

3. EXAMINATION OF COMMUNITY AND STAKEHOLDER CORE ISSUES AND RECOMMENDED ACTIONS.

CORE ISSUE: IMPROVING THE OVERALL DELIVERABILITY AND EFFICIENCY OF SUPPLY FOR THE ENTIRE CREEK SYSTEM.

ISSUE 3.1

Supply and Delivery of Water

The major supply of water for the YCS is derived from the Yanco Weir off-take west of Narrandera on the Murrumbidgee River. Other supply is sourced from DC800 and Coleambally Catchment Drains (CCD) as part of the Coleambally Irrigation Area and from the Finley escape in the Murray Irrigation Area.

At the Yanco creek off-take, 1400ML/day is the maximum that can be supplied without major flooding occurring. In times of high flow demand in the creek system, up to 1400ML/day can be directed into the system but considerable flooding occurs at several points in local areas. Most of the channel along the upper sections of the creek is limited by its capacity to accommodate 2000ML/day before bank overtopping occurs. The supply of water to the Yanco Creek System (YCS) is dependent on many factors. These include variability of inflows into the upper reaches of the two major irrigation storages (Blowering and Burrinjuck), the capacity of in-stream infrastructure such as weirs and channels to distribute the water and the extent of physical flow impediments. These in-stream impediments include private and public weirs, siltation slugs, large woody debris (LWD), cumbungi and willows. Cumbungi infestation also adds to effective travel times dictated by stream gradients (Simpson 1994). Water is also known to be escaping into runners at different flow levels and into prior streams.

With the advent of summer cropping in the 1980's, water demand management has become a critical issue. Information flow between landholders and State Water needs to improve to overcome the physical supply constraints of this system and the impact of the Finley Escape, which has become an important source of supplementary water during summer. This is not a new suggestion. A 1994 report concluded that water users must be made aware of the system's capacity limitation, so that crop areas better reflect the risk of under-supply during an extended dry period (Simpson, 1994). The Annual Allocation Plan developed by the Murray and Murrumbidgee River Management Committees determines operational aspects of water allocation in each of the respective river valleys.

ACTION 3.1

That YACTAC in conjunction with State Water and NSW Agriculture explore measures to increase information flow to enable landholders to make strategic decisions in terms of what crop or pasture to grow for any year, and enable tactical decisions in terms of specific watering regimes for any given summer irrigation period.

Responsibility: Appropriate bodies

Timeframe: 2005-2007

Priority: High

ISSUE 3.2

System Losses

State Water, being the supply manager of water on behalf of DIPNR, have estimated flow losses of up to 52% are occurring within the system (9% operational and 43% transmission). It has determined the major causes of these losses and can locate with some accuracy where the major losses are occurring. However, information regarding the locations of groundwater recharge, escapes and prior streams in the system will be required to build up a complete picture of the system. Such a water balance study will also enable a greater understanding of the relative contribution of willows, cumbungi etc in system losses.

ACTION 3.2 (A)

Request appropriate bodies to initiate a comprehensive water balance study of the entire Yanco Creek System to clarify definitions and interpretation of losses occurring in the system. This will improve overall understanding of water losses and transport of flows within the system and of those which there is little control over in relation to delivery capabilities. i.e. channel capacities, weir distribution volumes and travel times

Responsibility: Appropriate bodies

Timeframe: 2005-2007

Priority: High

ACTION 3.2 (B)

Target for reduction of transmission losses to be from the current 43% to 20% over ten years. This equates to 35GL water savings per year

Responsibility: All

Timeframe: 2005-2015

Priority: High

Plate 8: Yanco Weir



ISSUE 3.3

Seasonal Flows

Since the increased uptake of available water attached to licences and the deregulation of the rice growing along the creek system, the demand for water at critical times (spring through to summer) has increased to a point where reliable supply is difficult. Additionally, while the best attempts are made to distribute water in timely quantities, invariably problems arise. Given the constraints on the system, the supply of transfers into the creek system may not be able to be continued. The high flows in the system required at times of high demand are reversed to the natural ecosystems of the riparian environment and wetlands, and can adversely impact habitat for flora and fauna along the creek.

Continuous improvement of operations has been initiated by State Water. However, supply and usage flows need to be better modelled with a view to developing seasonal delivery policies. If these were appropriately advertised and localized to sections of the creek, water could be made more readily available.

ACTION 3.3

YACTAC in conjunction with State Water instigate a working party to investigate seasonal delivery policies for the YCS.

Responsibility: YACTAC and State Water

Timeframe: 2005

Priority: High

ISSUE 3.4

Improvement of Creek Flows

The extent of stream meandering in many parts of the system, combined with physical impediments to flow such as willow infestation, LWD and cumbungi, reduces flow considerably. Additionally there are competing water delivery distribution demands, such as ensuring adequate water is at key points along the system to meet water use demands that impact on managing and improving creek flows.

The most immediate and significant factor impacting stream flow are “chokes”. These result from the build up of LWD, willow invasion and the build up of Cumbungi in sections of the creek system.

At earlier consultation meetings, willow removal was viewed as a key priority of the maintenance work schedule for the creek system and the desire was expressed for works to commence where infestation is the greatest.

Considerable concern was conveyed about restrictions placed on landholders to undertake flow improvement works on sections of the creek on their own accord, due to the perceived bureaucratic procedures within relevant legislation such as the Native Vegetation Conservation Act 1997, the Rivers & Foreshores Improvement Act 1948, Water Management Act 2000, Fisheries Management Act 1994 and Threatened Species Conservation Act 1995.

ACTION 3.4

YACTAC to consult with DIPNR, NSWF, DEC and State Water to develop and apply an integrated approach for works along the system in order to meet legislative requirements. A holistic approach taking in the needs of both users and the environment for the entire YCS should help achieve a streamlined consent process for the project.

Responsibility: YACTAC, DIPNR, NSWF, DEC and State Water

Timeframe: 2005

Priority: High

ISSUE 3.5

Willow Removal (*Salix* spp.)

Willow trees have traditionally been planted along the YCS at weir sites and homesteads. These trees have suckered and spread, and in some places are now restricting the flow of water. Their invasive capacity is such that flow restrictions could be expected in the future in areas where willow trees are not currently a problem. The main species of willow (*Salix babylonica*) in the Yanco Creek reproduces vegetatively (i.e. from roots, twigs or branches deposited in moist soils and propagating).

Willows also provide a totally different and much poorer living environment for native plants and animals, than the local natural eco-system. The strong fibrous roots of willows, and their ability to grow in continually wet soil also enables them to exert a strong influence on stream behaviour. Fibrous willow roots and dense willow foliage trap large amounts of silt and build up the streambed, which can decrease channel capacity, exacerbate flooding and change flood patterns. Willows can also reproduce prolifically from seed, and cross-pollination between different willow species can occur. Willows can germinate in massive numbers and form islands in watercourses. When managing willows along watercourses it is important to consider the creek system further downstream. Willows, like many land and water management issues, have consequences beyond the local environment.

Advice is available from DIPNR on best management practice for willows. A programme to remove willows must take a holistic approach by considering the full range of issues such as the prevention of broad scale removal of willows that can impact on creek banks causing erosion and sedimentation, consider staged and progressive revegetation strategies and ongoing maintenance to avoid reinfestation of willow regrowth. Water needs of the environment such as that required for breeding habitats and adjacent billabongs and wetlands should be considered. There is potential for offsetting actions such as fencing off sections of the YCS and removing grazing stock to allow natural regeneration to provide protection for creek banks and provide long term security for native flora and fauna using the YCS corridor.

Action 3.5(A)

That a draft strategic program be developed for willow removal, bank stabilisation and revegetation providing prioritisation and timeframes for any proposed staged development.

Responsibility: YACTAC in collaboration with the relevant government agencies

Timeframe: commence 2005 and remain ongoing.

Priority: High

Action 3.5(B)

That the program of willow removal, bank stabilisation and revegetation be submitted and approved by relevant government agencies.

Responsibility: YACTAC in collaboration with the relevant government agencies

Timeframe: commence 2005 and remain ongoing.

Priority: High



Plate 9: Willow infestation of the stream



Plate 10: Cumbungi blocking the stream

ISSUE 3.6

Excessive Growth of Cumbungi

Shallow, slow-flowing water over long stretches of low gradient waterway has encouraged the invasive growth of cumbungi across the creek in many locations along the creek system.. Excessive growth of cumbungi has restricted the flow of water, which encourages sediment and organic matter to settle out of the water and accumulate in the dense mat of cumbungi rhizomes. The build up of organic matter further slows the flow of water, and further enhances the sediment-rich environment in which the cumbungi grows. This problem is a compounding one.

