

APPENDIX: 1 (A)

NOTES OF LANDHOLDER MEETING ON MONDAY 28 OCTOBER, 2002 AT PHIL LENEHAN'S WOOLSHED, "WIRRANI", MORUNDAH

PRESENT:

Richard Sleigh & Wendy Spencer - Yanco Creek & Tributaries Advisory Council

Jim Parrett & Phil Dempsey - State Water;

Peter Beal – Dept of Land & Water Conservation; and

Lee Furness – Murrumbidgee Private Irrigators.

Arthur James, B Bolton, Wayne Durnan, Paul Andrews, Ross Stockdale, Bob Baul, Roy Baul, Don Roffe, Phil Cock, John Mills, Philip Lenehan, John Austin, Michael Coughlan, Anna Coughlan, Carole Dalglish, Russell Dalglish, Mark Rowe, Anne Kennedy, Douglas Kennedy, Douglas Milvain, Andrew Steiner, Mark Savage.

APOLOGIES:

Rob Scriven – Dept of Land & Water Conservation

The meeting opened at 2:05 p.m.

- Richard Sleigh introduced himself as the Chairman of the Yanco Creek & Tributaries Advisory Council, which liaise with the Department of Land and Water Conservation with creek issues.
- Richard introduced everyone and explained that the purpose of these meetings was to develop a plan to improve the creek system, which would then be used to obtain outside funding.
- Peter Beal then explained the reasons for the plan.
- Jim Parrett gave a slide presentation of problems already identified on the creek and how they could be remedied.
- Lee Furness introduced herself and explained Murrumbidgee Private Irrigators involvement and the work that had been done to date to identify what issues were important.
- Peter Beal then gave a brief outline of the process to apply for funding.

Afternoon tea was then offered to everyone.

Question time commenced at 3:15 p.m.

The following lists the issues raised.

- Below Yanco Creek a storm blew through and silt has built up considerably.
- In this section there are worries about cumbungi.
- Also timber that has blown into the creek, if not removed, will become a real problem.
- Peter Beal responded that the Native Vegetation Act must be taken into account when removing cumbungi and snags and that Fisheries would need to be involved.
- The question was raised as to how much could be put down the creek and Jim Parrett responded that it was not a question of putting more water down the creek but of reducing losses which are currently around 52% down to, hopefully, 24%. The volume of water sent down the creek at peak times is 2000 ML per day, if the impediments were reduced State Water could have the amount of water sent down to meet orders.
- Colombo Creek was not, historically, an irrigation creek – if works are carried out won't it become a delivery canal? It was explained that the entire system needs to run all year round for town plus stock and domestic water.
- It was pointed out that the creek is 800 kms long, that is 1:4.
- People had heard a rumour about a channel for Coleambally and it was explained that there is a feasibility study being done at the moment and a draft has gone to Coleambally for comment. The initial costing on this is \$20 million.
- The suggestion was made that a pipe system could be developed with money from the Federal Government.

- The suggestion was made to start with willows and see what savings have been achieved, and then go on to the cumbungi and weirs.
- The point was raised that weirs would hold water if the drought continues and if allocation is as low as 25%. It was then explained that if water were held upstream that the bottom end would run dry.
- Flood issues – there is erosion on the bend of one property where, in years to come, sheds might be taken down.
- At one property, in about 1984, willows were taken out but not taken away. The owner has planted new trees and worries that these would be taken out via this plan. An assurance was made that consultation would be held before anything was done.
- Snags are a natural attrition of red gums and could be due to high flows.
- Complaint was made that this plan is only about supplying water for irrigators and that one landholder did not believe that his voice would be heard or that anything he said would make a difference. It was explained that the aim was to improve the health of the creek for everyone.
- Concerns were raised for organic properties with the poisoning of willows and it was explained that poisonous sprays could be used and that State Water would take water samples as part of quality assurance.
- One landholder believed that if it were up to government nothing would get done and feels that rice is the problem and this is how the health of the creek has fallen over the last 10 years.
- Concerns about the quality of water from Coleambally were raised and it was explained that an Environmental Officer could provide a boom to stop rubbish from flowing down the creek. Mark Shepherd is based in Leeton, but has just received a scholarship to go to Oxford, so State Water would now be using a fellow from Queanbeyan.
- Concerns were raised with regard to measures being in place for road accidents where diesel or other substances might flow into the creek and whether State Water was involved with these. It was explained that there were systems in place, which came under the control of the Fire Brigade and the Environmental Protection Agency.
- The issue of funding and what time frame would be employed was raised and it was explained that we are looking at trying to obtain funding by the end of 2003 with work to be carried out over a 5 year period.
- Concerns were raised over private rubbish dumps, which could go into the creek as a result of flooding.

Richard Sleight thanked everyone for their comments and for attending the meeting, which closed at 4:05 p.m.

**NOTES OF LANDHOLDER MEETING
ON TUESDAY 29 OCTOBER, 2002 AT THE IAN GILBERT ROOM,
JERILDERIE SHIRE COUNCIL, JERILDERIE**

PRESENT:

Richard Sleigh & Wendy Spencer - Yanco Creek & Tributaries Advisory Council

Jim Parrett & Phil Dempsey - State Water;

Peter Beal – Dept of Land & Water Conservation; and

Lee Furness – Murrumbidgee Private Irrigators.

Michael Gregory, Jann Robertson, Bill Robertson, Rick Mailler, Anthony Herlick, Ross Wells, Arthur Sleeman, Alan Brunt, Pete Sleeman, Neville Ham, Felicite Aull, Tim Westblade, Steven Day, Trent Gooden, Jim Morgan, Allen Hunt, Geoff Ham, John Graham, Tom Holt, G Rorato, Jeremy Barlow, Mark Wettenhall, John Purcell, Troy Hamilton.

APOLOGIES:

Rob Scriven – Dept of Land & Water Conservation

The meeting opened at 10:15 a.m. with introductions as in the Meeting on 28 October.

Question time followed with the following listing the issues raised.

- Funding – how much will it cost? The reply was made that this process was to find the problem areas, make up the plan and then evaluate the cost.
- It was suggested to eradicate small areas of cumbungi first. It was then explained that cumbungi does not like fast flowing water, so if willows and snags were managed to allow flow this would stop the cumbungi spreading.
- What were the restrictions on spraying? It was reported that spraying is quite restrictive due to organic farmers, Council's, EPA and Fisheries guidelines, which would not allow poisonous sprays to be used.
- Has some work already commenced? It was reported that the surveys for the redesign of Hartwood Weir have already been done.
- Concerns were raised about clearing all weirs thus not being able to stop water. State Water replied that they are not aware of anyone suggesting taking out all weirs as some are in strategic points.
- The point was raised that no money has been spent on the creek system over the last 10 years while huge amounts of funding have gone into the Murrumbidgee, Murray and other systems such as the Goulburn Valley. The losses in our system are becoming a real issue and we must take this opportunity as we have been neglected.
- It was felt that regulation was necessary and that Wetlands are good, but they are being watered in the summer instead of the winter when they need it.
- It was reported that yesterday, at the meeting, bank erosion seemed to be their main concern.
- The issue of flooding was raised. It was pointed out that there had not been a flood for a long time and there is a concern that if the snags and willows, in particular, are going to cause huge problems if a flood occurs.
- Cumbungi was not felt to be a high priority if flooding occurred, as it would lie down and die.
- Jim Morgan, from Lockhart, spoke on behalf of the Colombo Ski Club and stated that their weir was important and the club was worried that if this weir were pulled out it would render it unsafe for skiers. Jim stated that this area has been developed over many years, since the 1960's, with many hours spent and asked the meeting to consider young people who use this area for recreation. He asked the meeting to be mindful of the fact that, in the west, there is little of this type of opportunity for our youth.
- Concerns were raised over the amount of water being sent down Forest Creek and Wanganella Swamp and where did it go. The reply was made that it comes downstream for stock and domestic and runs into the Billabong.
- Representatives from the Ski Club asked if the removal of the ski club weir was a priority. It was reported that no, we are here to start with consultation of all interested parties. From here a draft plan will be drawn up which will then be sent to all members for comment at the AGM in 2003.

- Concerns were raised over the profile irrigators are receiving in Sydney. Recently, when visiting the museum in Harris Street, Sydney, it was reported that a video was running which crucified irrigators, showing canals, rice growing and salted areas, which, it was claimed, irrigation causes.
- The involvement of Fisheries was queried and it was reported that they don't get involved with willows, but are concerned about snags as they provide a habitat for native fish.
- One opinion was that the top end should be dealt with and forget about the rest.
- It was suggested that, because water is such a big issue, couldn't we get someone important to fly over and make a decision. Members were encouraged to lobby themselves, as individuals, as it is a major environmental issue. It was also explained that the Native Vegetation Act, with best practices and codes, might allow us to circumvent the normal bureaucratic process to get approval.
- The point was raised that we could make the greenies work for us – say to them that with willows removed water will be saved which could then go back to the Snowy.
- The Water Sharing Plan has no water for environmental flows in our system.
- It was asked if dredging could be done in some places, pointing out that the Billabong, over the last few years, has had an enormous amount of silt laid down.
- The results of recent willow trials were questioned and it was reported that Bioactive roundup with ring barking had proved successful but that the best process is total removal.
- Willows were felt to be the worse problem by one landholder.
- It was asked whether there were figures available for losses in each section. It was reported that State Water does have these figures but was not including them in these meetings.
- A time frame for funding and subsequent works was queried and it was reported that the aim was to have the document complete by June 2003 with works commencing in 2004.
- It was asked if DLWC had any money and it was reported that State Water did have some and that Jim Parrett was currently trying to do pilot schemes, however, there is no routine funding.

Richard Sleigh thanked everyone for their comments and for attending the meeting, which closed at 11:45 a.m.

Morning tea was then offered to everyone.

**NOTES OF LANDHOLDER MEETING
ON TUESDAY 29 OCTOBER, 2002 AT THE CONARGO HALL, CONARGO**

PRESENT:

Richard Sleigh & Wendy Spencer - Yanco Creek & Tributaries Advisory Council

Jim Parrett & Phil Dempsey - State Water;

Peter Beal – Dept of Land & Water Conservation; and

Lee Furness – Murrumbidgee Private Irrigators.

Mark Wettenhall, Neville Armytage, Hunter Landale, Tony Bull, Greg Brunt, Colin Sandford, Rob Landale, R Bradshaw, Tim Ceagan, Robert Armytage, Michael Burke, Mac Wallace, Michael Bull, Tony Bull, Craig Heath, Mark Byrne, Tim Cowper.

APOLOGIES:

Rob Scriven – Dept of Land & Water Conservation

The meeting opened at 2:05 p.m. with introductions as in the Meeting on 28 October.

Question time followed with the following listing the issues raised.

- Jim Parrett, from State Water was asked to run through the figures of variation. Jim made the point that; from 16 November the Yanco Creek System would have it's own operator, rather than the current procedure where the Murrumbidgee and Yanco Creek are together. It is hoped that this will help with delivery of water to the bottom end.
- The question was asked if any research has been done in recharge areas. State Water response was negative although Algdgerie has been pin pointed. The meeting was informed that the target was to bring the creek back into its natural boundaries.
- The issue of restricting rice growing was raised and one landholder indicated that he would be happy to see this restriction at around 60% of licences. The meeting was informed that the peak demand period refers to summer crops in general, however this landholder felt that the ability of the system to handle the water could be used to restrict areas of cropping.
- Storage dams were addressed and the meeting was informed of the feasibility study on Hartwood Weir. It was pointed out that the main problem of storage is due to the fact that the whole area is very flat and evaporation is a really big problem.
- The meeting, in general, supported the idea of regulation of rice growing and also supported on farm storage.
- Questions were raised on any restriction on removing willows and cumbungi and the meeting was informed that nothing can be removed without approval from NBCA.
- The top end was thought to be the highest priority with losses due to flood out.
- Willows were also perceived as a problem with deliverability.
- Concern was raised that creek blockages could cause flooding.
- Our system is the receiver of the flood by MIL. It was asked if there were agreements with MIL and/or Coleambally as to when the water comes out of drains. The meeting was informed that the quantity from Coleambally has been reduced to 200 ML and of the cost, approximately \$20 million, for the proposed new channel from the Feasibility Study. Litigation is a big issue with Coleambally.
- The Chairman called for local issues.
- Drainage was felt to be a high priority issue. There are concerns because we are expected to take their drainage water and it was felt that we could use this as a lever to improve the creek system. How we manage taking their drainage should be a big part of the study with a view to the detriment to water quality resulting in more cumbungi, weeds, etc.
- It was asked if State Water could clarify Coleambally and MIL drainage from a licencing point of view.
- It was asked if Fisheries were going to have to be involved. Jim replied that yes, at some point, this would be necessary and he intended to take them on site inspections to get the ball rolling with pilot schemes.

- It was pointed out that much of the timber that has fallen into the creek is a result of carp damage to the banks.
- A suggestion was made to take levels to find out exactly what gains would be achieved by removing impediments to make the study objective, rather than subjective.
- One opinion was that the first priority was to get rid of unused weirs.
- Part of the plan will be to obtain compensation for landholders who suffer due to the removal of a weir.
- The point was made that, some time ago in the 80's, State Water had decreed that all unlicensed weirs had to be removed – this did not happen.

Richard Sleight thanked everyone for their comments and for attending the meeting, which closed at 03:15 p.m.

Afternoon tea was then offered to everyone.

**NOTES OF LANDHOLDER MEETING
ON MONDAY 30 OCTOBER, 2002 AT THE WANGANELLA HALL, WANGANELLA**

PRESENT:

Russell Ford & Wendy Spencer - Yanco Creek & Tributaries Advisory Council

Jim Parrett, Phil Dempsey & Greg Jones - State Water;

Peter Beal – Dept of Land & Water Conservation; and

Lee Furness – Murrumbidgee Private Irrigators.

Ian Gibson, Anthony Gorey, Sally Dye, Bob Crawford, Colin McCrabb, John Radeski, Mark Byrne, Ken McCrabb, Mary McCrabb, Peter McCrabb, Andrew Wallace, Betty Wallace, John Wallace, Michael Elmes, Mac Wallace, Mike Gatacre, Hunter Landale

APOLOGIES:

Rob Scriven – Dept of Land & Water Conservation

The meeting opened at 10:15 a.m. with Russell Ford as Chair and introductions as in the Meeting on 28 October.

Question time followed with the following listing the issues raised.

- Hunter Landale said he believed that these meetings were great as a first step. He believes the next step will be a degree of support from individuals and that the Delegates of the Council should be responsible to get comments back. It was hoped that all Delegates knew the landholders in their area and should contact them all.
- Has the Forest Creek plan been thrown out? Jim replied that, no, but it has been superceded as everything now has to go through the blueprint.
- Landholders are very disappointed that nothing was done after all the work that was put into the plan.
- Jim explained to all present that he has had initial discussions with David Whitehouse from the Murray region and that they are happy for the Murrumbidgee region to oversee the entire project. David will take one visit and then had it over to the Murrumbidgee region as, although Forest Creek is in the Murray region it is on Murrumbidgee water.
- Jim also explained that the Forest Creek Plan will be used to form part of this plan so all the work done to date will not have to be redone. He stated that the Plan was very good and pertinent sections will be used for this plan.
- Warriston Weir is a problem with so much water.
- The issue of funding was raised and it was asked if there are any splits in funding.
- Murrumbidgee Wetlands group is keen to be involved. Wetlands are getting water at the wrong time.
- Jim informed the meeting that the aim was to have regulators at the side of the creek, rather than across it, which could dam off wetlands in the summer and then let water out in the winter.
- It was asked if Fisheries were represented on the Council. The reply was made that, no, however they would need to become involved further into the process. The Narrandera officer is quite practical and will be consulted.
- It was asked if the volume of water being currently sent down the system was locked in concrete with the worry that all this work will be done and then the amount of water would decrease. The reply was made that it does not look like that will happen at the moment. It will only change if government policies change. Jim informed the meeting that the amount of water sent down the creek was to meet allocations, which will not change without changes to policies.
- Lee pointed out that drought sharpens peoples focus and that presently this is a win, win situation – a win for creek users and a win for the government.
- The problem of drainage was raised. Don't want everybody's rubbish so we are looking towards having a robust system.
- It was asked if there were any objections in other meetings to the removal of willows and what costs were involved. The reply was made that only one lady had objected, more from the point of view that other trees

she had planted to try to firm up the banks might be taken out, otherwise there was total agreeance. The cost is approximately \$200 per tree for excavation. The plan will try for total removal with a follow up maintenance program. It is hoped to have this maintenance program under the State Water budget.

- Concerns were raised about the quality of the water after willow removal and it was explained that the water would be sandy at first but after approximately 2 years the creek would clean itself out.
- It was asked why, when MIL took over and given \$80 million, were we left out. MIL are now spending the interest on this money to improve their system. It was explained that the money was given because they are a closed system; whereas ours is an open system, and it was also pointed out that they had to do a land and water management plan to get that funding.
- The first round of funding will be used for Hartwood Weir in approximately 6 months.
- It was asked who would be paying for the removal of unlicensed weirs. The reply was made that if weirs needed to be removed they would be included into the plan. There is also a government plan through OH&S where all weirs will be inspected for safety. If deemed unsafe the public liability cost itself would be prohibitive. All weirs, either for removal or upgrading, will be part of the funding proposal. Unlicensed weirs, however, would probably not receive any compensation.
- It was suggested that there should be targets on water quality with limits on MIL and Coleambally as to what levels they can put into our system.
- It was pointed out that if 1400 was put down and we did not lose 700 of it then this would lessen the need for DC800.
- It was asked what the like life of the plan would be. The reply was that the short term was 5 – 10 years with an overall long term for sustainability.
- The problem of cumbungi removal was raised and any suggestions would be appreciated as it is a particularly difficult plant to eradicate. It was noted that an increased flow would help to right the presence of cumbungi.
- On Forest Creek 6 properties have had no water since 1996. This will be included in the plan. The suggestion was made that a stock and domestic pipeline could solve this problem.
- Jim informed the meeting that he is endeavouring to get funding from State Water to start work next year, outside the plan.
- It was suggested that landholders should assist and it was explained that landholders will need to assist as “in kind” contribution.
- The issue of a long term maintenance budget was raised and Jim reported that we will be looking at achieving this through the State Water budget rather than a levy on licence holders.
- Landholders should be informed that their input will help.
- The issue of snag removal, and the involvement of Fisheries, was raised and it was felt that the plan should set up a protocol for snag removal to alleviate the need for Fisheries to be involved in every instance.
- Access to the riparian zone must form part of this plan. Jim will be seeing the Lands Office for the top end where there is a great deal of Crown Land and leases.
- If we develop some guidelines in this plan all agencies should not have to inspect every site and we should get freer movement.
- The point was raised that, legally, we can't even remove cumbungi without access to the riparian zone.
- It was asked what powers we have to keep all the savings that would be made within the creek system. The answer to this was none, however, it was pointed out that to have an environmentally, sustainable creek system is attractive and should provide a lever to keep the savings. If, however, we needed to get money from the Snowy then we must expect a trade off.
- We should try not to be perceived as an irrigation system but as a living creek system.

Russell Ford thanked everyone for their comments and for attending the meeting, which closed at 12:10 p.m. Afternoon tea was then offered to everyone.

APPENDIX: 1 (B)

KEY ISSUES COLLECTED FROM SURVEY OF WATER USERS

Meeting Date	Location	Name	Creek Section	Deliverability	Environmental/Wetlands/ Operational flooding:	Losses:	Access:	Any other comments:
28.10.02	Lenehan's Woolshed	Don Rolfe, Windella Homestead	Offtake to Morundah					Take notice of metre reader. His experience should be of value as he sees all aspects of situation.
28.10.02	Lenehan's Woolshed	John Austin 6959 6212	Offtake to Morundah	Willow trees, cumbungi, creek has been de-snagged for at least 80 odd years. Fish still exist	Flooding should only coincide with seasons when it would naturally occur	Statement that flooding (wetlands) creates fodder for cattle is folly. Cattle <u>destroy Wetlands</u> . Irrigate properly for stock fodder. If serious about wetlands - fence stock out and protect.	Movement along creek should be mindful of spiny burr grass.	Creek eco-system is most seriously damaged by carp - visually, floating rubbish should be addressed. Yanco Creek Bridge, Sturt Highway crossing has the potential to create a major environmental incident. A plan should be in place, or equipment readily available. I have set aside about 200 acres of creek frontage for the environment. This area has had <u>nil</u> agricultural activity for 7 years (weed control only). Notable Change: 1 Proliferation of native trees and grasses; 2 Platypus seen in quiet sections of creek; 3 creek bank protected.
28.10.02	Lenehan's Woolshed		Morundah to DC800		If plenty of water yes, if not plenty of water NO			Snags should be reduced. Silt is bad especially if water is lowered. Stock find it hard to get a drink.
28.10.02	Lenehan's Woolshed	John Mills Parkwood	Offtake to Morundah	Many trees have fallen in and tend to restrict the flow. Partly caused by European carp which dig in the banks.		Flooding seems to occur during a dry time, which is not a natural occurrence.	One main creek crossing is sometimes not usable at back of farm and since creek runs at a higher level at the peak irrigation season.	
28.10.02	Lenehan's Woolshed			Ability of depth to deliver				

Meeting Date	Location	Name	Creek Section	Deliverability	Environmental/Wetlands/Operational flooding:	Losses:	Access:	Any other comments:
28.10.02	Lenehan's Woolshed	Michael & Anna Coughlan	Yanco – Offtake to Morundah – Morundah to DC800 – Morundah to Billabong Junction	Do not irrigate. Stock and domestic chief function of creeks		Willows		Stock & domestic main game. Therefore need high water quality, no chemicals – our land is organically certified. Need biodiversity in fauna & flora including fish. Wetlands/cumbungi very important to eco system. Willows should come out – snags stay. Sure no one in DLWC knows answers e.g. Lachlan with weirs and Murray with logs/snags.
28.10.02	Lenehan's Woolshed	DC Milvain	Morundah to Billabong Junction	No Problem	N/A	Nil	No Problem	Serious discussion re “weirs” with large property owners between Morundah and Jerilderie should be undertaken.
28.10.02	Lenehan's Woolshed	Mark Rowe	Offtake to Morundah	Need to investigate means of reducing high summer flows. Maybe limit the % of allocation that can be extracted over the summer months & encourage autumn & spring irrigation. In the longer term, summer irrigation in the lower reaches of the system may need to be phased out completely. Modeling to show the losses in the various reaches could be very enlightening and may be necessary to drive the management changes that will be required to help restore some health to the creek system.	Escapes from creek beds of irrigation flows should be eliminated if economically feasible. Water 'saved' by doing this should be used to mimic natural spring floods.	The current losses are unacceptable. Rehabilitating the creek system will take time and money. There is unlikely to be enough of, especially the latter, to make drastic improvements in the short term. Restricting summer usage to a % of allocations could be a way to dramatically reduce losses immediately. Good returns for winter cereals and the low allocation has probably already facilitated this for the current season. It may be an opportune time to capitalize on this management change and formulate a 'seasonal delivery policy'.	Continual stock access to creeks is causing major problems. Fencing off creek watering points will be necessary to allow banks to re-vegetate and stabilize.	Water users should pay some of the cost of rehabilitating the system. It would be unreasonable to expect the community to fund much of the work which will be largely for private benefit. The exception would be restoration of natural flooding – the public good emanating from these would need to be protected (i.e. by managing wetlands for predominantly conservation outcomes).

