

# QUEENSLAND

## AUStralian RIVer Assessment System



## ACCREDITATION MANUAL



# QUEENSLAND AUSTRALIAN RIVER Assessment System (AUSRIVAS) ACCREDITATION MANUAL

December 2000

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## **Acknowledgments:**

We would like to thank Diane Conrick (Queensland Department of Natural Resources) and Craig Tomkinson (Waterwatch Coordinator for Pioneer River) for contributing to the development of the manual. Diane Conrick also provided the Queensland site information and field sampling sheets.

## **Front Cover Photograph:**

Harmer River (Cape York) at Middle Peak. Photo by Steve Parker

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## **INTRODUCTION**

AUSRIVAS sampling methods are standardized within each State and Territory, but vary nationally. Therefore, AUSRIVAS Training and Accreditation Courses have been tailored specifically for each State and Territory. Additional training and accreditation may be required to use AUSRIVAS as an accredited operator outside the state or territory where accreditation was originally obtained.

The Queensland AUSRIVAS Training and Accreditation Course has been developed to provide uniformity and consistency in the application of AUSRIVAS methods in Queensland. The course comprises two major components, a training component and an accreditation component. Each of these components consists of four modules (listed below). Depending on the needs of the course participant, one or all of the modules may be completed (i.e., training with or without accreditation or just accreditation).

### ***Module 1***

#### **Pre-Field & Site Information**

- Preparation for field work
- Collection of site information

### ***Module 2***

#### **Field Work**

- Collection of field data
- Macroinvertebrate sampling
- Sample processing – live-sorting

### ***Module 3***

#### **Laboratory**

- Macroinvertebrate Identification
- Data entry (Training Component only)
- Quality Assurance/Quality Control (Training Component only)

### ***Module 4***

#### **AUSRIVAS Predictive Models**

- Using the predictive models
- Interpreting the results

The Queensland AUSRIVAS Accreditation Manual provides details of the accreditation component, including the assessment sheets and instructors notes for each of the four modules. The manual also provides a guide to the level of training required to become accredited. For more information on the training component, see the AUSRIVAS Training and Accreditation Course Outline, Content and Structure document, or visit the AUSRIVAS web site at <http://ausrivas.canberra.edu.au>.

### **Assessment Sheets**

Assessment sheets have been provided for each of the four modules. Each assessment sheet details a number of exercises that course participants must pass to be accredited as a Queensland AUSRIVAS operator. Assessment sheets should be photocopied from the manual or printed from the Queensland AUSRIVAS Training and Accreditation CD and handed out to course participants at the beginning of each accreditation module.

### **Instructor's Notes**

For each accreditation module, instructor's notes have been provided to aid instructors in preparing, conducting and assessing the accreditation exercises. The notes also ensure a standardized accreditation procedure among instructors. Included in the instructor's notes are Mark Allocation Sheets. These sheets provide the instructor with the marking scheme to be used when assessing exercises.

### **Accreditation Assessment Results Summary Sheet**

An Accreditation Assessment Results Summary Sheet (Appendix 1) is included in the Queensland AUSRIVAS Accreditation Manual to summarize the accreditation assessment results for each course participant.

**AUSRIVAS ACCREDITATION**

**MODULE 1 – ASSESSMENT SHEET**

**Page 1 of 1**

Name: \_\_\_\_\_

**Pre-Field & Site Information**

*Collection of Site Information*

**Exercise 1. Site Information Sheet - Pages 1 and 3**

Complete pages 1 and 3 of a site information sheet for sites \_\_\_\_\_,  
\_\_\_\_\_, and \_\_\_\_\_.

(Exercise 1 Mark = \_\_\_\_%).

Note: A mark of 90% or greater (averaged over the three sites) is required in Exercise 1 to pass Module 1.

# **AUSRIVAS ACCREDITATION**

## **MODULE 1 - INSTRUCTORS NOTES**

### **Pre-Field & Site Information**

A list of materials and resources required for Module 1 is given below.

- Queensland AUSRIVAS Sampling and Processing Manual
- Site Information Sheets
- Maps (laminated and non-laminated)
- Map measuring devices eg. digital planimeter, map wheel, ruler etc.
- Magnifying glass
- GPS (for converting grid references to latitude and longitude)

### ***Collection of Site Information***

#### **Exercise 1. Site Information Sheet - Pages 1 and 3**

##### **Preparation**

Before conducting Exercise 1, the instructor must complete pages 1 and 3 of a site information sheet for each of the three sites being assessed. The information collected by the instructor will become the answers against which the course participant's site information sheets will be assessed. The sites used in the Module 1 (and Module 2) assessment should be reference sites from the area in which the course is being conducted. The use of local sites increases the information retained by the participants because the information is more relevant. The use of the same sites throughout the accreditation process provides continuity between accreditation modules, and enables course participants to gain a detailed knowledge of the sites being examined.

Copy the site numbers of the three sites being assessed onto the Module 1 assessment sheet. For each site, place a dot on the relevant map indicating the site's location.

##### **Assessment**

Attach copies of the AUSRIVAS accreditation Module 1 assessment sheet and mark allocation sheet No. 1 to three blank site information sheets and hand out to each course participant. Participants must complete pages 1 and 3 of a site information sheet for each site. Once participants have completed the exercise, collect sheets, ensuring participant's names are on the assessment sheet.

##### **Marking**

Award marks for each question according to the marking scheme on mark allocation sheet No. 1. An answer is marked as correct if it is the same as the instructor's answer, or for variables listed in Table 1, within the acceptable error range. Answers for variables not listed in Table 1 must be the same as the instructor's answer to be marked correct (i.e., no variation is allowed). Answers receive full marks if correct, and zero marks if incorrect (i.e., a proportion of a question's mark cannot be given). Missing values are to be marked as wrong even when the correct answer is zero.





# QUEENSLAND SITE INFORMATION SHEET

GRAND TOTAL = 73

SITE NUMBER .....	(5)
SITE NAME .....	(5)
LATITUDE .....	(5)
LONGITUDE .....	(5)
GRID REFERENCE .....	(5)
GPS .....	(N/A)
MAP NAME .....	(1)
MAP NUMBER .....	(1)
SCALE .....	(1)
ALTITUDE (m) .....	(5)
STREAM ORDER .....	(5)
SLOPE (m/m) .....	(5)
DISTANCE FROM SOURCE (km) .....	(5)
AMTD (km) .....	(N/A)
REACH upland midland lowland .....	(5)
CATCHMENT AREA (km <sup>2</sup> ) .....	(5)
REFERENCE or TEST ASSESSMENT (see last page) .....	(5)
NEAREST RAINFALL STATION .....	(N/A)
NEAREST WEATHER STATION .....	(N/A)

## ACCESS DETAILS

Directions .....

.....

.....

.....

.....

Property Owner ..... Phone No. ....

Contact ..... Phone No. ....

Access Instructions .....

.....

.....

.....

Notify before each visit?       Yes       No

Permission required?           Yes       No

Key required?                     Yes       No

Key available from .....

.....

