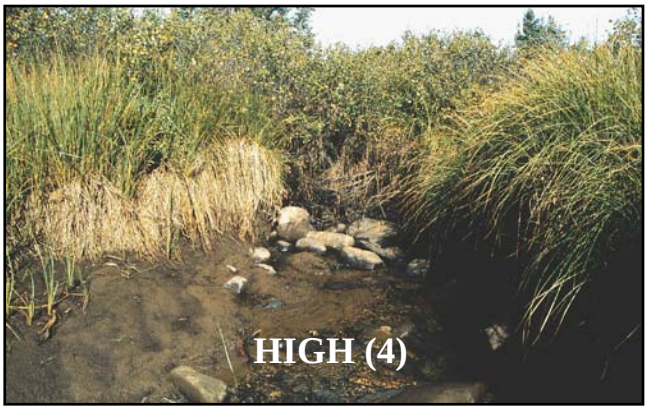
Category	Type	Description
1	None	Over 50% of the stream bank area without vegetation and the dominant material is soil, rock, road and bridge material, culvert, and/or mine tailings.
2	Grass/Sedge	The riparian vegetation is grass or forbs (sedges) and constitutes > 75% of the stream side vegetation.
3	Shrub	The riparian vegetation is shrubs or willows and constitutes > 25% of the stream side vegetation.
4	Deciduous	The riparian vegetation is deciduous trees (i.e. trembling aspen, balsam popular, and/or birch) and constitutes > 25% of the stream side vegetation.
5	Coniferous	The vegetation is coniferous trees (i.e. spruce, pine, fir, and/or tamarack) and constitutes > 25% of the stream side vegetation.
6	Mixedwood	The riparian vegetation consists of a combination of deciduous and coniferous trees with approximately equal percentages of each and constitutes > 25% of the stream side vegetation.

