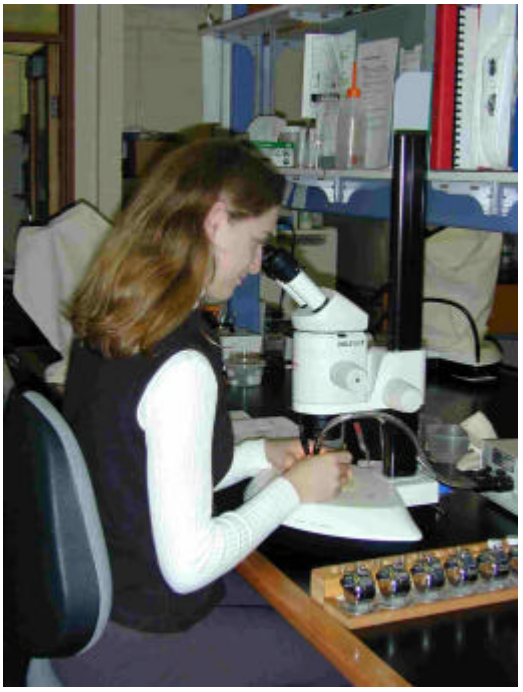
AUSTRALIAN CAPITAL TERRITORY

AUStralian RIVer Assessment System

AUSRIVAS

ACCREDITATION MANUAL



ENVIRONMENT ACT

COOPERATIVE RESEARCH CENTRE FOR FRESHWATER ECOLOGY

Natural Heritage Trust

Environment Australia

Department of the Environment and Heritage

AUSTRALIAN CAPITAL TERRITORY AUStralian RIVer Assessment System (AUSRIVAS) ACCREDITATION MANUAL

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For further information, visit the AUSRIVAS web site at
http://ausrivas.canberra.edu.au

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Front Cover Photograph:
Amara Barlow identifying macroinvertebrate sample. Photo by Phil Sloane.

TABLE OF CONTENTS

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 Australian Capital Territory (ACT) AUSRIVAS Training and Accreditation Course has been developed to provide uniformity and consistency in the application of AUSRIVAS methods in the ACT. 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

Module 3
Laboratory
- Sample processing – laboratory sub-sample
- 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 ACT 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 an ACT AUSRIVAS operator. Assessment sheets should be photocopied from the manual or printed from the ACT 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 ACT 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 - Page 1
Complete page 1 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.

- ACT 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 - Page 1

Preparation

Before conducting Exercise 1, the instructor must complete page 1 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 page 1 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.

Mark Allocation Sheet No. 1

ACT SITE INFORMATION SHEET (Version 2.0 Dec 2000)

RIVER_____(5)_____ **LOCATION CODE**__(1)__ __(1)__ **2** __(3)__

(Drainage divn. / Basin / 2 / Site)

LOCATION_____(3)_____

CATCHMENT_____(1)_____

STREAM ORDER (derived from 1:100 000 map)__(5)__

DISTANCE FROM SOURCE___(5)___**km**

CATCHMENT AREA UPSTREAM__(5)___**km²** **ALTITUDE**__(5)__**m asl**

GPS & MAP DETAILS

GPS DATUM (as set on the GPS at the time you recorded your position)____(3)____

LATITUDE_____(5)_____ **LONGITUDE**_____(5)_____

ZONE__(3)__ **EASTING**_____(5)_____ **NORTHING**____(5)_____

MAP NAME_____(1)_____ **SCALE**_____(1)_____

NUMBER_____(1)_____ **EDITION**_____(1)_____

JOINING MAP NAMES/NUMBERS_____(1)_____

_____

Page Total = 65

SITE ACCESS PHOTOGRAPH - DATE OF PHOTO_____

NOT ASSESSED

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.

Variable	Acceptable Error
Distance from Source	± 10%
Catchment Area Upstream	± 10%
Altitude	± 20m
Latitude	± 00° 00' 04"
Longitude	± 000° 00' 04"
Easting	± 100m
Northing	± 100m

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 1

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 riffle and edge sample from site _____ and place into separate labelled sample containers. A mark of 90% or greater (averaged over the two habitats) is required to pass Exercise 2.