Meeting Date	Location	Name	Creek Section	Deliverability	Environmental/Wetlands/Operational flooding:	Losses:	Access:	Any other comments:
28.10.02	Lenehan's Woolshed	Wayne Durnan	Morundah to Billabong Junction	The Colombo Creek has never been, and should never be seen as, a canal, only to deliver water to downstream creeks.	I'm in favour of beneficial flooding for wetlands.	Removal of willows and cumbungi in blocked areas would increase flow.	Satisfactory	A river system that supports native fish, fauna and flora, supplements underground water supplies and provides water for stock & domestic use, all rear round is an integral part of the ecosystem. The Colombo Creek is also used as a major sporting and recreational facility, and as such, plays an important role in the local community.
29.10.02	Jerilderie	Ian Girdwood	Morundah to Billabong Junction	Pull all willows out and make sure all the weirs are kept clear.	On the Colombo where there are weirs there should be no flooding, as the weirs have made a new environment over the last 70 years.			We must think of the way we like the creek to run – Do we want creeks to irrigate out of or – an irrigation system by using creeks.
29.10.02	Jerilderie	Jeremy Barlow	Colombo Junction to Jerilderie	I have not experienced any deliverability problems to date due to the fact that there is a good reservoir of water on my area of the creek. But the willows must be a huge problem for pushing water past the end of Carnarney and Pittfour.	I think it's a good idea. However I suggest that it is not necessary to do it every year. But if carried out in years of higher rainfall or when our storage dams are at a much higher rainfall than the last 3 years.	Willows must be addressed and perhaps a few areas need to be de-snagged or realigned. Our losses will get worse as time goes on. I am familiar with Billabong Creek only and it has no flow capacity due to willows blocking stream.		I believe if willows were removed the cumbungi problem will be minimal and losses will be reduced significantly due to the creeks ability to run water. The weirs should be reviewed but I think they probably serve the same purpose as what they were put there for. Obviously Work Cover will determine the R & M that will be required. Jim Parrett hit the nail on the head – if the willows aren't attended to there will be no creek in a short time to come, particularly for the purpose of reliable irrigation. Note: Re Restricted areas on Carnarney to Innes Bridge. On the stretch of the creek from main dwelling at Carnarney running back east to Innes Bridge, there are perhaps 6 lots of single or 2 trees that would cost minimal to pull out now (cost say \$10,000 max) From main dwelling to west boundary where creek exits the property there are 3 major areas of willows over perhaps 2 – 3 km that have the creek completely covered. These areas are made of say 200mtrs of continuous willows and spreading (est cost 60-80k)??

Meeting Date	Location	Name	Creek Section	Deliverability	Environmental/Wetlands/Operational flooding:	Losses:	Access:	Any other comments:
29.10.02	Jerilderie	Michael Gregory	Jerilderie to Hartwood	Willows a major problem that should be removed immediately. Some weirs should probably go.	Fine at 'normal' times of the year.	Must be minimized where practical. Carp are having a major effect on banks, siltation and native fish populations. We should be proactive in pushing for their control.		Willows on each creek should be removed concurrently so that the potential damage from floods is not exacerbated in one section. Fencing should be encouraged along the creeks by promotion of easy access to all available funding for this. Fact sheet suggests State Water receive ~ \$680,000 p.a. What maintenance are they doing?
29.10.02	Jerilderie	Alan Brunt	Colombo Junction to Jerilderie	A constant flow as a sharp flow causes areas where stock are bogged and die.	Moderate flooding does affect our land, but with small damage, extreme flooding causes 300 ha of our land to go under floodwater.			Removal of willows will give a better flow BUT this has to be done in conjunction with weir maintenance because in peak irrigation season the levels or supply of passing water fluctuates at a high degree.
29.10.02	Jerilderie	A Sleeman	Jerilderie to Hartwood	Removal of willow trees. Seems mainly to Colombo junction to Jerilderie.	Possible.	Need working on	Seems okay except in high rice growing years.	
29.10.02	Jerilderie	John Whitehead	Morundah to Billabong Junction	All weirs should be controlled by an "official" sliding gate – say 1200 mill wide	Some wetlands should be retained.	The weirs that cause flooding i.e. cumbungi evaporation must have the water height reduced. The creeks must be made to run within their banks.		Let us not forget that there are farmers etc. in South Australia who also need water. (It is very easy to be greedy)
29.10.02	Jerilderie	Tim Sheed	Colombo Junction to Jerilderie	Problems at peak demands exacerbated by willows and losses esp. Forrest Creek.	The Wetlands I am aware of in this system were naturally ephemeral.	Aim to get losses down to 20% of inflows would be a major saving and improve deliverability.		
29.10.02	Jerilderie	WD & JC Robertson Woodside, Jerilderie	DC 800 to Conargo 6 miles west of DC800	Being autumn and spring waterers we need the level of the creek maintained as it was this year – 2002.	If a flood is necessary to enhance the wetlands, the back waters should be filled to give the red gum trees a boost in the winter only. It would require 4 feet above the normal creek level at our pump site.	We don't have any visible losses in our section of the creek but we have a lot of snags due to the bushfires in 1987. There are no willows or cumbungi in our section of the creek (below Yanko Station boundary and the Wilson Road Bridge).		The video being shown at the moment at the Power House Museum in Harris Street, Ultimo Sydney depicts irrigators in a very poor light and claiming they are destroying the land and the environment.

Meeting Date	Location	Name	Creek Section	Deliverability	Environmental/Wetlands/Operational flooding:	Losses:	Access:	Any other comments:
29.10.02	Jerilderie	D Milthorpe Somerset	DC800 to Conargo	Cumbungi		What are salt tests etc of each inflow into system? When Yanko and Bundure Stations were cut up for sale in 1974 I asked my late cousin, Professor Fred Milthorpe, of Macquarie University, one of the top world botanist, about Bathurst Burrs which overran the properties – What advice, if any have you had on Cumbungi?		We have a very complex problem – if we get rid of willows will cumbungi disappear? – I doubt it – where is proof? – will creek flow fast enough etc? – Cumbungi transpires a lot of water as do gum trees – too many licences issued for below rainfall years – we need expert advice in many fields before intelligent comments can be made – i.e. amount of water coming down Tumut River has effect on us. (Fax included pg 81)
29.10.02	Jerilderie	Adrian Dore, Upper Wantagong Station P/L	Morundah to Billabong Junction	We have no problems.		No problems with the removal of willows and certain amounts of cumbungi.		If weirs are removed or lowered, because I live on a backwater, we will lose water for the garden and house. As this is the original creek if water levels changes the water should be diverted back to the original creek.
29.10.02	Jerilderie	Bernard Pinnuck	Jerilderie to Hardwood	We need as much water as the creek can deliver without it being wasted.	Need to be stopped in summer months by levy bank, de willow, and possibly canal around sensitive areas.	Are too high, we need to de willow and realign snags – this will lower the creek and may slow losses into the aquifers.	Is most important – 5.5 meg per day in January is not enough.	We need to get on with the job of fixing the creek. There must be holes in the creek, which are losing hundreds of megs a day. This should be a priority.
29.10.02	Jerilderie	DC & FA Aull, Mundoora Pastoral Co, Jerilderie	No answer			in overall system.	We have no problems with willows/snags but there is a huge problem in parts of the creek.	
29.10.02	Jerilderie	Victor Stonnill “Cocketged ong” Urana	Morundah to Billabong Junction	Good			Good	Deliverability and Access will be severely affected with the removal of weirs in this section of the creek.
29.10.02	Jerilderie	Colombo Creek Ski Club	Morundah to Billabong Junction					(Letter Included pg 82)

Meeting Date	Location	Name	Creek Section	Deliverability	Environmental/Wetlands/Operational flooding:	Losses:	Access:	Any other comments:
29.10.02	Jerilderie	Andrew Sleigh "Koorinal" Jerilderie	Morundah to DC800 and Jerilderie to Hartwood		Plan should include provisions for wetlands/red gum flooding – winter.	Agree with presentation. Willow/snag removal. Weirs sensitive issue – feasibility study extended.		<p>Most efficient labour and costing to undertake works required is to utilize Landholder's resources and experience; on a cost sharing basis</p> <ul style="list-style-type: none"> - provide landholders \$ subsidy/incentive - provide landholders with technical advice <p>Plan should look at LIMITING or PREVENTING additional water into creek system from other valley/source. Cap current allocation – use as a trade off – for plan implementation.</p> <p>Plan to include monitoring of losses, thus being accountable to money spent.</p> <p>Plan to have <u>achievable outcomes</u> and time frames.</p> <p>Plan to include Red Gum management within X distance from creek.</p> <p>To be successful plan has to be drawn up with CMB Targets in mind, both Murray & Murrumbidgee. Has to prove water savings.</p> <p>Those losses prevented/saved by implementation of plan to be used as carrot to obtain funding; or kept within creek system.</p> <p>Have concerns that creek system may, in future, be detached from Murrumbidgee administration/delivery.</p>
29.10.02	Conargo	Craig Heath	DC800 to Conargo	For us we have problems in winter. We grow winter crops under centre pivots and the creek is allowed to fall so low that when we pump, we have to have a channel dug to keep the water deep enough.	We have two Wetland areas above and below us. Home to sea eagles, broлга's etc. A few people would be very upset if these had to go. Any water lost into these areas should be counted in the environmental flow. Some anabranches could be regulated so that they only fill during flooding, not when rice people are wanting their big flows. Much fencing would need to be done as			Getting rid of carp high priority – willows cumbungi chokes.

Meeting Date	Location	Name	Creek Section	Deliverability	Environmental/Wetlands/Operational flooding:	Losses:	Access:	Any other comments:
					some of them form boundaries to properties not just internal paddocks.			
29.10.02	Conargo	Robert Armytage	Jerilderie to Hartwood	Removing old weirs and willow trees, trees across creek.	Only in above average rainfall or in heavy demand periods.		Bad areas in Hartwood station.	With the removal of a lot of the old weirs and the new Hartwood weir operational more water could be pushed down the Billabong and into the Yanco through the new weir.
29.10.02	Conargo	Mark Byrne FS Falkiner	Conargo to Darlot – Forrest Ck	Forrest Creek – 100 ml delivered over Warriston Weir/day. Removal of willows to free up flow. Maintenance of breakouts/earth banks/weirs to ensure water is contained in banks and designated creek direction.	Needs to be contained within designated system – too much water going beyond system e.g. water changing from Forrest to Billabong.	Maintenance of existing structures e.g. earth retaining bank on the north/east side of McCrabbs regulator is blown out allowing Forrest water to flood dryland areas and running into Billabong Creek.		FS Falkiner is strongly opposed to any consideration to reduction of 100ML/day flow over Warriston Weir. Conversion from overflow to underflow and construction of fish ladders should be a State Water expense (Weirs licensed).
30.10.02	Wanganella	Betty Wallace		Water must have clear flow to the end of the system so it can be delivered when ordered.	Flooding must only occur during the winter when it is a good season and dams have plenty of water. Before dams were built the creeks dried up and rivers died back to waterholes keeping them weed free. Now with water essential all year round for towns and irrigation the main rivers must be cleared of problem trees and weeds and the small creeks left dry in summer. The better weirs, where water is not obstructed in peak flow times, should be left, but weirs that completely block off the river should be removed.			Seeing the Government refused to let landholders clear in and along rivers they should do the major clearing and maintain the waterways free of weeds and obstructions.

Meeting Date	Location	Name	Creek Section	Deliverability	Environmental/Wetlands/ Operational flooding:	Losses:	Access:	Any other comments:
30.10.02	Wanganella	Anthony Gorey, Dhuramein Nominees	Darlot to Moulamein	European carp, snags, salinity in the water, reliable supply of water to lower section of creek system.	Only flood when necessary and to receive some cut backs in water as other users e.g. no high security.	To be managed as efficiently as other water users.	Full access to all parties concerned with wetland areas.	Investigate water transferred down Euroolie Creek to supply below Darlot. Encourage the removal of carp from the waterways to reduce turbidity. Better land practices in areas east to reduce salinity problems.
30.10.02	Wanganella	RB & JA Crawford	Darlot to Moulamein	Remove willows in chokes – Replace the effect with capital work to allow a certain amount of wetland to be maintained.	In exchange for capital works funding.	Evaporation from weir pool – Pool estimated at 600ML – Not an issue as weir has been replaced since 1920 and creek edge has developed at FSL.	All creek banks easily accessed.	We have the last licensed overshot weir on the creek and it needs a fish walk that allows a certain amount of undershot flow. Can we access funds? All users of creek should contribute to remediation works. Preferable on users pay system based on licensed allocation. Other system 1 – based on creek frontage; 2 – based on area served. Weirs only removed if government can absolutely guarantee water delivery. Weirs only removed after the chokes are removed. Once the creek has settled down, if they still present as a barrier, then remove from upstream location first.

Phone and Written Submissions

- YCATAC acknowledges several telephone call representations on the YCS NRMP made to the YCS NRMP Working Group from the following:

Mrs Gwen McGlaughlin
"Cooinee Woods"
Jerilderie NSW

Mr Bill Duffy
"Rhyola"
Moulamein NSW

Mr Mike Gattacre
"Woorooma"
Moulamein NSW

- **Fax from David Milthorpe to Richard Sleigh on 29 October 2002**

I fax these quick thoughts as you have another meeting tomorrow.

With due respects personally I think we are given an impossible task to come with practical ideas and expert advice is need in several fields.

First: If willows are main trouble and to be removed – How many are there? How much cost per tree? Are they to be removed from creek and cut up for firewood, etc?

If start top end of creek is it correct unless all trees are removed about same time as water will be held up in places by cumbungi.

Should we start at bottom end (not places like Forrest Creek) and do a trial section? If we cannot receive a grant put a levy on creek landowners (assume legal).

Engineers I assume would or should build a small scale experimental model before rushing in. It would not tell you if it get rid of cumbungi.

For a few years rice growers could sell off some water or use more other than summer.

The projects could cost many millions for little return.

Cumbungi a major weed infesting watercourses and irrigation, damage from extensive rhizomatous root system in spring and early summer and make prolific growth during summer. With onset of winter the plants come back, leaving a mass of dry leaf and stem which if not burnt builds up at base of plants. This accumulation of organic matter can eventually alter the structure of shallow waterways; eradication over large areas is difficult and costly

From book "Plants of Western NSW".

Trusting some of these thoughts may be helpful.

Yours sincerely, D Milthorpe

▪ **Submission from Colombo Creek Ski Club**
Yanco Creek Natural Resource Management Plan - Feedback Sheet

Name: Colombo Creek Ski Club
Creek Section: Colombo

22nd November 2002

Losses

The Colombo Creek Ski Club began in 1968 with a small group of skiers from the Boree Creek area. Over the years it has increased in numbers, to a present day membership of over 261 with many of their family and friends visiting also.

During this time the Ski Club area has been improved immensely with the building of toilet facilities, the planting of trees, establishment of a lawn area, barbeque area, a boat ramp and a fenced off area with a watering system.

In the early years of the Club, the land was leased from the owner, Mrs Holt. After a number of years, Mrs Holt generously donated this land to the Colombo Creek Ski Club. In her wisdom, she could see that this action would be beneficial to many users of the water for many years to come.

Hundreds of man-hours have gone into establishing the ski site. It is a facility that has been developed and nurtured into what it is today, by contributions solely from members and skiers. The area is a natural environment for individuals and families who live in such a harsh, isolated environment to meet during the hot summer months for some sport and recreation.

It is vitally important to encourage the youth of our area to socialize, recreate and spend their time and money in our communities, to keep our rural areas and towns alive. If they leave our regions and go to the cities they tend to not return. Please don't rob the young people of this great recreational facility. The Club has an excellent safety record during its 34-year history.

By removing the weir, the water area would be greatly reduced, affecting the safety of the skiers, leaving us with no option but to close our Club. The boat-launching area would be above water level, inaccessible for any other use and all the facilities maintained by members would be rendered obsolete. The whole picturesque environment would be lost. Water skiing competitions, for example Zone Tournament and State Championship's would be lost to other areas, resulting in a reduction in revenue for local businesses through visiting competitors and families. Businesses supplying food and drinks, ice and fuel and those providing ski equipment and maintenance materials from local workshops would be disadvantaged.

This is a facility that throughout its existence has never been vandalised. Visitors have always treated the area with respect, which on its own demonstrates its value to the community. The area has always been kept tidy by those that benefit from it and members spend time and money cleaning up, if required at the beginning of each skiing season.

Many people would be affected by changes to the Colombo Creek weir, to produce little monetary gain for a small increase in water flow. We understand that the Colombo Creek has significant water losses and we are totally agreeable and will support in any way possible the removal of Willow trees and cumbungi weed

We would love to see that this facility is maintained and nurtured for many generations to come. Third generation local families are now using this area as a major choice of recreation this summer. Removal of the weir will realise a loss of a small oasis in the middle of a dry plain and a loss to the people that enjoy all it has to offer.

We hope that we have been able to demonstrate the importance of our weir as a social and environmental issue.

Allan Hunt
President
Colombo Creek Ski Club

Trent Gooden
Secretary
Colombo Creek Ski Club

APPENDIX: 2

COMMUNITY AND STAKEHOLDER FEEDBACK ON DRAFT PLAN

Submissions and Feedback from the Draft Natural Resource Management Plan October 2003

Written Submissions

Name	Property	Town	Notes
1. David Milthorpe:		Somerset	Jerilderie
2. Jim Todd:		ex YCTAC Committee	
3. John Knight:		Aintree	Deniliquin
4. John Moorehouse:		ex YCTAC Committee	
5. Mike Gatacre:		Wooroma	Moulamein
6. Peter Robertson:		Woodside	Jerilderie
7. Ross Purcell:		Bettina Lodge	Jerilderie
8. M & A Coughlan:		Tarabah	Morundah
9. Angus Crawford		Blue Gate Stn	Deniliquin

Surveys

Name	Creek Section	Received	Meeting	
1. John Mills	DS to Morundah	29.10.03	Morundah	
2. Kel Baxter	Colombo	30.10.03	Jerilderie	
3. Anonymous	Jerilderie/Algudgerie	30.10.03	Jerilderie	
4. John Whitehead	YC/CC	30.10.03	Jerilderie	
5. S Burns	Forest Creek	30.10.03	Conargo	
6. I Gibson	Bottom	31.10.03	Wanganella	
7. Michael Gregory	Jerilderie/Hartwood	30.10.03	Jerilderie	Faxed
8. AR & C Menegazzo	Conargo	30.10.03	Conargo	Faxed
9. B J Bolton	Bingegong	06.11.03	Morundah	Post
10. David Leeds	Above DC800	10.11.03	Jerilderie	Post
11. John Webb	Yanco & Wilson anabranh	10.11.03	Jerilderie	Post
12. Victor Stonnill	Colombo Creek	20.11.03		Faxed
13. N Armytage		24.11.03	Conargo	Post
14. Jeff Osmond	Ndra Rural Lands	25.11.03	Morundah	Faxed
15. B Pinnuck	Above Algudgerie Weir	26.11.03	Jerilderie	Faxed
16. Ian Girdwood	Colombo	29.11.03	Jerilderie	Post
17. Michael Elmes	Billabong/Forest	26.11.03		Post
18. Anonymous		26.11.03	Wanganella	Post
19. Richard Sleight		26.11.03	Jerilderie	Post
20. Anonymous		28.11.03		Post
21. Anonymous		28.11.03		Post
22. Hugh Cameron	Yanco	02.12.03	Jerilderie	Faxed
23. Geoff Ham	Billabong u/s Jerilderie	02.12.03	Jerilderie	Faxed
24. Tim Sheed	Billabong east of Jerilderie	13.12.03		Post
25. AD & HJ Glenn	Athole, Morundah	13.12.03		Post

Meeting	No.	Name	Creek Section	Q. 1	Q2 F	Q2 U	Q 3 - 1	Q 3 - 2	Q 3 - 3	Q 3 - 4	Q 3 - 5
Morundah	1	John Mills	DS to Morundah	10-50%	\$1.00	\$2.00	No Rest.	Greater Sec	Environ	Living Murray	
Jerilderie	2	Kel Baxter	Colombo	10-50%	\$2.00	\$1.50	Greater Sec	No Rest.	Environ	Living Murray	Savings returned to landholder in proportion of contribution to plan, states share returned to rivers
Jerilderie	3	Anon	Jerild/Algudgerie	10-50%	\$1.00	\$2.50	Greater Sec	Environ (1)	No Rest	Living Murray	
Jerilderie	4	John Whitehead	YC/CC	10-50%	\$1.00	\$1.00	Greater Sec	Environ	No Rest (2)		
Conargo	5	S Burns	Forest Creek	10-50%	\$1.50	\$2.00	Greater Sec	Environ	Living Murray	No Rest.	