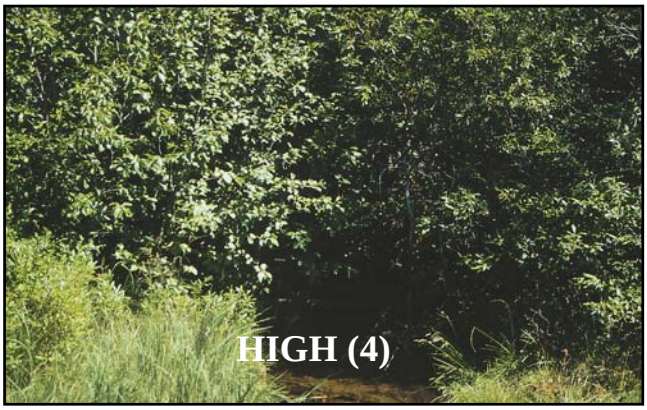


2.3 TERRESTRIAL CANOPY COVER









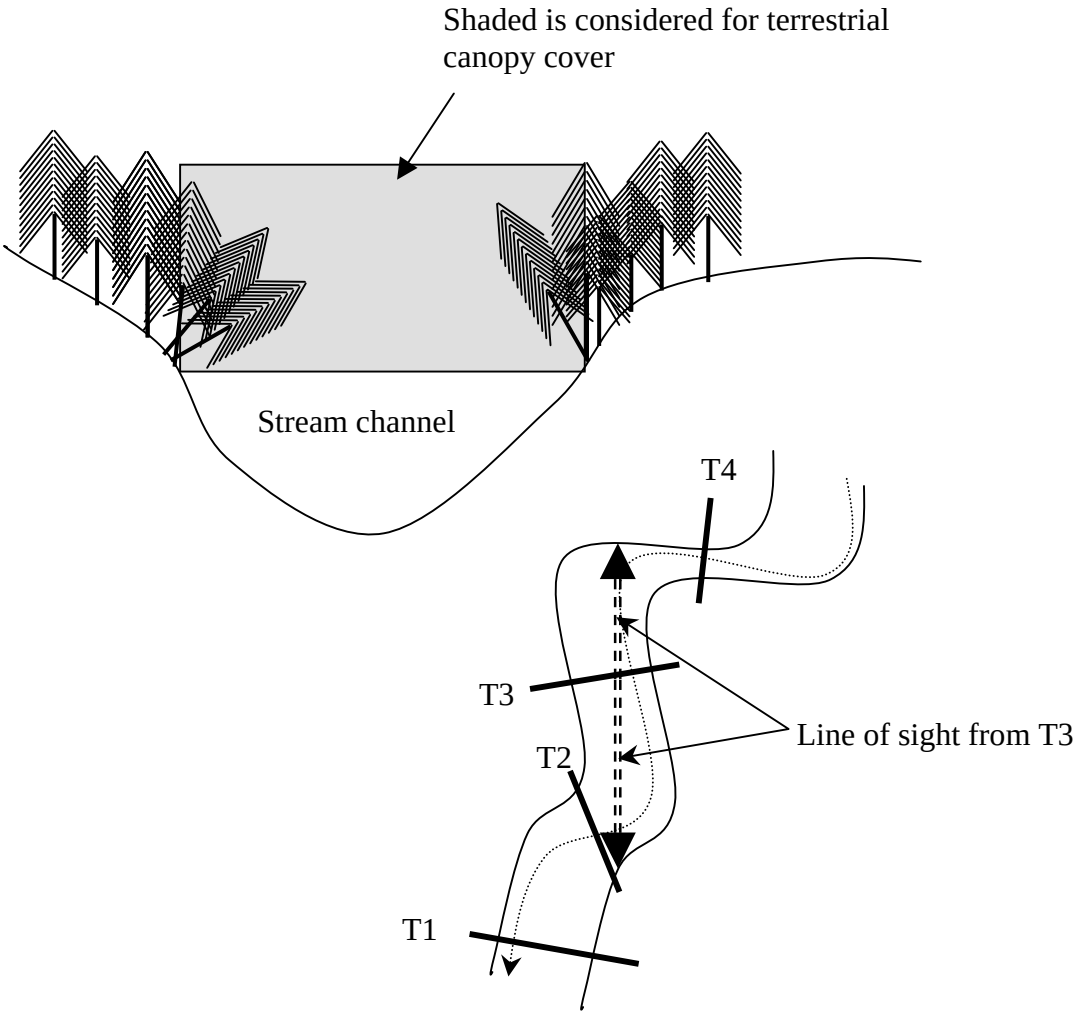
2.3 TERRESTRIAL CANOPY COVER

Definition: All living vegetation that projects over the water surface.

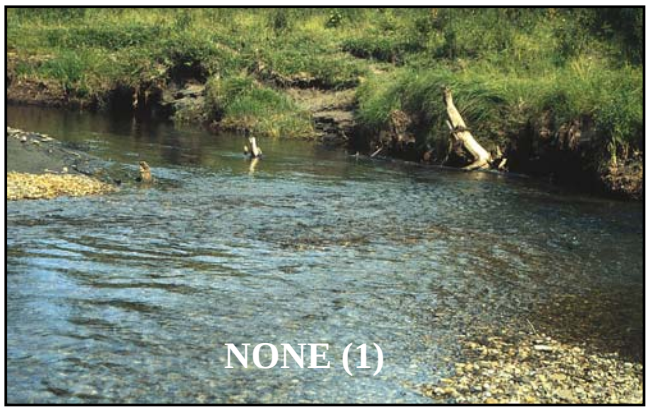
Method: Categorize terrestrial canopy cover at each transect, looking upstream for the first transect (0m), both downstream and upstream for the 50-250m transects, and downstream for the last transect (300m).

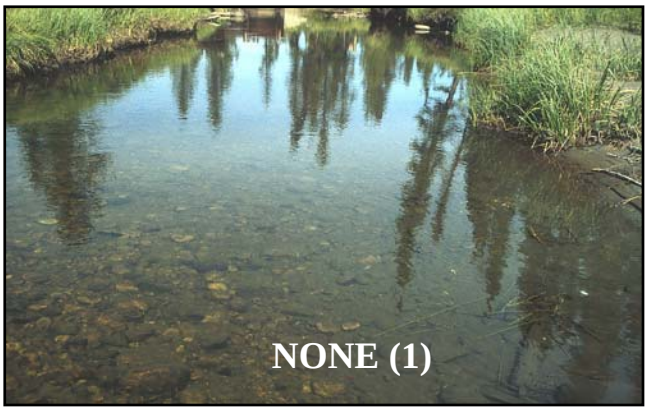
Classification System:

