ISC Aquatic Life sub-index

Index of Stream Condition (ISC3)

The ISC Aquatic Life sub-index is based on aquatic macroinvertebrates and has four indicators:

1. AUSRIVAS / Key Families
2. SIGNAL
3. EPT
4. Number of Families

Aquatic macroinvertebrates were collected using the EPAs standard Rapid Bioassessment protocol. At each sampling site, macroinvertebrates were collected from two habitats – riffle and edge - during Autumn and Spring (wherever possible). Macroinvertebrates were identified to the Family level.

AUSRIVAS

AUSRIVAS (Australian River Assessment System) consists of a suite of mathematical models that predicts the macroinvertebrates that should be present in specific stream habitats under reference conditions. It does this by comparing a test site with a group of reference sites which are as free as possible of environmental impacts, but have similar physical and chemical characteristics to those found at the test site. By comparing the macroinvertebrate Families predicted to occur at a test site, with the number of Families actually found, the resulting O/E index (Observed / Expected) can be calculated. The value of the O/E index can range from zero (none of the expected Families were found) to one (all the Families which were expected were found).

Key Families

Key Families represent the Families expected to occur in streams of good condition and, as such this indicator is similar in concept to AUSRIVAS and, generally, its results are highly correlated with AUSRIVAS scores. This indicator is used in place of AUSRIVAS when AUSRIVAS does not give a result for a site due to it being 'outside the experience of the model'. In the Highlands bioregion (see Figure 1), AUSRIVAS models are not available and the Key Families indicator is used instead.

SIGNAL

SIGNAL (Stream Invertebrate Grade Number Average) has been accepted and used nationally in stream assessments. Families have been awarded sensitivity scores, according to their tolerance or sensitivity to various pollutants. The SIGNAL score is calculated by totalling these sensitivity scores for each Family found and dividing by the total number of graded Families present (the average score). The resulting value, or SIGNAL, can be used to assess a site's status in terms of pollution.

EPT

The EPT indicator is named for three generally sensitive orders of aquatic insects that are common in the aquatic macroinvertebrate community: *Ephemeroptera* (mayflies), *Plecoptera* (stoneflies), and *Trichoptera* (caddisflies). The EPT indicator is based on the premise that high-quality streams usually have the greatest species richness and the EPT score decreases when streams are polluted. The EPT indicator cannot be used in all streams as stoneflies and some mayflies are naturally uncommon in warmer, slower flowing water that are typical of lowland regions. For this reason the EPT indicator is not used in lowland regions.

Number of Families

The number of macroinvertebrate Families found at a site can give a reasonable representation of the ecological health of a stream and healthy streams generally have more Families. The Number of Families indicator is calculated by adding the total number of Families of invertebrates found at a site.

Regionalisation

The EPA has divided Victoria into 5 biological regions based on aquatic macroinvertebrates (see Figure 1). For each bioregion, the EPA has defined the aquatic macroinvertebrate reference condition. The reference condition varies between bioregions due to natural differences in climate and topology across Victoria. Table 1 shows the scoring for each of the Aquatic Life indicators for each bioregion.

Figure 1. Macroinvertebrate bioregions

Calculating the Aquatic Life sub-index score

The Aquatic Life sub-index score is a score out of 10 and is calculated by adding the four Aquatic Life indicator scores according to the following formula:

Aquatic Life sub-index = 10/16 (AUSRIVAS score (or Key Families score) + SIGNAL score + EPT score + Number of Families score)

Where an EPT score is not available, the following formula is used:

Aquatic Life sub-index = 10/12 (AUSRIVAS score (or Key Families score) + SIGNAL score + Number of Families score)

Department of Environment and Primary Industries
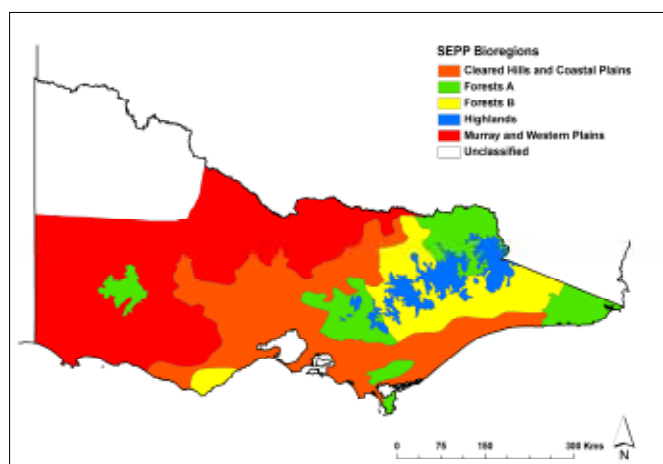
State Government Victoria