Given

N/A = Not Assessed

Page Total = 73

No.	Reference Condition Selection Criterion	Level of impact *
1	No intensive agriculture within 20 km upstream. Intensive agriculture is that which involves irrigation, widespread soil disturbance, use of agrochemicals and pine plantations. Dry-land grazing does not fall into this category.	①
2	No major extractive industry (current or historical) within 20 km upstream. This includes mines, quarries and sand/gravel extraction.	①
3	No major urban area (> 5000 population) within 20 km upstream If the urban area is small and the river large, this criterion can be relaxed.	①
4	No significant point source waste water discharge within 20 km upstream. Exceptions can again be made for small discharges into large rivers.	①
5	No dam or major weir within 20 km upstream. Sites within the ponded area of impoundments also fail. Sites failing this criterion automatically fail the overall assessment.	①
6	Seasonal flow regime not greatly altered. This may be by abstraction or regulation further upstream than 20 km. Includes either an increase or decrease in seasonal flow.	①
7	Riparian Zone of natural appearance. Riparian vegetation should be intact and dominated by native species.	①
8	Riparian Zone and banks not excessively eroded beyond natural levels or significantly damaged by stock. Stock damage to the stream bed may be included in this category.	①
9	Stream Channel not affected by major geomorphological change. Geomorphological change includes bank slumping, shallowing, braiding and unnatural aggradation or degradation.	①
10	Instream conditions and habitats not altered. This may be altered by excessive algal and macrophyte growth, by sedimentation and siltation, by reduction in habitat diversity by drowning or drying out of habitats (eg riffles), by direct access of stock into the river	①
	<b>SITE ASSESSMENT</b>	/30

\*Each criteria is assessed as a 'pass' or 'fail'. A 'pass' is automatically assigned a value of '3'; a 'fail' is then allocated a numerical value according to the level of impact:

1. Greatest impact
2. Moderate impact
3. No/little impact

Scores are summed and reference condition assigned to sites where total is > 26 (except where Criterion 5 scores a '1' or '2', in which case the site records a 'fail').

**Table 1.** The acceptable error for specific variables on page 1 of the site information sheet. Variables not listed below must be the same as the instructor’s answer to be marked correct.

<b>Variable</b>	<b>Acceptable Error</b>
Latitude	± 00° 00' 04"
Longitude	± 000° 00' 04"
Grid Reference	± 100m
Altitude	± 20m
Slope	± 10%
Distance from Source	± 10%
Catchment Area Upstream	± 10%

A mark of 90% or greater (averaged over the three sites) is required in Exercise 1 to pass Module 1. Record the mark for Exercise 1 in the space provided on the assessment sheet, and on the participant’s Accreditation Assessment Results Summary Sheet (Appendix 1). Hand the assessment sheet and site information sheets back to participants and work through any areas of difficulty with them. Participants should retain their site information sheets for use in Module 2.

# AUSRIVAS ACCREDITATION

## MODULE 2 – ASSESSMENT SHEET

### Page 1 of 2

Name: \_\_\_\_\_

### Field Work

#### *Collection of Field Data*

#### **Exercise 1. Field Sampling Sheet**

Complete a field sampling sheet for sites \_\_\_\_\_ and \_\_\_\_\_. A mark of 90% or greater (averaged over the two sites) is required to pass Exercise 1.

(Exercise 1 Mark = \_\_\_\_ %).

#### **Exercise 2. Site Information Sheet – Page 2**

Complete page 2 of a site information sheet for sites \_\_\_\_\_ and \_\_\_\_\_. A mark of 90% or greater (averaged over the two sites) is required to pass Exercise 2.

(Exercise 2 Mark = \_\_\_\_ %).

#### *Macroinvertebrate Sampling*

#### **Exercise 3. Sample Collection**

Collect a 10m pool and edge sample from site \_\_\_\_\_ and place into separate live-sorting trays. A mark of 90% or greater (averaged over the two habitats) is required to pass Exercise 3.

Assessable Criteria	Pool Mark	Edge Mark
• 10m of habitat sampled	___/ 2	___/ 2
• Available range of micro-habitats sampled	___/ 5	___/ 5
• Habitat sampled effectively	___/ 3	___/ 3
• Net rinsed when necessary	___/ 2	___/ 2
• Sample transferred successfully from net to live-sorting tray	___/ 3	___/ 3
<b>Total</b>	___/ 15	___/ 15

(Exercise 3 Mark = \_\_\_\_ %).

## **MODULE 2 – ASSESSMENT SHEET**

### **Page 2 of 2**

#### **Exercise 4. Live-Sorting**

Live-sort your pool and edge samples according to the Queensland live-sort protocols (see Queensland Sampling and Processing Manual for details). Retain the sample residues for further laboratory processing. Remember to label both the sample vials and sample residues with the site number; river name; date; your name; and habitat sampled. Your mark for this exercise will be determined after the macroinvertebrates have been identified in Module 3, Exercise 2.

The instructor will analyse your data using the WISE Access macro and to pass you are required to achieve:

- A sample size of 200 animals or failing this, show evidence that the sample has been sorted for one hour;
- A sample size of chironomid larvae  $> 20$  individuals (target 30) wherever the corresponding number in the Whole Sample Estimate (WSE) also exceeds this value;
- a Live-Sort/Whole of Sample Estimate (LS/WSE) taxa number ratio  $> 0.9$  (result displayed as “Actual” LS/WSE in WISE macro results);
- A Bray-Curtis dissimilarity measure (pres/abs) calculated between LS and WSE that is  $< 0.3$  (result displayed as “Actual”, “Unadjusted Bray-Curtis” Pres/Abs in WISE macro results);
- A Bray-Curtis dissimilarity measure (pres/abs) calculated between taxa in the live-sort component that are common to those in the residue, and all WSE taxa, that is  $\leq 0.25$  (result displayed as “Actual”, “Bray-Curtis less taxa unique to LS” Pres/Abs in WISE macro results).

(Exercise 4 Mark = \_\_\_\_\_%).

Note: To pass Module 2 you must pass all four exercises.

# **AUSRIVAS ACCREDITATION**

## **MODULE 2 - INSTRUCTORS NOTES**

### **Field Work**

A list of materials and resources required for the field trip is given in the Queensland Sampling and Processing Manual.

### ***Collection of Field Data***

#### **Exercise 1. Field Sampling Sheet**

##### **Preparation**

Before conducting Exercise 1, the instructor must complete field sampling sheets for the two sites being assessed. These sheets will provide the answers against which the course participant's field sampling sheets will be assessed. The sites should be selected from the three reference sites used in the Module 1 assessment.

Copy the site numbers of the sites being assessed onto the Module 2 assessment sheet.

##### **Assessment**

Attach copies of the AUSRIVAS accreditation Module 2 assessment sheet and mark allocation sheet No. 2 to two blank field sampling sheets and hand out to each course participant. The participants must complete a field sampling sheet for each site.

##### **Marking**

Award marks for each question according to the marking scheme on mark allocation sheet No. 2. An answer is marked as correct if it is the same as the instructor's answer, or for variables listed in Table 2, within the acceptable error range. Answers for variables not listed in Table 2 must be the same as the instructor's answer (or within the same category) to be marked correct. Answers receive full marks if correct, and zero marks if incorrect (i.e., a proportion of a question's mark cannot be given). Missing values are to be marked as wrong even when the correct answer is zero.

**GRAND TOTAL 328**

Note: Grand total may be less if Analysis No., TYPE, Gauge height and GPS are not required.



**WATER QUALITY SAMPLING FIELD SHEET**

* Site Number	5	Site Name	5
* Date	5	Gauge No.	
* Time	1	Party	1
* Project Name	1	Analysis No.	3
* Collecting Authority	N/A	TYPE	Submitted
* Sample Source	N/A	Received	A B C D E F G H I J K L M N

Parameter	Value	Quality	Variable
Gauge Height	If gauging station present	N/A	N/A
Air Temperature	1 3		2065.5
Water Temperature	3		2080.5
Conductivity	3		2010.5
pH	3		2100.5
Dissolved O <sub>2</sub>	3		2351.5
Turbidity	3		2030.5
Phenol Alkalinity	3		2114.5
Total Alkalinity	3		2113.5
Transparency	1		2046.5
Velocity	1		240.
Discharge	3		140.