Assessable Criteria	**Riffle 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 sample container	___/ 4	___/ 4
• Sample container correctly labelled	___/ 2	___/ 2
• Sample preserved correctly with operator wearing protective gloves, goggles and clothing (as required).	___/ 2	___/ 2
Total	___/ 20	___/ 20

(Exercise 3 Mark =____%).

Note: A mark of 90% or greater is required in all three exercises to pass Module 2.

AUSRIVAS ACCREDITATION

MODULE 2 - INSTRUCTORS NOTES

Field Work

A list of materials and resources required for Module 2 is given below.

ITEM	QUANTITY	CHECK
ACT Sampling and Processing Manual		
Kicknets 250 mm mesh		
Sieves, 250 mm mesh for "rapid" sampling		
Small plastic bucket		
Medium white tray		
Formaldehyde - buffered & with Rose Bengal stain		
Gloves - for handling formalin		
Bug sampling containers		
Bottles - 250ml plastic for water quality samples		
Flow meter		
Float (if flow meter fails)		
Waders + spare		
Wader repair kit		
Hydrolab		
Alkalinity kit		
Backpacks for Hydrolab, equipment etc		
Spare battery		
Spare DO membranes & O_2 probe solution		
Hydrolab calibration standards		
Hydrolab calibration instructions		
Barometer		
GPS		
Digital camera		
Mobile phone		
Site Information Sheets		
Field Sampling Sheets		
Clipboard		
Maps		
Marker pens/ pencils		
Esky (large) & Ice		
First Aid Kit		
4WD recovery equipment		
Tape measure 100m		
Calculator		
Camera & film		
Sunscreen		
Toilet paper / shovel		
Rain Jackets		
Plastic bags for veg. samples		
Reference - "A Field Guide to Waterplants in Australia" Sainty & Jacobs 1994		

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. Once participants have completed the exercise, collect the field sampling sheets, ensuring participant's names are on the front page. Participants should retain their Module 2 assessment sheet until all Module 2 exercises have been completed.

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.

Mark Allocation Sheet No. 2

ACT FIELD SAMPLING SHEET

GRAND TOTAL = 403

DATE ..(5).. **TIME** ..(1).. **LOCATION CODE** ..(5)..

RIVER ..(5).. **LOCATION** ..(3)..

PROJECT ..(3).. **TEST/REFERENCE SITE** ..(3)..

RECORDERS NAME ..(3).. **PHOTOGRAPH NUMBER (S)** ..(1)..

WEATHER ..(1).. **AIR TEMPERATURE** ..(1).. °C

CLOUD COVER ..(1)..% **RAIN IN LAST WEEK ?** Y [ ] N [ ] (1)

MEASUREMENTS **Water sample(s)[1] taken? yes [(1)] number...(1)..... no [ ]**

		Instrument		
Water Temperature[1] (°C)	(3)	(1)	**Barometric Pressure (millibars)**	N/A
Conductivity[1] (mS cm^{-1})	(3)	(1)	**Alk. H_2SO_4 (ml)/H_2O (ml)**	(1) / (1)
pH[1]	(3)	(1)	**Alkalinity (mg l^{-1})**	(5)
Dissolved Oxygen[1] (mg l^{-1})	(3)	(1)	**NOX (mg l^{-1})**	N/A
% Sat. Dissolved Oxygen[1]	(3)	(1)	**Total Phosphorus (mg l^{-1})**	N/A
Turbidity[1] (NTU)	(3)	(1)	**Total Nitrogen (mg l^{-1})**	N/A

Bank height[2] ..(3)..m **Bank-full width[3]** ..(5)..m **Length of Reach[4]** ..(5)..m

Stream Widths[5] within reach[4] (m) **Min**..(1).. **Max**..(1).. **Mode**..(5)..