Cumbungi is a native perennial that grows in stationary or slowly-flowing water up to 2m deep (Sainty & Jacobs, 1981). It relies on its starch-rich rhizome to survive periods of cold and water stress. Tall, dense spring growth provides canopy dominance during summer and early autumn and ensures the replacement of carbohydrate reserves that enable spring growth and canopy dominance the following season. In addition, their bulky rhizomes occupy most of the space available in the subsoil. The result is dense, monospecific stands of cumbungi, especially in deeper water. The water regime is probably the most important factor controlling the extent of cumbungi growth, as this defines the area in which it can potentially grow (Finlayson *et al.*, 1983).

For a number of reasons cumbungi control by spraying, dredging or cutting has not been supported as an appropriate long-term, economically viable solution to water supply and environmental concerns in the creek system.

These reasons included the:

- considerable costs associated with an on-going cumbungi control program;
- length of affected watercourse;
- dead black box trees and stumps in the creek channel, which would make it very difficult to carry out an effective dredging or cutting program;
- unknown long-term, cumulative impact of a spray program on the creek environment;
- ecological impact of dredging a natural watercourse.

It is considered more appropriate, that management of cumbungi is achieved by changing the flow regime. Over a number of years it is anticipated that the combination of a changed flow regime and some stock grazing will help to reduce existing stands of cumbungi and prevent new growth. This should increasingly improve the passage of winter/spring freshes. The off-take to Morundah has only 2 major infestations of cumbungi and this is due to the greater velocity of flows in this part of the creek. Recent experience is revealing that apart from faster in-stream velocities being the most effective at controlling colonisation of cumbungi, the plant does not like a shaded environment and hence where good shade is cast by native vegetation, the plant does not establish or persist.

ACTION 3.6

That the extent of cumbungi in the Yanco Creek system be monitored, with a view to the possible need for future control. This is to involve possible targeted areas where chemical control options would be trialled and monitored to determine efficient and effective control measures.

Responsibility: landholders, DIPNR and State Water

Timeframe: 2005 ongoing

Priority: medium (future control may be required to assist flow management)

ISSUE 3.7

Creek Breakouts

At various locations along the YCS at times of supply when demand is high, overtopping and bank breakouts are occurring resulting in losses. Breakouts occur in a number of forms. Water can escape the supply system via:

- ❑ Overtopping existing stream banks in low areas.
- ❑ Escaping into wetlands and or flood runners.
- ❑ Constriction of flow due to infestation of willows and snags.

Creek breakouts add to transmission losses, which are already high in the YCS.

ACTION 3.7

State Water Asset Management Branch liaise with DIPNR, NSWF and DEC staff where necessary and make provision in a State Water Maintenance budget to include remedial works to prevent losses.

Responsibility: State Water and DIPNR.

Timeframe: 2007

Priority: Medium



Plate 11: Flooding from breakout

ISSUE 3.8

Alternative Supplies and Water Saving Schemes

Investigations were encouraged to be undertaken by the community to determine the feasibility and construction costs of alternate supply channels away from the creek at strategic locations. Channels with capacities to handle greater volumes could be constructed and would result in less restriction on flow. Such channels may have merits if compared against the high cost of undertaking environmental works to remove willows and control other impediments as planned.

The ecological impact of such a proposal would require careful scrutiny, as it involves the drawing of water into such a channel and delivering it across the present creek. An advantage of an alternate supply channel is that flows could be managed in the creek system for ecological benefits such as enhancing habitat conditions. This and other proposals such as piping irrigation supplies to strategic distribution points are now being considered, and are worthy of further investigation.

Several initiatives are currently underway to explore avenues of water savings within the catchment and these include:

- The Living Murray (Murray Darling Basin Commission)
- Pratt Water
- Snowy Savings

YACTAC need to explore the potential for partnering with these organisations to further the implementation of the YCS NRMP.

ACTION 3.8 (A)

That YACTAC be proactive in discussing partnering opportunities with Murray Darling Basin Commission, Pratt Water and Snowy Hydro.

Responsibility: YACTAC

Timeframe: 2004 Ongoing

Priority: High

Preliminary investigations by State Water have been undertaken on a range of engineering options to improve supply and to reduce the adverse impact of a regulated stream on natural ecosystems. Examples of these include:

- Constructing alternative supply channels away from the creek using accessing supply via diversionary structures to improve irrigation supplies and to enable distribution of flows into the creek that mimic natural flow patterns.
- Construction of a more direct supply channel emanating from DC 800 out of the Coleambally Irrigation Area.
- Modifications that will involve a structure to better control diversionary flows into the Yanco Creek System at the Yanco Creek Regulator. The benefit of this would be improved delivery and control of environmental flows on the Murrumbidgee River.

ACTION 3.8 (B)

That all engineering options to improve operational and environmental management of the Yanco Creek system be appropriately assessed to determine their feasibility and cost benefit.

Responsibility: State Water and DIPNR

Timeframe: 2005 Ongoing

Priority: Medium

ISSUE 3.9

Weirs

The Molino Stewart Report (1999) identified 101 structures including weirs, regulators, block dams and by-wash dams on the Yanco Creek System. The impact of both State Water controlled and private weirs impinges on the system to supply sufficient water reliably. It is widely acknowledged that the presence of many structures along the creek, principally private weirs, provide positive benefits by allowing individual landholders better access to water, but they also inhibit flow throughout the whole system. This is mainly due to weirs being overshot in design. Weirs can create artificial wetlands, but also allow micro habitats for chokes such as willows and cumbungi to grow. This also promotes accidental flooding causing other problems to landholders and to State Water.

Presently, many of the weirs serve to supply stock and domestic water to homesteads and farms. As assets, many are in various states of repair and require refurbishment or removal. Since detailed assessments of these were undertaken prior to the 1980s, many weirs have had drop boards removed to place less restriction on flow. It has been stated that a resolution was made to remove all but the strategic weirs in 1980, but this never took place.

There was broad agreement during the community consultation process that weirs had both positive and negative impacts on flow. A clear example is the value of 8-mile Weir and the use of it by a ski club. This has enabled an asset of significant recreational amenity to be developed. Presently State Water is undertaking a review of all weirs along the valley and YACTAC will await the outcome of this review before making any recommendations on weir removal or otherwise.

Currently, some confusion exists as to which weirs are privately owned or owned by State Water and the responsibility or performance of any conditions associated with individual weir structures. Weirs, although privately "owned", are situated on the waterway that is a responsibility of government and therefore a public liability exists. State Water as the control authority for weirs along the system is currently undertaking a detailed operational and environmental investigation of the weirs on the Murrumbidgee River including the Yanco Creek System. In the future, the removal and/or modification of existing structures may be taken out of the hands of irrigators due to State Water having to meet its obligations under new OH&S and Public Liability legislation. The flow-on costs and ramifications of this investigation are likely to be considerable. It was urged by water users and community interest groups that an assessment of weirs be undertaken. Thus the State Water weir review is timely and will assist YACTAC in its decision making. Steps to remove and/or improve existing structures should only be undertaken after other flow improvement and other control works are carried out and following an open community consultation process. It was suggested the upper section of the system should be the first priority.

ACTION 3.9(A)

That YACTAC, DIPNR and State Water undertake a combined information program to increase landholder awareness of weir ownership and/or licence conditions included in relevant legislation.

Responsibility: YACTAC, DIPNR and State Water

Timeframe: 2005

Priority: Medium

ACTION 3.9(B)

Following the Weir Review of the YCS, undertaken by State Water, YACTAC review the document with a view to developing a strategic approach to weir removal or retention that is consistent with the outcomes and objectives of this plan.

Responsibility: YACTAC/DIPNR/State Water

Timeframe: 2005

Priority: High

ACTION 3.9(C)

Where viewed appropriate and in line with operational needs and Government policy, that State Water assist with the cost of refurbishment of important in-system flow structures.

Responsibility: State Water

Timeframe: 2005 ongoing

Priority: Medium



Plate 12: Algdugerie Weir

ISSUE 3.10

Water Ordering

The issue of management of the creek system, including procedures for water ordering, was ranked number two priority by participants at a meeting to discuss the *Strategic Plan for the Yanco and Billabong Creeks System* (Molino Stewart, 1999).

In recent years, a number of factors have combined to make it increasingly important that water ordering procedures are improved. With expansion and uptake of sleeper and dozer licences in the Yanco/Billabong Creek system, more water is required over a much shorter period of time than previously.