No.	Q 4	Q 5	Q 6	Q 7	Q 8	Q 9	Q 10
1	No response	No response	No response	Would like to see willows killed and pulled out	Would like dead tree snags removed	No response	No response
2	Management actions to reduce losses	Not enough emphasis on weirs – upgrading issues – as regulators – wetland management – for water efficiency – environment. Not enough discussion on alternate supply via Colly & MIL to increase water efficiency	Level of joint venture funding needs to be included once agreed, to show commitment of landholders	Plan cannot be seen as trying to turn creek into a channel which could be a conclusion by others	Linkage between management actions and budget not clear	Less on LWD. More on supply efficiency	Willow removal, Weir Review, Alternate supply investigation, Snag management
3	No response	No response	No response	No response	No response	No response	No response
4	Quicker flow. Reduce Losses	Nil, at the mo	No response	See 4	Seems OK	Did not view	Govt help State & Fed
5	No response	No response	No response	No response	No response	No response	No response

Meeting	No.	Name	Creek Section	Q. 1	Q2 F	Q2 U	Q 3 - 1	Q 3 - 2	Q 3 - 3	Q 3 - 4	Q 3 - 5
Wanganella	6	I Gibson	Bottom	10-50%	\$1.50	\$2.00	Greater Sec	Environ	'No Way' to No Rest		
Jerilderie	7	Michael Gregory	Jerild-Hartwood	10-50%	\$1.50	\$1.50	Greater Sec	Environ	No Rest	Living Murray	
Conargo	8	AR & C Menegazzo	Conargo	10-50%	\$2.00	\$2.00	Greater Sec	Environ	Living Murray	No Rest	
Morundah	9	B J Bolton	Bingegong								
Jerilderie	10	David Leeds	Above DC800	10-50%	\$1.50	\$2.00	Greater Sec	Other – Political bargaining power	Environ	Living Murray	No Restrictions

No.	Q 4	Q 5	Q 6	Q 7	Q 8	Q 9	Q 10
6	No response	No response	No response	No response	No response	No response	No response
7	Good detail	Weak science suggesting environmental "degradation", e.g. Walker et al all calculated salinity would increase: Models & predictions are no basis for actions.	More research should be encouraged to define natural parameters of creek habitat & credible investigation into bio diversity	No response	More emphasis needed on the rich & abundant bio diversity existing already & that protection & propagation are core. Currently reads a bit like a disaster manual, which understates the good things happening and the natural state of ???	Hard to know how costs will run until work is started – so suggest we take this budget as a starting point & get into it. State Water should be upfront with some funding.	<ol style="list-style-type: none"> Promote/support research – carp, willow control, existing biodiversity, existing natural parameters – this could be cheaply done. Willow, willows & willows. Carp, snags, etc
8	That irrigators contribute at least 40% of cost so that we get a proper say in how things are done	No problems with any of the Plan	No response	No response	No response	Fair	Finding Water Losses and eliminating losses.
9	No response	No response	No response	No response	No response	As I am only stock & domestic No Irrigation Licence – I really cannot quote on this.	Snags and cumbungi
10	It was a start to what needed to be done in the eyes of political interest & environmental interests	Lock of insight to the outcomes of the works once completed	No response	I question whether at the end of this process, we will have any control of the process and final outcome. Although we make use of this resource, the creek is owned by the Crown & controlled by the Crown & unless we have guaranteed security on our entitlements, this may be in vane to our irrigation prospects.	However, I believe we cannot neglect our environmental obligations & therefore this impacts on the whole of the Yanco Creek System Community. Hence I believe this burden should not only fall on the shoulders of the irrigators financially or otherwise.	No response	Action 3.14E

Meeting	No.	Name	Creek Section	Q. 1	Q2 F	Q2 U	Q 3 - 1	Q 3 - 2	Q 3 - 3	Q 3 - 4	Q 3 - 5
Jerilderie	11	John Webb	Yanco/Wilson ana	10-50%	\$1.00	\$1.00	Greater Sec	No Rest.	Environ	Living Murray	
	12	Victor Stonnill	Colombo Creek	No Resp	No Resp	\$1.50	Greater Sec	No Rest.	Environ	Living Murray	
Conargo	13	N Armytage		10-50%	\$1.50	\$1.50	Greater Sec	No Rest.	Environ	Living Murray	
Morundah	14	Jeff Osmond - Narrandera Rural Lands Protection Board		No Resp	No Res	No Resp	No Resp	No Resp	N/A	N/A	
Jerilderie	15	B Pinnuck	Above Algdgerie	NA	\$2.00	\$2.00	Greater Sec	No Rest.	Environ	Living Murray	

No.	Q 4	Q 5	Q 6	Q 7	Q 8	Q 9	Q 10
11	Professional Layout	Left treatment of weirs out of mainstream thinking, treatment, assessment, etc.	Weirs must be treated as part of total plan.	No	Before commenting let us see inclusions from meetings of October 29-31 2003	Still assessing	Still reviewing
12	No Response	No Response	No Response	No Response	No Response	No Response	No Response
13	No Response	No Response	No Response	No Response	No Response	No Response	No Response
14	No Response	No Response	No mention (specifically) of the "Key threatening processes" within the "Threatened Species, Fisheries Management Act". Removal of large woody debris (snags) has been made. \$13.6m has been targeted to removal of LWD and this may be prevented under the TSFM Act. Urgent comment from National Parks (?) should be obtained. Ground water recharge study should be undertaken to determine if system losses are all negative?	No Response	No Response	Majority of cost is targeted to Removal of Willows \$4.37m and L.W.D. \$13.6m. The cost of each \$1250 willow (\$1050 L.W.D.) should be revisited and explained/justified.	No Response
15	No Response	I feel we should start at the top where the water comes in. That's where the greatest wastage of water is.	The possibility of spray willows, cumbungi with round-up, to kill trees before any earthmoving equipment is used. Willows are very easy to kill if sprayed at the right time.	My concern is if I am to put money in expectation of the savings to be given as extra allocation, when there is 500GL to be found for Living Murray. I think any savings would be hard to hang on to.	It has been well covered in the plan. I think for us to get back to 20% losses in 10 years. More use of drains to feed creek, i.e., a new drain out of Coleambally, guaranteed supply from MIL into Billabong.	Is there Government money available to do some of these works? After all it is a creek not irrigation canal. If it is going to guarantee supply in high demand months, I would pay a levy to be determined.	3.4, 3.5, 3.9 (A) (B), 3.23

Meeting	No.	Name	Creek Section	Q. 1	Q2 F	Q2 U	Q 3 - 1	Q 3 - 2	Q 3 - 3	Q 3 - 4	Q 3 - 5
Jerilderie	16	Ian Girdwood	Colombo	51-74%	\$2.00	\$1.00	Greater Sec	Environ.	Living Murray	No Rest.	
	17	Michael Elmes	Billabong/Forest	10-50%	\$1.50	\$2.00	Greater Sec	No Rest.	Environ.	Living Murray	
Wanganella	18			10-50%	\$2.00	\$2.00	Greater Sec	Environ.	No Rest.	Living Murray	
Jerilderie	19	Richard Sleigh		10-50%	\$1.50	\$2.00	Greater Sec	Environ.	No Rest.	Living Murray	
	20			No Resp	\$1.00	\$2.00	Greater Sec	Environ.	Living Murray	No Rest.	

No.	Q 4	Q 5	Q 6	Q 7	Q 8	Q 9	Q 10
16	No Response	No Response	No Response	Looking at some way to bypass some of the worst areas for the creeks where there high water loss or slow flows.	No Response	No Response	No Response
17	Has it ever been established at which points create the greatest losses? I know there is no measuring point between Conargo & the end of the line. Who knows, 20% of losses may occur between Conargo/Wanganella where the Billabong flows through the Boonoke sandhills. This loss may go into an aquifer that supplies half the stock water for country between Billabong/Murrumbidgee. If this were the case it would not be a loss but accounted for, in a case like this there would be significant economic gains.	No Response	No Response	No Response	No Response	No Response	No Response
18	No Response	No definition of what constitutes a loss.	Fully analyzing what constitutes a loss.	Run the MP as a 3x3 program	Make the execution summary more precise. Review the document by an outsider.	No Response	Flow restrictions in upper Colombo. Work out what constitutes the loss – is say 80% of the loss (52%) actually an environmental flow to the Murray system or to the Wanganella swamp.
19	No Response	No Response	No Response	No Response	No Response	No Response	No Response
20	Increasing flow rate of ponded and slow flowing water should reduce evaporation. Overall endeavour to try & do something positive.	The uncertainty of reducing losses – what adverse effect it may have – method of measuring stream flow, take-off, along stream, also metering of pumps – this alone could amount to 10%	No Response	No Response	No Response	No Response	Increasing stream flow. Keeping abreast of new technology sorting out statements that are untrue or unlikely. 50% loss is high, however, the Government must reconcile the need to keep forest areas healthy.

Meeting	No.	Name	Creek Section	Q. 1	Q2 F	Q2 U	Q 3 - 1	Q 3 - 2	Q 3 - 3	Q 3 - 4	Q 3 - 5
	21			No resp	\$1.00	\$2.00	Greater Sec	No Resp	No Resp	No Resp	No Resp
Jerilderie	22	Hugh Cameron	Yanco	10-50%	\$1.50	\$2.00	Environ.	Greater Sec	No Resp.	Living Murray	
Jerilderie	23	Geoff Ham	Billabong upstream of Jerilderie	10-50%	\$1.50	\$2.00	Environ.	Greater Sec	No Resp.	Other – more off allocation flows	Living Murray
	24	Tim Sheed	Billabong east of Jerilderie	10-50%	\$1.50	\$2.00	Greater Sec	No Rest.	Environ.	Living Murray	
	25	AD Glenn, per H J Glenn	Athole, Morundah	10-50%	\$1.00	\$1.50	Greater Sec	Environ.	Living Murray	No Rest.	
	26	Gary Williams		51-74%	\$3.00	No entry	Greater Sec	No Resp	No Resp	No Resp	No Resp

No.	Q 4	Q 5	Q 6	Q 7	Q 8	Q 9	Q 10
21	Implement the levy and see what we get for our money.	No Response	No Response	No Response	No Response	No Response	No Response
22	Positive Plan for the Future	No Response	No Response	I am concerned about creek levels dropping once willows and snags are removed.	No Response	No Response	No Response
23	The vision of the first major assault on willows.	No Response	No Response	No Response	No Response	No Response	No Response
24	No Response	No Response	No Response	No Response	No Response	No Response	No Response
25	No Response	Neither Andrew nor I have the knowledge or experience to comment. The small acreage of our country is leased; we do want to keep our licence (Est. J O Glenn) are prepared to pay what is fair.	No Response	No Response	No Response	No Response	No Response
26	No Response	No Response	No Response	No Response	No Response	No Response	No Response

Tarabah, Morundah. NSW. 2700.

Received 06.11.03

The Secretary,
Yanko Creek & Tributaries Advisory Council.
PO Box 471,
Narrandera.
NSW. 2700

24 November, 2003.

Dear Sirs/Madams,

Congratulations on the management plan. I believe the plan to be comprehensive and gives us a direction to move in.

There seems an general agreement that willows are enemy number one.

My main concern relates to Table 7, on page 57, specifically under Staffing. This whole section is rubbish. There are already people employed to run the creek, Jim Parrett and Phil Dempsey are two. All work will be contracted out and Phil has had experience in problems like willows. Lets do the willows under existing DLWC funding and see what a huge difference this one action would make. Removing the willows meets every criteria- cost effective, doesn't need a team of consultants etc to tell us what a good idea it would be, it is a noxious weed, not native and once completed will require very little expense to maintain extinction. Let's not get another layer of bureaucracy when we have existing people to do the job. De-snagging is just going to cost a fortune and will have to be done again in 10 years.

I also feel strongly that a small amount of tweeking can save heaps of water, things that would allow creek to be run lower. E.g. water limited during Jan/Feb., water more expensive in summer, no transfers down creek. I believe we need sustainable actions.

I believe that existing funding is available for revegetation and particularly fencing riparian areas. Maybe the Council could arrange information on existing funding to be distributed to people along creek. In the Management plan, riparian land gets a pretty good review. Most of our water quality problems seem to be coming from catchments of Billabong and Murrumbidgee. If Council has not already done this, maybe they could meet with these catchments and encourage them to set goals/time table to improve water quality exiting their area.

Yours sincerely,

Michael and Anna Coughlan.

D.B. MILTHORPE & SON
Somerset Merino Stud
Jerilderie
20.10.03

The Executive Officer
Murrumbidgee Private Irrigators

Dear Lee,

Re: Creek Plan

Surely our creek system is dovetailed in with the Tumut River – If it can only carry so much water what are we gaining by improving creek flow except reducing losses.

Surely we are dovetailed in with Darling River – We have to send so much to South Australia and lately none going down Darling means more percentage has to come from Snowy etc.

In report these issues do not appear to be addressed – the Nation has some major problems to address.

Some locals have suggested to me that water should not be allowed to be sold off over \$10.00 a megalitre – This will not work in practise – Some have developed too much irrigation land and want water on the cheap when it is scarce – “A Black Market would develop”

Before white man interfered Forests and swamps did not flood every year – Do we know what effect this has on diseases, insects, etc.

If there are big losses of water in our creek system and they cannot be improved on not only should rice be grown on Murrumbidgee but winter cereals as well looking at things from a National outlook.

Yours sincerely
David Milthorpe

26.10.03
The Executive Officer, MPI

Dear Lee
Re: Creek Draft Management Plan

Licenses will not be tied to properties and water is becoming more expensive.

Fruit, vegetables, dairy products give a greater return than wool and meat, hence, in future surely some water will be sold off creek system, i.e., less water to go down creek system.

All the issues I have raised in my faxes should, in my opinion, have been addressed in the Management Plan.

See you on Thursday
Yours sincerely
David Milthorpe

Yanco Creek System Comments on the Management Plan (Jim Todd)

I think that the paper is incomplete without something of the historical background to this creek system.

Occupation by non-aboriginal people took place around the 1840s by enterprising people who moved into the area and occupied it wherever there was water for their stock. Wherever the water supply proved to be not fully reliable as on this Yanco Creek system, they soon began to take action to improve that reliability. Little is documented about this, but much of it consisted of putting earth banks across the streambeds to store water. Most of these failed being washed out by the next high (or not so high) flow in the stream. From time to time you come across the evidence of these old banks. The failure of these attempts to secure the water supply led to the development of more secure structures, some of which also failed.

Prior to the construction of Burrenjack Dam, flow in the Murrumbidgee River was very irregular. The higher of these irregular flows would have provided flows into Yanco Creek. In dry seasons there would have been substantial periods with no flows into Yanco Creek.

The plan refers to work done by landholders to improve the diversion of Murrumbidgee water into the Yanco Creek. The stories seem to attribute this to Samuel McCaughey. An amazing amount of work was done including a concrete regulator in the deep cutting close to the Sturt Highway upstream of the highway bridge over the creek (which collapsed). He also built a small concrete regulator in Yanco Creek at the start of Colombo Creek to improve the diversion to Colombo Creek and slightly deepened that creek for about 1 00m. (The spoil heaps are still visible). He also deepened Colombo Creek through the site of the original Morundah village (This was about 500m east of the present Newell Highway. It was probably located at the shallowest section of the creek and **therefore was the best crossing place**. For the same reason it was also said to be very flood liable. The village re-located when -the railway was built.)

There were a number of substantial structures built in the streams to retain water from the intermittent flows in these streams. Among these was Chesneys Weir on Colombo Creek. During the 1890 drought, McCaughey on Coonong Station completely stopped the flow in Colombo Creek and used the water to irrigate. There was, in 1982, aerial photos in the Finley office of the W.C.& I.C. on which this irrigation layout was still clearly visible. McCaughey's action resulted in protracted legal action and eventually the Water Act 1902 in NSW.

This resulted in some control of these structures in the creek system by licensing them with conditions on their operation generally designed to allow a reasonably free flow of water through the system in the spring and retain stored water through the dry summer period.

The construction of Burrenjack Dam greatly reduced the frequency of these higher flows in the Murrumbidgee River high enough to divert water into Yanco System. This resulted in the formation of the Yanco, Colombo, and Billabong Creek Trust and the construction of the old weir in weir in the Murrumbidgee to divert water into the creek system. As a result, the reliability of the water supply in the creek system was better than it had ever been.

This meant that most of the structures were no longer necessary. Some were simply allowed to deteriorate toward eventual failure. Some were carefully retained and even replaced as they fell into disrepair. There is evidence on the ground that Chesneys Weir

has been built 3 times. There seems to have developed an emotional attachment to these works and, in this dry land, to the broad stretch of water (and Cumbungi) impounded by them.

If there is a move to have the unnecessary structures removed, we must not be surprised if there is a move to get a Heritage classification on some of them.

Water losses

From the "plan" I calculate that the "losses" from the system amount to some 43,300 ml. The loss would perhaps be better called "water un-accounted-for". The suggestion that this 43% loss could be reduced to 20% can be utterly rejected.

This system has a water surface length of about 1,000 km, 800 km, if you omit to lower sections of Forest Creek. My figures have to be very approximate but I assess that the evaporation from this surface, and the evapo-transpiration from the bordering trees and growth would amount to some 32,000 ml per year.

Add to this, the fact that, from the offtake to the MR321 bridge, Yanco Creek overlays an ancestral bed of the Murrumbidgee River in what would be an intake area for the ground-water resource west from that area, which must also cause some loss (if that is really a loss) at least from the creek system. In short, I see no chance of reducing these losses.

Water Ordering

This has always been a hope-less matter - even in the irrigation areas and districts. The "ordering in advance" whether 4 day or 7 day, has been used to provide a legal-type method of dealing with the complaints (if not the problems) and their real purpose has been to control the "just help yourself system which would, of course, be preferred by the water users.

What, in this plan is called "time of travel" for water flows in this system is really "the time to effect a change of flow to a particular point in the system and it not constant from one point to another. I have made the point before - in the lower parts of this system, the water has to be released from storage for a crop for which the grower has not yet made the final decision to plant.

This, however, can be managed. There is quite a lot of "fat" in the system. At any time there is a large amount of water actually in transit in the system and, to a limited extent, this can be drawn on so long as the shortages or surplus can be "made up" as quickly as possible. What is needed is:

1. That the person controlling the stream system is reasonably aware of the farming activities planned by the water users - what crop, and the areas planned.
2. The evapo-transpiration rates for these crops at their various stages in their growth. The C.S.I.R.O. at Griffith did a lot of work on this some 30 40 years ago.
3. Average evaporation and rainfall records for the area
4. Day-to-day evaporation and rainfall records, the rainfall in particular at various points in the system.

With this information, the controller can use the "fat" in the system to cover and correct the day-to-day discrepancies in the flows.

Lee Furness
Executive Officer MPI

Dear Lee,

Re: Draft Natural Resource Plan Yanco Creek in particular. Our Property “Moonyanco” is situation near Conargo. We pump from 2 sites from to Yanco Creek arm. I would like to make some comments relating to the Moonyanco section of about 24 kms single frontage, however, I do not feel that I could make much useful comment about the other sections, that should be up to those landholders concerned.

The significant features of our section is that from the upstream boundary to the Homestead is a 3 metre fall the Yanco Creek therefore is quite fast running. There are willow trees at the Homestead we don't want the, however, they do not cause a restriction to the stream as it is very wide there.

There is one snag of timber and about four inside bends of Cumbungi once again very little restriction good channel on outside of bend. One day with excavator all that maybe necessary; access is possible but frontage is extremely dense with a lot of dad timber branches, etc., mainly black box some red gum.

Cost to improve stream flow is very marginal.

Riparian zone we have been talking about fencing the Riparian Zone we would have to line the fence line along way back from the creek to obtain a clear straight fence line more or less make it another paddock and supply stock water to stock by using the ana-branch or flood runners. There is about 500 p.a. of extremely dense timbered areas with virtually no feed values at all.

Endangered Species They are over the top worrying about protecting BATS. Plains-Wanderer maybe resolving itself as well as other species on the basis that seasonal conditions the bniggest factor that determines bird and other wildlife.

Thank You
John Knight
Moonyanco

YANCO CREEK SYSTEM

Careful control of flows in the creek systems and use of water cropping should be given the most careful consideration.

Due to the very limited grades of this area which is basically an artesian overflow system. Timing of the flows is very difficult and thought could be given to approximating fairly natural spring flows.

These flows could be used to provide late season flows for watering wheat, barley, oats and other cereal when normal winter rains are low. And would approximate normal spring rains and snowmelts on the hill catchment areas.

Cumbungi controls could roughly parallel more usual spring and early summer floods for control of this plant.

Cumbungi drowns in approximately two metres of water, and then the leaf matter breaks down and leaves a clearer flow channel for next seasons flow.

Alternatively in no winter flows it rots to ground level or less and so natural water flows along the creek can occur.

Perhaps thought could be given to arranging a no flow situation along the creek every five or so years.

Native fish and bird life thrive under high flow conditions. The breeding cycle of fish is very fast and small sprat can be seen returning to the depleting channels in four to six weeks. Bird breeding is rapid and the young are commonly fed from this native sprat, return period.

Both of these breeding cycles originally occur in a five, ten or thirteen year cycle depending on which cycle occurred and counted by our cycle of counting.

Phragmites follows a similar cycle to cumbungi but drowns less frequently and regenerates from dormant root systems more rapidly.

RICE GROWING

If not already required the growing of rice should be subject to strict limitations of pretesting to proposed areas by Electro magnetic testing and then limited areas of planting.

The water needs of this crop are higher than other grains and occur at the time of year when flows and areas are subject to something in the order of 1.2 to 1.6 metres of evaporation loss very undesirable during the summer season.

For many farmers rice is a very desirable income, yet in the long term I am of the feeling that it should be phased out, and water kept for relatively quick autumn flows to irrigate or pre irrigate for winter pastures or other early cereal crops.

SNAGS

Removal of these should be given very careful consideration, as these provide much of the natural shelter for all natural water life. (In some other areas where snag removal was used, the overall loss of river water life was great and now snag replacement procedures have been used).

WILLOW REMOVAL

These imported plants cause damage to waterways and native water life and should be removed as soon as practicable.

The issues of "Australian Geographic" April-June 2003 has a very interesting article Page 100 -105. The use of the procedure recorded there could be very helpful.

CARP

Various forms of European Carp (actually Chinese originally) cause serious damage in the soft alluvial soil such as the Yanco Creek System. And encouragement should be given to the various research programs, hopefully leading eventually to their elimination.

J. Moorhouse

P.S.

ROADS All roads are shown on the plans in the Plan.

During one flood period the road access Wanganella to Conargo was cut. Probably about 10 - 15km east of Wanganella town, most likely from memory the 1972 flood.

At some earlier time a bank had been built to stop flows in the Forest Creek returning to the Billabong Creek, then strengthened provide seasonable road passage.

Unfortunately the bank road had not been built high enough and was seriously damaged by overtopping. Repairs could not be undertaken for some six or more months.

Although the matter of an improved bank height and safe access was discussed twice with Shire engineers no real action followed.

SUGGESTION

The work necessary is to widen the whole bank and build higher than the cereal ground and provide shallow flood ways either side of the bank. Say 50 metres away for occasional flood conditions.



When funding for work along the creek system is being considered this work could be proposed so that sensible road access could be retained in most flood times and expensive repairs avoided as an after event.

To: Bob Crawford
Windouran
Yanco Creek & Tributaries Advisory Council

Re: YCTAC Meeting at Wanganella 31.10.03.

