

# ISC Streamside Zone sub-index

## Index of Stream Condition (ISC3)

The ISC Streamside Zone sub-index has 7 indicators:

1. Vegetation Width
2. Fragmentation
3. Vegetation Overhang
4. Large Trees
5. Tree and Shrub Cover
6. Structure
7. Weeds (Willows / Hawthorn)

### Background

Six of the seven indicators were assessed using the remotely sensed LiDAR data, and one indicator (Weeds) was assessed using aerial photography. The LiDAR data provided complete coverage across both river banks to approximately 300 metres from the bank. However, most of the indicators were only assessed across a 40 metre buffer from the edge of the river. This area roughly corresponds to the 'riparian' zone of the vegetation and is where the majority of vegetation works are carried out by Catchment Management Authorities.

### Vegetation Width

Vegetation Width is the width of vegetation and is measured perpendicular from the bottom of the river bank (toe of the bank) to where the cover of vegetation drops to below 20% and is capped at a maximum of 200 metres from the bank toe. Vegetation Width was measured every 25 metres along both sides of the river.



There are two rating tables to score Vegetation Width. Table 1a is for rivers that have a bank full width of less than 15 metres and Table 1b is for rivers that have a bank full width of greater than 15.

**Table 1a. Scoring table for Vegetation Width (rivers with a bank full width of less than 15 metres)**

Mean Vegetation Width both sides (m)	Score
< 5m	1
≥ 5 – 10m	2
≥ 10 – 30m	3
≥ 30 – 40m	4
> 40m	5

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**Table 1b. Scoring table for Vegetation Width (rivers with a bank full width (BFW) of greater than 15 metres)**

Mean Vegetation Width both sides (m)	Score
< 0.25 x BFW	1
≥ 0.25 x BFW - 0.5 x BFW	2
≥ 0.5 x BFW - < 1.5 x BFW	3
> 1.5 x BFW - 3 x BFW	4
> 3 x BFW	5

## Fragmentation

Fragmentation measures gaps in the cover of woody vegetation. A 'gap' is where woody vegetation cover is <20% for at least an area of 10m x 10m. Fragmentation is only measured in the 40 metre buffer from the bottom of the river bank (the bank toe).

**Table 2. Scoring table for Fragmentation**

Fragmentation on both sides of the river	Score
0 – 20%	5
20 – 40%	4
40 – 60%	3
60 – 80%	2
80 – 100%	1

## Vegetation Overhang

Vegetation Overhang is the amount of woody vegetation overhanging the bank toe where woody vegetation has at least 20% cover. It is measured as the linear proportion of the stream side that has overhanging woody vegetation.

**Table 3. Scoring table for Vegetation Overhang**

Vegetation Overhang on both sides of the river	Score
0 – 10%	1
10 – 20%	2
20 – 40%	3
40 – 60%	4
60 – 80%	5
80 – 100%	6

## Large Trees

Large Trees are defined as trees that exceed a predefined height and crown area criteria. These criteria can vary depending on the Ecological Vegetation Class (EVC) of the vegetation. Large Trees are mapped within a 300 metre buffer from the river toe but are only assessed within the 40 metre buffer from the bank toe. Data for large trees was not available for all EVCs.

**Table 4. Scoring table for Large Trees**

Percentage difference in proportion of Large Trees expected	Score
0 – 20%	5
20 – 40%	4
40 – 60%	3
60 – 80%	2
> 80%	1

## Tree and Shrub Cover

Cover is measured for both shrubs and trees. Shrubs are defined as woody vegetation that is between one and five meters tall, while trees are defined as woody vegetation that is greater than five meters tall. Tree and shrub cover is calculated within the 40 metre buffer from the bank toe.

**Table 5. Scoring table for Tree and Shrub Cover**

Percentage difference in proportion of cover expected	Score
0 – 20%	5
20 – 40%	4
40 – 60%	3
60 – 80%	2
> 80%	1

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## Structure

Structure considers the amount of woody vegetation (where cover is >20%) that is in six height intervals: 1.5 – 5m, 5 – 10m, 10 – 15m, 15 – 20m, 20 – 25m, >25m. Structure is calculated within the 40 metre buffer from the bank toe.

Table 6. Scoring table for Structure

Difference in mean number of vegetation height classes expected	Score
< 0.05	5
0.05 – 0.1	4
0.1 – 0.2	3
0.2 – 0.4	2
> 0.4	1

## Weeds - Willows and Hawthorn

Weeds is a measure of the amount of vegetation cover due to Willows and Hawthorn in the 40 metre buffer from the bank toe. This was measured from the aerial photography. Willows and Hawthorn are the major tree weed species found along Victorian rivers. Hawthorn is only found along a small number of rivers in the East and West Gippsland CMAs.

Table 7. Scoring table for Weeds

Percentage stream length (both banks) with Willows or Hawthorn	Score
0%	5
0 – 10%	4
11 – 39%	3
40 – 60%	2
> 60%	1

The Streamside Zone sub-index score is a score out of 10 and is calculated by adding the seven Streamside Zone sub-index indicator scores according to the following formula:

**Streamside Zone sub-index = 10/41 ((Vegetation Width score\*2) + (Fragmentation score\*2) + Vegetation Overhang score + Large Trees score + (Tree Cover score + Shrub Cover score + Structure score)/3 + Weeds score)**

For reaches that could not have a Large Tree score determined, the following formula is used to calculate the Streamside Zone sub-index:

**Streamside Zone sub-index = 10/36 ((Vegetation Width score\*2) + (Fragmentation score\*2) + Vegetation Overhang score + (Tree Cover score + Shrub Cover score + Structure score)/3 + Weeds score)**

Vegetation Width and Fragmentation are given twice the weight of the other indicators. This is because streamside vegetation cannot be good condition if it is too narrow and fragmented. The three indicator scores for cover and structure are combined and their scores are averaged. This ensures that the indicators that relate to structure are not over emphasized in the final sub-index score.

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