Accurate delivery of water in the Yanco/Billabong Creek System is difficult because of long travel times and considerable transmission losses. However, the introduction of Supervisory Control and Data Acquisition (SCADA) into the Yanco/Billabong Creek system will allow State Water to critically examine the travel times between gauging stations and to respond more appropriately to water supply problems. The introduction of voice activated ordering as a central ordering system, will assist staff to more accurately identify discrepancies in the audit of water usage throughout the Yanco/Billabong Creek system. This means for example, that the need to supplement en route supplies by external means (for example via Finley Escape) can be identified and addressed more effectively.

Improved communication amongst landholders during the irrigation season could also help to ensure that daily pumping does not exceed supply. This is particularly important on Forest Creek, as flows below Warriston Weir are very vulnerable to pumping activities above Warriston Weir during summer.

A number of landholders have expressed frustration at the current Interactive Voice Response (IVR) ordering system. State Water have indicated that they are developing an internet based system which may make ordering easier.

ACTION 3.10

That YACTAC seek a meeting with the Murrumbidgee Customer Service Committee to pursue improvements to State Water's water ordering system including information and education of users on its use and the need for compliance.

Responsibility: YACTAC

Timeframe: 2005

Priority: Low

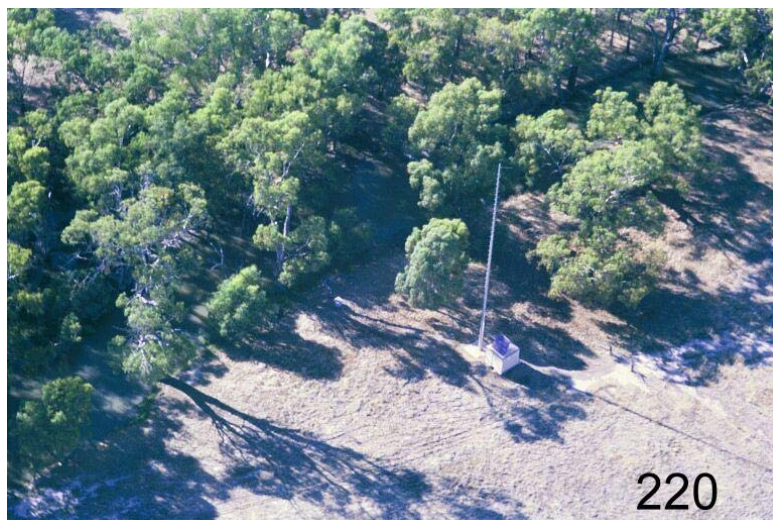


Plate 13: SCADA tower at Morundah

ISSUE 3.11

Demand Management during the Irrigation Season

During the 1999/2000 irrigation season a demand management plan was required to maximise supply availability during the summer growing period. This plan involved weekly orders, with a two week forecast of water requirements. Irrigators feel strongly that this demand management plan has set a precedent for future management of the Yanco Creek System.

ACTION 3.11(A)

That YACTAC instigate a demand management strategy and it be used during water shortages, for future management of supply in the YCS over the irrigation season.

Responsibility: YACTAC, DIPNR and State Water

Timeframe: Annually

Priority: high

ACTION 3.11(B)

That irrigators continue to order water weekly, with a two week forecast, as part of on-going management of supply in the YCS.

Responsibility: Irrigators, State Water

Timeframe: ongoing

Priority: high

ISSUE 3.12

Improve the Provision of Stream Flow Information

Landholders, particularly those on the unregulated section of the creek below Warriston Weir, need to be able to access flow information so that they can anticipate stock management requirements. This is especially important during summer.

Murrumbidgee Diversion and Flows (Appendix 10) is a daily report available to landholders via the fax for the cost of a phone call (50c/minute). Flow at Warriston Weir has recently been included on this information sheet. Landholders can also subscribe to the **Faxstream** on a yearly basis to automatically receive press releases about allocation levels and off-allocation announcements. Daily river information is available on the following website www.waterinfo.dipnr.nsw.gov.au.

ACTION 3.12

That YACTAC promote the availability of flow information on the Yanco Creek System to the YCS community in an accessible and easily understood format

Responsibility: YACTAC, State water

Timeframe: 2005

Priority: Low

CORE ISSUE: MAINTAINING AND IMPROVING THE HEALTH OF THE CREEK AND TO MIMIC NATURAL FLOODING EVENTS WHERE POSSIBLE.

ISSUE 3.13

Ecological Management of the Creek System

The health and vitality of the riparian environment and its related ecosystems along the Yanco Creek & Tributaries System is an important issue to all water users. Maintained and improved water quality and the health of waterways are also key components of the Murray and Murrumbidgee Catchment Blueprints to meet measurable environmental health targets.

The present condition and future sustainability of native flora and fauna as part of the areas biodiversity, was a key issue conveyed by the community.

The Impact of Seasonal Flow Patterns on In-stream Ecology and Wetlands

There is concern that high flows in streams (eg Colombo Creek) typically experienced in summer when water demands peak, are opposite to the natural patterns. ie wetlands along the system are receiving inflows at the wrong time. This adversely impacts on stability of stream banks, native vegetation regeneration, fish breeding cycles, and flooding events. While irrigators need water for summer cropping regimes, the regulation of flows into wetland areas may need to occur.

Flows of varying heights sustain a number of wetland areas along the YCS. Generally, the community recognises that these areas are an important part of the creek system and should be protected for their environmental values.

If the necessary reduction in creek height cannot be achieved through other means, the installation of a number of regulators (NSW Fisheries approved), in fill channels, and break away points, may be necessary. Due to the current hydrological regime of Yanco Creek, some wetlands (eg. Molley's Lagoon), are remaining full throughout many irrigation seasons. In deep lagoons such as Molley's, the "topping up" with irrigation water is of no ecological benefit, as most lagoons with similar geomorphology will hold water between seasons, if not for several years, without "topping up".

To some extent those wetlands which are sporadically connected with the creek during irrigation season are of ecological benefit to the system, (particularly the shallow wetlands which do still dry out) providing habitat for fauna including fish, water birds, frogs, reptiles etc.

However those wetlands which are permanently inundated are likely to become degraded over time. The visible symptoms of this degradation are death of river red gums, bank erosion, reduction in water quality and loss of aquatic plant diversity and cover. During irrigation season the operation of regulators to keep water out of such wetlands would benefit the wetlands and produce water savings in the system. Generally speaking, the substantial water losses associated with the wetland-creek connection during high operational flows cannot be outweighed by a perceived ecological benefit. The Yanco Creek wetlands would benefit from management that allowed flooding in late winter/spring and exclusion from high irrigation flows to produce a natural draw down during the warmer months. As long as Yanco Creek can still be managed to receive environmental flows of a sufficient height and duration to fill wetlands, there should seldom be any ecological need for wetland filling throughout irrigation season. Any future proposals for works on Yanco Creek (eg. upgrading, installation or removal of regulators or weirs) will need to consider the possible effects on riparian and wetland ecology.

EXAMPLES OF KEY WETLANDS ALONG YANCO CREEK

Dry Lake

This vast shallow lake is one of the most significant and largest wetlands on the Yanco Creek System. It fills via a channel off Yanco Creek when the Murrumbidgee River exceeds a height of 5.13 Metres or 22,500 ML/Day at Narrandera. The connecting channel has also been known to fill with water during periods of high operational flows in Yanco Creek, during high allocation irrigation seasons. Dry Lake last filled from environmental releases in 2000 and held water for approximately 6 months.

Currently the lake holds water in an area of approximately 200 ha. Historically, however, the surface area of the lake was possibly over 400 ha before a drainage line was cut into the south western end of the Lake. This drainage line was most likely excavated in a bid to empty the lake earlier to allow for lake bed cropping. The current owners are seeking to fill in the drain and manage the lake to maximise ecological benefit.

Molleys Lagoon

This deep narrow lagoon forms part of the fill channel to Dry Lake and during high allocation seasons sometimes receives irrigation flows throughout summer. This site has been an Integrated Monitoring of Environmental Flows (IMEF) study site since 1998. Early indications are that this lagoon is being over-watered.

Funds are available from a number of sources for Murray and Murrumbidgee catchment landholders in NSW to restore and protect the natural values of wetlands on their properties. Funds can be used for fencing to control grazing, earthworks to re-establish more natural water flows, and revegetation. Landholders must be willing to show other landholders their rehabilitation work (eg. allow the wetland to be used as a demonstration site for field days), and must be willing to meet at least half of the cost of the work, either financially or as in-kind assistance such as labour or materials.