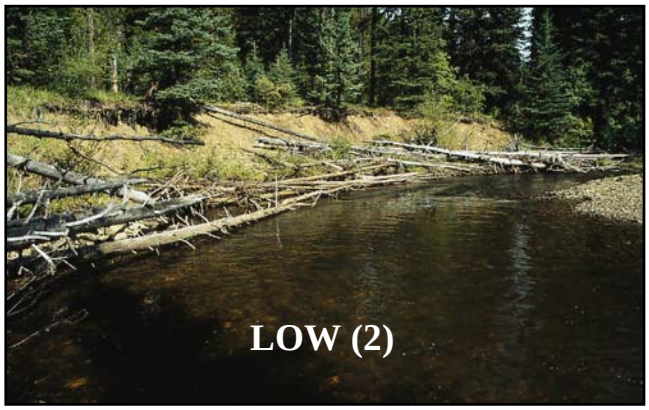
Category	Type	Description
1	None	0 - 5 % canopy cover
2	Low	6 - 25 % canopy cover
3	Moderate	26 - 50 % canopy cover
4	High	> 50 % canopy cover

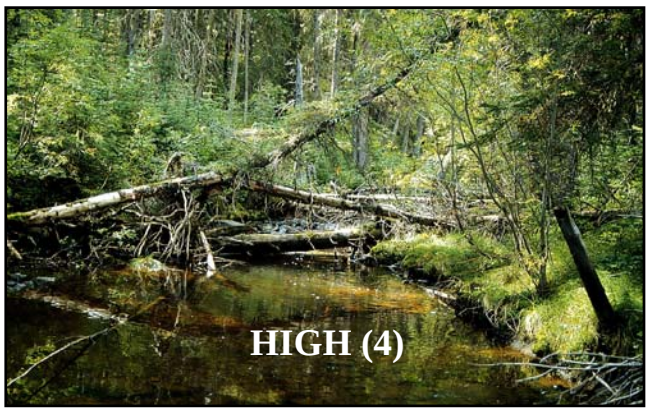


2.4 COARSE WOODY MATERIAL









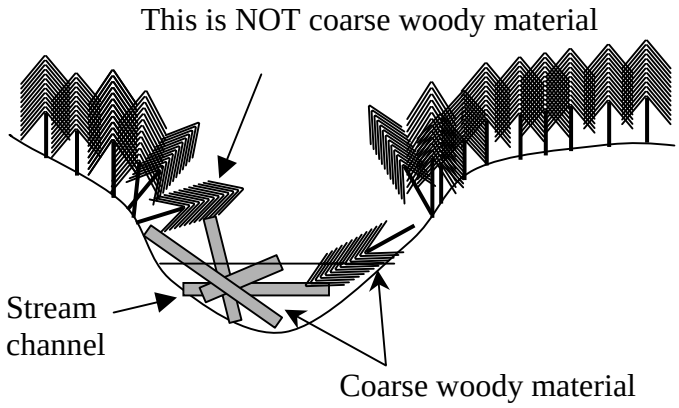
2.4 COARSE WOODY MATERIAL

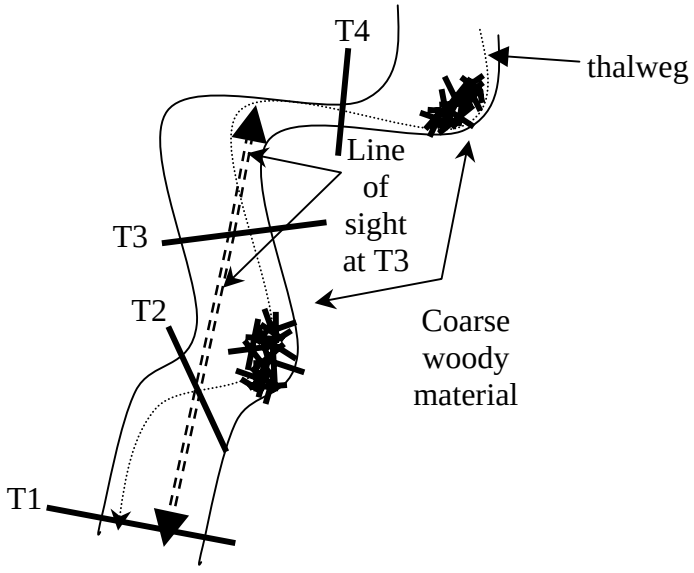
Definition: All woody vegetation found within the water or that projects over the water surface within 1m.

