# Planning and coordinating

# Do you need to start a community monitoring group?

A particular issue in the community can often spark a new project. An individual or group may realise that they need more information and/or that resources are available that could be used by a community group. The first step is to do some research:

- Contact SA MDB NRM Board staff to determine if a similar community project is underway. It is possible that someone is doing something about your issue and you can link with them rather than set up another community monitoring group.
- Find out if your issue is identified in other planning exercises, such as SA MDB NRM Regional NRM Plan, Local Action Plans, Wetland Management Plans or Water Allocation Plans.
- Look at NRM reports, for example from the SA MDB NRM region - do they support the need for monitoring data about your issue

If it appears there is a good reason to set up a new community monitoring group, now is the time to do some planning. Here are some questions to help you think about planning:

- Why do you want to monitor the issue?
- Where do you plan to undertake the monitoring?
- When you are going to do the monitoring?
- Which method will you use to monitor?
- Who will be affected, who will be involved, who needs to know about the project and your results?
- What data quality do you want?
- How will the data collected be stored and managed?
- How will the collected data be analysed?
- How will you communicate your results to users?
- How do you intend to make this happen, for example funding sources, technical support, training?

You may not be able to answer all these questions straight away and this is where the Toolkit can help including getting a monitoring group established.

Your group needs a monitoring plan, primarily for itself but also for users of data/information collected by your group. Without a plan your group may:

- be less likely to go forward together as one organisation, with one vision
- be unclear about whether or not you are achieving

your objective

- seem less credible to others
- run into difficulties that could have been avoided.

# Tips for established groups

Your group may already be taking action and monitoring. There may be some ways that you can enhance the value of your community monitoring group, which can lead to funding, training or technical support.

You may be tackling an NRM issue identified in other planning exercises, such as SA MDB NRM Board Regional Plan, Local Action Plan, Land and Water Management Plan, Wetland Management Plan, Water Allocation Plan. Other groups may also be interested in your monitoring data for NRM condition or performance reports. If either of these situations apply then you have identified potential users of your monitoring data and they can be listed in your communication plan.

If your group does not have a monitoring plan then there is an opportunity to develop one to ensure your monitoring meets your needs. Later on in this section you will find a monitoring plan template to help you get started.

If you already have a monitoring plan then there may be value in reviewing your plan and reflecting on whether it is as effective as it can be. The Toolkit has a later on evaluating and revising your monitoring plan. This includes examples of evaluation questions and approaches you might use to answer these questions. A template is provided containing mock questions and answers, which can be incorporated into your monitoring plan. You can also use the decision trees to help determine the parts of your plan that need revising.

Remember to inform people of the results of your evaluation. For example the SA MDB NRM Board are interested in what you learn, so make sure this is included in your communication plan.

# Tips for recruiting and retaining volunteers

Members of your community monitoring group may come and go. However, there are some things you can do to help recruit and retain volunteers.

Participation in an environmental monitoring program can be fun and educational. To encourage people to join in with the monitoring activities it is important to think about what makes participation easy and worthwhile. The experience from many programs implemented by volunteers shows that there are a few fundamentals to recruiting and retaining volunteers and the key steps to recruiting and retaining volunteers in an environmental monitoring program are listed in Table 1.

# Table 1 Key steps to recruiting and retaining volunteers

Step	Because volunteer members
Identify the tasks	want to know what is required of them and what they can contribute
Make contact	need to be encouraged that they are wanted and will be valued
Match tasks to interests and motivation	will be more engaged and likely to continue if the tasks suit them well
Explain time commitments	are likely to stay involved if they can plan their time effectively
Provide training	value learning opportunities and want support to do a good job
Seek feedback & ideas	are the ones who can best advise you about the rewards and obstacles to making a voluntary contribution

#### Step 1: Identify the tasks

Be sure to have a description of the activities of the group and the tasks you would like new participants to join in with. Meeting the expectations of volunteers is an important part of keeping them involved so you want them to know exactly what they are being asked to do and approximately how much of their time it will take. Don't assume that volunteers will understand what is required of them if you don't define and explain it for them.

Written instructions can be helpful for both recruiting volunteers and retaining new volunteers. Without written instructions, an individual may decline to volunteer - or may volunteer to do the job, but misunderstand exactly what it is he or she agreed to do and drop out after a short time.