Kerribirri

The natural topography through this property comprises low-lying country, flood runners, and a small creek (Kerribirri Creek) that flows out of Forest Anabranck to the south east. These areas total approximately 750ha in size. Instalment of structures such as weirs during the 1930s, and more recently the impact of dense cumbungi growth, has encouraged the movement of water into these low-lying areas and they now receive much more water than they would have naturally. Construction of a retaining bank and numerous block banks during the 1950s was designed to prevent water breaking out of the main creek and flooding low-lying country between the Forest Anabranck and Billabong Creek.

A large depression that is fed from Kerribirri Creek holds water all year, and provides an important water storage. A licensed block bank and pipe structure crosses this creek at the cottages further downstream and holds water between Kerribirri Creek off-take and the block bank.

While much of the water in low-lying areas dries up over summer, there are other deeper depressions, apart from the storages mentioned above, that remain permanently inundated.

Rhyola

Low-lying areas on *Rhyola* sustain extensive areas of dense lignum, with nitregoosefoot on adjacent high ground. Annual grasses and roly poly comprise much of the groundcover. The main flood runner is fringed with black box trees, juncus and nitregoosefoot.

Rhyola is a renowned cattle grazing property, and stock favour the shade and water provided by wetter areas, particularly during summer. However, where dense lignum and nitregoosefoot are growing, stock access is difficult. Kangaroos inhabit these less accessible areas.

An area to the north of the Forest Anabranck on *Rhyola* has previously been declared a 'Wildlife Sanctuary' through an agreement between the landowner and the National Parks and Wildlife Service. These areas were originally declared to protect waterbirds from duck shooters.

ACTION 3.13(A)

That the current flow regime of YCS be investigated and modified if necessary, to best mimic natural flooding regimes and particularly wetlands.

Responsibility: DIPNR and Murrumbidgee and Murray Wetlands Working Groups, State Water and Landholders.

Timeframe: 2007

Priority: Medium

ACTION 3.13(B)

That a scoping study be undertaken to identify and establish management needs to maintain and enhance key wetlands including natural wetlands and those created by water escapes and weir pools.

Responsibility: DIPNR and Murrumbidgee and Murray Wetlands Working Groups, State Water and Landholders.

Timeframe: 2006

Priority: High

Plate 14 - Typical Yanco System Wetland



ISSUE 3.14

Water Quality

In addition to the DIPNR water quality report in Section Two, the Molino Stewart Report also concludes that the overall water quality of the Yanco-Colombo system is not as bad as might be expected. However there is a need to establish a more rigorous monitoring regime to ensure that the YCS is at least maintaining the baseline position and developing an appropriate water quality monitoring regime for the future.

DIPNR Murrumbidgee Region currently monitors water quality at five stations within the Yanco-Colombo System. The Billabong Creek and lower section of the YCS including the Forest Creek are monitored by DIPNR staff in the Murray region of DIPNR. This monitoring regimes serves to provide general water quality assessment. To adequately address specific water quality issues and/or works and to source sufficient data to control and measure performance in meeting water quality targets will require targeted monitoring programs. It is recommended that such programs be integrated into the catchment planning process. Additionally, a continuous salinity and flow monitoring station at the lower reaches of Colombo Creek would enable a determination of end of valley flow and salt load export from the Murrumbidgee valley.

ACTION 3.14(A)

That the current water quality monitoring regime in place be assessed with a view to ensuring that it provides timely and accessible information on appropriate water quality parameters.

Responsibility: DIPNR

Timeframe: 2006

Priority: Medium

ACTION 3.14(B)

That a salinity audit of the YCS be undertaken that determines salt sources, its distribution and location in the system so as to instigate management actions to control its accumulation and impact on the system and to measure export quantities.

Responsibility: DIPNR

Timeframe: 2006

Priority: Medium

Water quality has been recognised as a major issue for future management of the system. Water quality has a critical influence on all the interested parties and issues of the system. Prompt action is needed to maintain any deterioration at its current level and begin to build a regime to start making improvements into the future. Remedial works as part of the natural resource management plan will be one of the key steps in achieving improved outcomes.

Two of the critical measuring parameters of water quality, Total Phosphorus and Turbidity, have been recorded at levels above generally accepted limits. Phosphorus levels in a range of samples and tests conducted by DIPNR were frequently above the EPA (1995) threshold at which damage to the ecological community will occur, potentially increasing the threat of algal bloom outbreaks in prolonged dry and low flow periods. Stream Turbidity is good at the Yanco Off-take, but rapidly deteriorates in the upper reaches and becomes severe in the lower reaches. All the drains in the system have high median turbidity levels. There is some concern of rising salinity from known dry land saline areas in the upper Billabong.

In the future, salinities of the irrigation drains may increase due to the implementation of the Berriquin Surface Drainage Scheme where it is likely to intercept high water tables and collect possible salts in the increased drainage of groundwater flows (Molino Stewart, 1999).

As water quality is such a critical determinant of Catchment Blueprint targets and therefore assisting to arrest the decline of the Murray Darling Basin, it is vital that an appropriate and properly resourced water quality monitoring system is established for the entire Creek system. This will require a detailed investigation to be performed of what water quality monitoring is needed, and where it should be located in the creek system, along with the provision of suitable resources to record and monitor the water quality status of the system.

There is also considerable opportunity for community participation in aspects of the water quality monitoring needed. For example, in addition to the need for established scientific water quality monitoring sites to be set up and resourced, school groups and farmers could carry out and report on data recorded at their location in the system under suitable guidelines. This would help to build better creek system ownership and improved understanding of the system.

Closely tied to supply and water flow agreements needed between the Irrigation Companies, State Water and water users represented by YACTAC; water quality management aspects such as chemical contingency plans need better public advertisement and should be openly policed. Currently, Irrigation Corporations are required to meet EPA licence conditions. Future agreements may need to account for irregular events when excessive discharges of contaminants such as molinate and other nutrient concentrations occur in the drainage channels that supply water to Yanco Creek System users. Such discharges have the potential to enter drains from the Finley Escape, Berrigan Escape and Wollami East Escape as well as from DC800 out of the Coleambally Irrigation Area. The management of chemical contaminants clearly has legal implications impacting on economic livelihoods and damage to environmental ecosystems. Collaborative efforts to improve existing arrangements and establish new guidelines will be an important benefit to all stakeholders.

ACTION 3.14(C)

That YACTAC meet with irrigation companies and the EPA with a view to determining the licence requirements and conditions as they effect the YCS and that this be made available to members.

Responsibility: YACTAC and EPA

Timeframe: 2004

Priority: Medium

ACTION 3.14(D)

That YACTAC work with the EPA and Local Councils and other appropriate bodies such as Fire Brigade and rescue squads to establish emergency management plans to control environmental emergencies. e.g. road accidents/chemical spills

Responsibility: YACTAC, EPA, Councils, State Water

Timeframe: 2008

Priority: Medium

In terms of water quality, the lower Yanco-Colombo is a eutrophic system driven by sediment and nutrient supply, much of which originates from the upper reaches of the system through altered flows and the influence of irrigation drainage to lower Yanco creek. The influences of these factors result in decreased water quality downstream.

However, the adoption of more natural flow regimes throughout the system are likely to yield improved water quality as greater flow variability would enhance periodic flushing of the system as well as increasing bank stability and riparian vegetation condition. Removal of obsolete weirs and other structures, particularly within the lower reaches of the Colombo Creek, would also improve water quality.

ACTION 3.14(E)

That a detailed hydrological analysis and modelling for the YCS be undertaken prior to any changes to existing structures or flow management.

Responsibility: DIPNR and State Water

Timeframe: 2006

Priority: High

Related to improving the water quality of the system is a need to also monitor the ecological health of the system. This is because environmental health is not only concerned with water quality, but the overall ecological health of the system. There will also be a need to ensure that actions arising from the plan, when implemented, are targeted and effective in improving the overall health status of the YCS. Immediate changes occurring because of works will also have to be monitored and evaluated to ensure the objectives of the plan are met.

The implementation of the Murray and Murrumbidgee Catchment Blueprints will involve extensive water quality and ecological assessments, and these will assist the YCS in determining the overall health of the catchment. It will also enable the YCS to be benchmarked along side other systems in the catchment.

ACTION 3.14(F)

That an integrated water quality and ecological monitoring framework be established to assess the effect of plan implementation. This to include riverine environment, in-stream water quality and town water supplies.

Responsibility: YACTAC, DIPNR, State Water, EPA, CSIRO, Local Government

Timeframe: 2005

Priority: High

ACTION 3.14(G)

That a review be undertaken of flow and water quality recording network to meet current and future requirements, and with particular emphasis on the lower reaches of Colombo Creek to determine end of valley flow and salt load export from the Murrumbidgee valley.