Discharge Method: 1 measured  estimated  rating curve

**Observations at Water Sampling Site**

Rain in past week: 1 Yes [ ] No [ ]

Weather: 1 No rain [ ] Showers [ ] Heavy rain [ ]  
 1 Sunny [ ] Some Cloud [ ] Over cast [ ]  
 1 Calm [ ] Breeze [ ] Strong Wind [ ]

Water Odour: 1 None [ ] Effluent [ ] Anoxic [ ] Algae [ ]

Water Foaming: 1 None [ ] Detergent [ ] Surf. Spot [ ] Scum [ ]

Algae: 3 ON SUBSTRATE: None [ ] Little [ ] Moderate [ ] Lot [ ]  
 3 IN WATER COLUMN: None [ ] Little [ ] Moderate [ ] Lot [ ]

Macrophytes: } EMERGENT: 1 None [ ] Little [ ] Moderate [ ] Lot [ ]  
 } SUBMERGED: 1 None [ ] Little [ ] Moderate [ ] Lot [ ]  
 } FLOATING: 1 None [ ] Little [ ] Moderate [ ] Lot [ ]

Presence of Pastoral Animals [ ] Presence of Non-Pastoral Animals [ ] 1

Any Human Activity 1

Plant Types (aquatic only) 1

Animal Life (eg fish, prawn) 1

Comments: N/A

(Office use only) N/A ENTERED INTO HYDSYS ON / / BY .....  
 CHECKED ON / / BY .....

\* Compulsory Fields

N/A = Not Assessed

Page Total = 73

Reach Observations						
<b>Water odours:</b>	1. normal	2. sewage	3. petroleum	4. chemical	5. none	[ ]
<b>Water oils:</b>	1. slick	2. sheen	3. globs	4. flecks	5. none	[ ]
<b>Turbidity:</b>	1. clear	2. slight	3. turbid	4. opaque		[ ]
<b>Plume:</b>	1. little	2. some	3. lots			[ ]
(amount of fine sediment generated when kick sampling)						
<b>Sediment oils:</b>	1. absent	2. light	3. moderate	4. profuse		[ ]
<b>Sediment odours:</b>		1. normal	2. sewage	3. petroleum	4. chemical	[ ]
		5. anaerobic	6. none	7. other .....		[ ]
<b>Flow level:</b>	(relative to 'watermark' i.e. normal inundation level shown by limit of terrestrial grasses, or by eroded area, or boundary in bank sediment types).					
	1. no flow (dry/isolated)	2. low (<water mark)	3. moderate (=)	4. high (>water mark)	5. flood	[ ]
<b>Bare ground above water mark:</b>	area in riparian zone expected to be vegetated but bare.					left bank ..... % right bank ..... %
<b>Bank erosion:</b>	1. extreme	2. extensive	3. moderate	4. limited	5. none	[ ]
<b>Are the undersides of stones, which are not deeply embedded, black?</b>				1. yes	2. no	[ ]
<b>Sediment deposits:</b>		1. none	2. sludge	3. sawdust	4. paper fibre	[ ]
		5. sand	6. relict shells	7. other .....		[ ]
<b>Local catchment erosion:</b>		1. none	2. some	3. moderate	4. heavy	[ ]
<b>Local non-point source pollution:</b>		1. no evidence	2. potential .....	3. obvious .....		[ ]
<b>Local point source pollution:</b>		1. no evidence	2. potential .....	3. obvious .....		[ ]
<b>Dams/barriers:</b>		1. absent	2. present	upstream/downstream discharge: >natural flow/<natural flow		[ ]
<b>Hydrologic deviation:</b>		1. none	2. some extraction	3. minor dams, weirs etc		[ ]
		4. extensive extraction		5. major dams	6. other .....	[ ]
<b>Site position in catchment:</b>		1. upland	2. midland	3. lowland		[ ]
<b>Site classification (of the reach):</b>		1. steep valley	2. broad valley	3. wetland/bog	4. heath	[ ]
		5. levees present	6. stream bars	7. natural riparian meadow		[ ]
<b>Adjacent landuse:</b>		1. urban	2. semi-urban	3. irrigated cropping		[ ]
(indicate L. &/or R bank if different)		4. non-irrigated cropping		5. light grazing	6. moderate grazing	[ ]
		7. heavy grazing	8. forestry	9. native forest	10. other .....	[ ]
<b>Upstream catchment development:</b>	1. >75%	2. 50-75%	3. 25-50%	4. 0-25%	5. none	[ ]
<b>Bars:</b>	(bed surface protruding from normal water level & forming a bar)					..... %
<b>Macrophytes</b> Indicate whether the following common taxa are present in the reach: <b>3</b>						
<b>NATIVE</b>			<b>EXOTIC</b>			
Azolla .....			Water Hyacinth ( <i>Eichhornia</i> ) .....			
Duckweed .....			Salvinia .....			
Hornwort ( <i>Ceratophyllum</i> ) .....			Alligator Weed ( <i>Alternanthera</i> ) .....			
Stoneworts ( <i>Chara</i> or <i>Nitella</i> ) .....			<i>Egeria</i> .....			
Hydrilla .....			Elodea .....			
Water Milfoil ( <i>Myriophyllum</i> ) .....			Para Grass ( <i>Urochloa</i> ) .....			
Pondweeds ( <i>Potamogeton</i> ) .....			Other .....			
Ribbonweed ( <i>Vallisneria</i> ) .....						
Water Ribbon ( <i>Triglochin</i> ) .....						
Water Lettuce ( <i>Pistia statiotes</i> ) .....						
Water Primrose ( <i>Ludwigia</i> ) .....						
Sedge ( <i>Cyperus</i> ) .....						
Common Rush ( <i>Juncus</i> ) .....						
Typha/Cumbungi .....						
Slender Knotweed ( <i>Persicaria</i> ) .....						
Other .....						
.....						
.....						



# River Bioassessment Program



## MACROINVERTEBRATE SAMPLING FIELD SHEET

**SITE NUMBER:** [ | | 5 | | ] **SITE NAME:** \_\_\_\_\_ (5)

**Project Name:** \_\_\_\_\_ (3) **Date:** \_\_\_\_\_ (5) / \_\_\_\_\_ **Time (24 hrs):** [ | 1 | ] **GPS** 3 if new site, otherwise 0

**EDGE/BACKWATER:** Y [ ] N [ ] (1) **Collected by:** [ ] (1) **Picked By:** [ ] (1) **No. vials:** (1)

**Velocity (m/sec):** max [ | • | 1 ] min [ | • | 1 ]  
**Mean Depth:** [ | • | ] m (3)  
**Mean Channel Width:** [ | | | • | ] m (5)  
**Method:** 10 m sweep [ ] }  
 60 min random pick [ ] } (1)  
 Other \_\_\_\_\_ [ ] }

**Substrate Description:** (5)  
 Bedrock [ | | ] % Gravel (4 - 16 mm) [ | | ] %  
 Boulder (> 256 mm) [ | | ] % Sand (1 - 4 mm) [ | | ] %  
 Cobble (64 - 256 mm) [ | | ] % Silt/Clay (< 1mm) [ | | ] %  
 Pebble (16 - 64 mm) [ | | ] %

**Canopy Cover:** [ | | ] % (3)  
**Width of Riparian Zone:** LB [ (3) ] m RB [ (3) ] m  
**Composition of Riparian Zone:**  
 Native [ (1) ] % Exotic [ (1) ] %

**Substrate Cover:**  

Periphyton	0	1	2	3	4	(1)
Moss	0	1	2	3	4	(1)
Filamentous algae	0	1	2	3	4	(3)
Macrophytes	0	1	2	3	4	(3)
Detritus	0	1	2	3	4	(3)