Method: Determine the category for coarse woody material at each transect, looking upstream for the first transect, both downstream and upstream for the middle transects, and downstream for the last transect.

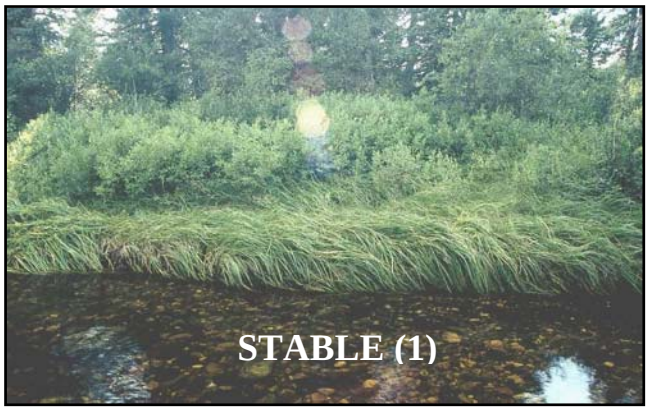
Classification System:

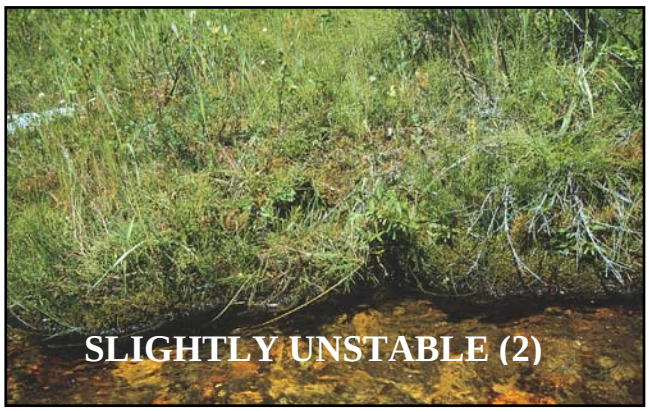
Category	Type	Description
1	None	0 - 5 % coarse woody material
2	Low	6 - 25 % coarse woody material.
3	Moderate	26 - 50 % coarse woody material.
4	High	> 50 % coarse woody material.