Responsibility: DIPNR

Timeframe: 2007

Priority: High

ACTION 3.14(H)

Provision of water quality and monitoring data to ensure landholders are better informed in related decision making.

Responsibility: YACTAC, Landholders, DIPNR, EPA, NSW Agriculture

Timeframe: 2006

Priority: High



Plate 15: Streambank Erosion caused by willows diverting flow

CORE ISSUE: MAINTAINING AND IMPROVING THE RIPARIAN HABITAT (BIODIVERSITY OF THE CREEK CORRIDOR) AND ECOLOGICAL HEALTH OF THE SYSTEM

ISSUE 3.15

Protection of Riparian Land and Wetlands

WEED MANAGEMENT

Apart from the burden of major infestations of weed such as Willows and Cumbungi, the YCS has many sections of the water way that are free of serious detrimental weeds. The best sections of the creek are where flow is less impeded and willows have not colonised. Low stocking densities typical of the region and well managed cropping operations away from the creek have facilitated this fortunate situation. Clearly, willow and cumbungi control will be the major components of the works and maintenance programme proposed for the YCS.

However, in recent years, the lack of maintenance on the creek system, the augmentation of irrigation area outfall drains into the system and potential for import of weeds from purchased stock feeds during several drought years confronts all stakeholders to be forever vigilant to prevent major and rapid riparian degradation. Weeds that establish quickly and over long sections of the creek tend to have serious consequences through competition by choking out native plants that are important to native terrestrial and aquatic fauna species and domestic livestock. They also often adversely affect water quality by shielding light and allowing excessive build up of nutrient.

Control method options for serious spreading weeds tend to be limited and very costly. Additionally, a variety of approvals are necessary to undertake control works and to comply with stringent government legislation such as the Protection of the Environment Act 1997, Water Management Act 2000, Native Vegetation Conservation Act 1997, Threatened Species Conservation Act 1995, and Fisheries Management Act 1994. A coordinated approach that focuses on prevention is seen as the best strategy to apply to keep weeds out of the system. In recent years, several major weeds have begun to colonise along sections of the YCS. These have the potential to spread and render control near impossible thus undermining the intrinsic value of the creek and key wetlands of the system. Of particular note is the recent discovery of the spread of Lippia (*phyla nodiflora*) and infestations of Arrowhead (*Sagittaria montevidensis*). Due to the preferred location of both these plants on the waters edge and on the banks and immediate edges of the creek, chemical control, grazing and physical removal is both difficult and dangerous. In Victoria, the installation of seed interceptor structures on irrigation area escape drain outfalls is proving an effective control measure and should be evaluated for use in the YCS.

PROPOSED ACTION 3.15(A)

- (i) That all land managers including farmers, irrigation companies, Government agencies, local councils and Regional Weed Management Groups implement and coordinate weed eradication programmes along riparian areas of the YCS.
- (ii) That YACTAC ensure weed identification, reporting and controls are key components in establishing a prioritised works and monitoring programme along the YCS.
- (iii) That control works programmes are formulated in consultation with government agency staff and comply with relevant legislation and noxious weed protocols.
- (iv) That alternative control methods are evaluated and adopted using community education measures to prevent the further spreading of weeds. E.g. installation of seed interceptor structures on escape drain outfalls.

Responsibility: YACTAC to coordinate Stakeholders

Timeframe: 2005 and ongoing

Priority: High

GRAZING MANAGEMENT

As efforts are being directed towards protecting the environmental values of the YCS and its associated wetlands through more appropriate flow management, it is important that grazing management is also addressed.

Stock moving along the travelling stock route affect only a part of the whole wetland system. A study conducted in 1990 suggested that travelling stock did not appear to be adversely affecting aquatic herb diversity at the time of the study, although the abundance and vigour of some species was being reduced. This was apparent when comparing the flood-out areas on the travelling stock route with similar areas on private properties fringing the swamps along Eight Mile Creek, where extensive stands of palatable sedges and fragile herbs could still be found (Roberts & Pasma, 1990).

This study also stated that an increase in grazing pressure, especially over summer as stock move in for water and green pick, could result in localised elimination of palatable and soft-stemmed wetland species and an expansion of flood-loving weedy species. This would destroy the value of the Wanganella Swamp system.

Currently stock on private land tend to be moved away from Wanganella Swamp during winter. The swamp paddocks are grazed during spring and then de-stocked as the wetland areas dry back in late summer, to prevent stock bogging in exposed mudflats (*pers. comm.* McCrabb, 2000). The TSR adjacent to the Wanganella Swamp is the most heavily grazed area on this stock route because it provides the best feed. On average, a mob of 600-800 stock is moved along the stock route 8-10 times a year. They are likely to spend around 7-10 days at the Wanganella Swamp, depending on seasonal conditions (*pers. comm.* Mullins, 2000).

It is important that stock on private and Crown land are managed to minimise the impact of grazing on the Wanganella Swamp system.

PROPOSED ACTION 3.15(B)

That land managers implement recognised best practice management techniques for the management of stock adjacent to riparian areas. Best management practices may include fencing off areas to exclude grazing stock and allowing natural regeneration.

Responsibility: land managers (private and RLPB), with assistance from DIPNR and Lands Department

Timeframe: 2005 and ongoing

Priority: high

Riparian land is land that adjoins, or directly influences, a body of water. This section of the plan is concerned with the land immediately adjacent to the YCS, including the creek bank itself. Riparian land differs from adjacent areas in several ways. It generally occupies the lower parts of the landscape, where there is usually more water, both in the vegetation and the soils. The soils are often rich in organic matter, with good soil structure and a better supply of nutrients available to support plant growth. The contrast with surrounding vegetation can be especially marked in arid and semi-arid environments, such as the southern Riverina, where the strip of riparian vegetation along YCS is a unique feature in the landscape.

Riparian land that supports native vegetation in good health often contains a high diversity of living organisms. This land provides food and nesting sites for wildlife and can provide a refuge for plants and animals during times of stress, such as prolonged drought or fire. Riparian vegetation can slow the overland movement of water, and filter sediment and nutrients. Wildlife benefits from riparian habitat in a variety of ways. Some animals, for example many frog species, are dependent on riparian habitats throughout their life. Many animals use riparian lands for breeding or as refuge for young. Others depend on daily access to riparian lands and vegetation for drinking, feeding or roosting.

The YCS is a red river gum and black box fringed watercourse, typical of streams in the Riverina that are subject to occasional flooding. The watercourse generally supports a mixture of stands of black box woodland, and scattered individual trees. The black box occurs in association with the occasional river cooba, and the understorey is dominated by nitre goosefoot, lignum, short-leaved bluebush and a mixture of native and introduced pasture species.

Generally the condition of black box trees is good, though stands are dominated by mature species. The condition of understorey species varies along the creek, and probably reflects the grazing management on individual properties. Generally, regeneration of black box and understorey species is marginal. In some places, riparian vegetation has been lost through permanent inundation and/or burning (to control cumbungi).

PROPOSED ACTION 3.15(C)

Those areas of high conservation value riparian areas be identified with a view to developing 'best management practices' and using funding incentives to maintain and improve riparian and wetland habitat. Best management practices may include fencing off areas to exclude grazing stock and allowing natural regeneration.

Responsibility: YACTAC, Landholders, RLPB, Lands Department, LCIA's, DIPNR

Timeframe: 2006

Priority: High

Being productive land, the riparian zone is vulnerable to overuse and to practices that can degrade land and water quality. The riparian zone is subject to varying levels of grazing pressure. Stock usually favour riparian areas because of the availability of water, fodder and shade. However, uncontrolled stock access can:

- **Damage important native habitat and in some cases, cause the loss of species**
Stock selectively graze the seedlings of some species, preventing the establishment of new plants of that species.
- **Reduce water quality and damage in-stream ecosystems**
Direct input of nutrients through manure and urine add substantially to the loads of nitrogen and phosphorus within the stream, and these nutrients can support excessive growth of nuisance plants and algae.
- **Lead to soil compaction and erosion**
Soil compaction may affect the ability of seeds to germinate and reduce the rate at which rainfall or runoff infiltrates the soil. Overgrazing by livestock opens up patches of bare soil which can then erode. Stock movement along the water edge disturbs and pugs the soil, leaving it prone to being washed away when rain increases the stream flow.
- **Encourage weed invasion**
The disturbance created by livestock through grazing of plants and exposure of bare ground, together with increased nutrient levels from animal manure and urine, creates an ideal situation for the establishment of weeds.

Grazing of riparian land, even of native vegetation, may not be incompatible with the maintenance of wildlife habitat, provided that grazing is planned and managed with care. This takes some planning and effort, but many landholders are discovering that in the long-term, substantial benefits can be gained in the form of enhanced production, improved water quality, stable stream banks and healthy riparian vegetation.