Table 1. Scoring table for the Water Quality indicators

Indicators	AUSRIVAS	SIGNAL	Number of Families	EPT	Key families (Combined Habitat)	Score
Region and habitat	value	value	value	value	value	
Highlands - Riffle		>6.4	>26	>11	>21	4
		5.8 - 6.4	22 - 25	10 - 11	18 - 21	3
		5.2 - 5.7	19 - 21	9	15 -17	2
		4.6 - 5.1	16 -18	8	12 -14	1
		<4.6	<16	<8	<12	0
Highlands - Edge		>6.8	>19	>9		4
		6.2 - 6.8	13 -19	4-9		3
		5.6 - 6.1	12	3		2
		5.0 - 5.5	11	2		1
		<5.0	<11	<2		0
Forests A - Riffle	> 1.13					3
	0.97 - 1.13	>6.6	>26	>12	>33	4
	0.87 - 0.96	6.0 - 6.6	21 - 26	9 -12	22 - 33	3
	0.78 - 0.86	5.4 - 5.9	19 - 20	7- 8	20 - 21	2
	0.62 - 0.77	4.8 - 5.3	17 - 18	5 - 6	18 - 19	1
	< 0.62	<4.8	<17	<5	<18	0
Forests A - Edge	>1.15					3
	0.97 - 1.15	>6.3	>26	>10		4
	0.86 - 0.96	5.7 - 6.3	22 - 26	7 - 10		3
	0.76 - 0.85	5.1 - 5.6	18 - 21	5 - 6		2
	0.58 - 0.75	4.6 - 5.0	13 - 17	3 - 4		1
	< 0.58	<4.6	<13	<3		0
Forests B - Riffle	> 1.13					3
	0.97 - 1.13	>6.6	>28	>12	>35	4
	0.87 - 0.96	6.0 - 6.6	23 - 28	10 - 12	26 - 35	3
	0.77 - 0.86	5.4 - 5.9	18 - 22	8 - 9	23 - 25	2
	0.60 - 0.76	4.8 - 5.3	14 - 18	6 - 7	20 - 22	1
	< 0.60	<4.8	<14	<6	<20	0
Forests B - Edge	> 1.13					3
	0.97 - 1.13	>6.4	>29	>11		4
	0.87 - 0.96	5.8-6.4	24-29	9-11		3
	0.77 - 0.86	5.2-5.8	19-23	7-8		2
	0.61 - 0.76	4.6-5.1	14-18	5-6		1
	< 0.61	<4.6	<14	<5		0
Cleared Hills and Coastal Plains - Riffle	>1.18					3
	0.95 - 1.18	>6.1	>24	NA	>26	4
	0.82 - 0.94	5.5 - 6.1	23 - 24	NA	22 - 26	3
	0.69 - 0.81	5.0 - 5.4	18 - 23	NA	19 - 21	2
	0.47 - 0.68	4.4 - 4.9	14 -17	NA	15 - 18	1
	< 0.47	<4.4	<14	NA	<15	0
Cleared Hills and Coastal Plains - Edge	> 1.15					3
	0.94 - 1.15	>6.1	>28	NA		4
	0.85 - 0.93	5.5 - 6.1	26 - 28	NA		3
	0.74 - 0.84	5.0 - 5.4	20 - 25	NA		2
	0.55 - 0.73	4.4 - 4.9	16 - 19	NA		1
	< 0.55	<4.4	<16	NA		0
Murray and Western Plains - Edge	> 1.13					3
	0.96 - 1.13	>5.8	>30	NA	>22	4
	0.87 - 0.95	5.3 - 5.8	23 - 30	NA	21 - 22	3
	0.78 - 0.86	4.8 - 5.2	18 - 23	NA	15 - 20	2
	0.62 - 0.77	4.2 - 4.7	14 - 17	NA	9 - 14	1
	< 0.62	<4.2	<14	NA	<9	0

Accessibility

If you would like to receive this publication in an alternative format, please telephone DEPI Customer Service Centre 136 186, email customer.service@depi.vic.gov.au or via the National Relay Service on 133 677 www.relayservice.com.au. This document is also available on the internet at http://ics.water.vic.gov.au.

Disclaimer

This publication may be of assistance to you but the State of Victoria and its employees do not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for any error, loss or other consequence which may arise from you relying on any information in this publication.

Department of
Environment and
Primary Industries

State Government
Victoria