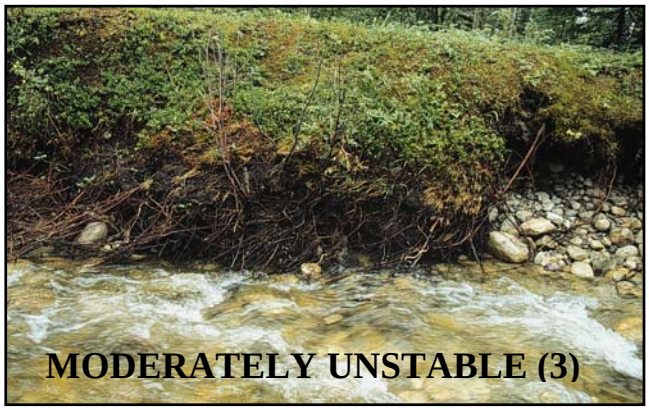


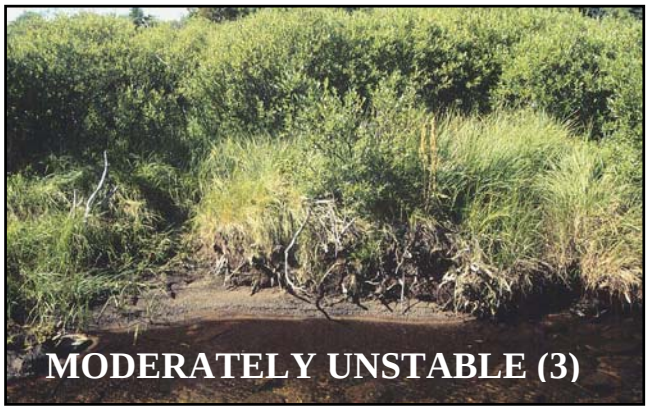


2.5 BANK STABILITY









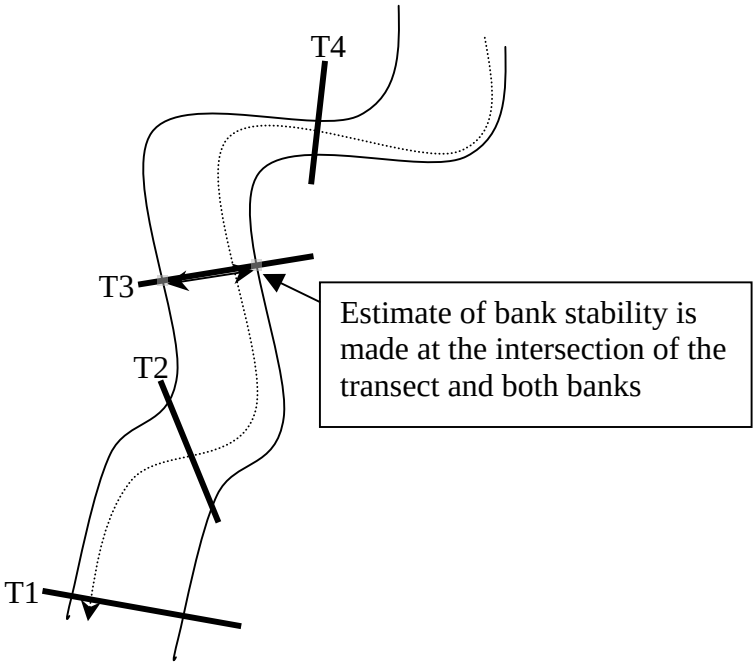
2.5 BANK STABILITY

Definition: Stable banks are characterized by the presence of boulders, rocks, or rooted vegetation that reduces the bank's susceptibility to erosion, while unstable banks are characterized by the presence of exposed raw dirt, lack of rooted vegetation, steep sloped banks, undercuts, and often slumping banks.

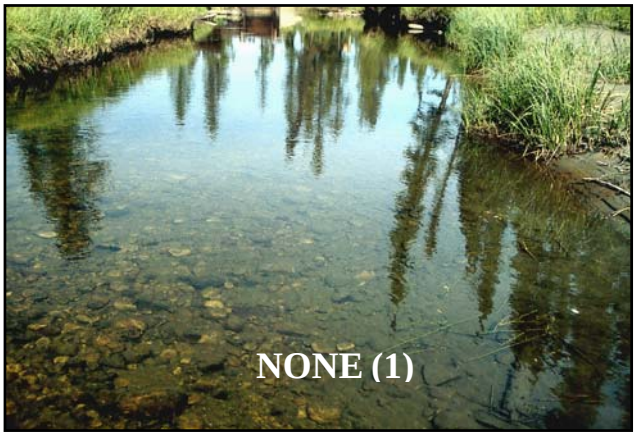
Method: Determine the category of bank stability for the left upstream bank (LUB) and right upstream bank (RUB) separately at each transect.