The key aspects of riparian zone management include:

- Retention of riparian vegetation;
- Stock management; and
- Revegetation of degraded riparian areas.

Legislation exists to protect riparian land by restricting activities such as clearing within 20m of streams, and other development within 40m of a watercourse. Specifically, the principal pieces of legislation pertaining to activities on riparian areas are the Native Vegetation Conservation Act 1997, the Water Management Act 2000, the Rivers & Foreshores Improvement Act 1948 and the Environmental Planning & Assessment Act 1979. Other important legislation such as the Threatened Species Conservation Act 1995, the Fisheries Management Act 1994 will also be considered in any proposed works undertakings.

General information and technical advice regarding the protection of riparian land, and financial assistance for management activities, are available from DIPNR and Greening Australia.

ACTION 3.15(D)

That DIPNR and the CMA's through incentive programmes continue to raise community awareness of the value of protecting riparian habitats, and the importance this plays in contributing to ecologically sustainable management.

Responsibility: DIPNR, and Wetland Working Groups

Timeframe: 2005 and ongoing

Priority: Medium



Plate 16: Cattle grazing

ISSUE 3.16

Influence of Common Carp.

The community considers Common Carp as one of the major causes of declining native fish numbers due to their territorial dominance, and to turbidity resulting from their digging in the floor of streams and into banks in search of food. In recent decades Common Carp numbers in the system have risen dramatically. This has had a deleterious effect on the water quality in the YCS. The increase of LWD in the creek has been attributed to *inter alia*, the infestation of Common Carp which has undermined bank stability, allowing trees to fall into the creek. This also causes deterioration in water quality. From Discussions with farmers and anglers fishing in the YCS there is anecdotal evidence to suggest many sections of the system are seeing a return of native fish species. However, despite observations of declining Common Carp numbers, the battle to control Common Carp remains and there is an urgent need to develop an overall control strategy through further research on aspects of flow management such as peaks, timing and duration, and their impacts on aquatic fish species breeding and control. Research of this nature will help ensure that there is sufficient information on the deleterious impact on water quality and turbidity. The future management of creek flows will have direct bearing on the presence of pest aquatic species such as Common Carp. For example, if high flows are released in spring for durations up to 10 days, spawning conditions for Common Carp recruitment will be ideal. Counter to this, native fish species benefit from high flows and flood conditions for nutrient transport along the system and for an improved feeding source. Therefore, a balance of facilitating conditions for native fish species has to be measured against control of conditions suited to pests like Common Carp as well as operational and supply practicalities in a regulated creek system.

ACTION 3.16(A)

Community participation programs to promote the control and commercial use of carp be supported and enhanced.

Responsibility: YACTAC and NSW Fisheries

Timeframe: 2005 and on-going

Priority: High

ACTION 3.16(B)

That current research techniques e.g. daughterless carp (induced sterility measures) to control the persistence and spread of Common Carp into inland waterways be supported.

Responsibility: YACTAC

Timeframe: 2005 and on-going

Priority: High

ACTION 3.16(C)

That the YACTAC NRMP strategies and actions are consistent with the Murray and Murrumbidgee Catchment Blueprints.

Responsibility: YACTAC and DIPNR

Timeframe: 2005

Priority: High

ISSUE 3.17

Vegetation Management

The community conveyed a strong view that voluntary stock exclusion from YCS waterways be encouraged, particularly to assist with revegetation and regeneration. Excluding stock from sensitive areas would also prevent water pollution and disturbance. Appropriate funding incentives would increase the uptake of such 'Best Management Practices', by partly offsetting fencing or alternate watering point costs. The CMA's will have to prepare Catchment Action Plans as part of their main responsibilities. YACTAC should ensure that the outcomes expected from the YCS Natural Resource Management Plan are consistent with the Catchment Action Plans.

ACTION 3.17

That the YACTAC seek access to vegetation management incentives to facilitate the opportunity to achieve better management outcomes from managing the riparian pathway for conservation purposes.

Responsibility: YACTAC

Timeframe: 2004 onwards

Priority: Medium

ISSUE 3.18

Environmental Regulation

Water users at the community forums staged along the catchment expressed a considerable degree of frustration about the degree and inflexibility of environmental regulation and controls in order to carry out works. The YCS community has found it difficult to accept the need for the greater control and planning under more stringent environmental legislation over the last decade. Specifically, frustration was conveyed about perceptions of bureaucratic and restrictive procedures influencing the timeliness for approvals to undertake environmental works on farmers' individual properties. The situation was pronounced in obtaining approvals for works under various Acts including the Local Government Act, NVC Act 1997, RFI Act 1948, Fisheries Management Act 1994, Threatened Species Conservation Act 1995 and the EPA Act 1979 and Water Act 2000.

The community expressed a desire for Governments to more fully recognise the contribution that agricultural improvements have on conservation and management of the environment. Fundamental to this, is the need for acceptance by government and the broader community that irrigated agriculture can be managed in a responsible and sustainable way. This Natural Resource Management Plan seeks to confirm this by including consideration of the environment and the needs of irrigators. Irrigators also seek acknowledgment of their role in planning and proposing reform, just as minority interest groups do. This will need to be reflected in future management plans and agreements that relate to the YCS.

ISSUE 3.19

More Flexible Approval Procedures For Riparian Works.

Works that result in impacts on core habitat of native flora and fauna involve the clearing of riparian vegetation (exotic or native), disturbance to the bed or bank of prescribed waterways, or the removal of large woody debris (snags) in the stream, require consent from relevant State Government agencies unless an exemption applies. The key piece of NSW Government legislation of which other Acts listed below have to take into account is the Environmental Planning and Assessment Act 1979. In addition Federal Legislation also places obligations for consideration under the Environmental Protection and Biodiversity Conservation Act 2000. Watercourses in NSW are subject to a variety of legislative controls aimed to control integrity of the waterway, mitigate soil erosion and sedimentation, maintain water quality, and conserve native flora and fauna. These Acts are administered by several natural resource management agencies such as DIPNR, NPWS, NSW Fisheries and EPA.

The Department of Infrastructure Planning and Natural Resources (DIPNR) administers both the Native Vegetation Conservation Act 2003 and the Rivers & Foreshores Improvement (RFI) Act 1948. This latter Act is to be repealed by the Water Management Act 2000.

As part of the NSW Government's new approach to natural resource management, the newly formed Murray and Murrumbidgee Catchment Management Authorities will be tasked to complete Catchment Action plans. It is anticipated that many elements of the Western Riverina Regional Vegetation Management Plan will be included in these plans with a strong focus on advisory activities, planning and incentive programmes to be part of Property Vegetation Plans viewed as the vehicle to achieve discernable improved catchment outcomes.

It is envisaged that most of the environmental works that will assist with targeted reduction in system losses and flow impediments will involve removal of exotic trees (mostly willows), targeted cumbungi infestations, weeds, and some removal, re-alignment and lopping of LWD. These works require the owner of the land on freehold land to gain consent from DIPNR, NSWF and NPWS. Works that entail removal of willow trees within State protected land will be assessed under the NVC Act 2003 and the Fisheries Management Act 1994.

Works that involve excavation of the bank out to the prescribed distance, or require excavation or re-alignment of the Creek bed, are assessed under the RFI Act 1948 and consent is required from NSWF and DEC.. In the assessment of both types of works, an eight part test and appraisal is required by decree under the EP&A Act 1979. In these situations, works applications under the relevant pieces of legislation need a management plan showing:

- what features occur at the site,
- what works are proposed and how the work is intended to be carried out,
- what measures will be undertaken to minimise adverse affects to the surrounding and associated environmental assets of the area.

DIPNR Staff assessing applications can assist with information and the contents of such plans.

It is recommended that using the YACTAC NRMP, that DIPNR, State Water, NSWF, DEC and landholders develop local implementation plans to identify sections of the creek that require consent authority under the various Acts. Such plans would need to be assessed and prioritised as part of a whole system strategy. Under this arrangement, the likely appointment of a project officer to assist with the implementation of the NRMP could achieve considerable efficiencies to expedite the commencement and completion of works. For example, joint inspections by the relevant agency officers could be co-ordinated in determining consent and achieve more complementary conservation measures.

DIPNR is developing measures to streamline approval procedures for efficiency gains and improved integration. These arrangements will enable land users to better plan future land use and seek the appropriate approvals under one application. Consent approvals and conditions will be based on the likely level of the impact a proposed work. Put simply, a low level impact work proposal will require only minimal information to be supplied by the proponent and hence can be processed more expediently.