% habitat in Reach[4]		**Depth[6] (cm)** 1	2	3	mean (cm)	**Velocity[6,7] (revs/30sec [ ] / m s^{-1} [ ])[8]** (1) U / L	U / L	U / L	mean (m s^{-1})
Riffle[9]	(5)	(1)	(1)	(1)	(5)	(1)	(1)	(1)	(5)
Pool[9]	(5)								
Run[9]	(5)								
Edge[10]	(5)/100	(1)	(1)	(1)	(5)	(1)	(1)	(1)	(5)
M'phyt	(5)/100	**Flow meter type**..(1)..				**Flow meter fan no.** ..(1)..			

[1] Measured/sampled from riffle, or centre of stream if no riffle is present. [2] Measured from water surface vertical to top of bank (bank-full height). [3] Distance between tops of banks (top of bank as determined in note 2). [4] Reach: 5 times the mode bank-full width either side of riffle sampling site, unless bank-full width <10m then the minimum reach length = 100m. [5] Measured from edges of water. [6] If depth ≥ 30cm then measure flow at 4/5 depth (U = Upper) & at 1/5 depth (L = Lower); if <30cm, measure at 1/2 depth only. [7] Three measurements taken to encompass flow variability within habitats. [8] Indicate units used to record flow. [9] Riffle, Pool & Run together must total 100. [10] Length of both banks as % of reach length that can be effectively sampled with sweep net.

RIPARIAN VEGETATION

Width of riparian zone[11] within reach[4]: estimated / measured left bank[12] ..(5)..m
estimated / measured right bank[12] ..(5)..m

Vegetation type:	% Cover of riparian zone[13]	Description
trees (>10m)	(5)	(1)
trees (<10m)	(5)	(1)
shrubs	(5)	(1)
grasses / ferns / sedges	(5)	(1)

Shading of river[14]: **1** = <5% [ ] **2** = 6-25% [ ] **3** = 26-50% [ ] **4** = 51-75% [ ] **5** = >76% [ ] (5)

Native vegetation[15] ..(1)..%
Exotic vegetation[15] ..(1)..%

[11] Area where waterway interacts with vegetation. [12] Facing downstream. [13] From 'plan' view, estimation of outline cover; may or may not total >100%. [14] Estimate as if sun directly overhead. [15] Native & Exotic vegetation together must total 100%.

N/A = Not Assessed

Page Total = 187

RIVER.....(1)..... **DATE**.....(1)..... **LOCATION CODE**.....(1).....

OBSERVATIONS (Circle and indicate appropriate number in box)

WATER ODOURS:	**1. normal**	**2. sewage**	**3. petroleum**	**4. chemical**	**5. none**	**[ ]**	(1)
WATER OILS:	**1. slick**	**2. sheen**	**3. globs**	**4. flecks**	**5. none**	**[ ]**	(1)
TURBIDITY:	**1. clear**	**2. slight**	**3. turbid**	**4. opaque**		**[ ]**	(1)
PLUME: (amount of fine sediment generated when kick-sampling)		**1. little**	**2. some**	**3. lots**		**[ ]**	(1)
SEDIMENT OILS:		**1. absent**	**2. light**	**3. moderate**	**4. profuse**	**[ ]**	(1)
SEDIMENT ODOURS:		**1. normal**	**2. sewage**	**3. petroleum**	**4. chemical**		
		5. anaerobic	**6. none**	**7. other.....**		**[ ]**	(1)

FLOW LEVEL: (relative to "water mark" ie. 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**	**[ ]** (1)

Bare ground above water mark: area in riparian zone expected to be vegetated but bare. **Left bank**[12] **...(1).....%**

Right bank[12] **.....(1)...%**

Are the undersides of stones which are not deeply embedded black? **1. yes** **2. no** **[ ]** (1)

SEDIMENT DEPOSITS: **1. none** **2. sludge** **3. sawdust** **4. paper fibre**
5. sand **6. relict shells** **7. silt** **8. other.....[ ]** (1)

LOCAL CATCHMENT EROSION: **1. none** **2. some** **3. moderate** **4. heavy** **[ ]** (1)

LOCAL PS [16] POLLUTION: **1. no evidence** **2. potential.....** **3. obvious.....** **[ ]** (1)

LOCAL NPS [16] POLLUTION: **1. no evidence** **2. potential.....** **3. obvious.....** **[ ]** (1)