 0 = <10% 1 = 10-35% 2 = 35-65% 3 = 65-90% 4 = >90%

**\*Riparian Vegetation:**  
 Grass [ (1) ] % Trees <10 m high [ (1) ] %  
 Shrubs [ (1) ] % Trees >10 m high [ (1) ] %

**Bank Overhang Vegetation:**  
 extensive [ ] moderate [ ] slight [ ] nil [ ] (3)  
**Trailing Bank Vegetation:**  
 extensive [ ] moderate [ ] slight [ ] nil [ ] (3)

**BED:** Y [ ] N [ ] (1) **Collected by:** [ | | ] (1) **Picked By:** [ | | ] (1) **No. vials:** [ ] (1)  
**TYPE:** Riffle [ ] Rocky/Gravel Bed [ ] Sandy/Silty [ ] (3)

**Velocity (m/sec):** max [ | • | 1 ] min [ | • | 1 ]  
**Mean Depth:** [ | • | 3 ] m  
**Mean Channel Width:** [ | | | 5 ] m  
**Method:** 10 m kick only [ ] }  
 10 m kick & gleaning rocks of different sizes (5) [ ] } (1)  
 60 min random pick [ ] }  
 Other \_\_\_\_\_ [ ] }

**Substrate Description:** (5)  
 Bedrock [ | | ] % Gravel (4 - 16 mm) [ | | ] %  
 Boulder (> 256 mm) [ | | ] % Sand (1 - 4 mm) [ | | ] %  
 Cobble (64 - 256 mm) [ | | ] % Silt/Clay (< 1mm) [ | | ] %  
 Pebble (16 - 64 mm) [ | | ] %

**Canopy Cover:** [ | | ] % (3)  
**Width of Riparian Zone:** LB [ (3) ] m RB [ (3) ] m  
**Composition of Riparian Zone:**  
 Native [ (1) ] % Exotic [ (1) ] %

**Substrate Cover:**  

Periphyton	0	1	2	3	4	(1)
Moss	0	1	2	3	4	(1)
Filamentous algae	0	1	2	3	4	(3)
Macrophytes	0	1	2	3	4	(3)
Detritus	0	1	2	3	4	(3)

 0 = <10% 1 = 10-35% 2 = 35-65% 3 = 65-90% 4 = >90%

**\*Riparian Vegetation:**  
 Grass [ (1) ] % Trees <10 m high [ (1) ] %  
 Shrubs [ (1) ] % Trees >10 m high [ (1) ] %

**Bank Overhang Vegetation:**  
 extensive [ ] moderate [ ] slight [ ] nil [ ] (3)  
**Trailing Bank Vegetation:**  
 extensive [ ] moderate [ ] slight [ ] nil [ ] (3)

\* Can add to > 100%

**Adjacent Landuse:** (3)  
**Upstream Landuse:** (3)  
**\*\*Percent of habitat types in 100 m reach:**  
 Riffle [ | 3 ] % Run [ | 3 ] % Macrophytes [ | 3 ] %  
 Pool (rocky) [ | 3 ] % Pool (sandy) [ | 3 ] % Dry [ | 3 ] % Edge [ (3) ] %

\*\* Riffle + Run + Pool + Macrophyte + Dry = 100%; Edge is % of habitat available to sample from L and R banks

**TOTAL NO. VIALS:** (1) **OTHERS:** (1)

# 1. LONGITUDINAL PROFILE SKETCH OF STREAM REACH

Scale: \_\_\_\_\_ **1** If "not to scale" please state

- Please indicate
- 1. Biological sampling sites for each habitat type and % of reach. **1**
  - 2. Water quality measurement and water sample collection sites. **1**
  - 3. Location from where photograph(s) taken. **1**
  - 4. Location of cross-sectional profile sketch. **1**

# 2. CROSS-SECTIONAL PROFILE SKETCH OF STREAM REACH

Scale: \_\_\_\_\_ **1** If "not to scale" please state

- Please indicate
- 1. Approx. bank height/bank width (overflow), stream width and depth. **1** **1** **1** **1**
  - 2. Approx. riparian vegetation height. **1**

# 3. COMMENTS

N/A

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(Office use only)

N/A

Entered into Hydsys on \_\_\_\_\_

By \_\_\_\_\_

Checked on \_\_\_\_\_

By \_\_\_\_\_

## River Bioassessment Program



# HABITAT ASSESSMENT FIELD SHEET

**SITE NUMBER:** [ | | | | | ] **5**    **SITE NAME:** \_\_\_\_\_ **5**

**Date:** \_\_\_\_/\_\_\_\_/\_\_\_\_ **5**    **Time (24 hrs):** [ | **1** | ]    **GPS:** \_\_\_\_\_ **N/A**    **Project Name:** \_\_\_\_\_ **3**

Habitat Variable	CATEGORY			
	Excellent	Good	Fair	Poor
<b>1. Bottom substrate/available cover</b>  <span style="font-size: 24px; border: 1px solid black; border-radius: 50%; padding: 2px 8px;">3</span>	Greater than 50% rubble, gravel, submerged logs, undercut banks or other stable habitat.  20, 19, 18, 17, 16	30-50% rubble, gravel or other stable habitat. Adequate habitat.  15, 14, 13, 12, 11	10-30% rubble, gravel or other stable habitat. Habitat availability less than desirable.  10, 9, 8, 7, 6	Less than 10% rubble, gravel or stable habitat. Lack of habitat is obvious.  5, 4, 3, 2, 1, 0
<b>2. Embeddedness</b>  <span style="font-size: 24px; border: 1px solid black; border-radius: 50%; padding: 2px 8px;">3</span>	Gravel, cobble and boulder particles are between 0 & 25% surrounded by fine sediment.  20, 19, 18, 17, 16	Gravel, cobble and boulder particles are between 25% & 50% surrounded by fine sediment.  15, 14, 13, 12, 11	Gravel, cobble and boulder particles are between 50 & 75% surrounded by fine sediment.  10, 9, 8, 7, 6	Gravel, cobble and boulder particles are over 75% surrounded by fine sediment.  5, 4, 3, 2, 1, 0
<b>3. Velocity/depth category</b>  <span style="font-size: 24px; border: 1px solid black; border-radius: 50%; padding: 2px 8px;">3</span>	Slow deep (<0.3 m/s & >0.5 m); slow shallow; fast deep; fast shallow; habitats all present.  20, 19, 18, 17, 16	Only 3 of the four habitat categories present (missing riffles or runs receive lower score than missing pools).  15, 14, 13, 12, 11	Only two of the four habitat categories present (missing riffles/runs receive lower score).  10, 9, 8, 7, 6	Dominating by one velocity/depth category (usually pool).  5, 4, 3, 2, 1, 0
<b>4. Channel alteration</b>  <span style="font-size: 24px; border: 1px solid black; border-radius: 50%; padding: 2px 8px;">3</span>	Little or no enlargement of islands or point bars and/or no channelisation.  15, 14, 13, 12	Some new increase in bar formation, mostly from coarse gravel; and/or some channelisation present.  11, 10, 9, 8	Moderate deposition of new gravel, coarse sand, on old and new bars; pools partly filled with silt; and/or embankments on both banks.  7, 6, 5, 4	Heavy deposits of fine materials, increased bar development; most pools filled with silt; and/or extensive channelisation.  3, 2, 1, 0
<b>5. Bottom scouring and deposition</b>  <span style="font-size: 24px; border: 1px solid black; border-radius: 50%; padding: 2px 8px;">3</span>	Less than 5% of the bottom affected by scouring and deposition.  15, 14, 13, 12	5-30% affected. Scours at constrictions and where grades steepen, some deposition in pools.  11, 10, 9, 8	30-50% affected. Deposits and scours at obstructions and bends. Some deposition in pools.  7, 6, 5, 4	More than 50% of the bottom changing nearly year long. Pools almost absent due to deposition. Only large rocks in riffle exposed.  3, 2, 1, 0