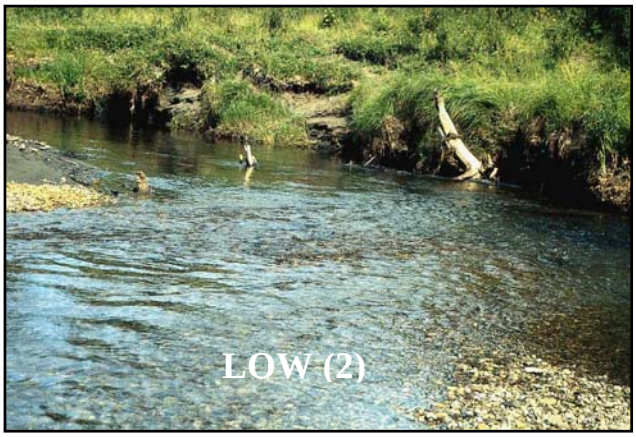
Classification System:

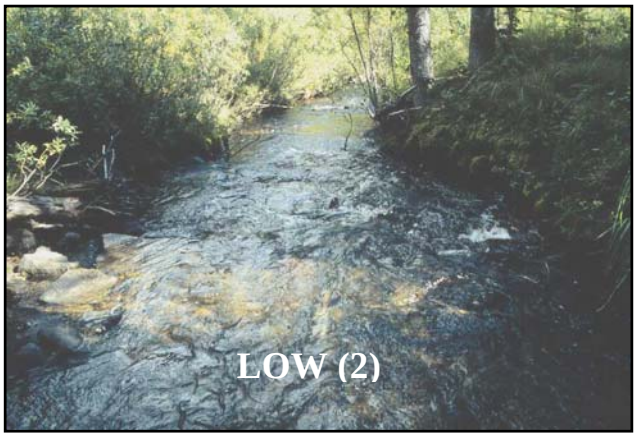
Category	Type	Description
1	Stable	Banks well vegetated or covered with large boulders.
2	Slightly Unstable	> 50% of bank vegetated or covered with rocks, and possibly some undercut banks.
3	Moderately Unstable	< 50 % of bank vegetated or covered with rocks, or lots of under cut banks.
4	Unstable	Massive bank slumping, large silt deposition, exposed raw dirt.