DAMS / BARRIERS: **1. present - upstream / downstream** **2. absent** **[ ]** (1)

RIVER BRAIDING: **1. yes** **no. of braids .....** **2. no** **[ ]** (1)

SITE CLASSIFICATION[17]:

1. steep valley **2. broad valley** **3. wetland/bog** **4. heath**
5. levees present **6. stream bars** **7. natural riparian meadow** **8. Other.....** **[ ]** (1)

LANDUSE[17]: Left Bank[12]

1. Native forest **2. Forestry** **3. Grazing** **4. Native grassland (no grazing)**
5. Exotic grassland (no grazing) **6. Cropped** **7. Residential**
8. Commercial **9. Industrial** **10. Recreational** **11. Other.....** **[ ]** (1)

LANDUSE[17]: Right Bank[12]

1. Native forest **2. Forestry** **3. Grazing** **4. Native grassland (no grazing)**
5. Exotic grassland (no grazing) **6. Cropped** **7. Residential**
8. Commercial **9. Industrial** **10. Recreational** **11. Other.....** **[ ]** (1)

BARS: (bed surface protruding from normal water level & forming a bar) **.....%** (1)

[12] Facing downstream. [16] PS = Point Source, NPS = Non Point Source. [17] Within the reach measurements; may indicate more than one category if required.

Page Total = 23

RIVER.....1..... **DATE**.....1..... **LOCATION CODE**.....1.....

REACH[4]

SUBSTRATUM DESCRIPTION (% cover): **ORGANIC SUBSTRATUM** (% cover of inorganic substrate)

			PHI
Bedrock		[.....3.....]	-9.5
Boulder	(>256mm)	[.....5.....]	-9.0
Cobble	(64-256mm)	[.....5.....]	-6.5
Pebble	(16-64mm)	[.....5.....]	-4.5
Gravel	(2-16mm)	[.....5.....]	-2.0
Sand	(0.06-2mm)	[.....3.....]	2.0
Silt	(0.004-0.06mm)	[.....3.....]	6.5
Clay	(<0.004mm)	[.....3.....]	9.5

Detritus (sticks, wood, CPOM[18]) [.....1.....]
Muck/Mud (black, very fine organics) [.....1.....]

Percent of reach covered by:

	Category					
Periphyton	**1**	**2**	**3**	**4**	**5**	3
Moss	**1**	**2**	**3**	**4**	**5**	3
Filamentous algae	**1**	**2**	**3**	**4**	**5**	3
Macrophytes	**1**	**2**	**3**	**4**	**5**	3

1= <10% 2=10-35% 3=35-65% 4=65-90% 5=>90%

[4] Reach: 5 times the mode bank-full width either side of riffle sampling site, unless bank-full width <10m then the minimum reach length = 100m.
[18] Course Particulate Organic Material.

RIFFLE

Macroinvertebrates collected by .....1.....
Macroinvertebrates picked/ sorted by .....N/A.....
Method: Kicknet [ ] 1 Other.....
Length of riffle sampled 10 metres [ ] Other.....metres.
Sample preserved [ ] 1

SUBSTRATUM DESCRIPTION (% cover): **ORGANIC SUBSTRATUM** (% cover of inorganic substrate)

			PHI
Bedrock		[.....3.....]	-9.5
Boulder	(>256mm)	[.....5.....]	-9.0
Cobble	(64-256mm)	[.....5.....]	-6.5
Pebble	(16-64mm)	[.....5.....]	-4.5
Gravel	(2-16mm)	[.....5.....]	-2.0
Sand	(0.06-2mm)	[.....3.....]	2.0
Silt	(0.004-0.06mm)	[.....3.....]	6.5
Clay	(<0.004mm)	[.....3.....]	9.5

Detritus (sticks, wood, CPOM[18]) [.....1.....]
Muck/Mud (black, very fine organics) [.....]