A task is more likely to be completed and on time when your volunteers know that their contribution is important and that others are counting on them. So let them know the importance of what they are doing and how the job fits into the groups' overall goals. The following will assist:

 Have a job description outlining the list of activities that the volunteer can get involved with (see page 10 for an example).  Follow up verbal commitments with a thankyou note that includes a summary of the agreed activities.

#### Step 2: Make contact

When someone is thinking of joining your monitoring group they will also be thinking about the kinds of people they will be working with. Therefore, it is important to give them some information about the people in the group and some confidence that they will be welcomed and valued. This can best be achieved through the personal approach. Think about developing a plan for recruiting and retaining members. Recruits may come from a number of sources and it may be worth spreading your effort.

Here are a few general tips that might improve your success rate:

- Have a few members of the group working on recruitment. This will mean that you will start with a much bigger network to draw on.
- Have some information on the general activities of the group ready to give to people who show interest.
- Set a time in the year when you encourage new people to start. There may be a time that suits people in your community and potential members will be encouraged to join at the same time as others.
- Encourage new people to join with a friend and let them know there are other members new to the group.
- Reach out to as many people as possible who may be interested. You could use attendance sheets from information sessions or workshops you have conducted or results from interest surveys conducted by the group to get a starting list of names.

General or mass recruitment is useful for spreading the message about your need for volunteers as widely as possible. This form of recruitment can help to increase the numbers up but does not guarantee quality. These methods can communicate the idea that anyone can do the tasks and that new members may not be individually valued for the skills and experience can offer. Monitoring of the environment can be technical and not all people have an interest in contributing, to managing the natural environment, will want to be involved in monitoring. However, development and implementation of a successful monitoring program involves many skills such as communication and recruitment.

Recruits from general or mass campaigns should be well informed of the program of activities to avoid wasting the time and energy of the recruits and the existing group members. Recruitment of this kind can use:

- general announcements in newsletters or meetings
- distribution of brochures or posters
- use of advertisements of stories in the mass media.

Targeted or select recruitment is a good way to enlist people with particular skills and interests that are needed or desirable. This is a more intensive recruitment effort but offers the benefit of expanding the capability of the group. It is beneficial to:

- decide what skills and interests are needed in the group/monitoring program
- identify where people with these skills and interests can be located
- find a method of approaching and encouraging the new people to join the monitoring activities of the group e.g. prepare general information on the monitoring program, prepare a specific a 'job' description and identify the benefits of participation for the individual.

The best place to start to look for people with specific skills or interests is in the 'inner circle' of people who are already connected to current members of the group. Encouraging person-to-person recruitment means everyone in the group can play a role but it also means that group members need to understand the responsibilities and processes of recruitment. When this method is the sole source of recruitment the group should be aware of the risk of becoming 'inbred', ie. having a membership with too narrow a range of views and experience. Starting points for inner-circle recruitment are:

- current volunteers in the group or related groups
- friends and relatives of current group members
- professional staff of NRM agencies and organisations who may be happy to get involved

#### Step 3: Match tasks to interest and motivation

The level of motivations for participation that potential members have will depend on their current level of interest and their understanding of the responsibilities and benefits of participation. The easiest way to draw on the motivation of potential members is to understand their interests and match these with specific tasks within the group or monitoring program. Motives can vary widely and may include looking for a challenge, self-improvement, and interest in meeting new people or concern for the environment.

Take time to speak with prospective and new members about why they want to participate. This can help to identify the tasks that they may find rewarding. For example, whether people:

- prefer to work alone or in a group (people who prefer groups may enjoy field days, people who are comfortable working alone may be happy entering data etc.)
- are interested in water quality, plants and animals etc. to help to define the component of the monitoring program which may suit the volunteer
- have training or specific expertise e.g. chemistry or statistics
- are interested in getting some training in monitoring techniques.

#### Step 4: Explain time commitments

Volunteers are more likely to continue to participate in the activities of the monitoring program if they have a clear understanding of the commitments involved and can plan their time. It is worth explaining:

- number and dates of monitoring activities
- time taken for different monitoring and associated activities (eg. data collection, equipment maintenance, data entry)
- number and timing of other meetings and events of the group

A good monitoring program will also have clear objectives and be focussed on management decisions which need to be made in the future. Explain this to new members and provide an end-point for the current monitoring program if one can be agreed. Motivation may be higher for some people if they know there is a clear purpose and a set time for the activity they are contributing to. For example, if monitoring has been implemented to examine changes in water quality downstream of a new development, 1 or 2 years of monitoring may be enough to make reliable judgements about the impact of the development.