- Bob, please offer an apology for me being unable to attend today's meeting.
- I authorize Bob Crawford of Windouran to vote on my behalf at today's meeting. Underneath I raise some strong views that I would like stated today.
- Despite all the good intention of YCTAC, DIPNR & State Water all have failed to supply water to the lower reach properties. Since 1996 over 300,000 ml has flowed over Warriston Weir and not reached the confluence of the Forest Creek & Billabong Creek on 90 kilometres downstream. If this were in private industry bankruptcy or sackings would occur.
- Neadoug P/L, which owns the Woorooma licences on the Billabong & Forest Creeks is adamant the only way to resolve the problem is the alternate water supply where the identifier of the saving receives the fair share of savings necessary to have compensation to those lower reach properties.
- Neadoug is not in favour at all of any levies on water usage and licenced allocation to improve flows. This is clearly the responsibility of DIPNR and State Water and YCTAC not for the individual consumptive users to prop up an inefficient supplier of the water.
- I have ideas that could save 40,000 ml water annually, however, I have not had much support. It seems too simple it must be too difficult to implement by the supplier. Also some individuals do not accept water is a fragile and valuable resource and are very greedy and do not respect other individuals or the system. These users will eventually reduce everyone's entitlements.
- This new plan like the old Forest Creek Management plan does nothing for the lower end users of the Forest Creek. Once again the hard issues have been avoided and the softer options taken.
- What relationship or action has been planned between YCTAC and Pratt Water Foundation. Has YCTAC been able to source some of the \$100 million funding?

Yours sincerely
William M Gatacre

Richard Sleigh
Chairman
Yanko Creek and Tributaries Advisory Council
Bowen Station
Jerilderie NSW 2716

"Woodside"
Jerilderie NSW 2716
23d October 2003
Ph/Fax 03 58867119

Dear Richard,

Congratulations on the release of your teams Draft Yanko Creek System Natural Resource Management Plan.

I would like to bring these points to the attention of the Council.

- * Point 1.3, whilst the broader dryland areas are conveniently ignored in the scope of the plan, the major achievable water savings highlighted by the plan are transmission losses. The Plan calls for these losses to be cut from 47% to 20% within ten years. Surely the importance of groundwater recharge to all farmers in the affected area cannot be simply ignored. While I am aware that not enough is known about groundwater recharge in any river system its importance to the general environment should not be dismissed in the scope of this plan.
- * I am yet to be convinced that any benefit can come from fencing the stream banks to exclude grazing under our districts normal low intensity stocking rates (i.e. without irrigated pastures).
- * Can someone please inform the experts that before intensive irrigation, the natural time for high stream flows is in late Spring/early summer? Common sense says that high flows will occur when the combination of storm rains and snow melts reach their maximum potential.
- * Regarding the subject of vegetation and wildlife, would it not be sensible to encourage individuals attempting to do the right thing.

Yours sincerely,

Peter Robertson

Ross Purcell
'Bettina Lodge'
Jerilderie NSW 2716

Dear Sir,

Just a few queries I have. I would like to know if there is any plan to clear willow regrowth in the Billabong Creek from Newell Highway to Bolton St bridge. After the expensive operation they under took some years ago and may I add not a very successful exercise if something isn't done very shortly it, will turn into another major job.

As well as the hold cumbungi is getting on the creek system.

The other concern is in regards to natural resource management plan is where the 406 million will be spent and if the new councils being set up will swallow a large portion of this money.

As well as who determines make of natural resources management committees.

Yours sincerely

Ross Purcell

Received: 28 November 2003
Blue Gate Station
Deniliquin
NSW 2710
10 November, 2003

Lee Furness
Murrumbidgee Private Irrigators Inc
PO Box 723
Griffith NSW 2680

Dear Madam

As the representative of the owners of the above property, which has frontages to the Billabong Creek, the Edward River and a double frontage to the Forrest Creek, I wish to respond to the Yanco Creek Natural Resource Plan.

The Yanco creek is just another victim of over allocation of scarce resources by various State Governments over the years. The creek itself is in exactly the position that the hydrologists engaged by the late Tom Holt foreshadowed. This inefficient creek system has been tragically over allocated

Spending \$20 million on cleaning up the creek will no doubt lead to increased and more efficient flows, but this does not necessarily mean greater access to water for the lower end of the system. It will mean that there will be an increase in land devoted to irrigation at a time when it is clearly obvious to the most blinkered view that we have over allocated our river systems. The mentality of that if there is water going past your property it should be pumped out onto a crop is out of date but unfortunately still exists.

The supply of water to the lower reaches of the Forest Creek has been non-existent for a number of years due to the inefficiencies along the creek. The man made Wanganella swamp has now become a very important bird breeding area and should be and no doubt will be maintained for this reason. The landholders from Rhyola down recognised a number of years ago that supplying the lower reaches of the creek was costing too much in wastage and agreed to a proposal that it would be far more efficient for the system if they received a non tradable and non irrigable stock and domestic allocation from either the Edward river or the Billabong Creek in lieu of water in the Forest Creek.

This proposal had the support of the Department and the landholders and for reasons unknown to me it has not seen the light of day. To this day, I am unsure why this proposal fell over as it meant a saving of several thousand megalitres of a scarce resource, which could have been usefully used for other purposes. The water in the lower Forrest creek when flowing filled underground aquifers in Nullum and Blue Gate and ensured that there was enough hydrolic pressure on Blue Gate to push salts etc, leaking into these aquifers from excessive downstream irrigation, west.

Angus Crawford
Director/Manager



Department of
Infrastructure, Planning and Natural Resources

RECEIVED
23.1.04

Contact: Gary Croker
Phone: 02 6923 0400
Fax: 02 6921 7308
Email: Gary.Croker@dipnr.nsw.gov.au

Richard Sleigh
C/- The Secretary
Yanco Creek and Tributaries Advisory Council.
PO Box 471
Narrandera NSW 2700

12 January 2004

Dear Richard

Subject: Comments on the Draft document titled *The Yanco Creek System Natural Resource Management Plan*

Please find the Department of Infrastructure, Planning and Natural Resources' (DIPNR) response to the draft document circulated for comment. Many of the comments refer to emerging changes in legislation with references to the newly gazetted Catchment Management Authorities Act 2003 and the Native Vegetation Act 2003. I acknowledge and commend the partnership approach with DIPNR in developing the document and the comments below are intended to be constructive and to assist the Yanco Creek and Tributaries Advisory Council in improving the management of the Creek System.

General comments

With the imminent creation of Catchment Management Authorities (CMA5), it is important to recognise the role these organisations will have on natural resource management, both in the Yanco Creek vicinity and the Murrumbidgee and Murray catchments. The implementers of the Plan will need to liaise closely with both CMAs. Much of that area covered by this plan is within the area dealt with in the Murray Catchment Blueprint. It is critical that both the Murray and Murrumbidgee Catchment Blueprints be specifically referred to, and the actions and strategies in the Yanco Creek Plan reflect these documents. Incentives for riparian management together with terrestrial vegetation management and restoration/revegetation will need to be targeted in the Plan. Additions to the existing map showing catchment boundaries, Catchment Management Authority boundaries and perhaps local government boundaries would be useful.

Under the Water Management Act 2000, the State Water Management Outcomes Plan (SWMOP) provides an overarching set of state wide targets and outcomes for water management in NSW. There does not appear to be any reference to the SWMOP in the preparation of Yanco Creek Plan. Of particular relevance for Yanco and similar creeks is the matter of bank-full flows. The Yanco plan should at least acknowledge the SWMOP.

Generally, this plan moves towards substantial on-ground works, but lacks emphasis on the need for geomorphic and hydraulic data that would be a prelude to such actions. In particular, reference is made to the proposed action to "manage" 12980 units of large woody debris. There is little explanation of how the 12980 units were derived and careful consideration needs to be given before any large woody debris is removed. In fact, recent scientific studies have lead to the reintroduction of snags back into streams, which appears to be at odds with the intent of this Plan. There is a need to seek comment and/or consent from NSW Fisheries, Department of Environment

and Conservation and DIPNR prior to any works commencing. In the particular, some scientific argument for the removal (or retention) of large woody debris should be included.

Specific recommendations for changes to the text

Section 2. 1 Paragraph 6.

It is incorrect to say that the length of the creek causes it to meander. The meanders are a result of topography and/or speed and quantum of flow.

Fourth dot point. Channel capacity constraints are more to do with natural capacity of the creeks than with willows and large woody debris, It is considered that cumbungi is less important.

Page 9. Table 2.

This table does not recognise natural creek bed capacity as an impediment to flow. It would also be worthwhile to introduce weighting for the various impediments. Perhaps an investigation of the hydrological effect of these 'blockages' would provide some critical facts and figures.

Section 2.6. Page 15

Some comments on climate would provide a more complete picture within this section. It is well recognised that climate over the last 100 years (where reliable observations are available) has distinct 'wet' and 'dry' periods, and drivers such as the Southern Oscillation Index/ENSO (short term trends) and Inter-decadal Pacific Oscillation Index (longer-term trends) have been documented as climatic indicators. For example, floods have decreased over the last 20 years, but this needs to be considered in context of longer- term climate. The period from the 1970's to the early 1990's is acknowledged as a relatively wet period in the Riverina, whereas there has been a marked decreased in flows throughout the southern Murray- Darling Basin since then. Hence the reduction in flooding is more likely to be indicative of longer-term fluctuations in climate than increased regulation.

Issue 3.2

Action 3.2 (B) targets a reduction in transmission losses from the current 43% to 20% over ten years. There is no explanation of how this desirable outcome was arrived at, or whether it is achievable. Although it is mentioned in the Plan, the following sequence needs to be emphasised:

1. Determine exactly what the cause of these losses are,
2. Prepare an activity plan based on (1) to reduce losses on a prioritised basis.

Issue 3.7.

This is a short and simple explanation of a complex issue. The problem of break-outs could also be partially overcome by reducing the operating level of the creek. The water that escapes also has an environmental benefit or cost. The environmental assessment mentioned in the Action Box may well determine that remedial works are not warranted. The Department is concerned about creating an ongoing engineering issue for Yanco Creek.

Issue 3.10. Paragraph 3.

It is unclear how the SCADA discussion fits into the water ordering issue. The document could provide more information on State Water's plan to "critically examine" water flow in the system.

Issue 3. 15 (b) Page 40.

In this section, an additional strategy to protect high conservation areas would be to consider re-zoning the land (eg 7a Environmentally Sensitive Land) under the respective Council's Local Environment Plan (LEP). This would provide a protective mechanism to control inappropriate land use in high conservation riparian areas.

Issue 3.16 Page 41.

The report could comment on the effect of flow management as a tool to control European carp.

Issue 3.19 Page 42.

With the Native Vegetation Conservation Act 1997 to be repealed with the commencement of the Native Vegetation Act 2003, the Western Riverina Regional Vegetation Management Plan (WRRVP) will not be gazetted. The Murrumbidgee and Murray CMAs will utilise elements of the WRRVP as they develop Catchment Action Plans however the regulatory components may not be acted on. As an alternative, consideration might be given in this section to refer to Property Vegetation Plans under the Native Vegetation Act 2003.

Issue 3.22 page 45 paragraph 2

The two Actions on page 46 appear to affect the licensing arrangements for the corporations and any negotiations should involve DIPNR. The statement attributed to Simpson (1994) is now outdated. Several changes to water management and regulation have occurred since this date make this quote invalid.

Issue 3.24

This section does not adequately explain Section 87 (regarding compensation) within the Water Management Act 2000.

Issue 3.27 page 51 (Action 3.27a) Target 1.

This would be better described as arrangements to better share flows that are excess to downstream consumptive requirements between the Billabong Creek and Forest Creek systems. It is also not clear what the intended outcomes are for the 'environmental purposes'.

Page 52 (Action 3.27 (17.

This section implies that rostering is required for irrigation pumpers when flows at Warriston Weir are regulated at or near to target flows. The target flows at Warriston Weir are provided for stock and domestic use not for irrigation.

Page 57 & 58 Costing Schedule.

Costs need to be identified for weirs that are targeted for removal.

Thank you for the opportunity to comment and I trust that the issues raised in this letter are taken into account in your deliberations prior to the finalisation of the document. I have arranged for Rob Scriven and Peter Beal to follow up on these issues should the Advisory Council require further assistance from the Department.

Yours sincerely

Warwick Ford

A/Regional Director, Murray-Murrumbidgee

Our ref: MPI 031

3 December 2003

Ms Lee Furness
Executive Officer
Murrumbidgee Private Irrigators Inc.
PO Box 723
GRIFFITH NSW 2680

Dear Ms Furness

Yanco Creek System – Draft Natural Resource Management Plan

Thank you for giving NSW Fisheries the opportunity to comment on the *Draft Natural Resource Management Plan* for the Yanco Creek System.

NSW Fisheries is responsible for conserving fish stocks, fish habitat, marine vegetation, threatened fish species and aquatic biodiversity and for achieving sustainable recreational and commercial fisheries. As such the Department is concerned about potential impacts on the aquatic environment of the Yanco Creek system that may arise from works proposed by the Management Plan. The following comments have been prepared in response to reviewing the Draft Natural Resource Management Plan for the Yanco Creek system and recent site inspections of the system attended by officers from State Water and NSW Fisheries.

General

From NSW Fisheries perspective one of the main problems with the Yanco Creek system is that its capacity to convey water is being regularly exceeded by regulated flows. It is noted that the current maximum (regulated) flow in Yanco Creek at the offtake is 1400ML/d. The statement on page 26 that at 1400ML/d “considerable flooding occurs at several points in local areas” tends to suggest that 1400ML/d is too high and therefore ecologically unsustainable.

It is clear from reading the plan that this issue is also recognised by landholders and State Water. However, the Plan seems to suggest that the most appropriate way to address the problem is to increase the capacity of the creek by erecting block banks across flood runners to prevent loss of water (eg Action 3.7) and removal of snags which impede the flow. NSW Fisheries is not supportive of the erection of additional block banks as these serve as fish passage barriers during natural high flow events. The more appropriate approach is to reduce the flow rate into the creek to a level that reduces losses to an insignificant level. Such a flow rate is more likely to be ecologically sustainable.

Therefore it would be appropriate to include an action that encompassed the concept of determining the ecologically sustainable maximum regulated flow level for the Creek and implementing a phase in period to reduce flows to that level over a reasonable period of time (eg 5 to 10 years).

Note that Section 65 of the Water Sharing Plan for the Murrumbidgee Regulated River Water Source states that the maximum operating channel capacity shall be determined taking in to account various issues, so there is an intent for this to happen anyway.

Notwithstanding the above, NSW Fisheries supports the removal of **unnatural** flow blockages in the system such as willows and weirs. Indeed these should be the highest priority.

In conclusion I would like to reiterate that the most appropriate way to address the Yanco Creek “water supply problem” is to firstly:

1. Remove willows and redundant and unnecessary weirs, then
2. Review the water carrying capacity of the Creek and determine the ecologically sustainable capacity, then
3. Implement rules to reduce the current flow volume down to the ES volume.

When all that has been done it would then be appropriate to reassess the need to “manage” snags (see below).

Large Woody Debris

Large woody debris or snags are critically important habitat for many native fish species, several of which have been listed as threatened under NSW and Commonwealth legislation. Recognising the continued loss of this particular habitat type and the associated impacts on threatened fish species, the Minister for Fisheries listed “removal of large woody debris” as a Key Threatening Process in November 2001. As a consequence of this listing, a threat abatement plan is currently being prepared by NSW Fisheries in liaison with key stakeholder groups.

NSW Fisheries is particularly concerned at the emphasis being placed on the need to remove snags from the Yanco Creek System for the purpose of achieving water delivery efficiencies. Given the above, a widespread program of snag removal would be considered an activity that would have a significant environmental impact. As such an Environmental Impact Statement and Species Impact Statement would need to be completed and assessed before any such program could be undertaken. It is difficult to envisage how such a program could be approved. NSW Fisheries certainly would not support, or give approval to, any widescale proposal to remove snags.

Following the recent inspection of Yanco Creek it appears that in reality, there are few locations where removal of snags is being considered. The concerns of landholders appear to be centred around the potential for debris accumulation in the immediate vicinity of certain snags and also around streambank erosion due to redirected flow as a result of the current state of alignment. These concerns can be adequately addressed in most instances by lopping or realignment. Removal is generally not necessary.

As a general principal, lopping should be considered the first priority for the management of snags. Where lopping will not solve the immediate problem, re-alignment should be considered as the next possibility, followed by relocation. Removal of a snag is the least desirable alternative and should only be adopted as a last resort. It is NSW Fisheries understanding that these alternate management methods are being considered by State Water as part of the management arrangements for snags in the Yanco Creek system. Such an approach is supported by NSW Fisheries.

Therefore, I strongly suggest that the Plan be reworded to discuss the issue of snags in terms of “snag management” rather than “desnagging ” or “snag removal”, as is currently the case. This will reduce the potential for misunderstanding and generation of unrealistic expectations among the local community. More discussion of the environmental value and ecological role of snags/LWD and the legislative situation is also warranted.

Riparian Zone Management

NSW Fisheries note the intentions expressed in the draft plan to enhance the management of the riparian zone. However the actions are unlikely to lead to significant improvements. The reality is

that few landholders will undertake riparian zone repair unless they receive substantial assistance or are compelled to do so. The plan should commit to a more pro-active program of riparian zone repair. Perhaps a partnership arrangement with an organisation such as Greening Australia could be explored. An alternative approach would be inclusion of conditions on water licences requiring Best Management Practice of riparian zones.

Weirs

In the last several years there have been a number of initiatives and programs that have been implemented to address the environmental impacts that arise from the existence and operation of weirs and other regulating structures on native aquatic species and their habitat. These have included the development of the NSW Weirs Policy and the undertaking of a statewide review of all existing weirs to determine their suitability for removal or retrofitting to allow for fish passage past these structures.

In May 2002 the "Installation and operation of instream structures and other mechanisms that alter natural flow regimes of rivers and streams" was gazetted as a Key Threatening Process under the threatened species provisions of the *Fisheries Management Act 1994*. This listing was in recognition of the impacts that weirs and other regulating structures have had, and continue to have, on threatened aquatic species.

It is imperative that any proposals for weir removal, installation of fishways or construction of new regulating structures be undertaken in full consultation with NSW Fisheries. This will ensure that considerations relating to the recovery of native fish populations are addressed and incorporated at the earliest stages of the design process thereby avoiding possible cost blowouts. This involvement should be reflected in the actions of the management plan that address this issue (eg 3.7, 3.9(B)). The involvement of NSW Fisheries in the development of the Implementation Plans for the Yanco Creek system and selected site specific inspections is strongly supported.

Threatened Species

The Yanco Creek System is included in the range of the Lower Murray River Catchment Endangered Ecological Community . This means that the community of fish and aquatic invertebrate species, which occurs within the Yanco Creek System, is considered endangered and must be considered in the planning process for any potential works or activities. There are also a number of individual species and populations that have also been listed as either endangered or vulnerable under the respective Schedules of the Fisheries Management Act that occur within the Yanco Creek System which must also be considered in developing and undertaking proposed work programs. NSW Fisheries is willing to provide any information that may be required by State Water for the preparation of threatened species assessments, required as part of the proposed works program.

Fish sampling records

On page 23 of the Management Plan, reference is made to fish population data that has been collected from a site on Colombo Creek but there is no indication as to the source of this data and when it was collected. This is important if this information is to be used as part of any baseline study for the Yanco Creek system.

Liaison with NSW Fisheries

In the Action summary table on pages (iv) and (v) of the draft Plan NSW Fisheries has not been listed as a responsible agency despite the fact that several actions have a direct impact on aquatic species and their habitat. NSW Fisheries has the following comments to make with respect to the highlighted management actions:-

- **Action 3.4** – As NSW Fisheries has an approval role for works undertaken in the Yanco Creek System, it would be appropriate for the Department to be included in the application of Integrated Procedures Assessment Protocols to ensure that a streamlined approvals process is in place for all works undertaken as part of the *Draft Natural Resource Management Plan*.
- **Action 3.5** – specific information is required on how the prioritisation of works will be undertaken. It is assumed that environmental concerns will be a component of the prioritisation process and that relevant agencies will be involved in the prioritisation process, or if not, be permitted to have an input into the prioritised works list.
- **Action 3.8(b)** – NSW Fisheries should be consulted to ensure that appropriate fish passage requirements are included in the design of any engineering options.
- **Action 3.9(a)** – Environmental impacts of weirs and NSW Fisheries legislative requirements with respect to weirs and barriers that obstruct fish passage should be incorporated in this information program.
- **Action 3.9(b)** – The weir review of the Yanco Creek System should be undertaken in conjunction with staff from NSW Fisheries to ensure that fish passage concerns / considerations are included in the review process. Weir removal and / or retention should be consistent with the Fisheries Management Act and the NSW Weirs policy.
- **Action 3.13** – Any investigation of the flow regime of the Yanco Creek System should include consideration of the flow requirements of native fish species and should look at all aspects of the flow regime such as the natural timing and volumes of flow (ie incorporating periods of low flow in summer) and not just natural flooding regimes. Environmental flow requirements for wetlands should be determined by DIPNR in association with NSW Fisheries.
- **Action 3.14(f)** – any monitoring program developed for the Yanco Creek System should include the monitoring of aquatic biota so as to provide a complete assessment of the state of aquatic health in the Yanco Creek System.

NSW Fisheries approvals

In developing the works program it should be recognised that the majority of works will require one or more approvals from NSW Fisheries. These are for “dredging and reclamation works”, works that “obstruct fish passage” and possibly “harm to threatened species”. Such approvals are subject to an environmental review process. It is the responsibility of the applicant to provide all the relevant information required for the assessment process to be undertaken. It is sensible and advisable to put forward a package of works for approval rather than deal with them individually.

It is important to note that while the proposed IPAP process may integrate all DIPNR approvals into one application, approvals to be issued by other government departments such as NSW Fisheries are not included in this process. The current Management Plan does not adequately reflect this situation (second last paragraph on p43 of the Management Plan).

McCraib’s Regulator and adjacent spillway

The Management Plan refers to McCraib’s regulator and adjacent spillway on the western edge of Wanganella Swamp and to the fact that since 1990 the regulator has not been operated due to staffing changes within DIPNR. The Plan also suggests that’s the existing regulator and spillway do not serve a useful purpose within Wanganella Swamp. NSW Fisheries is willing to be involved in any proposals to modify the existing structure or develop appropriate operating protocols that will benefit the local aquatic environment.

The development of the Natural Resource Management Plan and associated Implementation Plans for the Yanco Creek system is a positive step forward in the future management of Yanco Creek in terms of meeting the needs of the environment and of water users. NSW Fisheries is keen to be involved in this process and looks forward to working with State Water and Yanco Creek and Tributaries Advisory Council during this process.