Percent of riffle covered by:

	Category					
Periphyton	**1**	**2**	**3**	**4**	**5**	3
Moss	**1**	**2**	**3**	**4**	**5**	3
Filamentous algae	**1**	**2**	**3**	**4**	**5**	3
Macrophytes	**1**	**2**	**3**	**4**	**5**	3

1= <10% 2=10-35% 3=35-65% 4=65-90% 5=>90%

[18] Course Particulate Organic Material.

Page Total = 98

RIVER.....1..... **DATE**.....1..... **LOCATION CODE**.....1.....

EDGE / BACKWATER:

Macroinvertebrates collected by .....1.....
Macroinvertebrates picked/ sorted by .....N/A.....
Method: Sweep [ ] 1 Other.....
Length of edge sampled 10 metres [ ] Other.....metres.
Sample preserved [ ] 1

SUBSTRATUM DESCRIPTION (% cover): **ORGANIC SUBSTRATUM** (% cover of inorganic substrate)

		PHI		
Bedrock	[.....3.....]	-9.5	**Detritus (sticks, wood, CPOM[18])**	[.....1.....]
Boulder (>256mm)	[.....5.....]	-9.0	**Muck/Mud (black, very fine organics)**	[.....1.....]
Cobble (64-256mm)	[.....5.....]	-6.5		
Pebble (16-64mm)	[.....5.....]	-4.5		
Gravel (2-16mm)	[.....5.....]	-2.0	Trailing Bank Vegetation:	
Sand (0.06-2mm)	[.....3.....]	2.0	1=nil [ ] 2=slight [ ] 3=moderate [ ] 4=extensive [ ]	5
Silt (0.004-0.06mm)	[.....3.....]	6.5	Description:	
Clay (<0.004mm)	[.....3.....]	9.5	.....1.....	

Percent of edge covered by:	**Category**					
Periphyton	**1**	**2**	**3**	**4**	**5**	1
Moss	**1**	**2**	**3**	**4**	**5**	1
Filamentous algae	**1**	**2**	**3**	**4**	**5**	1
Macrophytes	**1**	**2**	**3**	**4**	**5**	5

1= <10% 2=10-35% 3=35-65% 4=65-90% 5=>90%

[18] Course Particulate Organic Material.

MACROPHYTES

Indicate whether the following common taxa are present in the reach:

SUBMERGED/ FLOATING	EMERGENT
Ceratophyllum (Hornwort)	*Callitriche* (Starwort).....
Chara (Stonewort).....	*Carex* (Tussock Sedge) .....
Elodea (Canadian Pondweed)	*Crassula* (Crassula) .....
Myriophyllum (Water Milfoil) 3	*Cyperus* (Sedge).....
Nitella (Stonewort)	*Eleocharis* (Spikerush).....
Potamogeton (Pondweed)	*Juncus* (Rush).....
Triglochin (Water Ribbon)	*Paspalum* (Water Couch) .....
Vallisneria (Ribbonweed)	*Polygonum* (Smartweed) .....
Other	*Phragmites* (Common Reed).....
.....	*Ranunculus* (Buttercup) .....
.....	*Scirpus* (Clubrush).....
.....	*Typha* (Cumbungi).....
.....	Other .....

Vegetation samples collected: Yes [ ] No [ ] 1

Epiphyte cover on macrophytes Nil [ ] Slight [ ] Moderate [ ] Extensive [ ] 1

Notes:
.....N/A.....
.....
.....

Page Total = 59

RIVER..... (1) **DATE**..... (1) **LOCATION CODE**..... (1)

	CATEGORY			
Habitat Variable	**Excellent**	**Good**	**Fair**	**Poor**
(3) **1. Bottom substrate/available cover**	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 other stable habitat. Lack of habitat is obvious 5, 4, 3, 2, 1, 0
(3) **2. Embeddedness**	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
(3) **3. Velocity/depth category**	Slow deep (<0.3 m/s & >0.5m); 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 2 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
(3) **4. Channel alteration**	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 w/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
(3) **5. Bottom scouring and deposition**	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 obstruction 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

Page Total = 18

RIVER..... (1) ..... **DATE**..... (1) ..... **LOCATION CODE**..... (1) .....