Time commitments can be written into the volunteer job description to ensure that everyone is clear about the expected commitments being made.

#### Step 5: Provide training

One of the key motivation for people to participate in community based monitoring of the environment is interest in the natural world and a desire to protect and manage it. Good quality training can contribute to the benefits and satisfaction volunteers receive from their involvement in a monitoring program. They can learn about the natural environment and also build skills and confidence in areas interest.

Training should be matched to the experience, needs and activities of the volunteer and can be supplemented by providing copies of monitoring manuals, procedures or notes from previous monitoring events. Think about the full range of training that might help group members. Training in data collection is usually readily available with support from NRM officers but there may be opportunities to develop or access training in:

- planning
- science of the environment or monitoring
- data analysis and interpretation, or
- communication.

New members may bring specific skills which can be shared with the group through a workshop or training session and members should be canvassed to determine if such expertise is available. It may also be possible to discuss training needs with other groups with similar needs and interests and develop joint training opportunities. Also try to stage training to closely follow the recruitment program to ensure that people who need the training are fresh, involved and ready to act with their newly acquired knowledge.

The training required for new members to contribute effectively to the group's activities can be written into the volunteer's job description.

#### Step 6: Seek feedback and ideas

It is good to keep a continuous check on the activities and satisfaction of members. Checking on the progress of tasks can provide an opportunity for feedback: from the new members to the group/leaders and from the group/leaders to the new members. Encouraging new members can help them to see their value to the group and sustain their involvement. Checking on tasks can be a chance to identify where additional support is needed but should not be arranged to measure volunteer effort or success. Opportunities can be made to get ideas from new members on how to run the program better or refocus efforts. Remember that new members may eventually become long-term members and leaders of the group.

Above all it is important to show appreciation and recognise the efforts of volunteers. This can be difficult when all members of the group are volunteers and employed project officers might be encouraged to take on this role. Simple ways of recognising the contribution of volunteers include:

- recognising volunteers publicly in newsletters or at meetings
- setting aside some time at an annual social function of the group to recognise or award people who make a substantial contribution.

## Developing a monitoring plan

A monitoring plan should outline the why, what, when, who and how of your monitoring activities. The preparation of a plan will serve as a useful exercise to clarify the intent of the monitoring and can be used as a resource for the community group to evaluate their monitoring effort. A monitoring plan template has been developed to assist your group. A completed example is provided in Appendix B.

#### Monitoring Methodology

The Plan requires details about the methodology used when collecting the data. If you are unsure of which methodology to use you can look at the list of monitoring methods (page 17 onwards). If you are already using a method, ensure it is documented and note where it can be located.

#### Purpose of monitoring

What is important it to have a clearly documented purpose for you monitoring.

There are many reasons why groups choose to monitor:

- increasing knowledge and understanding of natural resources for the community, decision makers and scientists
- influencing decision making at the local level to manage natural resources to determine appropriate management actions
- detecting change over time that may identify the requirement for changed management practices or assess effectiveness of management interventions
- contribute towards the needs of data/information users at a higher level, for example sub regional, regional, State Government, Australian Government.

# Table 2 Example of a Community Monitoring Volunteer Job Description

COMPONENT	EXAMPLES			
Purpose A general statement that identifies what the job is and why it is necessary.	Monitor surface water quality to inform management of the wetland			
Responsibilities List each duty and responsibility of the job. Be as specific as possible.	<ul> <li>Attend two field monitoring days per year</li> <li>Organise other volunteers for monitoring days</li> <li>Maintain the monitoring equipment</li> <li>Participate in meeting about the monitoring results and future wetland management</li> </ul>			
Qualifications List the skills, knowledge and attitudes you seek. Be careful not to over-qualify the position - you could lose some excellent volunteers. This may also be an opportunity to identify training needs	<ul> <li>interest in wetlands and water quality</li> <li>ability to communicate</li> <li>ability to delegate responsibility</li> <li>ability to maintain monitoring equipment</li> </ul>			
Relationships Who the volunteer reports or is accountable to.	<ul> <li>responsible to the wetland management group</li> <li>communicate with project officer and other monitoring personnel</li> </ul>			
Time Commitment Expectations regarding time demands of the job. Be specific! i.e., weekly, monthly, long-term basis, flexible, self-determined.	<ul> <li>2 field monitoring days per year</li> <li>attend 2 wetland management group meetings per year</li> </ul>			
Benefits What's in it for the volunteer? What is to be gained personally by doing the job?	<ul> <li>increased knowledge of the wetland and knowledge and skills about for wetland monitoring</li> <li>personal satisfaction</li> <li>opportunity to meet new people</li> <li>opportunity to effectively improve the quality and management of the wetland</li> </ul>			