The anticipated approach to remedial works along the riparian pathway of the YCS, will adopt a prioritised and co-ordinated schedule of works, and should result in major efficiencies and less frustration for all stakeholders in the consent process.

ACTION 3.19(A)

That any creek works be undertaken following a coordinated and integrated approach involving consent authorities and with regard to a whole of system strategy.

Responsibility: YACTAC, State Water, DIPNR, NSW Fisheries and NPWS

Timeframe: 2005

Priority: High

ACTION 3.19(B)

That YACTAC investigate the possibility of the YCS NRMP and associated works, being used as a pilot project for trialling improved integrated approvals being developed by Government Agencies.

Responsibility: YACTAC, DIPNR and State Water

Timeframe: 2005

Priority: High



Plate 17 : Field Day – The Gerrin Inspection

ISSUE 3.20

Funding

The YCS has suffered considerably in the last ten years due to a lack of resources being allocated for maintenance of the system. As a result, water delivery difficulties have arisen due problems such as LWD build ups, siltation and cumbungi growth infestations. Previously, when the system was administered by the Yanco Trust, an annual budget was allocated to undertake maintenance works. Following the handing over of management responsibility to the then Department of Water Resources, and changes to funding allocation procedures, on-going works maintenance lapsed. State Water, being recently moved into the Ministry for Energy and Utilities is considering making between \$60,000-80,000 available annually.

A key objective of producing the natural resource management plan for the system is to set a framework to conduct maintenance works. These will help reduce the current heavy losses from the system and result in a more timely and reliable delivery of water. Complementing this, the NRMP recommends that incentives for assistance to undertake irrigation education, and design and management packages such as 'Waterwise', will bring about additional water use efficiencies in the entire system. It is the expressed desire of the communities along the reaches of the system to possibly negotiate a specific budget for the system for on-going maintenance, for on-farm water use efficiencies. This could be jointly administered by the key stakeholder community representative groups (YACTAC & MPI) and relevant government agencies.

In planning a pathway for a maintenance program, it is incumbent on all the water users to make a measurable financial, and/or 'in-kind' contribution to works needed for the continued function of the system both for water delivery and to maintain and improve the ecological integrity of the system. This does not deter from the significant contribution that landholders already make to caring for the creek, and their commitment to carry out much of the monitoring and reporting work needed in the future, to audit the performance of the system.

There are a number of sources of funding available for implementing works. Many of these require a dollar for dollar contribution from landholders. That is any dollar given by a funding body for related outcomes, is matched by an equal either dollar or in-kind contribution from the landholder.

A simple way of funding any works which flow from this document may be via a levy on entitlement. This is common practice in other river valleys in New South Wales where capital and provision for ongoing maintenance has occurred. Alternatively, the YACTAC may be able to raise a loan for the works from the Government which would then be paid back through a levy on entitlement.

What needs to be understood is, that the total cost of the works required will not be met by the government alone.

ACTION 3.20

That YACTAC set up a funding sub-committee to pursue all funding opportunities for the implementation of the NRMP.

Responsibility: YACTAC

Timeframe: 2004

Priority: High

ISSUE 3.21

Environmental Flow Provision to be included in Regulated Water Sharing Plan.

The Murrumbidgee Regulated Water Sharing Plan, intended to commence in January 2004 and operate until 2013, aims to manage the system under the environmental flow rules (Rule 4) developed by the Murrumbidgee River Management Committee. Environmental flow rules have operated in the Murrumbidgee River System since 1998. The Murrumbidgee River Management Committee openly acknowledges that flow rules may need to be altered at any time, to address an environmental contingency such as bird breeding, fish breeding or wetland watering. The current operating rules allow for a volume of 25GL of water to be set aside each year (when available allocation exceeds 60%) for environmental contingencies and is not available for consumptive use. Provision also exists for use of unreleased translucency water as environmental contingency allocation.

In addition, provisional storage enables the 25 GL to be set aside at 60% allocation to be carried forward to the next water year. This increases linearly from 25 GL at 80% allocation, to 200 GL at 100% allocation. Provision exists for the storage of unreleased translucent water as provisional storage in the following years.

The Water Sharing Plan will set up an 'Environmental Water Allowance Reference Group' to provide advice on the release rules for the environmental water allowances. The intention being put up for discussion is for this reference group to comprise Murrumbidgee Catchment Management Board representatives, and Customer Service Committee representatives. This action may take some time to establish.

In addition, under the Water Management Act 2000, under which the Water Sharing Plans sit, a 12 month review of Environmental Flow Rules will be carried out. The likely model for this task will be the establishment of a Review Group comprising DIPNR staff experts and Community Representatives with permitted decision making delegation. It is envisaged this group will commence the task in February 2004.

ACTION 3.21

That the YACTAC requests appropriate authority to have a formal and permanent consideration of environmental flow requirements for the YCS.

Responsibility: YACTAC

Timeframe: 2005

Priority: High

ISSUE 3.22

Negotiation of Water Quality and Quantity Agreements with Associated Water Authorities

Of particular concern to landholders is the future supply of water during the irrigation season, from the Murray Valley via MIL's Finley Escape Channel, from the Murrumbidgee Valley via the CICL Catchment Drain, and DC800. Maximum daily in-flows are 250 ML/d from Finley Escape, 150 ML/d from the catchment drain, and 200 ML/d from DC800. Finley Escape Channel is recognised within MIL's Licence (IC2) as a credited escape, which facilitates the arrangement for delivering flows to the Murrumbidgee Valley. This supplementary flow has become a critical source of water for the Billabong Creek below Jerilderie and the Forest Creek system. It has also recently been recognised as a potentially valuable way of assisting with the delivery of environmental flows to the Wanganella Swamp system.

The existing arrangement that MIL customers receive their water requirements as a priority (*pers. comm.* Watts, 1999). There is no legal or binding agreement to supply supplementary water to the Murrumbidgee Valley via MIL escapes (Molino Stewart, 1999). The existing arrangement with CICL is that as part of their operating licence they are required to deliver water through the catchment drain and DC800. The original quantities as specified are not currently being delivered due to concerns over in-system flooding and environmental concerns.

Further improvements to assist delivery of water to match demands and in monitoring the flows through the system, would be achieved by DIPNR and State Water, also by negotiating a formal agreement with Coleambally Irrigation Cooperative Limited and Murray Irrigation Ltd. This would guarantee the supply of water from their channel systems to the Yanco-Billabong Creek Systems under agreed conditions. These conditions would have to include maximum flow rates, procedures to be adopted in wet periods where drainage capacity is required, and limitations to supply resulting from supply channels being overcommitted.

There also appears to be no formal agreements in place for the acceptance of surplus flows from irrigation areas. This is not a problem at the moment given the drought, however during times of high rainfall, surplus flows into the creek may have a detrimental effect by causing bank erosion and flooding. It is imperative that agreements are put in place for the timing and quantity of surplus flows from irrigation areas.

ACTION 3.22(A)

That YACTAC, DIPNR and State Water develop a Memorandum Of Understanding with Murray Irrigation Limited and Coleambally Irrigation Cooperative Limited which guarantees supply of water from their channel systems to the YCS under agreed conditions.

Responsibility: YACTAC, DIPNR, State Water, MIL, CICL

Timeframe: 2006

Priority: High

ACTION 3.22(B)

That the YACTAC, DIPNR and State Water establish formal agreements with irrigation companies for surplus flows entering the system which would place parameters on flow volumes, timing of releases, and water quality targets.

Responsibility: YACTAC, DIPNR, State Water, MIL, CICL

Timeframe: 2006

Priority: High

ISSUE 3.23

Maintenance work

There is widespread concern regarding insufficient funding and works to maintain delivery and water quality to users. There needs to be an established on-going maintenance program that sets out a schedule of works that is visible and accountable. Insufficient attention has been directed to the control of willows, removal of snags and bank maintenance work to keep a check on water quality. Programs to describe works, location, priority and funding arrangements should be widely circulated. Additionally a review and forward year planning program of works completed and pending, with key stakeholders should be developed.

State Water has set up a number of Customer Services Committees that meet on a quarterly basis to assist State Water with determining priorities for maintenance and to give irrigators an avenue for consultation with State Water. There is a need for YACTAC to ensure that State Water commits to a program of on-going maintenance of the creek system.

ACTION 3.23

That State Water in collaboration with relevant agencies (local government, community etc) establish and make a permanent commitment to an annual system maintenance program based on targeted work priorities to enhance the long term sustainability of the YCS.