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

Total Habitat Score (1)

From US EPA RBA Protocols 1989

(Office use only) Entered on Computer [ ] By: _____ Date: _____
Quality Control [ ] By: _____ Date: _____

N/A

Page Total = 18

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
Air Temperature (^{o}C)	± 10%
Cloud Cover	± 10%
Water Temperature (^{o}C)	± 10%
Conductivity (µS cm^{-1})	± 10%
pH	± 10%
Dissolved Oxygen (mg l^{-1})	± 10%
% Sat. Dissolved Oxygen	± 10%
Turbidity (NTU)	± 10%
Alkalinity (mg l^{-1})	± 10%
Bank height	± 20%
Bank-full width	± 20%
Length of Reach	± 20%
Stream width – Min, Max and Mode	± 20%
% habitat in Reach	± 10%
Depth (cm)	± 20%
Velocity	± 20%
Width of riparian zone	± 20%
% cover of riparian zone	± 10%
Native vegetation	± 10%
Exotic vegetation	± 10%
Bare ground above water mark	± 10%
Bars	± 10%
Substratum description (% cover of each size category)	± 10%
Detritus	± 10%
Muck/Mud	± 10%

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.

Mark Allocation Sheet No. 3

ACCESS DETAILS

DIRECTIONS (5) _____

_____

_____

_____

Given

LAND-OWNER/MANAGER_____

ADDRESS_____

PHONE NUMBER_____

Given

NOTIFY BEFORE EACH VISIT? **Y [ ]** **N [ ]**

PERMISSION REQUIRED? **Y [ ]** **N [ ]**

KEY REQUIRED? **Y [ ]** **N [ ]** **No.**_____

KEY AVAILABLE FROM_____

SKETCH OF ACCESS ROUTE

Include:

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

SKETCH OF REACH

Include:

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

Page Total = 15

Macroinvertebrate Sampling

Exercise 3. Sample Collection

Assessment
While completing Exercises 1 and 2, take each course participant aside and assess them collecting a riffle 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.

Assessable Criteria	**Riffle 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 sample container	___/ 4	___/ 4
• Sample container correctly labelled	___/ 2	___/ 2
• Sample preserved correctly with operator wearing protective gloves, goggles and clothing (as required).	___/ 2	___/ 2
Total	___/ 20	___/ 20

Note: A mark of 90% or greater is required in all three exercises to pass Module 2.

AUSRIVAS ACCREDITATION

MODULE 3 – ASSESSMENT SHEET

Page 1 of 2

Name: _____

Laboratory

Sample Processing

Exercise 1. Laboratory Sub-Sample
Collect a 200 organism sub-sample from both a riffle and edge sample following the ACT laboratory sub-sampling protocols (see ACT Sampling and Processing Manual for details). Retain the sub-sample residues in separate containers. Your instructor will sort through the sub-sample residues to ensure all the required animals have been removed. To pass you are required to recover an average of ≥ 95% of the total number of organisms from the two sub-samples.

(Exercise 1 Mark =____%).

Macroinvertebrate Identification

Exercise 2. Reference Collection Identification
Identify macroinvertebrates in the reference collection to family taxonomic level, except for 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 2 you must achieve a "Percent Taxa Error" of ≤ 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.

Percent Taxa Error	
Number of Taxa Errors (a)	
Total Number of Original Taxa (b)	
Percent Taxa Error ([a/b] x 100)	
Pass or Fail? (Pass if ≤ 5%)	

(Exercise 2 Mark =____%).

MODULE 3 – ASSESSMENT SHEET

Page 2 of 2

Exercise 3. Sample Identification
Identify each of the macroinvertebrate sub-samples collected from the riffle and edge habitats to family taxonomic level, except for 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 3 you must achieve a "Percent Taxa Error" of ≤ 5% (averaged over the two samples).

(Exercise 3 Mark =____%).

Exercise 4. Scan
Place the unsorted sample residues into separate trays and scan each for 15 minutes, collecting any taxa not found in the sub-samples. Macroinvertebrates collected during the scans should be kept separate from macroinvertebrates collected in the sub-samples and recorded on separate data sheets.