# Job Description: .....

COMPONENT	
Purpose	
Responsibilities	
Qualifications	
Relationships	
Time Commitment	
Benefits	

# **Monitoring Plan Template**

# 1. Objective of Monitoring

Why is the monitoring being done? Is it to inform local planning, as a formal part of regional monitoring against targets, for the interest of the participants?

# 2. Other Related Monitoring and Associated Activity

Record other projects which may influence or interact with the monitoring activities described in this plan. This may include activities of the group, other stakeholders, and activities which are planned but not yet started.

# 3. Methodology Used

What methods are used, where are the methods described? How often is data collected and when, who is responsible for making sure the monitoring happens and who is willing to participate?

Use the QA/QC guidelines and quality control sampling to help complete this table and determine the quality of the data that will be collected. ?

Method	Reference (where are the methods described?)	Timing	Responsibility	QA/QC checklist

# 4. Location of Monitoring

Include as much detail on the location of the monitoring sites as possible, eg. GIS datum (e.g. GDA94), GPS location (or GPS points of a polygon that describes the area), map reference, diagram or map of the location

# 5. Data Storage

In what format will the data be stored (eg. excel spreadsheet, government or web-based database, paper-based files), what data will be stored, where will the data be stored, who is responsible for storing the data. Refer to other sections of this toolkit including data management and contributing to online databases.

Format	Data to be stored (eg. Fields, maps, photos)	Location of data storage	Responsibility

# 6. Data Analysis Reporting

Who will do the analysis, what analyses will they use, how will it be presented, who will it be presented to? Refer also to data display control plots (page XXX) and monitoring quality assurance and quality control.

Analysis tool	Responsibility	Presentation	To Whom

# 7. Additional Metadata

Use the categories below to record additional project metadata required for others to understand and use the data you have collected.

Category	Element	Metadata
Dataset	Identifier	
	Title	
Custodian	Custodian	
	Jurisdiction	
Description	Abstract	
	Search Word	
	Geographic Extent Name	
Data Currency	Beginning Date	
	Ending date	
Dataset Status	Progress	
	Maintenance and Update Frequency	
Access	Stored Data Format	
	Available Format Type	
	Access Constraint	
Data Quality	Lineage	
	Positional Accuracy	
	Attribute Accuracy	
	Logical Consistency	
	Completeness	
Contact Information	Contact Organisation	
	Contact Position	
	Mail Address	
Meta-data Date	Meta-data Date	

Refer also to data management guidelines.

# 8. Communication Plan

Who do you want to communicate your message to, how will you communicate the message most effectively, when do the different tasks of communicating need to be undertaken and who will be responsible for each?

Refer also to the communication section of the toolkit including examples of media releases and briefing papers.

Communication Objectives:					
Target Audience	Communication Tool	Timing and Frequency	Responsibility (including deadlines)		

# 9. What Support is Available / Required?

What technical support resources, volunteer assistance etc is available to assist with the monitoring?

Refer also to the toolkit section on recruitment tips.

# 10. Evaluation and Reflection

Choose components of the project which should be reviewed and/or evaluated to ensure that the project is on track and that learning is captured. Methods for answering these questions should be chosen to be easy to implement and provide simple unambiguous answers which require minimal processing. The group should decide when the most appropriate time is to evaluate selected stages of the of the project management cycle, who should be involved and what methods will be used.

See later section more information and templates relating to evaluation and revision of your monitoring plan.

