

# Appendix 1

## 2010 Index of Stream Condition metrics

Metric	Meaning
<b>Hydrology sub-index</b>	
Low flow	The two lowest monthly flows in a year
High flow	The two highest monthly flows in a year
Zero flow	The period of time that there is no flow
Seasonality	A measure of the shift in the timing of the maximum flow month and the minimum flow month
Variability	The difference in magnitude between the high and low flows within each year
<b>Physical Form sub-index</b>	
Bank condition	An assessment of the level of erosion/ instability on the bank face and whether it is above what is expected for the type of stream
Artificial barriers	Artificially constructed weirs and dams
Instream woody habitat	A tree, branch or root system that has fallen into a stream. Often referred to as 'snags'
<b>Streamside Zone sub-index</b>	
Width	Width of woody vegetation along the river
Fragmentation	A measure of the amount of gaps where there is no woody vegetation
Overhang	Percentage of the stream bank that has overhanging vegetation
Cover of trees and shrubs	The amount of vegetative cover in the shrub layer (<5 m in height) and tree layer (>5 m in height)
Structure	The amount of vegetative cover in 5 m height intervals
Large trees	Older mature trees that are larger than a prescribed diameter (usually 80 cm)
Weeds	The percentage cover of Willows and Hawthorn in the tree layer
<b>Water Quality sub-index</b>	
Total Phosphorus	The sum of the concentrations of soluble and in-soluble Phosphorus
Turbidity	Cloudiness or haziness of the water caused by individual particles that are too small to see without magnification
Salinity	A measure of the concentration of dissolved salts in the river
pH	A measure of the acidity or alkalinity of water
<b>Aquatic Life sub-index</b>	
AUSRIVAS	Australian River Assessment System – an indicator of the quality of instream habitat based on the presence of particular macroinvertebrate Families
SIGNAL	Stream Invertebrate Grade Number Average Level – is a measure of the effect of pollution on macroinvertebrate Families
EPT	Three Orders of macroinvertebrates: Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies)
Number of Families	The number of different macroinvertebrate Families in a sample

# Appendix 2

## Summary of improvements made to the 2010 ISC

Component	Improvements
<b>Reaches</b>	<p>51 additional reaches were added in the northern basins (basins 1-8, 14 and 15) to align the ISC river network with the Murray Darling Basin Authority (MDBA) Sustainable Rivers Audit network.</p> <p>77 estuary reaches were separated from riverine reaches.</p> <p>1,166 reaches totalling 29,000 km were assessed.</p>
<b>Hydrology</b>	<p>Reaches have been separated into those with priority watering actions and those that do not have priority watering actions. Reaches with environmental watering objectives (66 reaches), were assessed against how many of their 2011-12 priority watering actions were fully achieved. The remaining 1,100 reaches have been assessed using the same Flow Stress Ranking (FSR) procedure as was used in the 2004 ISC benchmark.</p> <p>However, the FSR method was updated to: increase the period of record, update private diversion demands, update the farm dam input, update the modelled time series and software. Due to budget constraints, not all sites were updated. Forty reaches used hydrology data from the 2004 benchmark.</p> <p>Additional analysis was done to quantify the impact of the drought on the hydrology sub-index.</p>
<b>Physical form</b>	<p>The same three metrics were assessed in 2004 and 2010. However, for the 2010 benchmark, they were measured using LiDAR and aerial photography. The bank condition was assessed by classifying all rivers into one of 9 stream types and 3 classes of sinuosity (extent that the river bends or meanders). Erosion thresholds were then established for each of these classes. The assessment results indicated where erosion rates were outside what would be expected. In previous benchmarks, just the amount of erosion was assessed.</p> <p>In-stream woody habitat was identified using the aerial photography and was scored based on the size and complexity of instream wood (i.e. logs).</p> <p>A new database was developed for major fish barriers (dams and artificial weirs). Scoring for these artificial barriers was increased from a three to a five point scale.</p>
<b>Streamside zone</b>	<p>Five of the six vegetation metrics were assessed using the LiDAR data, the other metric (weeds) was assessed using aerial photography. Some of the 2004 biodiversity measures (such as understorey biodiversity, litter) were not assessed for the 2010 benchmark, as they could not be sufficiently measured using LiDAR technology. More emphasis was placed on the vegetation condition, rather than biodiversity.</p> <p>The reference Ecological Vegetation Classes (EVC) were updated and remodelled.</p> <p>All vegetation metrics were assessed using a fixed 40 metre distance from the bottom of the river bank, whereas in 2004, this distance was not fixed and could vary from 0-40 metres.</p>
<b>Water quality</b>	<p>The period of record was extended to cover the past six years (2004-2009). Fifty months of data for at least three of the four metrics (Total Phosphorus, Turbidity, Salinity and pH) over the 72 months (i.e. six year period) had to be available for the data to be used.</p> <p>To extend the limited number of number of reaches that had water quality data available, the community-based Waterwatch program organised for its volunteer monitors to collect 12 months of data in 2009 for 119 reaches.</p>
<b>Aquatic life</b>	<p>An additional two metrics were added – EFT (3 orders of macroinvertebrates: Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies)) and number of Families. The addition of these extra metrics produced more accurate results.</p> <p>Since 2004, the emphasis has been to sample the maximum number of reaches. As a result, for the 2010 benchmark, 70% of reaches had Aquatic Life data, compared with only 36% for 2004 benchmark.</p>

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