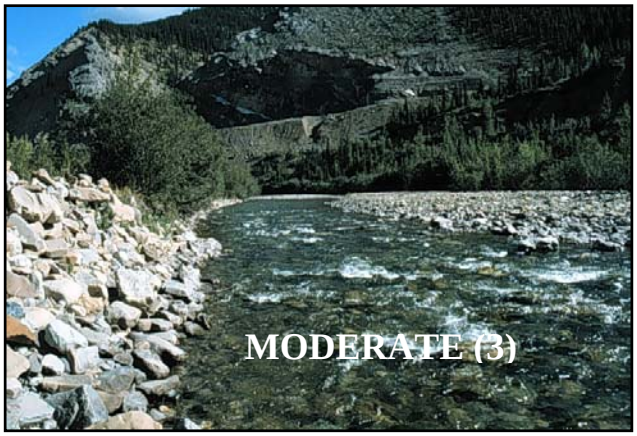


2.6 SURFACE TURBULENCE









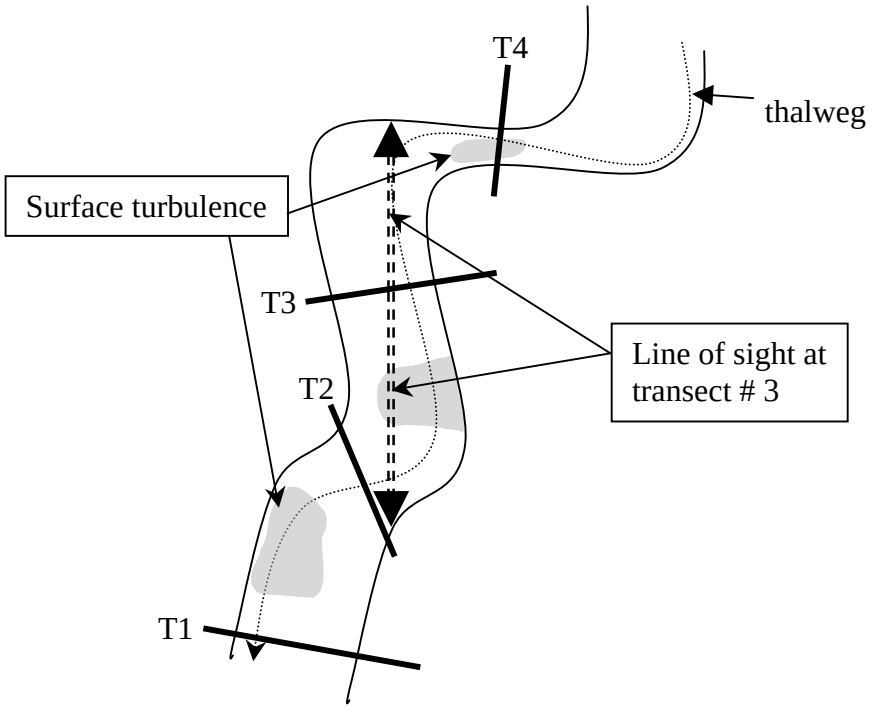
2.6 Surface Turbulence

Definition: Fast flowing water that is broken (not laminar) at the water's surface.

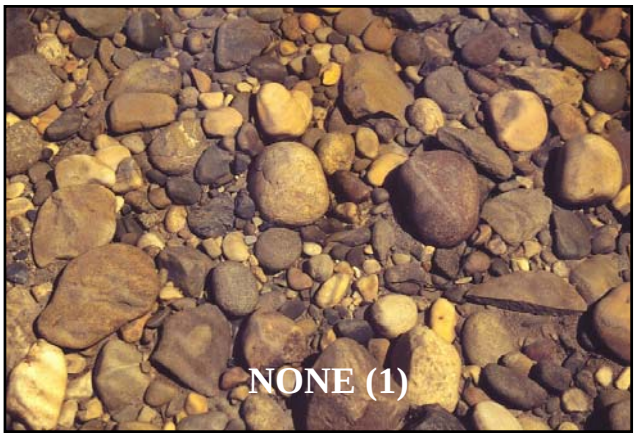
Method: Determine the category for surface turbulence at each transect, looking upstream for the first transect, both downstream and upstream for middle transects, and downstream for the last transect. Percent surface turbulence refers to that portion of the surface area that is covered by surface turbulence.

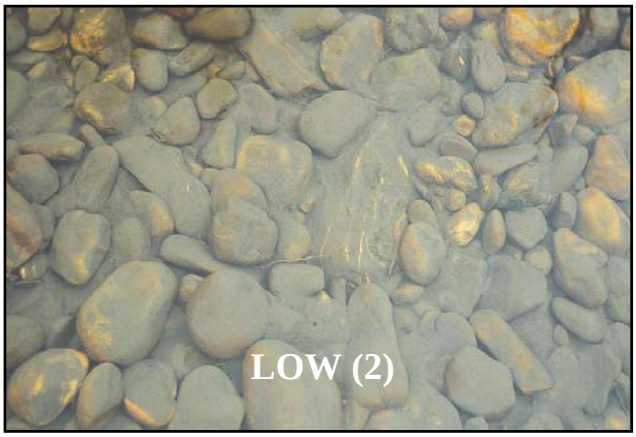
Classification System:

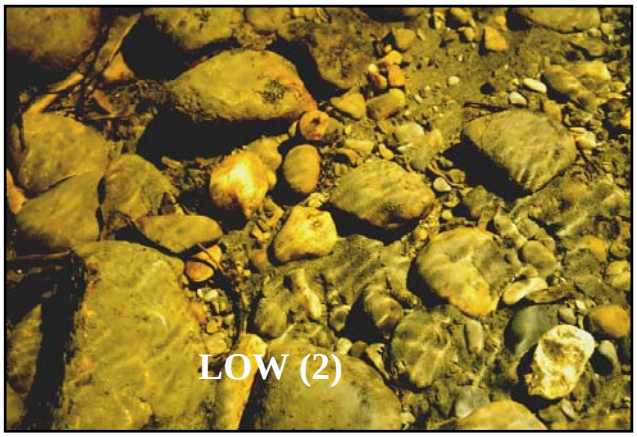
Category	Type	Description
1	None	0 – 5 % surface turbulence
2	Low	6 – 25 % surface turbulence
3	Moderate	26 – 50 % surface turbulence
4	High	> 50 % surface turbulence