After you have scanned each of your samples for 15 minutes, your instructor will also scan the samples. To pass you are required to collect ≥ 90% of the taxa collected by your instructor (averaged over the two samples). Remember, only taxa not found in the original sub-sample should be collected.

(Exercise 4 Mark =____%).

Note: To pass Module 3 you must pass Exercises 1 and 4 and achieve a "Percent Taxa Error" of ≤ 5% (averaged over Exercises 2 and 3).

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 ACT AUSRIVAS models
- Riffle 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, 2nd 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
- Sub-sampling box and vacuum pump
- Large white plastic sorting tray (for scan)
- Ethanol
- Squeeze bottles (for water and ethanol)
- Glycerol (dropper bottle)

Sample Processing

Exercise 1. Laboratory Sub-Sample

Preparation
Prepare laboratory with equipment required for sub-sampling (see above).

Assessment
Participants are required to collect a 200 organism sub-sample from both a riffle and edge sample following the ACT laboratory sub-sampling protocols (see ACT Sampling and Processing Manual for details). Ask participants to retain the sub-sample residues in separate containers. Sort through each participant's sub-sample residues and ensure all the required animals have been removed. Record the number of organisms missed by each participant. Place these organisms into separate vials. These organisms should be added to the 200 organism sub-samples once Exercise 1 has been assessed.

Marking
To pass participants are required to recover an average of ≥ 95% of the total number of organisms from the two sub-samples. 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.

Macroinvertebrate Identification

Exercise 2. 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 ACT AUSRIVAS models is needed for this exercise.

Assessment
Participants are required to identify macroinvertebrates in the reference collection to family taxonomic level except for 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 must achieve a "Percent Taxa Error" of ≤ 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.

Percent Taxa Error	
Number of Taxa Errors (a)	
Total Number of Original Taxa (b)	
Percent Taxa Error ([a/b] x 100)	
Pass or Fail? (Pass if ≤ 5%)	

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.

Exercise 3. Sample Identification

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

Assessment
Participants are required to identify macroinvertebrate sub-samples collected from both the riffle and edge habitats to family taxonomic level, except for 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 3, participants are required to achieve a "Percent Taxa Error" of ≤ 5% (averaged over the two samples). Record the mark for Exercise 3 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 4. Scan

Preparation
Prepare laboratory with equipment required for a scan (see above).

Assessment
Participants are required to place their unsorted sample residues into separate trays and scan each for 15 minutes, collecting any taxa not found in the sub-samples. Macroinvertebrates collected during the scans should be kept separate from macroinvertebrates collected in the sub-samples and recorded on separate data sheets.

After the participants have scanned each of the samples for 15 minutes, re-scan the samples for another 15 minutes, collecting taxa not found in the original sub-samples.

Marking
To pass participants are required to collect ≥ 90% of the taxa collected by the instructor (averaged over the two samples). Record the mark for Exercise 4 in the space provided on the Accreditation Assessment Results Summary Sheet. Show participants any taxa missed in their scan.

Note: To pass Module 3 participants must pass Exercises 1 and 4 and achieve a "Percent Taxa Error" of ≤ 5% (averaged over Exercises 2 and 3).

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 **ACT Autumn Edge** AUSRIVAS model and list below.

Predictor Variables Used:

_____
_____
_____
_____
_____
_____
_____
_____
_____

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 **ACT Combined-Season Edge** AUSRIVAS model and list below.

Predictor Variables Used:

_____
_____
_____
_____
_____
_____
_____
_____
_____

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 riffle 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 riffle 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

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	
Total	___/ 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	
Total	___/ 48	

Interpreting the Results

Exercise 3. Site Assessment

Preparation
Prepare two data sets comprising AUSRIVAS combined season riffle 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 riffle 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 riffle 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.

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

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
    - 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
MODULE 1				
Exercise 1		≥90		
MODULE 2				
Exercise 1		≥90		
Exercise 2		≥90		
Exercise 3		≥90		
MODULE 3				
Exercise 1		≥95		
Exercise 2		≥95		
Exercise 3		≥95		
Exercise 4		≥90		
MODULE 4				
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: _____