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## River Bioassessment Program



### HABITAT ASSESSMENT FIELD SHEET cont.

Habitat Variable	CATEGORY			
	Excellent	Good	Fair	Poor
<b>6. Pool/riffle, run/bend ratio.</b> <i>(Distance between riffles divided by stream width)</i> <div style="text-align: center; border: 1px solid black; border-radius: 50%; width: 20px; height: 20px; margin: 0 auto; display: flex; align-items: center; justify-content: center;">3</div>	0-7 Variety of habitat. Deep riffles and pools.  <div style="text-align: center;">15, 14, 13, 12</div>	7-15 Adequate depth in pools and riffles. Bends provide habitat.  <div style="text-align: center;">11, 10, 9, 8</div>	15-25 Occasional riffle or bend. Bottom contours provide some habitat.  <div style="text-align: center;">7, 6, 5, 4</div>	>25 Essentially a straight stream. Generally all flat water or shallow riffle. Poor habitat.  <div style="text-align: center;">3, 2, 1, 0</div>
<b>7. Bank stability</b>  <div style="text-align: center; border: 1px solid black; border-radius: 50%; width: 20px; height: 20px; margin: 0 auto; display: flex; align-items: center; justify-content: center;">3</div>	Stable. No evidence of erosion or bank failure. Side slopes generally <30%. Little potential for future problem.  <div style="text-align: center;">10, 9</div>	Moderately stable. Infrequent, small areas of erosion mostly healed over. Side slopes up to 40% on one bank. Slight potential in extreme floods.  <div style="text-align: center;">8, 7, 6</div>	Moderately unstable. Moderate frequency and size of erosional areas. Side slopes up to 60% on some banks. High erosion potential during extreme/high flows.  <div style="text-align: center;">5, 4, 3</div>	Unstable. Many eroded areas. Side slopes > 60% common. 'Raw' areas frequent along straight sections and bends.  <div style="text-align: center;">2, 1, 0</div>
<b>8. Bank vegetative stability</b>  <div style="text-align: center; border: 1px solid black; border-radius: 50%; width: 20px; height: 20px; margin: 0 auto; display: flex; align-items: center; justify-content: center;">3</div>	Over 80% of the streambank surfaces covered by vegetation or boulders and cobble.  <div style="text-align: center;">10, 9</div>	50-79% of the streambank surfaces covered by vegetation, gravel or larger material.  <div style="text-align: center;">8, 7, 6</div>	25-49% of the streambank covered by vegetation, gravel or larger material.  <div style="text-align: center;">5, 4, 3</div>	Less than 25% of the streambank surfaces covered by vegetation, gravel or larger material.  <div style="text-align: center;">2, 1, 0</div>
<b>9. Streamside cover</b>  <div style="text-align: center; border: 1px solid black; border-radius: 50%; width: 20px; height: 20px; margin: 0 auto; display: flex; align-items: center; justify-content: center;">3</div>	Dominant vegetation is of tree form.  <div style="text-align: center;">10, 9</div>	Dominant vegetation shrub.  <div style="text-align: center;">8, 7, 6</div>	Dominant vegetation is grass, sedge, ferns.  <div style="text-align: center;">5, 4, 3</div>	Over 50% of the streambank has no vegetation and dominant material is soil, rock, bridge materials, culverts, or mine tailings.  <div style="text-align: center;">2, 1, 0</div>

<b>Column Totals</b>	N/A			
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<b>Score</b>	N/A
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Page Total = 12



# River Bioassessment Program

## FIELD SAMPLING TASKS TO BE COMPLETED

\* Please check off each item before leaving a sampling site. \*

SITE NO. .... (5) .....	SITE NAME .... (5) .....
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- (1) **Plan sketch of 100 m stream reach to be sampled; to include:**
  - (1) location of different habitats, macrophytes and other vegetation
  - (1) location of biological sampling sites
  - (1) location of water quality measurement sites
  - (1) location of water collection sites for GCL samples
  - (1) location of x-sectional profile sketch
  - (1) location from where photograph (s) taken
  - (1) scale
  
- (1) **X-sectional profile sketch; to include:**
  - (1) stream width
  - (1) bank heights
  - (1) riparian vegetation heights
  
- (1) **Photograph(s)/video of sampling site**
  
- (1) **Biological sampling of the different habitats and 60 min. random picking for each**
  
- (1) **Biological samples preserved in 80% methylated spirit, labelled and stored upright**
  
- (1) **Water quality measurements taken**
  
- (1) **Water quality samples for GCL collected, labelled and stored appropriately**
  
- (1) **Field sheets 1, 2 and GCL water analysis input sheets completed, checked and initialled**
  
- (1) **Gauge height/flow recorded**
  
- (1) **GPS recorded**
  

Date ..... (3) .....

Signed ..... (3) .....

**Table 2.** The acceptable error for specific variables on the field sampling sheet. Variables not listed below must be the same as the instructor's answer (or within the same category) to be marked correct.

Variable	Acceptable Error
Gauge Height	± 10%
Air Temperature (°C)	± 10%
Water Temperature (°C)	± 10%
Conductivity ( $\mu\text{S cm}^{-1}$ , @ 25 °C)	± 10%
pH	± 10%
Dissolved Oxygen ( $\text{mg l}^{-1}$ )	± 10%
Turbidity (NTU)	± 10%
Phenol. Alkalinity ( $\text{mg l}^{-1}$ )	± 10%
Total Alkalinity ( $\text{mg l}^{-1}$ )	± 10%
Velocity	± 20%
Discharge	± 20%
Mean depth (m)	± 20%
Mean channel width	± 20%
Canopy Cover	± 10%
Width of riparian zone	± 20%
Composition of riparian zone	± 10%
Riparian vegetation (% cover)	± 10%
Substratum description (% cover of each size category)	± 10%
Percent of habitat types in 100m reach	± 10%
Habitat assessment variables	± 2 marks

A mark of 90% or greater (averaged over the two sites) is required to pass Exercise 1. Where a participant's mark falls just below the 90% threshold, assessment of a third site may be permitted at the instructor's discretion. Record the mark for Exercise 1 in the space provided on the participant's Accreditation Assessment Results Summary Sheet (Appendix 1). Hand the field sampling sheets back to participants and work through any areas of difficulty with them. Participants may record their mark on the Module 2 assessment sheet.

## **Exercise 2. Site Information Sheet – Page 2**

### Preparation

Before conducting Exercise 2, the instructor must complete page 2 of a site information sheet for the two sites being assessed. The information collected by the instructor will become the answers against which the course participant's site information sheets will be assessed.

### Assessment

Hand out a copy of mark allocation sheet No. 3 to each participant. Participants will already have the site information sheets and the details of Exercise 2 on the Module 2 assessment sheet given to them earlier. The participants must complete page 2 of a site information sheet for each site. Once participants have completed the exercise, collect the site information sheets, ensuring participant's names are on the front page.

### Marking

Award marks for each question according to the marking scheme shown on mark allocation sheet No. 3. A mark of 90% or greater (averaged over the two sites) is required to pass Exercise 2. Record the mark for Exercise 2 in the space provided on the participant's Accreditation Assessment Results Summary Sheet (Appendix 1). Hand the site information sheets back to participants and work through any areas of difficulty with them. Participants may record their mark on the Module 2 assessment sheet.