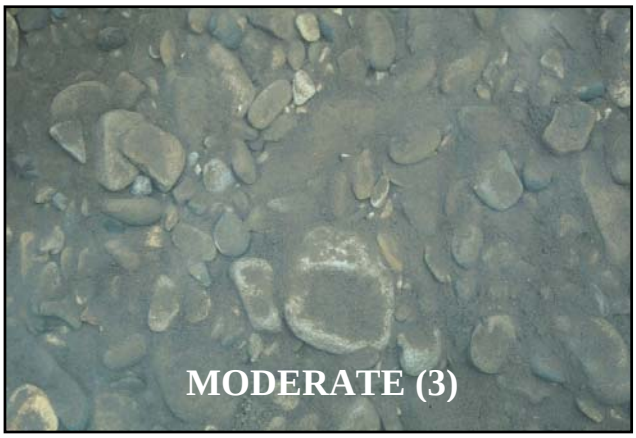


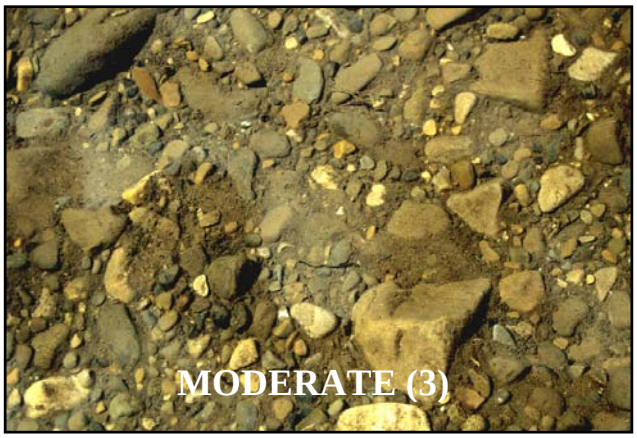
2.7 SUBSTRATE EMBEDDEDNESS

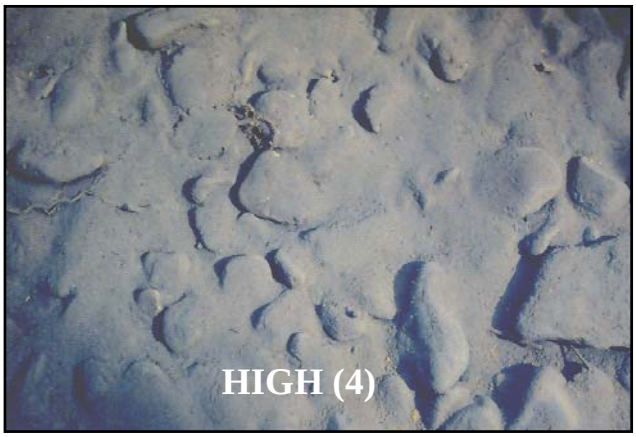


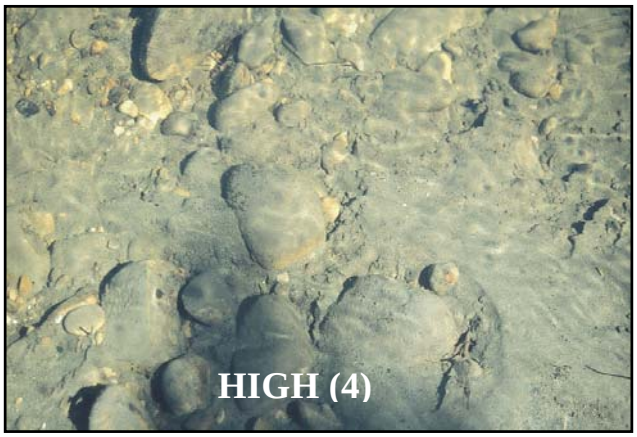












2.7 SUBSTRATE EMBEDDEDNESS

Definition: An estimate of the surface area of the large substrate types that are covered with fine substrate particles (< 2mm diameter).

Method: Determine the embeddedness category for 0.25m on either side of the transect.

Classification System:

Category	Type	Description
1	None	< 25 % of their surface area covered in fines
2	Low	26 - 50 % of their surface area covered in fines
3	Moderate	51 - 75 % of their surface area covered in fines
4	High	> 75 % of their surface area covered in fines