Overall Objective:				
Evaluation/Reflection Question	Timing and Frequency of Evaluation	Source of Information	Future Actions	
	Evaluation/Reflection Question	Evaluation/Reflection       Timing and         Question       Frequency of         Evaluation       Evaluation	Evaluation/Reflection       Timing and Frequency of Evaluation       Source of Information         Image: Source of Evaluation       Image: Source of Evaluation       Image: Source of Evaluation         Image: Source of Evaluation       Image: Source of Evaluation       Image: Source of Evaluation         Image: Source of Evaluation       Image: Source of Evaluation       Image: Source of Evaluation         Image: Source of Evaluation       Image: Source of Evaluation       Image: Source of Evaluation         Image: Source of Evaluation       Image: Source of Evaluation       Image: Source of Evaluation         Image: Source of Evaluation       Image: Source of Evaluation       Image: Source of Evaluation         Image: Source of Evaluation       Image: Source of Evaluation       Image: Source of Evaluation         Image: Source of Evaluation       Image: Source of Evaluation       Image: Source of Evaluation         Image: Source of Evaluation       Image: Source of Evaluation       Image: Source of Evaluation         Image: Source of Evaluation       Image: Source of Evaluation       Image: Source of Evaluation         Image: Source of Evaluation       Image: Source of Evaluation       Image: Source of Evaluation         Image: Source of Evaluation       Image: Source of Evaluation       Image: Source of Evaluation         Image: Source of Evaluation       Image: Source of Evaluation <t< td=""></t<>	

# **References for monitoring methods**

#### General

Hunt, N. and Gilkes B. (1992). Farm Monitoring Handbook: A practical down-to-earth manual for farmers and other land users. University of Western Australia.

#### Wetlands

Baldwin, D.S., Nielsen, D.L., Bowen, T. and Williams, J. (2005). Recommended methods for monitoring floodplains and wetlands. Murray Darling Basin Commission.

Bayley, P.B. (1991). The flood pulse advantage and the restoration of river-floodplain systems. Regulated Rivers: Research and Management 6, 75-86.

Bayly, I.A.E. & Williams, W.D. (1973). Inland Waters and their Ecology, Longman, Australia, 316 pp.

Bailey, R. C., Norris, R. H. & Reynoldson, T. B. (2004). Bioassessment of Freshwater Ecosystems: Using the Reference Condition Approach. Kluwer Academic Publishers (Boston).

Close, A. (1990). The impact of man on the natural flow regime. Pp. 61-76 in The Murray (eds N. Mackay and D. Eastburn). Murray Darling Basin Commission: Canberra.

Kingsford, R.T., H Dunn, D Love, J Nevill, J Stein and J Tait (2005). Protecting Australia's rivers, wetlands and estuaries of high conservation value. Department of the Environment and Heritage, Australia.

Goonan, P.M., Beer, J.A., Thompson, T.B. and Suter, P.J. (1992). Wetlands of the River Murray flood plain, South Australia. Preliminary survey of the biota and physicochemistry of ten wetlands from Chowilla to Mannum. Transactions of the Royal Society of South Australia 116: 81-94.

Norris, R.H., Liston, P., Davies, N., Coysh, J., Dyer, F., Linke, S., Prosser, I., and Young, B. (2001). Snapshot of the Murray-Darling Basin River Condition. (Murray-Darling Basin Commission) 60 pp.

Pressey, R. (1990). Wetlands. Pp. 167-182 in The Murray (eds N. Mackay and D. Eastburn). Murray Darling Basin Commission: Canberra.

Reid, M.A. and Brooks, J. (1998). Measuring the Effectiveness of Environmental Water Allocations: Recommendations for the Implementation of Monitoring Programs for Adaptive Hydrological Management of Floodplain Wetlands in the Murray-Darling Basin. Cooperative Research Centre for Freshwater Ecology: Clayton, Melbourne.

Tucker, P. (2004). Your Wetland: Monitor Manual- Data Collection, River Murray Catchment Water Management Board, Berri and Australian Landscape Trust, Renmark. United States Environmental Protection Agency (2001). Volunteer Wetland Monitoring: An Introduction and Resource Guide. Office of Water, Office of Wetlands, Oceans and Watersheds Washington, DC. http://www.epa.gov/owow/wetlands/monitor/volmonit or-plaintxt.pdf

#### Water Quality

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Australian and New Zealand Environment and Conservation Council & Agriculture and Resource Management Council of Australia and New Zealand (ANZECC & ARMCANZ) (2000). The Australian and New Zealand Guidelines for Fresh and Marine Water Quality, National Water Quality Management Strategy Paper No 4, ANZECC & ARMCANZ, Canberra, http://www.ea.gov.au/water/guality/nwgms/index.ht

Ũ

Australian and New Zealand Environment and Conservation Council & Agriculture and Resource Management Council of Australia and New Zealand (ANZECC & ARMCANZ) (2000b). Australian Guidelines for Fresh and Marine Water Quality Monitoring and Reporting, National Water Quality Management Strategy Paper No 7, ANZECC & ARMCANZ, Canberra, http://www.ea.gov.au/water/quality/nwqms/index.ht ml

Department of Environment and Heritage, Australia (2004). Integrated Groundwater - Surface Water Management. National Groundwater Committee, DEH.

