

Appendix 7.1: Step-by-step calculations of the SIBI score for the February 1999 data of locality 5.

Table A: Expected and observed scenarios for locality 5 during the February 1999 survey.

SPECIES	SV's	Expected proportion (%)	Observed proportion (%)
<i>Labeobarbus aeneus</i> ^{O-RRR}	2.4	10.3	5.4
<i>Labeobarbus kimberleyensis</i> ^{RRR}	4.3	5.2	0
<i>Barbus anoplus</i> ^{T-O-VH-PS}	1.8	15.5	21.6
<i>Barbus pallidus</i> ^{VH-PS}	3.4	10.3	0
<i>Barbus paludinosus</i> ^{T-VH-PS}	1.6	10.3	13.5
<i>Labeo capensis</i> ^{RRR}	2.8	10.3	2.7
<i>Labeo umbratus</i> ^{T-PS}	1.9	10.3	7.4
<i>Clarias gariepinus</i> ^{T-O-PS}	1.2	5.2	8.1
<i>Austroglanis sclateri</i> ^{RRR}	3.1	2.1	0
<i>Tilapia sparrmanii</i> ^{T-O-VH-PS}	1.1	10.3	15.5
<i>Pseudocrenilabrus philander</i> ^{T-VH-PS}	1.1	10.3	25.6
Sum of SV's		24.7	13.9
Sum of SV's of species sensitive to loss/degradation of riffle/rapid habitats ^{RRR}		12.6	5.2
Sum of SV's of species sensitive to loss/degradation of vegetated habitats ^{VH}		9.00	5.60
Sum of SV's of species sensitive to loss/degradation of pools/slow flowing habitats ^{PS}		12.10	8.70
Relative abundance of tolerant individuals ^T		62	91.7
Relative abundance of omnivore individuals ^O		41	50.6
Sampling Effort			2.25
Number of individuals			148
CPUE (individuals/effort)		97	65.78
Percentage of individuals with anomalies		-	1.26

T - Tolerant species. O – Omnivorous species

RRR - Sensitive to degradation/loss of riffle/rapid/run habitats

VH - Sensitive to degradation/loss of vegetated habitats

PS - Sensitive to degradation/loss of pool/slow flowing habitats

Calculation of metric scores

SIBI Metric 1: Native species diversity

$$\begin{aligned} \text{Metric}^1 &= \Sigma [\text{sensitivity values of observed spp.}] / \Sigma [\text{sensitivity values of expected spp.}] \\ &= [2.4+1.8+1.6+2.8+1.9+1.2+1.1+1.1] / \\ & [2.4+4.3+1.8+3.4+1.6+2.8+1.9+1.2+3.1+1.1+1.1] \\ &= 13.9 / 24.7 \\ &= 0.56 \end{aligned}$$

SIBI Metric 2: Species sensitive to loss/degradation of riffle/rapid/run (RRR-) habitats.

$$\begin{aligned} \text{Metric}^2 &= \Sigma [\text{sensitivity values of observed spp. sensitive to RRR-habitat degradation}] \\ & / \Sigma [\text{sensitivity values of expected spp. sensitive to RRR-habitat degradation}] \\ &= [2.4+2.8] / [2.4+4.3+2.8+3.1] \\ &= 5.2 / 12.6 \\ &= 0.41 \end{aligned}$$

SIBI Metric 3: Species sensitive to loss/degradation of vegetated habitats.

$$\begin{aligned} \text{Metric}^3 &= \Sigma [\text{sensitivity values of observed spp. sensitive to vegetated habitat degradation}] / \\ & \Sigma [\text{sensitivity values of expected spp. sensitive to vegetated habitat degradation}] \\ &= [1.8+1.6+1.1+1.1] / [1.8+3.4+1.6+1.1+1.1] \\ &= 5.6 / 9.0 \\ &= 0.62 \end{aligned}$$

SIB Metric 4: Species sensitive to loss/degradation of pool and slow flowing habitats.

$$\begin{aligned}
 \text{Metric } ^4 &= \Sigma [\text{sensitivity values of observed spp. sensitive to pool and slow flowing habitat} \\
 &\quad \text{degradation}] / \Sigma [\text{sensitivity values of expected spp. sensitive to pool and slow} \\
 &\quad \text{flowing habitat degradation}] \\
 &= [1.8+1.6+1.9+1.2+1.1+1.1] / [1.8+3.4+1.6+1.9+1.2+1.1+1.1] \\
 &= 8.7 / 12.1 \\
 &= 0.72
 \end{aligned}$$

SIBI Metric 5: Relative abundance of tolerant individuals

Metric ⁵ =

$$\begin{aligned}
 &1 - \left[\frac{\text{proportion (\% of tolerant individuals observed)} - \text{proportion (\% of tolerant individuals expected)}}{100 - (\text{proportion (\% of tolerant individuals expected)})} \right] \\
 &= 1 - \left[\frac{91.7 - 62}{100 - 62} \right] \\
 &= 1 - 0.8 \\
 &= 0.2
 \end{aligned}$$



SIBI Metric 6: Relative abundance of omnivorous individuals

Metric 6 =

$$\begin{aligned}
 &1 - \left[\frac{\text{proportion (\% of omnivorous individuals observed)} - \text{proportion (\% of omnivorous individuals expected)}}{100 - (\text{proportion (\% of omnivorous individuals expected)})} \right] \\
 &= 1 - \left[\frac{50.06 - 41}{100 - 41} \right] \\
 &= 1 - 0.1 \\
 &= 0.9
 \end{aligned}$$

SIBI Metric 7: CPUE of native species

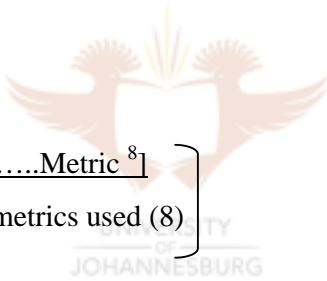
$$\begin{aligned} \text{Metric}^7 &= \text{Observed CPUE} / \text{expected CPUE} \\ &= 65.78 / 64 \\ &= 1.02 \text{ (A maximum value of 1 can be appointed to this metric, therefore)} \\ \text{Metric}^7 &= 1.00 \end{aligned}$$

SIBI Metric 8: Percentage of individuals with anomalies

Percentage of individuals with anomalies was 1.26%. If the percentage of individuals with anomalies are less than 2%, a score of 1 is given to this metric.

$$\text{Metric}^8 = 1.00$$

Calculation of SIBI score


$$\begin{aligned} \text{SIBI} &= \left[\frac{\sum [\text{Metric}^1 + \text{Metric}^2, \dots, \text{Metric}^8]}{\text{Number of metrics used (8)}} \right] \times 100 \\ &= \left[\frac{[0.56+0.41+0.62+0.72+0.2+0.9+1.0+1.0]}{8} \right] \times 100 \\ &= (5.41/8) \times 100 \\ &= 68 \% \end{aligned}$$