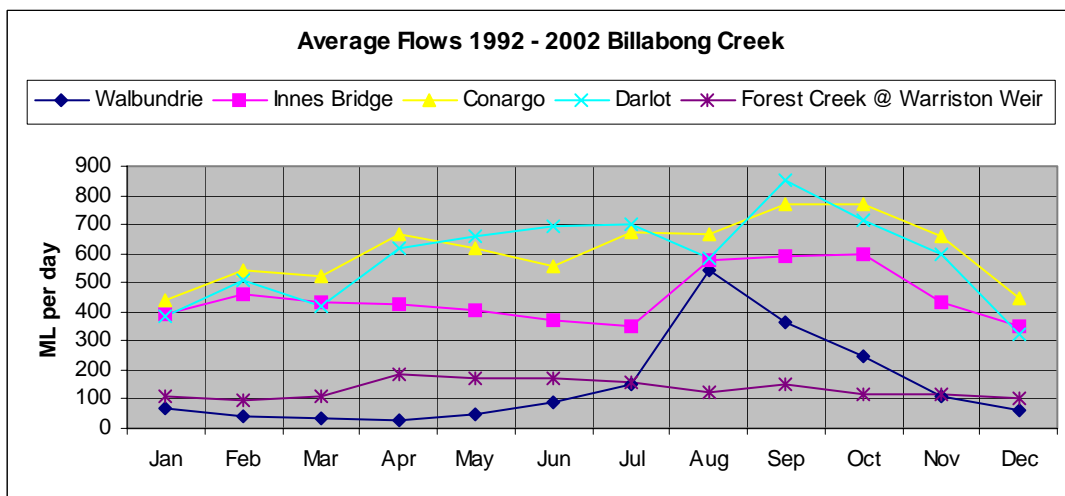
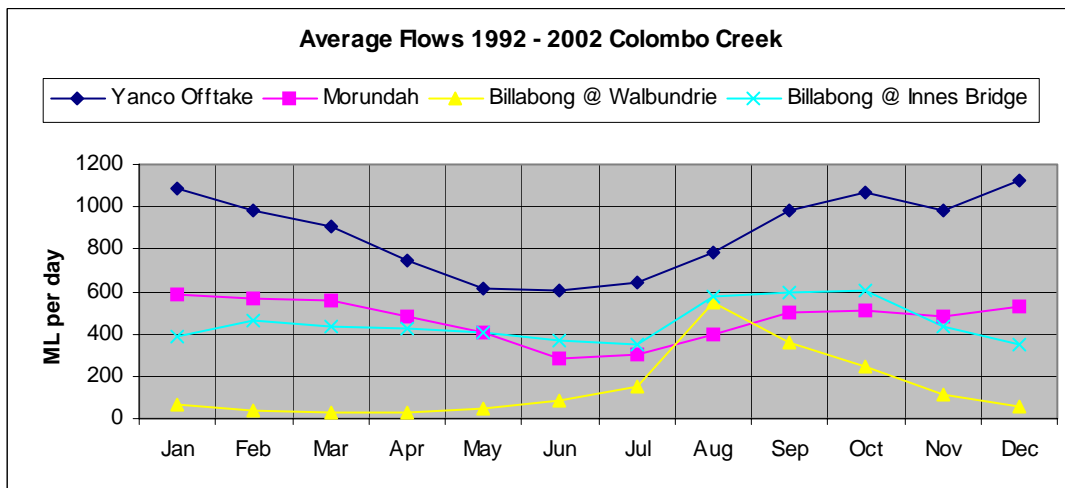
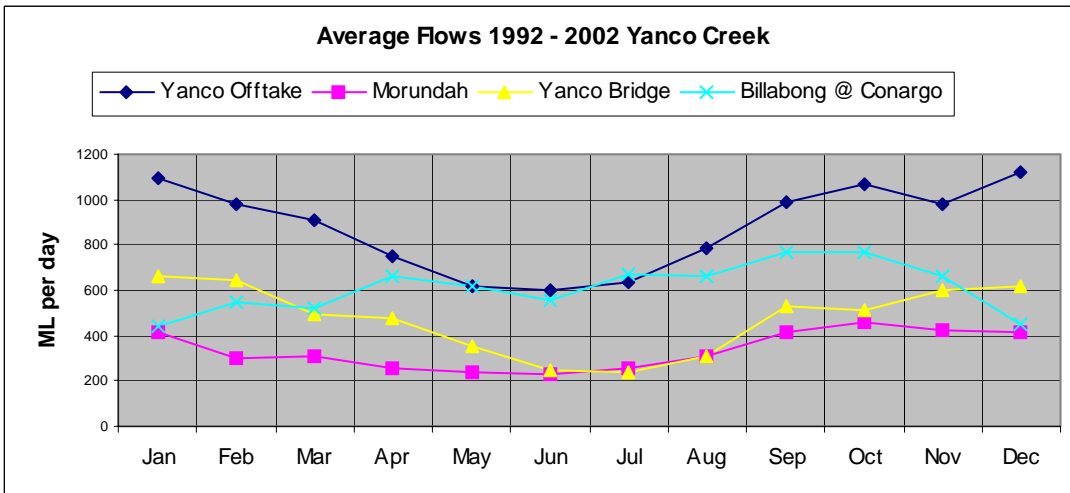
If you wish to discuss any of the above matters or require further information please contact Nicole McKirdy at the Narrandera Office on 6959 9028 in the first instance.

Yours sincerely,

Allan Lugg
Senior Conservation Manager (South)

APPENDIX: 3

AVERAGE DAILY FLOW VOLUMES IN MEGALITRES (ML) FOR THE YCS



APPENDIX: 4 (A)

Threatened Species Conservation Act Biological Database Lists

No.	Vegetation Type	Species	Location	General Description	Changes	
1.	Western Grey Box Woodland	*Western Grey Box (<i>Eucalyptus microcarpa</i>) Hooked needlewood (<i>Hakea tephrosprema</i>) Yellow Box (<i>Eucalyptus melliodora</i>) Emu-bush (<i>Eremophila longifolia</i>) White Cypress Pine (<i>Callitris glaucophylla</i>) Sugarwood (<i>Myaporum platycarpum</i>) Yarran (<i>Acacia melvillei</i>) Bull-oak (<i>Allocasuarina luehmannii</i>) Butterbush (<i>Pittosporum phylliraeoides</i>) Quandong (<i>Santalum acuminatum</i>) Moonah (<i>Melaleuca lanceolata</i>) Yellow Gum (<i>Eucalyptus leucoxylon</i>) Narrow-leaf hopbush (<i>Dodonaea viscosa</i> subsp. <i>augustissima</i>) Wedge-leaf hopbush (<i>Dodonaea viscosa</i> s subsp. <i>cuneata</i>)	Grey Wattle (<i>Acacia brachybotrya</i>) Western Black Wattle (<i>Acacia hakeoides</i>) Torny Saltbush (<i>Rhagodia spinescens</i>) Golden Wattle (<i>Acacia pycnantha</i>) Punty Bush (<i>Senna</i> spp.) Miljee (<i>Acacia oswaldii</i>) Native Blackthorn (<i>Bursaria spinosa</i>) Gold Dust Wattle (<i>Acacia acinacea</i>) Ruby Saltbush (<i>Enchylaena tomentosa</i>) Leafless Cherry (<i>Exocarpos aphyllus</i>) Box grass (<i>Paspalidium constrictum</i>) Climbing Saltbush (<i>Einadia nutans</i>) Spear Grass (<i>Stipa</i> spp.) Mat Rush (<i>Lomandra</i> spp.) Windmill Grass (<i>Chloris truncata</i>) Whitetop (<i>Danthonia</i> spp.)	Elevated flats and rises of the Murray River floodplain, on red-brown earths and clay.	Open, well developed woodlands with diverse understorey and grass layer has been largely cleared.	Now sparse and isolated tree clumps with little regeneration and no understorey. Often weed invaded. Widespread need for management for regeneration and enhancement from seed.
2.	Boree Woodland	*Boree (<i>Acacia pendula</i>) Yarran (<i>Acacia melvillei</i>) Cooba (<i>Acacia salicina</i>) Miljee (<i>Acacia oswaldii</i>) Yarran (<i>Acacia homolophylla</i>) Moonah (<i>Melaleuca lanceolata</i>) Emu-bush (<i>Eremophila longifolia</i>) Thorny Saltbush (<i>Rhagodia spinescens</i>)	Cottonbush (<i>Maireana aphylla</i>) Old Man Saltbush (<i>Atriplex nummularia</i>) Roly-Poly (<i>Sclerolaena muricata</i>) Punty Bush (<i>Senna</i> spp.) Whitetop (<i>Danthonia</i> spp.) Curly Windmill Grass (<i>Enteropogon acicularis</i>) Speargrass (<i>Stipa</i> spp.)	Level to depressed plains in the east of the Riverina, on grey and brown clays and red earths.	Once open woodland/shrublands with moderate structural and species diversity.	There has been a general degradation and loss of woodland structure with a depletion of perennial shrubs and grasses. Great opportunities for broadscale regeneration under rotational grazing. Increased grazing potential with re-introduction of shrub layer.
3.	Bimble Box Woodland	*Bimble Box (<i>Eucalyptus populnea</i> subsp. <i>bimbil</i>) Belah (<i>Casuarina pauper</i>) Budda (<i>Eremophila mitchellii</i>) Wilga (<i>Geijera parviflora</i>) Hooked needlewood (<i>Hakea tephrosprema</i>) Willow Wattle (<i>Acacia salicina</i>) Emu-bush (<i>Eremophila longifolia</i>) Spreading saltbush (<i>Atriplex pseudocampanulata</i>) Berry saltbush (<i>Atriplex semibaccata</i>) Ruby saltbush (<i>Enchylaena tomentosa</i>)	Common Wallaby-grass (<i>Austrodanthonia caespitosa</i>) Rough Spear-grass (<i>Austrostipa scabra</i> subsp. <i>falcata</i>) Golden Everlasting (<i>Bracteantha bracteata</i>) Clustered Everlasting (<i>Chrysocephalum semipapposum</i>) Nodding saltbush (<i>Einadia nutans</i> subsp. <i>nutans</i>) Spider Grass (<i>Enteropogon acicularis</i>) Dwarf Bluebush (<i>Maireana humillima</i>) Ridge Sida (<i>Sida cunninghamii</i>)	Valleys and floodplains. Alluvial, red loams	Open Bimble Box woodland on floodplains and wide valleys with a grassy understorey.	There has been a considerable contraction in area and a general degradation and loss of woodland structure with a depletion of perennial shrubs and grasses. Few intact examples remain.

No.	Vegetation Type	Species	Location	General Description	Changes	
		Woolly Bassia (<i>Sclerolaena lanicuspis</i>)	Dissected New Holland Daisy (<i>Vittadinia dissecta</i> var. <i>hirta</i>)			
4.	Prior Stream Callitris Woodland	*White Cypress Pine (<i>Callitris glaucophylla</i>) Buloke (<i>Allocasuarina leuhmannii</i>) Kurrajong (<i>Brachychiton populneus</i> subsp. <i>trilobus</i>) Gum Coolibah (<i>Eucalyptus intertexta</i>) Bimble Box (<i>Eucalyptus populnea</i> subsp. <i>bimbil</i>) Wilga (<i>Geijera parviflora</i>) Hooked Needlewood (<i>Hakea tephrosprema</i>) Deanne's Wattle (<i>Acacia deanei</i>) Hakea Wattle (<i>Acacia hakeoides</i>) Cattle-bush (<i>Alectryon oleifolius</i> subsp. <i>canescens</i>) Narrow-leaf hopbush (<i>Dodonaea viscosa</i> subsp. <i>augustissima</i>) Narrow-leaf Desert cassia (<i>Senna artemisioides</i> subsp. <i>zygophylla</i>) Eardley's saltbush (<i>Atriplex eardleyae</i>) Berry saltbush (<i>Atriplex semibaccata</i>) Ruby saltbush (<i>Enchylaena tomentosa</i>)	Common bluebush (<i>Maireana decalvans</i>) Goat-head (<i>Malacocera tricornis</i>) Hedge saltbush (<i>Rhagodia spinescens</i>) Common Wallaby-grass (<i>Austrodanthonia caespitosa</i>) Golden Everlasting (<i>Bracteantha bracteata</i>) Clustered Everlasting (<i>Chrysocephalum semipapposum</i>) Black anther Flax-lily (<i>Dianella revoluta</i>) Nodding Saltbush (<i>Einadia nutans</i> subsp. <i>nutans</i>) Common Wheat-grass (<i>Elymus scaber</i>) Many-flowered Mat-rush (<i>Lomandra multiflora</i>) Pussy-tails (<i>Ptilotus spathulatus</i>) Short-winged Copperburr (<i>Sclerolaena brachyptera</i>) Twiggy Sida (<i>Sida intricata</i>) Mulga Mitchell Grass (<i>Thyridolepis mitchelliana</i>)	Sandy rises of prior streams, sand ridges. Aeolian, well drained sandy loams and loams.	Low woodland to woodland of prior streams, dominated by White Cypress Pine and shrubs scattered over a grassy understorey.	There has been a general degradation and loss of woodland structure with a depletion of perennial shrubs and grasses.
5.	Old Man Saltbush Shrubland	*Old Man Saltbush (<i>Atriplex nummularia</i>) Thorny Saltbush (<i>Rhagodia spinescens</i>) Bladder Saltbush (<i>Atriplex vesicaria</i>)	Level to depressed plains, grey or brown clays and often in low-lying situations with black box woodland	Once extensive and diverse perennial shrubland with well-developed herb and grass layers.	Now old stands with low diversity, invasive perennials and low native annuals.	
6.	Bladder Saltbush Shrubland	*Bladder Saltbush (<i>Atriplex vesicaria</i>) Slender Grasswort (<i>Sclerostegia tenuis</i>)	Level to depressed alluvial plains, on deep grey, cracking clays to red-clay loam.	Moderate/high species diversity of shrubland/grassland.	Contraction of area and depletion of some diversity. Need for continued strategic management and regeneration.	
7.	Belah-Rosewood Woodland	*Belah/Black Oak (<i>Casuarina pauper</i>) *Rosewood (<i>Alectryon oleifolius</i> subsp. <i>canescens</i>) Black Bluebush (<i>Maireana pyramidata</i>) Leafless Cherry (<i>Exocarpus aphyllus</i>) Yarran (<i>Acacia melvillei</i>) Wilga (<i>Geijera parviflora</i>)	Aeolian sandplains in the far north of the Riverina, on red or brown calcareous earths.	Once open woodland with diverse chenopod shrub layer.	Regeneration variable and shrub layer depleted. Great opportunity for controlled grazing management.	

No.	Vegetation Type	Species	Location	General Description	Changes
8.	Lachlan Callitris Mixed Woodland	*White Cypress Pine (<i>Callitris glaucophylla</i>) *Gum Coolibah (<i>Eucalyptus intertexta</i>) Bimble Box (<i>Eucalyptus populnea</i> subsp. <i>bimbil</i>) Belah (<i>Casuarina pauper</i>) Bull-oak (<i>Allocasuarina luehmannii</i>) Rosewood (<i>Alectryon oleifolius</i>) Wilga (<i>Geijera parviflora</i>)	Narrow-leaf Emu-bush (<i>Eremophila sturtii</i>) Budda (<i>Eremophila mitchellii</i>) Narrow-leaf Desert cassia (<i>Senna rtemisioides</i> subsp. <i>zygophylla</i>) <i>Aristida</i> spp. <i>Eragrostis</i> spp. Enteropogon spp.	Aeolian sandplains and minor dune fields typically on earthy sands. Depth of sand sheet is critical determinant of species distribution.	Once a woodland with a predominantly grassy understorey and a sparse shrub layer. Changes to disturbance regimes have promoted the prevalence of woody shrubs and small trees. Need for strategic grazing management and re-introduction of understorey and groundcovers for increased diversity and structure. In some locations where there has been heavy regeneration there is a case for managed thinning.
9.	Black Box Woodland	*Black Box (<i>Eucalyptus largiflorens</i>) Cooba (<i>Acacia salicina</i>) River Cooba (<i>Acacia stenophylla</i>) Miljee (<i>Acacia oswaldii</i>) Butterbush (<i>Pittosporum phylliraeoides</i>) Nitre Goosefoot (<i>Chenopodium nitrariaceum</i>) Thorny Saltbush (<i>Rhagodia spinescens</i>) Old Man Saltbush (<i>Atriplex nummularia</i>) Ruby Saltbush (<i>Enchylaena tomentosa</i>)	Spotted Emu Bush (<i>Eremophila maculata</i>) Spreading Emu Bush (<i>Eremophila divaricata</i>) <i>Senna</i> spp. Leafless Cherry (<i>Exocarpus aphyllus</i>) Lignum (<i>Muehlenbeckia florulenta</i>) Warrego Summer Grass (<i>Paspalidium jubiflorum</i>) Whitetop (<i>Danthonia</i> spp.) Climbing Saltbush (<i>Einadia nutans</i>)	River floodplains, low-lying areas and creek lines, on grey soils.	Once open woodland with a well developed and diverse but variable understorey. Now still open woodland but with a depleted low diversity understorey. Tree layer capable of regeneration. Need for shrub layer enhancement and strategic grazing management.
10.	Mallee Woodland	*Dumosa Mallee (<i>Eucalyptus dumosa</i>) *White Mallee (<i>Eucalyptus gracilis</i>) *Oil Mallee (<i>Eucalyptus oleosa</i>) *Black Mallee Box (<i>Eucalyptus porosa</i>) *Slender-leaf Mallee (<i>Eucalyptus leptophylla</i>) *Grey Mallee (<i>Eucalyptus socialis</i>) Sugarwood (<i>Myoporum platycarpum</i>) White Cypress Pine (<i>Callitris glaucophylla</i>) Wait-a-while (<i>Acacia colletioides</i>) Narrow-leaf Hopbush (<i>Dodonaea viscosa</i> subsp. <i>angustissima</i>) Umbrella Wattle (<i>Acacia oswaldii</i>) Bramble Wattle (<i>Acacia victoriae</i>) <i>Senna</i> spp. Kidney Saltbush (<i>Atriplex stipitata</i>) Cottony Goosefoot (<i>Chenopodium curvispicatum</i>) Ruby Saltbush (<i>Enchylaena tomentosa</i>) Erect Saltbush (<i>Maireana pentatropis</i>) Shrubby Bluebush (<i>Maireana pyramidata</i>)	Pimelea Daisy-bush (<i>Olearia pimeleoides</i>) Hedge Saltbush (<i>Rhagodia spinescens</i>) Oblique-spined Bassia (<i>Sclerolaena obliquicuspis</i>) Horned Bassia (<i>Sclerolaena diacantha</i>) Stiff Westringia (<i>Westringia rigida</i>) Pointed Twin-leaf (<i>Zygophyllum apiculatum</i>) Shrubby Twin-leaf (<i>Zygophyllum aurantiacum</i>) Rough Spear-grass (<i>Austrostipa scabra</i> subsp. <i>scabra</i>) Balcarra Spear-grass (<i>Austrostipa nitida</i>) Knotty Spear-grass (<i>Austrostipa nodosa</i>) Sandhill Goodenia (<i>Goodenia willisiana</i>)	Sandplains, swales and dune crests. Aeolian, sandy red loams	Tall shrubland to low woodland dominated by multi-stemmed mallee eucalypts. Still a low woodland but with a depleted low diversity understorey. Need for strategic grazing management.