Environment Australia (2002). Water Quality Targets: A Handbook. Version 1.0 http://www.environment.gov.au/water/publications/qu ality/pubs/targets-handbook.pdf

Jolly, I.D., Williamson, D.R., Gilfedder, M., Walker, G.R., Morton, R., Robinson, G., Jones, H., Zhang, L., Dowling, T.I., Dyce, P., Nathan, R.J., Nandakumar, N., Clarke, R., and McNeill, V. (2001). Historical stream salinity trends and catchment salt balances in the Murray-Darling basin, Australia. Marine and Freshwater Research 52: 53-63.

Kruger, T, Lubczenko, V (1994) A Community Water Quality Monitoring Manual for Victoria. Victorian Community Water Quality Monitoring Task Group.

Van Gameren, J (1997) Waterwatch Victoria Education Kit Waterwatch Victoria & Barwon Water Department and Natural Resources and Environment -Waterway & Floodplain Unit (1999).

Waterwatch Victoria Data Confidence Manual (2000) http://www.vic.waterwatch.org.au/file/inform/Data%2 0confidence%20VIC%20-%20June%202000.pdf Waterwatch Victoria Equipment Manual (1999) http://www.vic.waterwatch.org.au/file/inform/Equipm ent%20Manual%20April%2099.pdf

Waterwatch Victoria Macroinvertebrate Voucher Collections: Best Practice Guidelines (2005) http://www.vic.waterwatch.org.au/file/inform/Macro\_ voucher\_collection2.pdf

Waterwatch Victoria Methods Manual (1999) http://www.vic.waterwatch.org.au/file/inform/Method s%20Manual%20June99.pdf

### Vegetation

State Herbarium of South Australia (2005) Barker, B., Barker, R., Jessop J. &Vonow, H. (eds) Census of South Australian vascular plants. 5th edition. Botanic Gardens of Adelaide & State Herbarium

http://www.flora.sa.gov.au/pdfs/Census\_5.0\_web.pdf

State Herbarium of South Australia (2005) Barker, B., Barker, R., Jessop J. & Vonow, H. (eds) Census of South Australian vascular plants Online Searchable Database. Botanic Gardens of Adelaide & State Herbarium. http://www.flora.sa.gov.au/census.shtml

Blanch, S.J., Ganf, G.G. and Walker, K.F. (1999). Tolerance of riverine plants to flooding and exposure indicated by water regime. Regulated Rivers: Research and Management 15:43-62.

Bren, L.J. (1988). Effects of river regulation on flooding of a riparian red gum forest on the River Murray, Australia. Regulated Rivers: Research and Management 2: 65-77.

Casanova, M.T. and Brock, M.A. (2000). How do depth, duration and frequency of flooding influence the establishment of wetland plant communities? Plant Ecology 147, 237- 250.

Nicol, J and Ganf, G (2000). Water regimes, seedling recruitment and establishment in three wetland plant species. Marine and Freshwater Research 51, 305-309.

Heard L. and Channon B. (1997). Guide to a native vegetation survey (agricultural region) using the biological survey of South Australia. Geographic analysis and research unit information and data analysis branch department of housing and urban development, Adelaide.

Ladiges, P.Y., Foord, P.C. & Willis, R.J. (1981). Salinity and waterlogging tolerance of some populations of Melaleuca ericifolia Smith. Australian Journal of Ecology 6: 203-215.

Lissner, J & Schierup, H.-H. (1997). Effects of salinity on the growth of Phragmites australis. Aquatic Botany. 55: 247-260.

Mensforth, L.J., Thorburn, P.J., Tyerman, S.D. & Walker, G.R. (1994). Sources of water used by riparian Eucalyptus camaldulensis overlying highly saline groundwater. Oecologia 100(1-2): 21-28.