**MUDMAP OF ACCESS ROUTE**

**Include:**

- river (1)
- flow direction (1)
- site location (1)
- roads (1)
- access details (location of turnoffs, distances and landmarks leading to site) (1)

**SKETCH OF REACH**

**Include:**

- location of riffle, run, pool, edge and macrophyte habitats within the reach (2)
- flow direction (1)
- access point (1)
- riffle and edge sampling locations (1)



## *Macroinvertebrate Sampling*

### **Exercise 3. Sample Collection**

#### Assessment

While completing Exercises 1 and 2, take each course participant aside and assess them collecting a pool and edge sample as outlined in Exercise 3.

#### Marking

Award marks according to the marking scheme shown below. Participants receive full marks for each criterion correctly completed, and zero marks for those criteria incorrectly completed (i.e., a proportion of a mark cannot be given). A mark of 90% or greater (averaged over the two habitats) is required to pass Exercise 3. Record the marks for Exercise 3 in the space provided on the assessment sheet and on the Accreditation Assessment Results Summary Sheet. Hand the assessment sheet back to participants and work through any areas of difficulty with them.

<b>Assessable Criteria</b>	<b>Pool Mark</b>	<b>Edge Mark</b>
• 10m of habitat sampled	___/ 2	___/ 2
• Available range of micro-habitats sampled	___/ 5	___/ 5
• Habitat sampled effectively	___/ 3	___/ 3
• Net rinsed when necessary	___/ 2	___/ 2
• Sample transferred successfully from net to live-sorting tray	___/ 3	___/ 3
<b>Total</b>	___/ 15	___/ 15

### **Exercise 4. Live-Sorting**

#### Assessment

Pool and edge samples are to be live-sorted according to the Queensland live-sort protocols (see Queensland Sampling and Processing Manual for details). Participants are required to retain the sample residues for further laboratory processing.

On return to the laboratory, sub-sample the preserved residues using the following procedure:

1. Using a multi-cell sub-sampler, take a sufficient sub-sample of animals likely to result in slightly more animals than were live-sorted (this estimate is typically derived by sorting the contents of just one or two cells). Where less than 100 animals were live-sorted, a minimum sub-sample size of 100 organisms is required.
2. Sort and identify the contents of sufficient cells to derive approximately 50 animals. This portion of the 'sub-sample' is used to estimate the taxa and relative abundances of animals that are 'common' in the sample.
3. Sort the remainder of the sub-sample, ignoring (leaving behind) the taxa that were recovered in step 2.

4. Scale up the raw taxa abundances derived from step 2 to the full sub-sample fraction taken in step 1. Add together taxa and relative abundances from step 2 (scaled up) and step 3, which now forms the sub-sample of the residue.
5. Enter the residue sub-sample and live-sort data (once identified in Module 3, Exercise 2 and QA/QC has been conducted by instructor) into the Whole of Individual Sample Estimate (WISE) database to obtain a Live-Sort/Whole of Sample Estimate taxa number ratio (LS/WSE) and Bray-Curtis dissimilarity index.

The WISE database is an MS Access database that automatically calculates the LS/WSE and Bray-Curtis dissimilarity index. Instructions on the installation and use of the WISE database can be down loaded from the AUSRIVAS web site at <http://ausrivas.canberra.edu.au>.

### Marking

To pass participants are required to achieve:

- A sample size of 200 animals or failing this, show evidence that the sample has been sorted for one hour;
- A sample size of chironomid larvae > 20 individuals (target 30) wherever the corresponding number in the Whole Sample Estimate (WSE) also exceeds this value;
- a Live-Sort/Whole of Sample Estimate (LS/WSE) taxa number ratio > 0.9 (result displayed as “Actual” LS/WSE in WISE macro results);
- A Bray-Curtis dissimilarity measure (pres/abs) calculated between LS and WSE that is < 0.3 (result displayed as “Actual”, “Unadjusted Bray-Curtis” Pres/Abs in WISE macro results);
- A Bray-Curtis dissimilarity measure (pres/abs) calculated between taxa in the live-sort component that are common to those in the residue, and all WSE taxa, that is  $\leq 0.25$  (result displayed as “Actual”, “Bray-Curtis less taxa unique to LS” Pres/Abs in WISE macro results).

Note: To pass Module 2 participants must pass all four exercises.

# AUSRIVAS ACCREDITATION

## MODULE 3 – ASSESSMENT SHEET

Page 1 of 2

Name: \_\_\_\_\_

### Laboratory

#### *Macroinvertebrate Identification*

##### **Exercise 1. Reference Collection Identification**

Identify macroinvertebrates in the reference collection to family taxonomic level, except for Microcrustacea (Sub-class), Oligochaeta (Class), Acarina (Order) and Chironomidae (Sub-family), using the keys recommended by Hawking (2000). You may also use the Interactive Guide to Australian Aquatic Invertebrates CD (Gunn *et al.* 1999) to aid in identifications.

Each taxon should be placed into a separate vial and the count for each recorded on a data sheet. To pass Exercise 1 you must achieve a "Percent Taxa Error" of  $\leq 5\%$ . A "Taxa Error" is defined as a mis-identification resulting in the loss or addition of a taxon. The "Percent Taxa Error" is the "Number of Taxa Errors" divided by the "Total Number of Original Taxa", multiplied by one hundred.

<b>Percent Taxa Error</b>	
Number of Taxa Errors (a)	
Total Number of Original Taxa (b)	
Percent Taxa Error ( $[a/b] \times 100$ )	
Pass or Fail? (Pass if $\leq 5\%$ )	

(Exercise 1 Mark = \_\_\_\_ %).

## MODULE 3 – ASSESSMENT SHEET

### Page 2 of 2

#### **Exercise 2. Sample Identification**

Identify each of the macroinvertebrate samples collected from the pool and edge habitats to family taxonomic level, except for Microcrustacea (Sub-class), Oligochaeta (Class), Acarina (Order) and Chironomidae (Sub-family), using the keys recommended by Hawking (2000). You may also use the Interactive Guide to Australian Aquatic Invertebrates CD (Gunn *et al.* 1999) to aid in identifications.

Each taxon should be placed into a separate vial and the count for each recorded on a data sheet. Remember to record important sample information on the data sheet, such as the site number; river name; date; your name; habitat sampled, total number of organisms, total number of taxa etc.

To pass Exercise 2 you must achieve a “Percent Taxa Error” of  $\leq 5\%$  (averaged over the two samples).

(Exercise 2 Mark = \_\_\_\_\_ %).

Note: To pass Module 3 a “Percent Taxa Error” of  $\leq 5\%$  (averaged over Exercises 1 and 2) is required.

# AUSRIVAS ACCREDITATION

## MODULE 3 - INSTRUCTORS NOTES

### Laboratory

A list of materials and resources required for Module 3 is given below.

- Reference collection containing all families used in the creation of the Queensland AUSRIVAS models
- Pool and edge macroinvertebrate sample
- Taxonomic keys for invertebrate taxa. See Key to Keys: A guide to keys and zoological information to identify invertebrates from Australian inland waters. Identification Guide No. 2, 2<sup>nd</sup> Edition. (Hawking 2000). Visit the AUSRIVAS web site for a list of keys to families.
- *Interactive Guide to Australian Aquatic Invertebrates*, Compact Disk. 2nd Edition. (Gunn *et al.* 1999)
- Computer to run interactive identification CD.
- Invertebrate data sheets
- Staff with macroinvertebrate identification expertise
- Laboratory with stereo microscopes
- Forceps
- Vials
- Channel trays or grided dishes
- Counters
- Labels
- Ethanol
- Squeeze bottles (for water and ethanol)
- Pencil/rubber

### *Macroinvertebrate Identification*

#### **Exercise 1. Reference Collection Identification**

##### Preparation

Prepare laboratory with equipment required for macroinvertebrate identification (see above). A reference collection containing all families used in the creation of the Queensland AUSRIVAS models is needed for this exercise.