No.	Vegetation Type	Species	Location	General Description	Changes	
		Satiny Bluebush (<i>Maireana turbinata</i>) Nitrite-bush (<i>Nitraria billardierei</i>) Mallee Bitter-pea (<i>Daviesia arenaria</i>)	Hard-head Saltbush (<i>Dissocarpus paradoxus</i>) Nodding Saltbush (<i>Einadia nutans</i> subsp. <i>nutans</i>) Woolly-fruit Bluebush (<i>Maireana sclerolaenoides</i>) Slender Bluebush (<i>Maireana pentagona</i>) Minnie Daisy (<i>Minuria leptophylla</i>) Lambs-tails (<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>) Rough Porcupine Grass (<i>Triodia scariosa</i>) New Zealand Spinach (<i>Tetragonia tetragonioides</i>)			
11.	Cottonbush Shrubland	*Cottonbush (<i>Maireana aphylla</i>) Dillon Bush (<i>Nitraria billardierei</i>) Roly-Poly (<i>Sclerolaena muricata</i>) Streaked Poverty bush (<i>Sclerolaena tricuspis</i>)	Depressed alluvial plains on grey clay soils, often disturbed.	Derived from diverse chenopod shrubland /woodland/grass-land complex. Considered a disclimax community resulting from past grazing pressure.	Structure and diversity can be maintained and improved with strategic grazing.	
12.	Murray Callitris Mixed Woodland	*Murray Pine (<i>Callitris gracilis</i> subsp. <i>murrayensis</i>) *White Cypress Pine (<i>Callitris glaucophylla</i>) Yellow Box (<i>Eucalyptus melliodora</i>) Butterbush (<i>Pittosporum phylliraeoides</i>) Needlewood (<i>Hakea leucotera</i>) Hooked Needlewood (<i>Hakea tephrosprema</i>) Bull-oak (<i>Allocasuarina luehmannii</i>) Sandalwood (<i>Santalum lanceolatum</i>) Quandong (<i>Santalum acuminatum</i>) Cooba (<i>Acacia salicina</i>) Emu-bush (<i>Eremophila longifolia</i>) Sugarwood (<i>Myoporum platycarpum</i>) Moonah (<i>Melaleuca lanceolata</i>) Rosewood (<i>Alectryon oleifolius</i>) Narrow-leaf Hopbush (<i>Dodoniaea viscosa</i> subsp. <i>angustissima</i>) Grey Wattle (<i>Acacia brachybotrya</i>)	Yarran (<i>Acacia melvillei</i>) Miljee (<i>Acacia oswaldii</i>) Western Black Wattle (<i>Acacia hakeoides</i>) Wilga (<i>Geijera parviflora</i>) Native Blackthorn (<i>Bursaria spinosa</i>) Thorny Saltbush (<i>Rhagodia spinescens</i>) Ruby Saltbush (<i>Enchylaena tomentosa</i>) Punty Bush (<i>Senna</i> spp.) Box Grass (<i>Paspalidium ocnstrictum</i>) Climbing Saltbush (<i>Einadia nutans</i>) Spear Grass (<i>Stipa</i> spp.) Finger Panic Grass (<i>Digiaria</i> spp.) Mat Rush (<i>Lomandra</i> spp.) Windmill Grass (<i>Chloris truncata</i>) Whitetop (<i>Danthonia</i> spp.)	Sandy rises of old source bordering dunes and prior streams on red and brown sands and loam.	Once open to thick woodland with a diverse and well-developed shrub understorey.	Now open, sparse and degraded woodland. Loss of understorey diversity and structure and often heavily weed invaded. Little to no regeneration south of the Lachlan River under normal grazing conditions. Only regenerates in above average rainfall years. Need for strategic destocking and re-introduction of understorey and increased diversity and structure. In some locations where there has been heavy regeneration there is a case for managed thinning.
13.	Bimble Box/Callitris	*Bimble Box (<i>Eucalyptus populnea</i> subsp. <i>bimbil</i>)	Narrow-leaf Hopbush (<i>Dodoniaea</i>	Rocky outcrops of	Low open woodland	In some locations there have

No.	Vegetation Type	Species	Location	General Description	Changes	
	Mixed Woodland	*White Cypress Pine (<i>Callitris glaucophylla</i>) Currawang (<i>Acacia doratoxylon</i>) Kurrajong (<i>Brachychiton populneus</i> subsp. <i>trilobus</i>) Belah (<i>Casuarina pauper</i>) Budda (<i>Eremophila mitchellii</i>) Gum Coolibah (<i>Eucalyptus intertexta</i>) Mulga (<i>Acacia aneura</i>) Western Silver Wattle (<i>Acacia decora</i>) Cattle-bush (<i>Alectryon oleifolius</i> subsp. <i>canescens</i>) Lobed-leaf Hop-bush (<i>Dodonaea lobulata</i>)	<i>viscosa</i> subsp. <i>angustissima</i>) Green Fuchsia Bush (<i>Eremophila serrulata</i>) Narrow-leaf Emu-bush (<i>Eremophila sturtii</i>) Grey Mallee (<i>Eucalyptus morrisii</i>) Narrow-leaf waxflower (<i>Philotheca linearis</i>) Small Vanilla-lily (<i>Arthropodium minus</i>) Blue Burr-daisy (<i>Calotis cuneifolia</i>) Hairy Burr-daisy (<i>Calotis hispidula</i>) Tall Raspwort (<i>Gonocarpus elatus</i>) Slender Violet-bush (<i>Hybanthus monopetalus</i>) Rock Isotome (<i>Isotoma axillaris</i>) Many-flowered Mat-rush (<i>Lomandra multiflora</i>) Wonga Vine (<i>Pandorea pandorana</i>) Mulga Mitchell Grass (<i>Thyridolepis mitchelliana</i>)	Sedimentary, sandstone-conglomerate, sands and loams with a gravelly surface.	with exposed rock and sparse groundcover	been only minor changes. Other areas are now more open, sparse and degraded.
14.	Riverine Forest/Woodland	*River Red Gum (<i>Eucalyptus camaldulensis</i>) Black Box (<i>Eucalyptus largiflorens</i>) Cooba (<i>Acacia salicina</i>) River Cooba (<i>Acacia stenophylla</i>) Lignum (<i>Muehlenbeckia florulenta</i>)	Nitre Goosefoot (<i>Chenopodium nitraticeum</i>) Slender Cherry (<i>Exocarpos strictus</i>) Common reed (<i>Phragmites australis</i>) Rush (<i>Juncus</i> spp.) Warrego Summer grass (<i>Paspalidium jubiflorum</i>)	River and creek levees and adjacent flats of grey soil.	Once a mixture of open woodland and forest of a diverse age and size with moderate ground flora diversity.	Now open forest with thick forest areas of even age and sized trees. There is also low species and structural diversity. Need for continued grazing and forestry management.
15.	Black Bluebush shrubland	*Black Bluebush (<i>Maireana pyramidata</i>) Pearl Bluebush (<i>Maireana sedifolia</i>) Eastern Flat-top saltbush (<i>Atriplex lindleyi</i>)	Lake lunettes, low rises, undulating plains, red-brown sands, loams, duplex soils.	Diverse and vulnerable landsystem.	Tend to be degraded because of soil type/location and grazing pressure.	
16.	Lignum, Nitre Goosefoot, Canegrass, Reed beds, wetlands	*Lignum (<i>Muehlenbeckia florulenta</i>) *Nitre Goosefoot (<i>Chenopodium nitraticeum</i>) *Canegrass (<i>Eragrostis australasica</i>) Rush (<i>Juncus</i> spp.) Black Box (<i>Eucalyptus largiflorens</i>) – on edges and high ground	Infrequently flooded channels, depressions and river flats on heavy grey cracking clays.	Once diverse in both structure and species	Now depleted species diversity with many highly degraded and weed invaded.	
17.	Dillon Bush Shrubland	*Dillon Bush (<i>Nitratia billardierei</i>) Spear Grass (<i>Stipa</i> spp.) Whitetop (<i>Danthonia</i> spp.)	Depressed alluvial plains on grey clay soils, often disturbed.	Derived from diverse chenopod shrubland/ woodland/grassland complex. Considered	Structure and diversity can be maintained and improved with strategic grazing.	

No.	Vegetation Type	Species	Location	General Description	Changes
				a disclimax community resulting from past grazing pressure.	
18.	Mixed Chenopod Shrubland	Bladder saltbush (<i>Atriplex vesicaria</i>) Slender grasswort (<i>Sclerostegia tenuis</i>) Cottonbush (<i>Maireana aphylla</i>)	Dillon Bush (<i>Nitratia billardierei</i>) Roly-Poly (<i>Sclerolaena muricata</i>) Streaked Poverty bush (<i>Sclerolaena tricuspis</i>)	Moderate/high species diversity of shrubland/grassland.	Structure and diversity can be maintained and improved with strategic management and regeneration.
19.	Native Grassland	*Whitetop (<i>Danthonia caespitosa</i>) *Curly windmill grass (<i>Enteropogon acicularis</i>) *Speargrass (<i>Stipa</i> spp.) <i>Swainsona</i> spp. <i>Rhodanthe</i> spp. <i>Leucochrysum</i> spp. <i>Cotula</i> spp. <i>Leptorhynchus</i> spp. <i>Brachycome</i> spp. <i>Wahlenbergia</i> spp.	Level alluvial plains in the east of the Riverina, on grey to brown clay soils.	Once perennial tussock grassland with a diverse annual plant composition.	Extensive areas of less diverse but valuable native pasture grasslands. Some have been derived from grassland/woodland/shrubland types. Still areas of high species diversity but also many degraded with annual exotic grasses. Need for continued strategic grazing management of this valuable resource.

* Denotes dominant or key species.

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APPENDIX 4 (B) – Threatened fauna predictions

			Riverine forest	Black Box woodland	Callitris mixed woodlands	Mixed Box woodlands	Cotton bush shrubland	Lignum / Nitre goosefoot / canegrass	Native grassland	Old man saltbush shrubland	Bladder saltbush shrubland	Dillon bush shrubland	Black Bluebush shrubland	Belah/rosewood woodland	Prior stream Callitris woodland	Open areas	Boree woodland	Rocky ridge woodland	Mallee woodland	Cleared
Southern Bell Frog	<i>Litoria raniformis</i>	Probably restricted to larger waterbodies, has been recorded utilising rice bays and vegetated dams.	BS	BS				BS												
Spotted-tailed Quoll	<i>Dasyurus maculatus</i>	Probably used to disperse along the riverlines but not many left	LC	LC											LC					
Brush-tailed Phascogale	<i>Phascogale tapoatafa</i>	Hollow dependant.	LC	LC																
Koala	<i>Phascolarctos cinereus</i>	More productive euc forests	LC	LC																
Brush-tailed Rock-wallaby	<i>Petrogale penicillata</i>	Would have ranged across non rocky areas but most of the life is on and near the hills																	LC	
Kultarr	<i>Antechinomys laniger</i>	Probably extinct in region. Lives in open areas in woodlands or shrublands and grasslands.		FB	FB	FB	FB	FB	FB	FB	FB	FB	FB	FB	FB		FB	FB	FB	
Yellow-bellied Sheathtail-bat	<i>Saccolaimus flaviventris</i>	Feeds over most vegetation but roosts in hollows	FR	FR	F	FR	F	F	F	F	F	F	F	F	F	F	F	F	F	F
Large-footed Mouse-eared Bat	<i>Myotis adversus</i>	Feeds over water, roosts in caves and large trees	FR	FR																
Greater Long-eared Bat	<i>Nyctophilus timoriensis</i>	Feeds in scrubby areas, roosts in hollows and crevices	FR	FR	FR	FR								FR	FR		FR	FR	FR	
Little Pied Bat	<i>Chalinolobus picatus</i>	Feeds over wide areas, roost in hollows and crevices	FR	FR	FR	FR								FR	FR	F	FR	FR	FR	F
Australasian Bittern	<i>Botaurus poiciloptilus</i>	Rivers and reeds																		FF
Magpie Goose	<i>Anseranus semipalmata</i>	Wet areas including flooded grasslands etc					FF									FF	FF			FF
Freckled Duck	<i>Stictonetta naevosa</i>	Waterbodies																		
Blue-billed Duck	<i>Oxyura australis</i>	Waterbodies																		
Brolga	<i>Grus rubicundus</i>	Wet areas for breeding	F	F			F	F	F	F	F	F				F	F			F
Black-tailed Godwit	<i>Limosa limosa</i>	Lake margins																		
Great Knot	<i>Calidris tenuirostris</i>	Lake margins																		
Osprey	<i>Pandion haliaetus</i>	Major rivers	R																	
Square-tailed Kite	<i>Lophoictinia isura</i>	Feed over woodlands and nearby shrublands etc, nest near water	FB	FB	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
Black-breasted Buzzard	<i>Hamirostra melanosternon</i>	Feeds widely, nest in large trees	FB	FB	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
Grey Falcon	<i>Falco hypoleucos</i>	Woodlands	FB	FB	F	F	F	F	F	F	F	F	F	F	FB		F	F	F	
Malleefowl	<i>Leipoa ocellata</i>	Scrubby and litter rich areas			FB	FB								F			F		FB	
Australian Bustard	<i>Ardeotis australis</i>	Open areas, no longer breeding in NSW					F	F	F	F	F	F			F					F

			Riverine forest	Black Box woodland	Callitris mixed woodlands	Mixed Box woodlands	Cotton bush shrubland	Lignum / Nitre goosefoot / canegrass	Native grassland	Old man saltbush shrubland	Bladder saltbush shrubland	Dillon bush shrubland	Black Bluebush shrubland	Belah/rosewood woodland	Prior stream Callitris	Open areas	Boree woodland	Rocky ridge woodland	Mallee woodland	Cleared
Plains-wanderer	<i>Pedionomus torquatus</i>	Open grassy areas							FB							FB				
Bush Thick-knee (Curlew)	<i>Burhinus grallarius</i>	Mostly in the river associated areas now	FB	FB	FB	FB									FB		FB		FB	
Painted Snipe	<i>Rostratula benghalensis</i>	Wetlands					F													
Glossy Black-cockatoo	<i>Calyptorhynchus lathamii</i>	Hollows and food trees. Veg containing she-oaks plus the neighbouring large trees for nesting																	FB	
Pink Cockatoo	<i>Cacatua leadbeateri</i>	Hollows	F	FB	FB	FB	F	F	F	F	F	F	F	F	F	F	F	FB	FB	
Superb Parrot	<i>Polytelis swainsonii</i>	Association of red gum and box sites	B	F	F	FB												F		
Swift Parrot	<i>Lathamus discolor</i>	Blossom feeding	F	F	F	F													F	F
Turquoise Parrot	<i>Neophema pulchchella</i>	Woodlands and forests	F		FB	FB													FB	
Barking Owl	<i>Ninox connivens</i>	Forests and woodlands	FB																	
Masked Owl	<i>Tyto novaehollandiae</i>	Forest areas with large hollows and open feeding areas. May not breed in inland areas nowadays. Will use caves	FB	FB		FB													FB	
Gilbert's Whistler	<i>Pachycephala inornata</i>	Mostly mallee but lots of others at times. Dense shrub layer needed.	FB	FB	FB	FB								FB					FB	FB
Chestnut Quail-thrush	<i>Cinlosoma castamotus</i>	Dense understorey				FB							FB						FB	FB
Regent Honeyeater	<i>Xanthomyza phrygia</i>	Flowering Eucalypts and woodlands	F			F														
Painted Honeyeater	<i>Grantiella picta</i>	Mistletoe	FB																FB	
Pied Honeyeater	<i>Certhionyx variegatus</i>	Flowering shrubs																		
Striated grasswren	<i>Amytornis striatus</i>	Spinifex or hilly scrub																	FB	FB
Thick billed grass wren	<i>Amytornis textilis</i>	Probably gone					FB	FB		FB	FB	FB	FB							
Southern scrub robin	<i>Drymodes brunneopygia</i>	Mallee and shrublands																		FB
Western Blue tongue lizard	<i>Tiliqua occipitalis</i>	Mallee/Triodia											LC	LC						LC
Red lored whistler	<i>Pachycephala rufogularis</i>	Mallee																		LC

KEY
FB= feeds and breeds
BS=breed and shelter under debris
LC= life cycle

FR=feeds over and roosts in
FF= feeds in if flooded
F= feed
R= roost

DATA SOURCE

The predicted records are generated by Bioclimatic analyses (Busby 1991) run through the WinERMS (NPWS) program. These analyses are based on there being suitable climatic conditions for the species to occur in the search area. However, this does not necessarily mean that its required habitat is there. Sources of distribution records used to make these predictions include the RAOU Bird Atlas, Australian Museum specimen register, CSIRO Wildlife Collection register and the Atlas of NSW Wildlife.

Murray Ellis (Zoologist, NPWS), John Brickhill (Naturalist, NPWS) and Rick Webster (Ecologist, Ecosurveys P/L) made comments on the listing of species and their use of different habitat types.

For further information regarding threatened species visit NPWS website at www.npws.nsw.gov.au/wildlife/tsprofile.htm

APPENDIX: 5

NPWS THREATENED SPECIES ATLAS

Threatened Species (common name / scientific name)	Primary Habitat	Threats to habitat/ species	Recovery Plan Actions and Other Recommendations
Barking Owl <i>Ninox connivens</i>	Large, old growth, hollow bearing eucalypts. South/ west Riverina. Formerly common along the Murrumbidgee and Lachlan Rivers. Also in East and almost certainly in north.	<ul style="list-style-type: none"> ▪ Clearing of woodland vegetation, particularly large hollow-bearing trees, for agriculture and firewood harvesting. ▪ Frequent fire that leads to degradation of understorey vegetation which is critical as habitat and foraging substrate for its prey. Secondary poisoning. 	<ul style="list-style-type: none"> ▪ Retain existing woodland and open forest remnant stands, especially those containing hollow-bearing trees that provide nesting sites. ▪ Retaining vegetation along watercourses to protect roosting areas. ▪ Retaining a buffer (no disturbance) of native vegetation at least 200m radius around known nest sites. ▪ Appropriate use of pesticides. ▪ Recovery plan not yet drafted.
Masked Owl <i>Tyto novaehollandiae</i>	Large, old growth, hollow bearing eucalypts. South/ west Riverina. Formerly common along the Murrumbidgee and Lachlan Rivers.	<ul style="list-style-type: none"> ▪ Reduction of prey numbers and loss of nesting sites through loss of hollow bearing trees. ▪ Probably all the threats that are mentioned for Barking Owl. 	<ul style="list-style-type: none"> ▪ Retention of large stands of native vegetation, especially those containing hollow-bearing trees that provide nesting sites. ▪ Retaining a buffer (no disturbance) of native vegetation at least 200m radius around known nest sites. ▪ Recovery plan not yet drafted.
Bush Stone-Curlew <i>Burhinus grallarius</i>	Open grassy woodlands, riparian forests with low sparse native grasses and fallen timber.	<ul style="list-style-type: none"> ▪ Clearing, degradation and fragmentation of grassy woodland habitat. ▪ Foxes and cats. ▪ Loss of under-storey habitat (eg. native grasses, leaf litter, coarse woody debris) through grazing, burning, weed invasion. 	<ul style="list-style-type: none"> ▪ Retention of existing native vegetation. ▪ Fencing of suitable woodland habitats, particularly those with unimproved pasture and an intact native ground plant layer. Encourage good grazing management within remnants which maintains species diversity while limiting grass height. Some limited tree regeneration is appropriate. ▪ Encouraging landholders to increase the size of existing remnants, plant trees and to establish buffer zones of unimproved uncultivated pasture around woodland remnants. ▪ Limiting firewood collection. ▪ Encouraging landholders to leave fallen branches and debris on the ground beneath trees. ▪ Regional fox control programs ▪ Draft Recovery plan in progress.
Australian Bustard <i>Ardeotis australis</i>	Occurs in grasslands, light scrubland and woodlands. Apparently moves in response to rainfall. Preferred habitat is grassland. Once common now a vagrant.	<ul style="list-style-type: none"> ▪ Overgrazing, reducing ground cover ▪ Loss of habitat through clearing and cultivation ▪ Foxes and cats ▪ Low breeding potential 	<ul style="list-style-type: none"> ▪ Grazing regimes that allow for the maintenance of preferred vegetation structure. ▪ Protection of known and potential habitat ▪ Regional fox control programs ▪ Draft Recovery plan in preparation
Plains-wanderer <i>Pedionomus torquatus</i>	Sparse native grasslands dominated by white top and spear grass on red-brown soils.	<ul style="list-style-type: none"> ▪ Loss of grassland habitat ▪ Pasture improvement, over grazing (particularly 	<ul style="list-style-type: none"> ▪ Grazing regimes that allow for the maintenance of preferred vegetation structure. ▪ Protection of known and potential habitat

Threatened Species (common name / scientific name)	Primary Habitat	Threats to habitat/ species	Recovery Plan Actions and Other Recommendations
		<ul style="list-style-type: none"> during drought), weed invasion ▪ Predation by foxes ▪ Drought and fire 	<ul style="list-style-type: none"> ▪ Irrigated areas are 2 kms from habitat to provide a buffer from fox predation ▪ Regional fox control planning ▪ Sensitive grazing of habitat at appropriate times ▪ Monitoring, survey and benchmarking ▪ Reservation of habitat ▪ Draft Recovery plan in preparation
Malleefowl <i>Leipoa ocellata</i>	Mallee woodlands in Carrathool Shire majority of NSW population is west of the Lachlan River, south to around Goolgowi.	<ul style="list-style-type: none"> ▪ Loss of habitat, habitat fragmentation ▪ Isolation of populations leaves small populations vulnerable to catastrophic events ▪ High fire frequency in mallee ▪ Predation by foxes 	<ul style="list-style-type: none"> ▪ Protection and maintenance of known or potential habitat ▪ Fire control/management ▪ Grazing management in key habitat ▪ Regional fox control programs ▪ Recovery plan in preparation
Striated Grasswren <i>Amytornis striatus</i>	Poorly known species in Riverina. Mature spinifex usually associated with Mallee eucalypts and sandy soils.	<ul style="list-style-type: none"> ▪ Fire ▪ Grazing ▪ Clearing ▪ Predation by foxes and cats 	<ul style="list-style-type: none"> ▪ Retain old spinifex clumps and mallee ▪ Regional fox control programs in habitat areas ▪ Recovery plan not yet drafted.
Shy Heathwren <i>Hylacola cautus</i>	Sedentary species. Mallee woodlands with dense low heathy understorey.	<ul style="list-style-type: none"> ▪ Clearing of suitable habitat ▪ Grazing pressure that reduces the density of ground cover ▪ Predation by foxes and cats. 	<ul style="list-style-type: none"> ▪ Protection and maintenance of known or potential habitat ▪ Regional fox control programs ▪ Recovery plan not yet drafted.
Redthroat <i>Pyrholaemus brunneus</i>	Sedentary species, inhabits discrete pockets in far west of Riverina around Balranald. Mostly Old Man Saltbush and Black Bluebush. At eastern edge of range.	<ul style="list-style-type: none"> ▪ Overgrazing of saltbush and bluebush destroys habitat, prevents regeneration of suitable vegetation. ▪ Frequent fires. 	<ul style="list-style-type: none"> ▪ Protection and maintenance of known or potential habitat ▪ Recovery plan not yet drafted.
Painted Honeyeater <i>Grantiella picta</i>	Migratory species. Associated with mistletoe in woodlands particularly <i>Acacia pendula</i> (Boree) <i>Acacia aneura</i> (Mulga) <i>Acacia homophylla</i> (Yarran) <i>Acacia melvillei</i> mallee and <i>Allocasurina leuhamanni</i> (Buloke). Also dry forest including box/pine. Specialist feeders on mistletoe fruit.	<ul style="list-style-type: none"> ▪ Clearing and degradation of woodland and mallee habitat. ▪ Lack of regeneration from overgrazing ▪ Isolation, degradation and clearing of patches of Boree, Yarran and <i>Acacia melvillei</i>. ▪ Selective removal of mistletoe 	<ul style="list-style-type: none"> ▪ Retaining suitable foraging and nesting trees, including those trees that host mistletoe. ▪ Encouraging regeneration of habitat by fencing remnant stands. ▪ Recovery plan not yet drafted.
Regent Honeyeater <i>Xanthomyza phrygia</i>	Woodland, usually Ironbark. Associated with White Box, Yellow Box and Mugga Ironbark. Nomadic-relies on nectar.	<ul style="list-style-type: none"> ▪ Clearing, degradation and fragmentation of habitat, in particular, logging of larger, mature trees in Box – Ironbark forests that provide reliable nectar and nesting sites. 	<ul style="list-style-type: none"> ▪ Retaining and enhancing stands of suitable open Box - Ironbark forest or woodland habitat. ▪ Encouraging regeneration of feed / nesting trees by fencing remnant stands and new plantings.