Morris, J.D. (1981). Factors effecting the salt tolerance of eucalyptus, In: K.M. Old, G.A. Kile, & C.P. Ohmart, (Eds.), Eucalypt Dieback in Forests and Woodlands, CSIRO, Australia.

Roberts, J. and Ludwig, J.A. (1991). Riparian vegetation along current-exposure gradients in floodplain wetlands of the River Murray, Australia. Journal of Ecology 79: 117-127.

Taylor, P.J., Walker, G.R., Hodgson, G., Hatton, T.J. & Correll, R.L. (1996). Testing of a GIS model of Eucalyptus largiflorens health on a semiarid, saline floodplain. Environmental Management 20(4): 553-564.

Kercher, S.M., Frieswyk, C.B. & Zedler, J.B. (2003). Effects of sampling teams and estimation methods on the assessment of plant cover. Journal of Vegetation Science 14:899-906.

### **Biota (General)**

De Decker, P. & Geddes, M.C. (1980). Seasonal fauna of ephemeral saline lakes near the Coorong Lagoon, South Australia. Australian Journal of Marine & Freshwater Research 31: 677-699.

Geddes, M. (1990). Crayfish. Pp. 302-307 in The Murray (eds N. Mackay and D. Eastburn). Murray Darling Basin Commission: Canberra.

Goonan, P.M., Beer, J.A., Thompson, T.B. & Suter, P.J. (1992). Wetlands of the River Murray flood-plain, South Australia. 1 Preliminary survey of the biota and physicochemistry of ten wetlands from Chowilla to Mannum. Transactions of the Royal Society of South Australia 116(3): 81-94.

Hart, B.T., Bailey, P., Edwards R., Hortle, K., James, K., McMahon, A., Meredith, C. & Swadling K.M. (1991). A review of the salt sensitivity of the Australian freshwater biota. Hydrobiologia 210: 105-44.

Main, B.Y. (1990). Restoration of biological scenarios: the role of museum collections. Proceedings of the Ecological Society of Australia 16: 397-409.

Thomas, J.M., McKenzie, D.H. and Eberhardt, L.L. (1981). Some limitations of biological monitoring. Environment International 5: 3-10.

#### Birds

Briggs, S.V., Lawler, W.G. and Thornton, S.A. (1998). Relationships between control of water regimes in river red gum wetlands and abundance of waterbirds. Corella 22, 47-55. Briggs, S.V., Thornton, S.A. and Lawler, W.G. (1997). Relationships between hydrological

control of River Red Gum wetlands and waterbird breeding. Emu 97, 31-42.

Crome, F.H.J. (1988). To drain or not to drain? – Intermittent swamp drainage and waterbird breeding. Emu 88: 243-248.

Lane, B. (1987). Shorebirds in Australia. Nelson, Melbourne, 187 pp.

McLaren, M.A. and M.D. Cadman (1999). Can novice volunteers provide credible data for bird surveys requiring song identification? Journal of Field Ornithology 70:481-490.

Roshier, D., A. Robertson and R. Kingsford (2001). The availability of wetland habitat for waterbirds in arid Australia.

http://www.environment.gov.au/water/publications/en vironmental/wetlands/rd-waterbirds.html

Thompson, W.L. (2002). Towards reliable bird surveys: accounting for individuals present but not detected. The Auk 119:18-25.

#### Frogs

Frogs Australia Database. Australian Frog Database. http://frogsaustralia.net.au/frogs/display.cfm?method= search&bioregion=bioregion\_murrdarl

Barker, J., Grigg, G.C. and Tyler, M.J. (1995). A Field Guide to Australian Frogs. Surrey Beatty and Sons: Chipping Norton, NSW.

Cogger, H.G. (2000). Reptiles and Amphibians of Australia. 6th edn. Reed Books: Sydney.

Robinson, M. (1993). A Field Guide to Frogs of Australia. Reed Books: Sydney.

Tyler, M.J. (1977). The Frogs of South Australia. South Australian Museum, Adelaide.

#### Fish

Allen, G.R. & Cross, N.J. (1982). Rainbow fishes of Australia and New Guinea, Angus and Robertson, Sydney.

Allen G.R., Midgley S.H. and Allen M. (2002). Field guide to the freshwater fishes of Australia. Western Australian Museum, Perth, Western Australia.