##### Assessment

Participants are required to identify macroinvertebrates in the reference collection to family taxonomic level except for Microcrustacea (Sub-class), Oligochaeta (Class), Acarina (Order) and Chironomidae (Sub-family) using the keys recommended by Hawking (2000). The Interactive Guide to Australian Aquatic Invertebrates CD (Gunn *et al.* 1999) may also be used to aid in identifications. Once participants have completed the exercise, collect identification sheets, ensuring participant's names are written on the sheet.

### Marking

To pass Exercise 1, participants must achieve a “Percent Taxa Error” of  $\leq 5\%$ . A “Taxa Error” is defined as a mis-identification resulting in the loss or addition of a taxon. The “Percent Taxa Error” is the “Number of Taxa Errors” divided by the “Total Number of Original Taxa”, multiplied by one hundred.

<b>Percent Taxa Error</b>	
Number of Taxa Errors (a)	
Total Number of Original Taxa (b)	
Percent Taxa Error ( $[a/b] \times 100$ )	
Pass or Fail? (Pass if $\leq 5\%$ )	

Record the mark for Exercise 1 in the space provided on the Accreditation Assessment Results Summary Sheet. Hand sheets back to participants and work through with them any areas of difficulty.

## **Exercise 2. Sample Identification**

### Preparation

Prepare laboratory with equipment required for macroinvertebrate identification (see above). Two samples are required for this exercise, one from a pool habitat and another from a stream edge habitat.

### Assessment

Participants are required to identify macroinvertebrate samples collected from both the pool and edge habitats to family taxonomic level, except for Microcrustacea (Sub-class), Oligochaeta (Class), Acarina (Order) and Chironomidae (Sub-family) using the keys recommended by Hawking (2000). The Interactive Guide to Australian Aquatic Invertebrates CD (Gunn *et al.* 1999) may also be used to aid in identifications. Once participants have completed the exercise, collect identification sheets, ensuring participant’s names are written on the sheet.

### Marking

To pass Exercise 2, participants are required to achieve a “Percent Taxa Error” of  $\leq 5\%$  (averaged over the two samples). Record the mark for Exercise 2 in the space provided on the Accreditation Assessment Results Summary Sheet. Hand sheets back to participants and work through with them any areas of difficulty.

Note: To pass Module 3 a “Percent Taxa Error” of  $\leq 5\%$  (averaged over Exercises 1 and 2) is required.

**AUSRIVAS ACCREDITATION**

**MODULE 4 – ASSESSMENT SHEET**

**Page 1 of 4**

Name: \_\_\_\_\_

**AUSRIVAS Predictive Models**

*Using the Predictive Models*

**Exercise 1. Single-Season Predictive Model**

- a) Determine the habitat predictor variables required by the \_\_\_\_\_  
\_\_\_\_\_ AUSRIVAS model and list below.

Predictor Variables Used:

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- b) Place macroinvertebrate and habitat data into the format required by AUSRIVAS.  
c) Import the bug and habitat files into AUSRIVAS and run model. Save the file on the floppy disk provided. Call the file “your name\_single\_model.AUS”.  
d) Export the AUSRIVAS sheet labelled Predicted/Collected containing the Observed to Expected (O/E) ratios and open in Excel.  
e) Save this file as an Excel spreadsheet on the floppy disk provided. Call the file “your name\_single\_oe.xls”. Ensure your name is written on the disk.

A mark of 90% or greater is required to pass Exercise 1.

(Exercise 1 Mark = \_\_\_\_\_%).

## MODULE 4 – ASSESSMENT SHEET

### Page 2 of 4

#### **Exercise 2. Combined-Season Predictive Model**

- a) Determine the habitat predictor variables required by the \_\_\_\_\_  
\_\_\_\_\_ AUSRIVAS model and list below.

Predictor Variables Used:

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- b) Combine the macroinvertebrate data for autumn and spring.  
c) Combine the habitat data for autumn and spring.  
d) Place macroinvertebrate and habitat data into the format required by AUSRIVAS.  
e) Import the bug and habitat files into AUSRIVAS and run model. Save the file on the floppy disk provided. Call the file “your name\_combined\_model.AUS”.  
f) Export the AUSRIVAS sheet labelled Predicted/Collected containing the Observed to Expected (O/E) ratios and open in Excel.  
g) Save this file as an Excel spreadsheet on the floppy disk provided. Call the file “your name\_combined\_oe.xls”. Ensure your name is written on the disk.

A mark of 90% or greater is required to pass Exercise 2.

(Exercise 2 Mark = \_\_\_\_\_ %).



## MODULE 4 – ASSESSMENT SHEET

Page 3 of 4

### *Interpreting the Results*

#### **Exercise 3. Site Assessment**

Using the information provided, complete the summary table below.

Site	Overall Site Assessment (Band)	Habitat used for Overall Site Assessment	Taxa Predicted to occur but not collected in the habitat used for overall site assessment

Note: If both pool and edge habitats are placed into the same band, refer to the habitat with the lowest O/E taxa ratio.

One mark is awarded for each section of the table completed correctly. A mark of 90% or greater is required to pass Exercise 3.

(Exercise 3 Mark = \_\_\_\_%).

## **MODULE 4 – ASSESSMENT SHEET**

### **Page 4 of 4**

#### **Exercise 4. Interpreting Results**

List 5 of the steps that one can take when interpreting AUSRIVAS results.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

One mark is awarded for each step listed. A mark of 4 out of 5 (80%) or greater is required to pass Exercise 4.

(Exercise 4 Mark = \_\_\_\_\_ %).

Note: To pass Module 4 you must pass all four exercises.

# **AUSRIVAS ACCREDITATION**

## **MODULE 4 - INSTRUCTORS NOTES**

### **AUSRIVAS Predictive Models**

A list of materials and resources required for Module 4 is given below.

- Predictive Model Manual - hard copy
- Macroinvertebrate and habitat data for two sites assessed as mildly impacted
- AUSRIVAS combined season pool and edge model outputs for five sites
- Access to AUSRIVAS models (password)
- Computers with AUSRIVAS software
- Access to the Internet
- Floppy disk for each participant containing the above data

Note: The AUSRIVAS Training and Accreditation CD contains demonstration data from the ACT that may prove useful when developing data sets for Queensland.

### ***Using the Predictive Models***

#### **Exercise 1. Single-Season Predictive Model**

##### **Preparation**

Prepare a data set comprising macroinvertebrate and habitat data collected from two mildly impacted test sites. The macroinvertebrate data may be from any habitat for which there is a single season model and should be saved as an Excel spreadsheet. Photocopies of the field sampling sheets can be used to provide the habitat data.

##### **Assessment**

Participants are required to manipulate the data into the format required by AUSRIVAS and run the data through a single season model.

##### **Marking**

Award marks for each question according to the marking scheme shown below. Participants receive full marks for each criterion correctly completed, and zero marks for those criteria incorrectly completed (i.e., a proportion of a mark cannot be given). A mark of 90% or greater is required to pass Exercise 1. Record the mark for Exercise 1 in the space provided on the Accreditation Assessment Results Summary Sheet. Work through any areas of difficulty with participants.