Threatened Species (common name / scientific name)	Primary Habitat	Threats to habitat/ species	Recovery Plan Actions and Other Recommendations
	At western edge of range.	<ul style="list-style-type: none"> Poor regeneration of suitable foraging and nesting sites. 	<ul style="list-style-type: none"> Identifying areas where the species occurs regularly, and those areas used occasionally as refuge. Draft Recovery plan in preparation
Pied Honeyeater <i>Certhionyx variegatus</i>	Widespread but nomadic and irregularly seen. Inhabits primarily acacia scrub, mallee, spinifex and eucalypt woodlands, usually when shrubs (particularly <i>Eremophila</i>) are flowering.	<ul style="list-style-type: none"> Clearing of shrubs that provide nectar and interrupt nomadic movements. Over grazing by goats 	<ul style="list-style-type: none"> Retaining and enhancing stands of suitable habitat. Reducing grazing pressure, especially by goats. Encouraging regeneration of feed / nesting trees by fencing remnant stands and new plantings. Recovery plan not yet drafted.
Southern Scrub robin <i>Drymodes brunneopygia</i>	Distributed in disjunct populations. Recorded in Nombinnie, Cocoparra and The Charcoal Tank Reserves. Inhabits mallee usually with dense shrubs in the understorey. Sedentary	<ul style="list-style-type: none"> Clearing and fragmentation of habitat. Brushcutting Foxes and cats Fire which reduces the amount of cover for the bird 	<ul style="list-style-type: none"> Retaining and enhancing stands of suitable habitat. Fox and cat control Recovery plan not yet drafted.
Chestnut Quail-thrush <i>Cinlosoma castanotus</i>	Mostly mallee, but also recorded in Belah/Pine and eucalypt woodland. Sedentary	<ul style="list-style-type: none"> Clearing and fragmentation of habitat. Foxes and cats Fire which reduces the amount of habitat and food for the bird 	<ul style="list-style-type: none"> Retaining and enhancing stands of suitable habitat. Fox and cat control Recovery plan not yet drafted.
Gilberts Whistler <i>Pachycephala inornata</i>	In mallee, eucalypt woodland and Pine forest always with a dense understorey. Feeds on or near the ground.	<ul style="list-style-type: none"> Clearing and fragmentation of habitat. Removal of shrubs and litter through forestry clearing, overgrazing and frequent fires. Fire frequency Inadequate knowledge of species requirements. 	<ul style="list-style-type: none"> Retaining and managing habitat to retain dense understorey. Avoid burning "old" mallee. Retain and enhance corridors between habitat. Recovery plan not yet drafted.
Red-lored Whistler <i>Pachycephala rufogularis</i>	Rarest extant bird species in Riverina. Currently confined to Mallee communities with low dense cover and mixed plant communities aged between 5- 30 years. Requirements poorly known. Still found in Round Hill NR and Nombinnie NR.	<ul style="list-style-type: none"> Fire threatens remaining populations, and reduces food sources Clearing and fragmentation of habitat Excessive grazing reducing nesting habitat and food sources 	<ul style="list-style-type: none"> Retaining and enhancing stands of suitable habitat. Retain and protect suitable habitat from fire and overgrazing. Recovery plan not yet drafted.
Major Mitchell's (Pink) cockatoo <i>Cacatua leadbeateri</i>	Most commonly recorded threatened species in western directorate (NPWS) Commonly seen in the NW of the region, lives mainly in dry woodlands with mallee, pine and belah.	<ul style="list-style-type: none"> Clearing woodlands and feeding areas Non replacement of hollow bearing trees Illegal nest robbing 	<ul style="list-style-type: none"> Retain known and potential habitat Retaining hollow bearing trees, Protect hollow bearing trees when burning off Encourage regeneration of habitat by fencing off areas. Be observant of nest sites and report illegal poaching activity to NPWS. Develop a network of woodland habitat in your area.

Threatened Species (common name / scientific name)	Primary Habitat	Threats to habitat/ species	Recovery Plan Actions and Other Recommendations
Glossy Black cockatoo <i>Calyptorhynchus lathami</i>	Range includes the Lachlan, Cocoparra and Narrandera ranges within the planning area. Occurs in hilly rocky country where Casuarinas occur and requires hollows to nest in.	<ul style="list-style-type: none"> ■ Clearing of woodlands containing food trees almost exclusively Allocasuarina seeds. ■ Removal of nesting trees usually at the base of hills ■ Grazing which removes food sources ■ Fire resulting in the temporary loss of foraging habitat ■ Competition for nesting sites with possums 	<ul style="list-style-type: none"> ■ Recovery plan not yet drafted. ■ Retain known and potential habitat ■ Retaining hollow bearing trees ■ Protect hollow bearing trees when burning off ■ Encouraging regeneration of nesting and feed trees by fencing remnant stands and new plantings ■ Manage grazing pressure. ■ Appropriate fire regimes ■ Recovery plan not yet drafted.
Swift Parrot <i>Lathamus discolor</i>	Irregular Winter migrant to Murray Shire; Communities that feature winter flowering eucalypts. Ironbark communities; lower Grey box/Yellowbox / Whitebox Woodlands and Black box. At western edge of range.	<ul style="list-style-type: none"> ■ Clearing, degradation and fragmentation of habitat, in particular, logging of larger, mature trees in Box-Ironbark forests that provide reliable nectar and lerp sites. 	<ul style="list-style-type: none"> ■ Identifying areas where the species occurs regularly, and those areas used occasionally as refuge. ■ Retaining and enhancing stands of suitable open Box-Ironbark forest or woodland habitat, including along roadsides and remnant stands in agricultural areas. ■ Recovery plan complete
Turquoise Parrot <i>Neophema pulchella</i>	Grassy Forests and woodlands. At western edge of range.	<ul style="list-style-type: none"> ■ Clearing of grassy woodland habitat. ■ Degradation of grassy woodland habitat through activities such as heavy grazing and firewood collection. ■ Fragmentation of habitat ■ Predation by foxes and cats. ■ Kills that occur when parrots feed on grain spilt onto roads. 	<ul style="list-style-type: none"> ■ Retaining and enhancing existing grassy woodland vegetation. ■ Limiting habitat degradation by fencing remnant stands and managing grazing pressure. ■ Encouraging regeneration of habitat by fencing remnant stands and new plantings. ■ Fox and cat control programs. ■ Recovery plan not yet drafted.
Superb Parrot <i>Polytelis swainsonii</i>	Nesting largely restricted to the Murrumbidgee and Edwards rivers. Nests in large mature healthy Red Gums. Requires feeding sites within 10km of nesting sites. Feeds in Box and Boree woodlands and associated grasslands. Prefers to fly along wooded corridors.	<ul style="list-style-type: none"> ■ Clearing of hollow bearing nest trees. ■ Clearing and degradation of feeding areas. ■ Poor regeneration of nesting trees and food resources. ■ Mass kills that occur when parrots feed on split grain on roads. ■ Illegal trapping of birds, which also often results in destruction of hollows. 	<ul style="list-style-type: none"> ■ Retaining remnant vegetation especially within 10 km of nest sites. ■ Retaining mature hollow-bearing trees within riparian zones. ■ Cover grain trucks during harvest season ■ Encouraging regeneration of nesting and feed trees by fencing remnant stands and new plantings ■ Managing grazing pressure. ■ Retaining and enhancing corridors. ■ Be observant of nest sites and report illegal activity to NPWS. ■ Draft Recovery plan in preparation.

Threatened Species (common name / scientific name)	Primary Habitat	Threats to habitat/ species	Recovery Plan Actions and Other Recommendations
Regent parrot <i>Polytelis anthopeplus</i>	Confined to areas where mallee occurs adjacent to riverine woodlands. Nests in riverine woodlands and feeds in mallee. Occurs on the Murray river downstream of the Wakool confluence, occasionally seen on the Murrumbidgee to Balranald. At eastern edge of range.	<ul style="list-style-type: none"> ■ Clearing of mallee and Red gum ■ Illegal trapping by bird poachers and orchardists. ■ Road kills ■ Occupation of nest sites by introduced honey bees 	<ul style="list-style-type: none"> ■ Retaining remnant vegetation especially within 10 km of nest sites ■ Retaining and enhancing Red gum/ mallee associations ■ Retaining and enhancing corridors. ■ Be observant of nest sites and report illegal activity to NPWS. ■ Cover grain trucks during harvest season ■ Draft Recovery plan in preparation.
Blue Billed Duck <i>Oxyura australis</i>	Large permanent and intermittent wetlands and swamps. Nests in Cumbungi or similar.	<ul style="list-style-type: none"> ■ Potential threats include disruption to natural hydrological regimes, loss of habitat, clearing and grazing of Cumbungi, illegal hunting 	<ul style="list-style-type: none"> ■ Restore natural hydrological regimes. ■ Protect wetland habitat. ■ Recovery plan not yet drafted.
Freckled Duck <i>Sticonetta naevosa</i>	Large permanent and intermittent wetlands and swamps. Nests in Cumbungi or similar.	<ul style="list-style-type: none"> ■ Potential threats include disruption to natural hydrological regimes, loss of habitat, clearing and grazing of Cumbungi, illegal hunting 	<ul style="list-style-type: none"> ■ Restore natural hydrological regimes. ■ Protect wetland habitat. ■ Recovery plan not yet drafted.
Magpie Goose <i>Aneranas semipalmata</i>	Prefers large shallow swamps or dams with rushes and adjacent grassland. Formerly probably an abundant bird in the region. Now only a rare vagrant.	<ul style="list-style-type: none"> ■ Loss of habitat through grazing, clearing, cultivation and altered water regimes. ■ Shooting and poisoning ■ Predation on eggs and goslings ■ Human interference, birds have low tolerance of humans 	<ul style="list-style-type: none"> ■ Retain and enhance suitable habitat. ■ Protect wetland habitat ■ Don't shoot or disturb birds. ■ Recovery plan not yet drafted.
Australasian Bittern <i>Botaurus poiciloptilus</i>	Favour wetlands with large areas (>5ha) of tall dense vegetation.	<ul style="list-style-type: none"> ■ Draining and clearing of wetlands ■ Salinity ■ Overgrazing of wetland vegetation ■ Predation by foxes 	<ul style="list-style-type: none"> ■ Restore natural hydrological regimes ■ Fence out wetlands so they are not overgrazed. ■ Protect wetland habitat ■ Keep pesticides and herbicides away from wetlands ■ Recovery plan not yet drafted.
Brolga <i>Grus rubicunda</i>	Open swamplands. Frequently on plains in Urana, Lachlan River, from Condobolin to Lake Cargelligo. Once common in region.	<ul style="list-style-type: none"> ■ Egg mortality- predation, illegal egg collecting, flooding of nest sites and trampling of eggs by stock. Fox predation on young chicks. ■ Hydrological changes particularly drainage of swamps and marshes ■ Shooting, declining in frequency ■ Grazing, competition for food sources and trampling modifies plant communities 	<ul style="list-style-type: none"> ■ Using fencing and grazing to produce a suitable wetland. ■ Restore natural hydrological regimes. ■ Protect suitable wetland habitat ■ Control feral animals ■ Recovery plan not yet drafted.

Threatened Species (common name / scientific name)	Primary Habitat	Threats to habitat/ species	Recovery Plan Actions and Other Recommendations
Great Knot <i>Calidris tenuirostris</i>	Recorded at Tullakool evaporation ponds and Griffith. Migrating in August from Siberia the birds utilise fresh and saltwater inland lakes. More commonly seen on the coast. Only rare vagrant to Riverina.	<ul style="list-style-type: none"> ■ Few threats because of its infrequency and irregularity of visits ■ Habitat destruction ■ Loss of open wetlands through re-vegetation. 	<ul style="list-style-type: none"> ■ Using fencing and grazing to produce a suitable wetland. ■ Restore natural hydrological regimes. ■ Protect wetland habitat ■ Control feral animals ■ Recovery plan not yet drafted.
Black-tailed Godwit <i>Limosa limosa</i>	Visits Australia during summer, “passes through” Riverina using exposed muddy shores around large lakes. Recorded in Fivebough and Nericon swamps.	<ul style="list-style-type: none"> ■ Hydrological changes particularly artificial water level control. ■ Few threats because of its infrequency and irregularity of visits. ■ Loss of open wetlands through re-vegetation. 	<ul style="list-style-type: none"> ■ Using fencing and grazing to produce a suitable wetland. ■ Restore natural hydrological regimes. ■ Protect wetland habitat ■ Control feral animals ■ Recovery plan not yet drafted.
Painted Snipe <i>Rostratula benghalensis</i>	Very shy bird. Inhabits fringes of swamps and marshy areas where there is sufficient cover. Most often seen in freshly flooded areas.	<ul style="list-style-type: none"> ■ Predation ■ Overgrazing eliminates vegetation cover used for shelter ■ Cultivation ■ Changed flood patterns 	<ul style="list-style-type: none"> ■ Using fencing and grazing to produce a suitable wetland. ■ Restore natural hydrological regimes. ■ Protect wetland habitat ■ Control feral animals ■ Recovery plan not yet drafted.
Square-tailed Kite <i>Lophoictinia isura</i>	Rare bird in Riverina, preferring open forests and woodlands. Breeds along wooded water courses, mainly in the south. Occupy large territories, therefore require large areas of wooded country.	<ul style="list-style-type: none"> ■ Clearing of woodland habitat. ■ Degradation of open forest and woodland habitat through activities such as heavy grazing and firewood collection. ■ Clearing of trees along watercourses, illegal egg collecting. 	<ul style="list-style-type: none"> ■ Retaining existing open forests, woodland vegetation, and vegetation within drip lines. ■ Limiting habitat degradation by fencing remnant stands and managing grazing pressure. ■ Encouraging regeneration of habitat by fencing remnant stands and new plantings. ■ Reinstate woodland corridors ■ Recovery plan not yet drafted.
Osprey <i>Pandion haliaetus</i>	Rare non-breeding vagrant. Occasional sightings along large inland rivers.	<ul style="list-style-type: none"> ■ NSW population recovering from eggshell thinning caused by DDT. ■ Clearing of nesting trees ■ Hunting success, turbidity and siltation reduces visibility of prey. 	<ul style="list-style-type: none"> ■ Record sightings ■ Recovery plan not yet drafted.
Grey Falcon <i>Falco hypoleucos</i>	Recorded in Griffith, Leeton, Conargo and Carrathool shires. Observed along watercourses, plains and woodlands. Population stronghold is in arid and semi arid areas.	<ul style="list-style-type: none"> ■ NSW population recovering from eggshell thinning caused by DDT. ■ Clearing of mature trees close to watercourses. Clearing of marginal land together with overgrazing in semi arid areas ■ Competition from larger raptors. ■ Fragmentation of habitat. 	<ul style="list-style-type: none"> ■ Retain known and potential habitat. ■ Recovery plan not yet drafted.

Threatened Species (common name / scientific name)	Primary Habitat	Threats to habitat/ species	Recovery Plan Actions and Other Recommendations
Black-breasted Buzzard <i>Hamirostra melanosternon</i>	Formerly moderately common in Riverina, now more common in the NW of the state. Prefer timbered watercourses. Nest in dead trees or on dead limbs. Occupy large territories.	<ul style="list-style-type: none"> ■ Clearing of woodland habitat. ■ Degradation of open forest and woodland habitat through activities such as heavy grazing and firewood collection. ■ Clearing of trees along watercourses, illegal egg collecting, secondary poisoning. 	<ul style="list-style-type: none"> ■ Retaining existing open forests, woodland vegetation and vegetation along water courses. ■ Limiting habitat degradation by fencing remnant stands and managing grazing pressure. ■ Encouraging regeneration of habitat by fencing remnant stands and new plantings. ■ Reinstate woodland corridors ■ Recovery plan not yet drafted.
Grey-crowned Babbler <i>Pomatostomus temporalis temporalis</i>	Open Woodlands dominated by mature eucalypts with regenerating trees, tall shrubs and native groundcover.	<ul style="list-style-type: none"> ■ Clearing and fragmentation of preferred habitat ■ Habitat degradation as a result of weed invasion and grazing ■ Reduction in family group size 	<ul style="list-style-type: none"> ■ Retain and enhance existing woodland remnants ■ Reinstate woodland corridors ■ Existing remnants be increased in size ■ Recovery plan not yet drafted
Diamond Firetail <i>Stagonopleura guttata</i>	Eucalypt woodlands, forests and mallee with a grassy understorey	<ul style="list-style-type: none"> ■ Clearing and fragmentation of preferred habitat ■ Remnants less than 200ha ■ Overgrazing of grassy understorey 	<ul style="list-style-type: none"> ■ Retain and enhance existing woodland remnants ■ Reinstate woodland corridors ■ Existing remnants be increased in size ■ Recovery plan not yet drafted
Brown Treecreeper <i>Climacteris picummus victoriae</i>	Open euclaypt woodland lacking a dense understorey	<ul style="list-style-type: none"> ■ Clearing and fragmentation of preferred habitat ■ Remnants less than 200ha ■ Loss of hollow bearing trees ■ Overgrazing of grassy understorey 	<ul style="list-style-type: none"> ■ Retain and enhance existing woodland remnants ■ Reinstate woodland corridors ■ Existing remnants be increased in size ■ Recovery plan not yet drafted
Speckled Warbler <i>Pyrrholaemus sagittata</i>	Woodlands with grassy understorey	<ul style="list-style-type: none"> ■ Clearing and fragmentation of preferred habitat ■ Remnants less than 100ha ■ Removal of dead fallen timber ■ Predation by feral animals (foxes) 	<ul style="list-style-type: none"> ■ Retain and enhance existing woodland remnants ■ Existing remnants be increased in size ■ Regional fox control Plan, control of feral animals ■ Encourage protection of fallen timber ■ Recovery plan not yet drafted
Hooded Robin <i>Melanodryas cucullata cucullata</i>	Eucalypts, acacia shrublands, Belah woodlands, Rosewood and Cypress Woodlands	<ul style="list-style-type: none"> ■ Clearing and fragmentation of preferred habitat ■ Remnants less than 100-200ha ■ Removal of dead fallen timber ■ Grazing and weed invasion 	<ul style="list-style-type: none"> ■ Retain and enhance existing woodland remnants ■ Existing remnants be increased in size ■ Encourage retention of fallen timber ■ Recovery plan not yet drafted
Black-chinned Honeyeater <i>Melithreptus gularis gularis</i>	River Red Gum forest woodland	<ul style="list-style-type: none"> ■ Clearing and fragmentation ■ Remnants less than 200ha ■ Competition with aggressive Honeyeater species 	<ul style="list-style-type: none"> ■ Retain and enhance existing woodland remnants ■ Existing remnants be increased in size ■ Recovery plan not yet drafted
Brush-tailed Phascogale <i>Phascogale tapoatafa</i>	Box-Ironbark woodlands and forests; nests in hollow-bearing trees.	<ul style="list-style-type: none"> ■ Clearing and/or fragmentation of preferred habitat. ■ Loss of fallen trees on the forest floor due to inappropriate firewood collection. ■ Loss of hollow-bearing trees, large old trees. 	<ul style="list-style-type: none"> ■ Maintenance of healthy ecosystems, particularly with a range of shrubs (size & species) and on areas of dissected topography. ■ Limit firewood collection ■ Appropriate fox and feral dog control.

Threatened Species (common name / scientific name)	Primary Habitat	Threats to habitat/ species	Recovery Plan Actions and Other Recommendations
Koala <i>Phascolarctos cinereus</i>	River Red Gum forest and associated woodlands	<ul style="list-style-type: none"> ▪ Predation from feral foxes, dogs and cats. ▪ Clearing and/or fragmentation of preferred habitat. ▪ Predation from feral dogs and foxes. ▪ Road-kill caused by vehicular traffic. ▪ Disease 	<ul style="list-style-type: none"> ▪ Recovery plan not yet drafted. ▪ Retain and enhance suitable habitat and feed trees. ▪ Identify presence of core and potential koala habitat. ▪ Retention, re-vegetation and maintenance of vegetation corridors between feeding areas. ▪ Fox and feral dog control. ▪ Recovery plan preliminary draft.
Tiger Quoll <i>Dasyurus maculatus</i>	In Riverina probably largely confined to forest along major rivers, and extensive areas of woodland. Elsewhere found in variety of forest and woodland types, wherever there is suitable prey sources; shelters in complex rocky outcrops and in hollows of large fallen trees. In Riverina is now only a vagrant.	<ul style="list-style-type: none"> ▪ Competition with feral foxes and cats for preferred prey items. ▪ Loss of preferred den sites. ▪ Adverse changes in the relative availability of preferred prey sources caused by habitat degradation. ▪ Poisoning 	<ul style="list-style-type: none"> ▪ Identify presence of core habitats especially areas of thick under-storey, hollow logs and rocky outcrops. Then, undertake steps that mitigate against identified threats to these areas. ▪ Appropriate fox and feral dog control and use of 1080 baits ▪ Recovery plan not yet drafted.
Kultarr <i>Antechinomys laniger</i>	Thought to be extinct in the Western Riverina planning area. Recently recorded around Cobar/Bourke. Prefers sparsely vegetated, arid to semi arid areas with cracks in soil.	<ul style="list-style-type: none"> ▪ Overgrazing causing vegetation loss and loss of soil structure ▪ Cultivation removes refuge habitat ▪ Inappropriate fire regimes ▪ Predation by foxes and cats 	<ul style="list-style-type: none"> ▪ Protection and maintenance of known or potential habitat ▪ Further research ▪ Regional fox control programs ▪ Recovery plan gazetted
Stripe-faced Dunnart <i>Sminthopsis macroura</i>	Has been recorded at Willandra NP. An arid zone species that is flexible in habitat preferences	<ul style="list-style-type: none"> ▪ Grazing which reduces perennial groundcover which this species prefers. ▪ Cultivation ▪ Predation ▪ Flooding may temporarily reduce populations. 	<ul style="list-style-type: none"> ▪ Protect known and potential habitat sites from cultivation ▪ Appropriate grazing regimes ▪ Control of feral animals.
Brush-tailed Rock wallaby <i>Petrogale penicillata</i>	Presumed extinct in Western Riverina. Inhabits broad range of rocky outcrops	<ul style="list-style-type: none"> ▪ Competition with goats for food and shelter ▪ Isolation of population places them at risk from catastrophic events and genetic introgression ▪ Predation by foxes, eagles and dingoes 	<ul style="list-style-type: none"> ▪ Retention of habitat ▪ Reduced grazing on perimeter of habitat ▪ Control of feral animals ▪ Recovery plan in preparation

Threatened Species (common name / scientific name)	Primary Habitat	Threats to habitat/ species	Recovery Plan Actions and Other Recommendations
Little Pied Bat <i>Chalinolobus picatus</i>	Very little is known about this species. Recorded in the southern Riverina. Occurs exclusively in arid and semi-arid areas in a range of habitat types.	<ul style="list-style-type: none"> ■ Clearing of hollow bearing trees may eliminate species from woodland areas ■ Possibly predation by cats on roosting sites 	<ul style="list-style-type: none"> ■ Retain hollow bearing trees ■ Control of feral animals.
Large-footed Myotis <i>Myotis adversus</i>	Recorded on the Murray River near Tocumwal. Roosts close to fresh water, primarily in caves but will use tunnels, trees, mines and buildings.	<ul style="list-style-type: none"> ■ Population and distribution suspected to be reduced ■ Disturbance of colonies particularly in colder months when hibernating ■ Loss of hollow bearing trees 	<ul style="list-style-type: none"> ■ Retain hollow bearing trees and encourage regeneration of hollow bearing trees.
Greater Long-eared Bat <i>Nyctophilus timoriensis</i>	Recorded in the planning area. Dry open woodlands and around red gums that line watercourses and lakes on the inland plains of semi arid zone.	<ul style="list-style-type: none"> ■ Clearing of hollow bearing trees ■ Grazing and clearing can result in poor regeneration of hollow bearing species. ■ Predation by cats on bat species whilst roosting has been observed. 	<ul style="list-style-type: none"> ■ Control of feral animals ■ Retain hollow bearing trees and encourage regeneration of hollow bearing trees.
Western Blue Tongue <i>Tiliqua occipitalis</i>	Preferred habitat appears to be mixed mallee/spinifex communities. Recorded in Carrathool shire.	<ul style="list-style-type: none"> ■ Potential threats include clearing, ripping of rabbit warrens (lizards live in warrens), predation by foxes and cats and possibly secondary poisoning from baits 	<ul style="list-style-type: none"> ■ Further research to locate populations and species requirements. ■ Recovery plan not yet drafted.
Southern Bell Frog <i>Litoria raniformis</i>	Permanent water/ billabongs	<ul style="list-style-type: none"> ■ Potential threats include disruption to natural hydrological regimes, loss of habitat, disease and predation by introduced fish and terrestrial predators, including foxes and cats. 	<ul style="list-style-type: none"> ■ Protect, breeding sites especially vegetation around pools ■ Restore natural hydrological regimes. ■ Draft Recovery plan in preparation
Daisy <i>Brachyscome muelleroides</i>	Southern Riverina, Murray River on damp areas around clay pans, lagoons in mud or water.	<ul style="list-style-type: none"> ■ Clearing, trampling by stock, weed invasion, water regulation, recreational activity. 	<ul style="list-style-type: none"> ■ Locate new populations and extend the ranges of known populations ■ Erect exclosures around populations and protect them from weeds and grazing pressure. Ensure exclosures have gates so that pasture growth can be managed. ■ Recovery plan not yet drafted.
Mossgiel Daisy <i>Brachyscome papillosa</i>	Occurs from Mossgiel to Urana and has been recorded in grassland areas around Jerilderie. Prefers clay soils within Bladder saltbush communities.	<ul style="list-style-type: none"> ■ Clearing, trampling by stock, weed invasion ■ Modification of bladder salt bush country. 	<ul style="list-style-type: none"> ■ Locate new populations and extend the ranges of known populations ■ Erect exclosures around populations and protect them from weeds and grazing pressure. Ensure exclosures have gates so that pasture growth can be managed. ■ Recovery plan not yet drafted.
Chariot wheels <i>Maireana cheeli</i>	Southern Riverina mainly between Deniliquin and Hay. Heavier clay soils with Bladder saltbush or Cotton bush.	<ul style="list-style-type: none"> ■ Modification of bladder salt bush country. Grazing in the absence of more palatable species. Clearing also sowing of improved pastures. 	<ul style="list-style-type: none"> ■ Sympathetic management of suitable chenopod shrubland habitat. ■ Locate and protect populations. ■ Recovery plan not yet drafted.