Anderson, C.M. (1977). Cattail decline at Farmington Bay waterfowl management area. Great Basin Naturalist 37: 24-34.

Cadwallader, P.L. (1978). Some causes of the decline in range and abundance of native fish in the Murray Darling River system. Proceedings of the Royal Society of

Victoria 90: 211-224.

Cadwallader, P.L. and Lawrence, B. (1990). Fish. Pp. 316-335 in The Murray (eds N. Mackay and D. Eastburn). Murray Darling Basin Commission: Canberra.

Gehrke, P.C, Brown. P., Schiller, C.B., Moffat, D.B. and Bruce, M. (1995). River regulation and fish communities in the Murray-Darling River system, Australia. Regulated Rivers Research and Management 11: 363-375.

Harris, J.H. and Gehrke, P.C. (eds) (1997). Fish and Rivers in Stress. The NSW Rivers Survey. NSW Fisheries Office of Conservation: Cronulla, NSW.

Humphries, P., King, A.J. and Koehn, J.D. (1999). Fish, flows and flood plains: links between freshwater fishes and their environment in the Murray-Darling River system, Australia. Environmental Biology of Fishes 56: 129-151.

Humphries, P. and Lake, P.S. (2000). Fish larvae and the management of regulated rivers. Regulated Rivers: Research and Management 16: 421-432.

McDowall, R.M. (Ed.) Freshwater Fishes of South-Eastern Australia. Reed Books, Chatswood NSW.

Merrick, J.R. & Schmida, G.E. (1984). Australian Freshwater Fishes, Biology and Management, J.R. Merrick, Sydney.

#### **Tortoises**

Chessman, B.C. (1989). Habitat preferences of freshwater turtles in the Murray Valley, Victoria and New South Wales. Australian Wildlife Research 15: 485-491.

Doody, J.S., A. Georges and J.E. Young (2000). Monitoring Plan for the Pig-nosed Turtle in the Daly River, Northern Territory. Applied Ecology Research Group and CRC for Freshwater, Ecology, University of Canberra, ACT.

http://aerg.canberra.edu.au/reprints/2000\_Doody\_etal \_monitoring\_plan.pdf

Cogger, H.G. (2000). Reptiles and Amphibians of Australia. 6th edn. Reed Books: Sydney.

Goodwin, C., Hopkins, G. (2005). River Murray Turtle Protection Manual. Fifth Creek Studio.

#### Macroinvertebrates

Bennison, G.L., Hillman, T.J., and Suter, P.J. (1989). Macroinvertebrates of the River Murray: Review of Monitoring 1980-1985. Water Quality Report No. 3. Murray Darling Basin Commission: Canberra.

Boulton, A.J. and Lloyd, L.N. (1991). Macroinvertebrate assemblages in floodplain habitats of the lower River Murray, South Australia. Regulated Rivers: Research and

Management 6: 183-201.

Boulton, A.J. and Lloyd, L.N. (1992). Flooding frequency and invertebrate emergence from dry floodplain sediments of the River Murray, Australia. Regulated Rivers: Research and Management 7: 137-151.

Cranston, P.S. and Trueman, J.W.H. (1997). 'Indicator' taxa in invertebrate biodiversity assessment. Memoirs of the Museum of Victoria 56, 267-274.

Sloane, P.I.W. and Norris, R.H. (2003). Bioassessment: are macroinvertebrate predictive model outputs related to a pollution gradient? Journal of the North American Biological Society 22, 457-471.

## **Statistics and Power Tests**

Bernstein, B.B. and Zalinski, J. (1983). An optimum sampling design and power tests for environmental biologists. Journal of Environmental Management 16: 35-43.

Fairweather, P.G. (1991). Statistical power and design requirements for environmental monitoring. Australian Journal of Marine and Freshwater Research 42: 555-567.

Green, R.H. (1979). Sampling Design and Statistical Methods for Environmental Biologists.Wiley: New York.

Hurlbert, S.H. (1984). Pseudoreplication and the design of ecological field experiments. Ecological Monographs 54, 187-211.

Loftis, J.C., Taylor, C.H. and Chapman, P.L. (1991). Multivariate tests for trend in water quality. Water Resources Research 27, 1419-1429.

Michener, W.K. (1997). Quantitatively evaluating restoration experiments: research design, statistical analysis, and data management considerations. Restoration Ecology 5, 324- 337.