Assessable Criteria	Marks	Comments
• Predictor Variables Correct	___/ 5	
• Macroinvertebrate data in correct format:		
- Adults and larvae combined	___/ 2	
- Bug codes correct	___/ 5	
- Zeros added and no blanks found	___/ 2	
- Data with sites as rows and bugs as columns	___/ 2	
- File saved as text (tab delimited) file	___/ 1	
• Habitat data in correct format:		
- Habitat codes correct	___/ 3	
- Zeros added and no blanks found	___/ 2	
- Data with sites as rows and habitat variables as columns	___/ 2	
- Sites in the same order as the bug data	___/ 2	
- File saved as text (tab delimited) file	___/ 1	
• Imported the bug file into AUSRIVAS successfully	___/ 2	
• Imported the habitat file into AUSRIVAS successfully	___/ 2	
• Choose the correct AUSRIVAS model i.e. region, season and habitat	___/ 3	
• Exported the AUSRIVAS predicted/collected sheet successfully	___/ 2	
• Opened the AUSRIVAS predicted/collected sheet in excel and saved the file as an excel spreadsheet	___/ 2	
<b>Total</b>	___/ 38	

## Exercise 2. Combined-Season Predictive Model

### Preparation

Prepare a data set comprising macroinvertebrate and habitat data collected from two mildly impacted test sites. The macroinvertebrate data should be from the same habitat and include both autumn and spring data. The data should be saved as an Excel spreadsheet. Photocopies of the autumn and spring field sampling sheets can be used to provide the habitat data.

### Assessment

Participants are required to manipulate the data into the format required by AUSRIVAS and run the data through a combined season model.

### Marking

Award marks for each question according to the marking scheme shown below. Participants receive full marks for each criterion correctly completed, and zero marks for those criteria incorrectly completed (i.e., a proportion of a mark cannot be given). A mark of 90% or greater is required to pass Exercise 2. Record the mark for Exercise 2 in the space provided on the Accreditation Assessment Results Summary Sheet. Work through any areas of difficulty with participants.

Assessable Criteria	Marks	Comments
• Predictor Variables Correct	___/ 5	
• Macroinvertebrate data in correct format:		
- Autumn and spring macroinvertebrate data combined	___/ 5	
- Adults and larvae combined	___/ 2	
- Bug codes correct	___/ 5	
- Zeros added and no blanks found	___/ 2	
- Data with sites as rows and bugs as columns	___/ 2	
- File saved as text (tab delimited) file	___/ 1	
• Habitat data in correct format:		
- Autumn and spring habitat data combined	___/ 5	
- Habitat codes correct	___/ 3	
- Zeros added and no blanks found	___/ 2	
- Data with sites as rows and habitat variables as columns	___/ 2	
- Sites in the same order as the bug data	___/ 2	
- File saved as text (tab delimited) file	___/ 1	
• Imported the bug file into AUSRIVAS successfully	___/ 2	
• Imported the habitat file into AUSRIVAS successfully	___/ 2	
• Choose the correct AUSRIVAS model i.e. region, season and habitat	___/ 3	
• Exported the AUSRIVAS predicted/collected sheet successfully	___/ 2	
• Opened the AUSRIVAS predicted/collected sheet in excel and saved the file as an excel spreadsheet	___/ 2	
<b>Total</b>	___/ 48	

## *Interpreting the Results*

### **Exercise 3. Site Assessment**

#### Preparation

Prepare two data sets comprising AUSRIVAS combined season pool and edge model outputs for five sites. As the first part of this exercise is designed to test whether course participants know the rules for combining bands, sites exhibiting different band assessments between habitats should be used.

#### Assessment

Participants are required to complete the summary table, indicating the:

- Overall site assessment - determined by combining assessments from the pool and edge habitats.

The rules for combining assessments from different habitats are as follows. Where the bandings from both habitats allocate the site to the same band, then that is the final band allocation for the site. Where there is a mismatch in the band allocation from the two habitats, then allocate the site to the band that is farther from band A. In the rare event that the alternative bands are band B and band X, allocate to band B, because this is the most precautionary approach.

- Habitat used for the overall site assessment. If both pool and edge habitats are placed into the same band, the habitat with the lowest O/E taxa ratio should be referred to.
- Taxa predicted to occur but not collected in the habitat used for the overall site assessment.

#### Marking

Award marks for each question according to the marking scheme shown below. Participants receive full marks for each criterion correctly completed, and zero marks for those criteria incorrectly completed (i.e., a proportion of a mark cannot be given). A mark of 90% or greater is required to pass Exercise 3. Record the mark for Exercise 3 in the space provided on the Accreditation Assessment Results Summary Sheet. Work through any areas of difficulty with participants.

<b>Assessable Criteria</b>	<b>Marks (1 mark per site)</b>	<b>Comments</b>
• Overall site assessment correct	/ 5	
• Habitat used in overall site assessment correct	/ 5	
• Taxa predicted but not collected correct	/ 5	
<b>Total</b>	<b>/ 15</b>	

## **Exercise 4. Interpreting Results**

### Assessment

Participants are required to list 5 of the steps that one can take when interpreting AUSRIVAS results. Steps include:

- Check for data entry errors – bug data and habitat data.
- Check “Unused Bugs” for any bugs which should have been used by AUSRIVAS but were maybe given the wrong code.
- Examine O/E values in relation to the band width e.g., if a site is assigned Band B, how far below reference is the site?
- Band X – may require further examination – possible biological “hot spot”, nutrient enrichment, constant flow in normally intermittent stream etc.
- Examine the list of taxa predicted to occur but not collected.
- Examine field data sheets for impact indicators, including
  - poor water quality
  - poor habitat (may be naturally poor)
  - land use impacts
  - point source pollution
  - non-point source pollution
  - dams/barriers upstream
  - recent flooding or low flows
  - under-sampling
  - poor live-sorting conditions
- May need to draw a conclusion of “no reliable assessment possible”

Steps other than those listed above may be deemed acceptable.

### Marking

Award 1 mark for each of the 5 steps listed. A mark of 4 out of 5 (80%) or greater is required to pass Exercise 4. Record the mark for Exercise 4 in the space provided on the Accreditation Assessment Results Summary Sheet. Work through any areas of difficulty with participants.

Note: To pass Module 4 participants must pass all four exercises.

## **REFERENCES**

Gunn, B., Cranston, P.S., Dimitriadis, S. & Trueman, J.W.H. (1999). *Interactive guide to Australian Aquatic Invertebrates*. Windows edn 2. CSIRO, Land & Water Resources Research & Development Corporation, & Environment Australia: Canberra.

Hawking J.H. (2000) *Key to Keys: A Guide to keys and zoological information to identify invertebrates from Australian inland waters, Identification Guide No. 2*, 2nd Edn. Cooperative Research Centre for Freshwater Ecology, Albury, NSW.



## APPENDICES

### Appendix 1 Accreditation Assessment Results Summary Sheet

Participants Name: \_\_\_\_\_

MODULE	MARK (%)	MARK (%) REQUIRED TO PASS	PASS/FAIL	COMMENTS
<b>MODULE 1</b>				
Exercise 1		≥90		
<b>MODULE 2</b>				
Exercise 1		≥90		
Exercise 2		≥90		
Exercise 3		≥90		
Exercise 4		See Page 22		
<b>MODULE 3</b>				
Exercise 1		≥95		
Exercise 2		≥95		
<b>MODULE 4</b>				
Exercise 1		≥90		
Exercise 2		≥90		
Exercise 3		≥90		
Exercise 4		≥80		

MODULE	PASS/FAIL
Module 1	
Module 2	
Module 3	
Module 4	

Organisation Conducting Course: \_\_\_\_\_

Instructor's Name: \_\_\_\_\_

Instructor's Signature: \_\_\_\_\_

Date: \_\_\_\_\_