Threatened Species (common name / scientific name)	Primary Habitat	Threats to habitat/ species	Recovery Plan Actions and Other Recommendations
Darling Pea <i>Swainsonia plagiotropis</i>	Jerilderie. Found in grasslands on heavy soils, especially on the edges of depressions.	<ul style="list-style-type: none"> ■ Loss and degradation of habitat by clearing and over-grazing, pasture improvement, cultivation, earthworks, fertilisers and water use. ■ Grazing during flowering and fruiting, trampling by stock. ■ Rabbits. ■ Inappropriate tree planting in grasslands. ■ Weed invasion 	<ul style="list-style-type: none"> ■ Appropriate grazing regimes. Light grazing at appropriate times to maintain an open grassland. ■ Fire, prolonged wet conditions or soil disturbance may be necessary to break the seed and allow germination. ■ Rabbit control ■ Weed control ■ Recovery plan not yet drafted.
Darling Pea <i>Swainsonia murryana</i>	Scattered through out western NSW, recorded at Deniliquin, Hay extending north to Willandra NP. Found in grasslands on red/ brown soils.	<ul style="list-style-type: none"> ■ Loss and degradation of habitat by clearing and over-grazing, pasture improvement, cultivation, earthworks, fertilisers and water use. ■ Grazing during flowering and fruiting, trampling by stock. ■ Rabbits. ■ Inappropriate tree planting in grasslands. ■ Weed invasion 	<ul style="list-style-type: none"> ■ Appropriate grazing regimes. Light grazing at appropriate times to maintain an open grassland. ■ Fire, prolonged wet conditions or soil disturbance may be necessary to break the seed and allow germination. ■ Rabbit control ■ Weed control ■ Recovery plan not yet drafted.
Darling pea <i>Swainsonia sericea</i>	Grassland and eucalypt woodland, sometimes with Callitris.	<ul style="list-style-type: none"> ■ Unknown. Same as above 	<ul style="list-style-type: none"> ■ Same as above ■ Recovery plan not yet drafted.
<i>Swainsonia pyrophila</i>	. Known fire ephemeral. Plant is a short lived perennial appearing after fires. Poorly known. Vulnerable.	<ul style="list-style-type: none"> ■ Inappropriate fire regimes. ■ Clearing of mallee ■ Possibly goats 	<ul style="list-style-type: none"> ■ Periodic burning of habitat ■ Recovery plan not yet drafted.
A Copper Burr <i>Sclerolaena napiformis</i>	A number of populations near Jerilderie Also present on TSR between Mathoura and Moama.	<ul style="list-style-type: none"> ■ Overgrazing ■ Weed invasion ■ Clearing of habitat 	<ul style="list-style-type: none"> ■ Light intermittent grazing ■ Protection and management of known populations. ■ Recovery plan not yet drafted.
Winged Peppergrass <i>Lepidium monophlooides</i>	Semi- arid parts of western plains. Riverine plain species, both in the Riverina and the Darling Riverine Plains near Moree. Most recently in grassland on the Hay plains. Occurs on seasonally moist to waterlogged sites on fertile soils. Open woodland.	<ul style="list-style-type: none"> ■ Loss and degradation of habitat, pasture improvement, cultivation, earthworks, fertilisers and water use. ■ Grazing during flowering and fruiting, trampling by stock. 	<ul style="list-style-type: none"> ■ Fence off known populations and protect from grazing ■ Locate new populations and extend the ranges of known populations ■ Recovery plan not yet drafted.
McBarron's Goodenia <i>Goodenia mabbarronii</i>	Annual herb recorded around Tocumwal. Grows in damp sandy soils, often where there has been recent disturbance.	<ul style="list-style-type: none"> ■ Grazing, pugging and trampling ■ Roadside disturbance ■ Competition with exotic weed species 	<ul style="list-style-type: none"> ■ Locate new populations and extend the ranges of known populations ■ Sympathetic management of known populations ■ Recovery plan not yet drafted.

Threatened Species (common name / scientific name)	Primary Habitat	Threats to habitat/ species	Recovery Plan Actions and Other Recommendations
Curly-bark wattle <i>Acacia curranii</i>	Recorded around Hillston. Prefers rocky outcrops found in both mallee and pine woodlands.	<ul style="list-style-type: none"> ■ Clearing, generally during firebreak construction ■ Overgrazing, particularly goats ■ Quarrying ■ Low seed viability and lack of fire to germinate seed 	<ul style="list-style-type: none"> ■ Locate new populations and extend the ranges of known populations ■ Sympathetic management of known populations ■ Recovery plan not yet drafted.
A spear grass <i>Austrostipa metatoris</i>	Has been recorded in Carrathool and Wakool Shire . Recorded in a variety of sandy habitats in both grassland and woodland.	<ul style="list-style-type: none"> ■ Clearing ■ Possibly rabbits and overgrazing 	<ul style="list-style-type: none"> ■ Locate new populations and extend the ranges of known populations ■ Erect exclosures around populations and protect them from weeds and grazing pressure. ■ Recovery plan not yet drafted.
A spear grass <i>Austrostipa wakoolica</i>	Grows on Murray river tributaries, usually on grey silty clay or sandy loamy soils in a variety of open woodlands. Recorded around Jerilderie and Finley.	<ul style="list-style-type: none"> ■ Clearing ■ Habitat reduction and modification ■ Altered water regimes ■ Invasion by exotic species and grazing ■ Rainfall dependant 	<ul style="list-style-type: none"> ■ Locate new populations and extend the ranges of known populations ■ Erect exclosures around populations and protect them from weeds and grazing pressure. ■ Recovery plan in preparation.
A Starwort <i>Callitriche cyclocarpa</i>	One recording in Riverina near Swan Hill. Grows in floodwaters and along river banks.	<ul style="list-style-type: none"> ■ Grazing ■ Changes to water regimes ■ Cultivation 	<ul style="list-style-type: none"> ■ Recovery plan not yet drafted. ■ Locate new populations and extend the ranges of known populations ■ Monitor and research on known population to improve knowledge of species.
An orchid <i>Caladenia arenaria</i>	Sclerophyll forests and on sandhills usually under Callitris	<ul style="list-style-type: none"> ■ Clearing ■ Grazing ■ Weed Invasion ■ Hybridisation ■ Physical disturbance ■ Collection ■ Small population size 	<ul style="list-style-type: none"> ■ Recovery plan in preparation ■ Various research to do with pollination, weed control, grazing pressure, hybridisation and germination is being conducted to recover this species.
<i>Amphibromus fluitans</i>	Recorded along the Murray River from Wodonga to Echuca. Found mainly in permanent swamps but also recorded in swamp margins, dam beds, and in hard clay.	<ul style="list-style-type: none"> ■ Loss of wetland habitat ■ Introduced grasses ■ Altered water regimes ■ Grazing and trampling by stock. 	<ul style="list-style-type: none"> ■ Recovery plan not yet drafted. ■ Locate new populations and extend the ranges of known populations ■ Monitor and research on known population to improve knowledge of species.
Spotted throat Cowslip <i>Diuris tricolor</i>	Two recordings in western NSW. Bimble box community on red earth soil Under pine, yellow box and grey box in the east Riverina	<ul style="list-style-type: none"> ■ Clearing ■ Grazing ■ Weed Invasion ■ Physical disturbance 	<ul style="list-style-type: none"> ■ Grazing management ■ Weed control ■ Survey and exclusion zones for logging operations ■ Recovery plan not yet drafted.
A Rush <i>Eleocharis obicis</i>	Recorded at Condobolin and Hay. Grows in ephemerally wet situations.	<ul style="list-style-type: none"> ■ Grazing ■ Clearing 	<ul style="list-style-type: none"> ■ Recovery plan not yet drafted. ■ Locate new populations and extend the ranges of known populations ■ Monitor and research on known population to improve knowledge of species.

The predicted records are generated by Bioclimatic analyses (Busby 1991) run through the WinERMS (NPWS) program. These analyses are based on there being suitable climatic conditions for the species to occur in the search area. However, this does not necessarily mean that its required habitat exists. Sources of distribution records used to make these predictions include RAOU Bird Atlas, Australian Museum specimen register, CSIRO Wildlife Collection register and the Atlas of NSW Wildlife.

References:

NPWS (2000) Wildlife Management Manuel for the Riverine Plains. NPWS, Hurstville.
Ayers, D, Nash,S. Baggett,K.(1996)Threatened Species of Western New South Wales. NPWS, Hurstville.
NPWS (1999) Threatened Species Management species information. NPWS, Hurstville.

Key: Yes = implementation of the RVMP will provide a positive (even partial) outcome for the recovery action listed beside it.
No = implementation of the RVMP will produce an outcome detrimental to the recovery action listed beside it
-- = the RVMP has no influence on the recovery action listed beside

Notes:

1. Recovery actions for the Square-tailed kite refer to retaining vegetation within drip lines – an action not agreed to by the RVC. A YES is marked against that action on the basis that drip lines will be accepted by the RVC.
2. A NO is marked against a number of bird species for the action to reinstate woodlands (cleared under consent or exemption), and remnants be increased in size (rather than ‘No Net Loss’, for these species the RVMP would need to provide a ‘Net Increase’ outcome).
3. Recovery actions for Barking Owl and Masked Owl refer to a 200m buffer around nest trees. The current draft RVC provisions for PNF refer to 100m buffers only. A NO has been marked against those actions.

APPENDIX: 6

THREATENED SPECIES, FISHERIES MANAGEMENT ACT

As of July 1998 amendments to the Fisheries Management Act 1994 providing for the protection of all threatened fish and marine plants native to NSW waters came into effect. This legislation provides for the protection, conservation and recovery of threatened species, populations and ecological communities and makes provision for the management of key threatening processes. Threatened species fall into two categories, endangered and vulnerable. These amendments also provide for the preparation of recovery plans, which are designed to promote the recovery of a threatened species, population or community aimed at returning the species etc to a position of viability in nature. The Act also makes provision for the preparation of threat abatement plans.

Current listings which pertain to the Murray, Murrumbidgee and Lachlan River catchments

Endangered species

- Trout Cod
- Murray Hardyhead

Vulnerable species

- Macquarie perch
- Silver perch
- Southern pygmy perch

Endangered population

- Western population of purple spotted gudgeon
- Western population of olive perchlet

Endangered ecological community

- Lower Murray river ecological community

Key Threatening Processes are processes which adversely affect two or more threatened species or which could cause a species to become threatened.

- Introduction of fish to fresh waters with a river catchment outside their range.
- Removal of large woody debris (snags)
- Degradation of native riparian vegetation
- The installation and operation of instream structures and other mechanisms that alter natural low regimes of rivers and streams (resulting in cold water pollution and river regulation)

APPENDIX: 7

Assessment Ratings used in the Preliminary Report

	Riparian Habitat Rating	In-stream Habitat Rating	Streambank Stability Rating
1 Excellent	<ul style="list-style-type: none"> ▪ Undisturbed bank – little grazing impacts ▪ Mature red gum and/or box overstorey for 20m from top of bank ▪ Extensive groundcover of grasses, forbs, herbs and rushes ▪ Extensive cover of woody debris 	<ul style="list-style-type: none"> ▪ Very few weirs ▪ Natural flow regimes ▪ Extensive cover of snags ▪ Natural submergent and emergent vegetation 	<ul style="list-style-type: none"> ▪ No removal of bank vegetation ▪ No evidence of streambank erosion
2 Moderate	<ul style="list-style-type: none"> ▪ Moderate grazing pressures ▪ Partial clearing of red gum/ box overstorey ▪ Sparse woody debris ▪ Partially cleared floodplain within 20m 	<ul style="list-style-type: none"> ▪ Low number of small weirs ▪ Perennial flows with higher winter flows ▪ Some removal of snags ▪ Dense patches of reedbeds 	<ul style="list-style-type: none"> ▪ Some removal of vegetation ▪ Occasional streambank erosion
3 Poor	<ul style="list-style-type: none"> ▪ Eroded/denuded banks / heavily grazed ▪ Little overstorey ▪ Little woody debris ▪ Agriculture to top of bank 	<ul style="list-style-type: none"> ▪ One or more weirs providing full barrier to fish passage ▪ Large number of small weirs ▪ Perennial flows ▪ Extensive reed beds ▪ Few snags 	<ul style="list-style-type: none"> ▪ Little streambank vegetation ▪ Evidence of substantial erosion

Source: Molino Report, 1999

APPENDIX: 8

SALINITY DATA FOR YANCO BILLABONG CREEK SYSTEM – MOLINO STEWART REPORT

Site	Electrical Conductivity ($\mu\text{S}/\text{cm}$)			Data
	Min	Max	Median	Period
Main Streams				
Colombo Ck @ Morundah	70	350	101	1995-1998
Colombo Creek @ Urana Road	78	259	128	1995-1997*
Yanco Ck upstream DC800	73	268	135	1991-1997*
Billabong Ck @ Jerilderie	88	477	249	1993-1997*
Billabong Ck @ Conargo	111	426	197	1992-1997*
Billabong Ck @ Darlot	135	447	237	1978-1997*
Billabong Ck @ Moulamein	152	517	240	1991-1997*
Tributaries				
Coleambally Catchment Drain	162	475	319	1993-1996
DC800	158	1170	238	1993-1994
Billabong Ck @ Walbundrie	96	3750	980	1790-1997*
Berrigan Escape	80	1300	122	1995-1997*
Finley Escape	55	460	98	1991-1997*
Wollami East Escape	5	274	153	1996-1997*
Wollami Escape	96	617	174	1995-1997*
Coleambally Outfall Drain	198	1690	312	1992-1997*

Source: O'Connell (1997)

APPENDIX: 9

GUIDELINES FOR NATIONAL WATER QUALITY MANAGEMENT STRATEGY

General Guidelines for Salinity of Irrigation Water

Class	Electrical Conductivity Threshold ($\mu\text{S}/\text{cm}$)	Comments
Low-salinity water	280	Low risk of salinity problems
Medium-salinity water	800	Medium salt tolerant plants can be grown, provided moderate leaching occurs
High-salinity water	2 300	Adequate drainage, salinity controls and medium salt tolerant plants needed.
Very high-salinity water	5 500	Not suitable under ordinary conditions. Requires permeable soils, adequate drainage, considerable leaching and salt-tolerant crops.
Extremely high-salinity water	>5 500	Only on permeable well-drained soils under good management or for occasional emergency use.

Source: Molino Report (1999)

APPENDIX 10

Murrumbidgee River Diversions and Flows



SITE			Saturday		Sunday		Monday	
			23-Aug-2003		24-Aug-2003		25-Aug-2003	
Burrinjuck	Percent		15.6		16.3		20.0	
	Discharge		256		256		256	
	Rain		5.5		39.0		21.0	
Blowering	Percent		34.8		35.2		36.0	
	Discharge		556		650		650	
	Rain		0.4		57.0		32.0	
Gundagai	8am Gauge	1.32	1544	1.57	2674	3.55	18063	
	24 Hr Mean		1492		1911		9321	
Wagga	8am Gauge	0.87	2179	0.93	2418	1.45	5361	
	24 Hr Mean		2303		2253		2797	
Berembed U/S FSL = 4.94 D/S	8am Gauge	4.96	3131	4.96	3129	4.95	3119	
	8am Gauge	1.07	2643	1.03	2514	1.02	2466	
	24 Hr Mean		2846		2626		2504	
MIA Canal Diversion	8am Flow	0.87	260	0.86	253	0.76	150	
	24 Hr Mean		250		252		150	
Bundigerry Regulator U/S	8am Gauge	4.26	5330	4.32	5510	4.34	5570	
Narrandera Regulator Canal	8am Flow		615		665		280	
	24 Hr Mean		590		640		473	
Beavers Creek @ Mundowey	8am Gauge	0.83	45	0.80	36	0.81	38	
Narrandera River	8am Gauge	2.24	3369	2.19	3116	2.14	2789	
	24 Hr Mean		3571		3222		2979	
Yanco Creek Offtake	8am Gauge	1.59	367	1.58	364	1.57	359	
Yanco Weir U/S D/S	8am Gauge	2.23	2153	2.23	2153	2.22	2153	
	8am Gauge	1.50	3567	1.44	3354	1.36	3034	
Gogeldrie Weir U/S FSL = 6.10 D/S	8am Gauge	6.10	7400	6.09	7383	6.10	7388	
	8am Gauge	1.55	2258	1.60	2420	1.58	2359	
	Discharge		1867		2229		2449	
Sturt Canal Offtake Diversion	8am Flow		40		40		40	
Darlington Point	8am Gauge	1.23	2017	1.29	2179	1.40	2492	
	24 Hr Mean		2551		1955		2397	
Carrarathool	8am Gauge	1.83	3948	1.65	3434	1.37	2711	
Hay Weir U/S D/S	8am Gauge	8.60	12900	8.60	12900	8.60	12900	
	8am Gauge	1.88	1115	2.09	1576	2.29	2066	
Maude Weir U/S D/S	8am Gauge	5.95	4840	5.95	4835	5.95	4847	
	8am Gauge	0.90	660	0.87	620	1.18	1155	

TELEPHONE : Jim Parrett (02) 6953 0755 FAX : (02) 6953 3569

LEGEND : LHS figures are Gauge or Pool Height; RHS figures are Flow or Pool Volume

APPENDIX 10

Murrumbidgee River Diversions and Flows



			Saturday		Sunday		Monday	
SITE			23-Aug-2003		24-Aug-2003		25-Aug-2003	
Redbank Weir	U/S	8am Gauge	5.52	5367	5.56	5436	5.59	5480
	D/S	8am Gauge	0.15	271	0.15	269	0.15	267
Balranald Weir	D/S	8am Gauge	0.55	224	0.56	233	0.56	233
	Conductivity	8am Reading	88		82		83	
Yanco Ck @ Morundah		8am Gauge	0.90	146	0.92	153	0.89	143
Columbo Ck @ Morunda		8am Gauge	1.05	195	1.05	193	1.03	188
Billabong Ck @ Innes Bridge		8am Gauge	1.86	843	1.99	951	2.00	956
Billabong Ck @ Walbundrie		8am Gauge	0.84	202	0.81	177	1.16	509
Billabong Ck @ Jerilderie		8am Gauge	0.43	450	0.54	712	0.60	856
Billabong Ck @ Hartwood Weir		8am Gauge	1.85	370	1.82	352	1.87	384
Billabong Ck @ Puckawidgee		8am Gauge	1.57	687	1.48	610	1.46	585
Billabong @ Darlot		8am Gauge	1.48	803	1.54	854	1.54	857
Yanco Ck Catch Drain		8am Gauge	0.93	0	1.00	0	1.00	0
Yanco Ck DC800 Drain		8am Gauge	0.35	5	0.43	24	0.54	77
Yanco Ck DC500 Drain		8am Gauge	1.05	20	1.09	29	1.08	28
Coleambally Outfall @ Bundy		8am Gauge	0.80	9	0.85	16	0.87	20
Yanco Ck @ Yanco Bridge		8am Gauge	0.39	65	0.60	170	0.59	181
Coleambally Diversion		8am Gauge	879		445		15	
		24hr Mean	1109		652			
Tombullen Storage		8am Gauge	3.65	10304	3.76	10724	3.75	10703
Inlet		24hr Total	1100		390		0	
Outlet		24hr Total	0		0		0	

7 DAY FORECAST ORDERS	Date	30-Aug-03	31-Aug-03	1-Sep-03
MIA Canal (Yanco + Mirrool)		300	300	150
Sturt Canal		50	50	50
Coleambally Main Canal		0	0	0

RAINFALL (mm) & Weather	Cool, overcast and windy
25/08/2003	Rainfall: Maude 13mm, Hay 16mm, Gogeldrie 22mm, Leeton 36 mm, Berembed 22mm, Kyeamba 35mm, Belmore Bridge 25mm

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LEGEND : LHS figures are Gauge or Pool Height; RHS figures are Flow or Pool Volume