Responsibility: State Water and YACTAC

Timeframe: 2005

Priority: High

ISSUE 3.24

The Water Management Act (2000) and Compensation Triggers

The Water Management Act 2000 repeals the Water Act 1912 principally as well as several other Acts. Within the Water Management Act 2000, various management plans, such as the Murrumbidgee Regulated Water Sharing Plan, determine future management of water resources and sets benchmarks to define water access rights. These are provided by establishing operating rules within each of the management plans. If the Government elects to change the operating rules without notice and without due compliance to the process of permitted alterations contained in the plan, claims can be made for compensation. The conditions, on which claims can be made, come into play on January 2004 and are explained in Section 87 of the Water Management Act 2000.

ACTION 3.24

YACTAC to make members aware of limited provisions pertaining to compensation contained in the Water Act 2000.

Responsibility: YACTAC

Timeframe: 2005

Priority: Low

Plate 18: Wollomi Escape



CORE ISSUE: DEVELOPING COMMUNITY OWNERSHIP, PARTICIPATION AND EMPOWERMENT TO IMPROVE THE FUTURE MANAGEMENT OF THE SYSTEM'S NATURAL RESOURCES.

ISSUE 3.25

Community Engagement

The Natural Resource Management Plan for the YCS has evolved out of a number of preceding studies, meetings and community concern. Accordingly YACTAC resolved that the YCS needed an overall natural resource management plan in order that issues could be explored by the whole community and developed into coordinated strategies and remedial actions. It was also felt that an essential ingredient to the success of any plan was to engage the whole community in the decision making process. YACTAC has sponsored meetings throughout the YCS and has also canvassed license holder views by a mail-out. License holders have also been encouraged to contact local delegates with any issues they may have. Community consultation and partnership remains a core issue of the YCS NRMP.

It has been suggested that a sub-committee of the YACTAC take on the role of ensuring adequate consultation and participation in the development and review of the plan. This sub-committee could also include individuals with particular knowledge, for example with environmental expertise or local knowledge of the particular parts of the creek. The sub-committee would also need to take on a role of liaison with the Murrumbidgee and Murray Catchment Management Authorities, the River Management Committees and Customer Services Committees, such integration and cooperation is paramount, as funding bodies would need to be confident that local NRM plans such as that being developed by YCTAC, is consistent with the Murrumbidgee and Murray Catchment Blueprints.

It is envisaged that this steering group would report back at regular intervals to the community, and play an important role in preparing proposals for external funding and exploring cost-sharing arrangements.

ACTION 3.25(A)

That the YACTAC form an implementation steering group that is tasked with ensuring adequate consultation with stakeholders in the development, management and review of the Natural Resource Management Plan.

Responsibility: YACTAC

Timeframe: 2004 and ongoing

Priority: High

As previously stated, YCS was known to be an ephemeral stream prior to regulation, and indigenous habitation was likely to have been sporadic. State Government requires that sites of cultural significance be protected from destruction under the National Parks Act 1974.

ACTION 3.25(B)

That YACTAC ensure that any works are carried out in accordance with the regulations contained in the National parks Act 1974 pertaining to Aboriginal sites of cultural significance.

Responsibility: YACTAC

Timeframe: 2005 and ongoing

Priority: High

ISSUE 3.26

Perceptions of Government and Other Groups

Local communities in the Yanco Creek and Tributaries area have expressed concern about the inaccurate perceptions about the way farms are managed and the detrimental impact irrigated agriculture is having on the environment. The 2002/2003 drought has further fuelled comment by the media and green groups that crops such as rice are a luxury that the driest continent on the earth can ill afford. Currently the rice industry is worth between \$700m and \$1 billion annually to the Australian economy.

The challenge for Australia is to produce significantly more food and fibre to meet the demands of an increasing world population. The desire in Australia is to do this in the context of environmental responsibility.

In 1996/97, 30% of the State's agricultural production was grown by irrigation using only a small fraction of the State's catchment areas. This provided the State with \$2.4 billion of food and fibre and a further \$7 billion to \$10 billion worth of jobs and economic activity in downstream processing and service activity.

Professor Lindsay Flavey at the National Workshop on Integrated Catchment Management, said

"Moral responsibility extends to care of our fellow human beings as well as care of the environment ... Food Demand is most easily described in terms of population growth... Food demand appears likely to double in the next three decades".

- *World population will increase from its present level of 5.2 billion to 8.4 billion by 2025. The population of the Asia Pacific region will double by the year 2025 from 2.7 billion to 5.4 billion.*
- *UNICEF estimates that over 40,000 children under 5 die every day from starvation and malnutrition and a third of the world go to sleep hungry every day.*
- *The president of the UN's international Commission on Irrigation and Drainage, Shahrizaila Abdulla said "we have a twin problem here, not only to deal with population growth but also the growing demands of nutritional requirements because as countries get affluent, the need is even greater to have larger calories input, a diversified input also". Malaysia, for example changed from 90% self sufficiency in food in 1974 to 65% in 1995.*

A necessary precondition for a secure, caring and sustainable future is that the food and fibre production objectives and the environment objectives are attained. It is misguided to consider the issue as trading off environmental goals against production goals. It is not a question of balance but a question of how to achieve both sets of objectives.

ACTION 3.26

That YACTAC continue to support efforts by groups such as NSW Irrigators Council to improve the public's perception of irrigated agriculture.

Responsibility: YACTAC

Timeframe: 2004 and ongoing

Priority: Medium

CORE ISSUE – ISSUES UNIQUE TO THE FOREST CREEK

ISSUE 3.27

Lack of Water in the Lower Reaches of the Forest Anabranh

Currently, landholders at the lower end of the creek system are most effected by this situation- particularly *Woorooma* and *Blue Gate*; and to a lesser extent *Nullum*, *Mooroolbark* and *Back Nullum* – with smaller volumes of water taking longer to reach these landholders as each year passes. *Murgha*, *Boxgreen* and *Inverness* have had permanent water available for stock and domestic from the Forest Creek and the Murgha Creek Anabranh. Recognition of the problem led the six landholders below *Rhyola* to attempt to instigate action to restore the environment and water flows by removing cumbungi in the mid 1980's, however EPA approval was denied.

Although The Forest Creek is an unregulated watercourse and there is no legal obligation to supply water, a Department of Water Resources report in 1994 stated that; “it could be argued that there is a moral obligation to supply stock and domestic requirements...” (Simpson, 1994). This argument is based on the history of supply and history of landholder expectation generated as ratepayers of the Trust that administered the system between 1921 and 1980.

It should also be remembered that properties have been bought and sold along the Lower Forest Creek over the last century with the value of these permanent creeks for stock water making these properties of premium value for investment

Reliable delivery of stock and domestic water below *Rhyola* has required additional volumes of water as the result of a combination of factors;

- Some irrigators extracting water before water has been provided down stream for stock and domestic use which has priority.
- The extensive invasion of cumbungi in the creek, particularly below *Rhyola*; has slowed the flow of water
- Despite construction of block banks, breakaway flows still occur in several key places where structures, excessive growth of cumbungi and low creek banks allow backed-up water to move out of the creek channel. This occurs at the Wanganella Swamp and on *Rhyola*;
- Extensive wetland areas on *Rhyola* fill before water flows further downstream. In addition, Forest Creek sometimes backs up to Murgha Creek where Murgha Creek re-enters the Forest anabranh. This tends to occur after a particularly dry summer when the Forest Anabranh begins to flow again, and Murgha Creek is virtually dry. These flow patterns delay the passage of water to properties further downstream on the Anabranh;
- Increased regulation upstream;
- Increased demand for water upstream, for irrigated agriculture;
- Seepage to prior streams reduces the end-of-system flow;
- Willow trees planted at various locations along the creek in some places are restricting the flow of water.

Original Option: Provide an alternative water supply below Rhyola

The six landholders of eight properties below *Rhyola* have put forward the option of returning the Lower Forest and its anabranh to ephemeral streams, and an alternate supply of water be available. They proposed that replenishment flows no longer be supplied for stock and domestic requirements below *Rhyola* and that this flow be returned to the Billabong Creek via a channel on the Western boundary of *Rhyola*. Then half the water savings generated by this changed flow regime would be transferred to existing licences on the Billabong Creek or Edward River, as all landholders below *Rhyola* have frontage to either or both of these watercourses.

The plan formulated provided water savings of 5.65 gigalitres for environmental flows and would enhance habitat without excessive financial hardship to the landholders.

In an effort to avoid this financial inequity, the plan to provide each of these properties with irrigation water to offset the devaluation and finance the establishment and ongoing costs of the alternate water systems that will be required.

However this plan was presented by David Harris to the Lower Murray Darling Community Consultative Committee and rejected as they did not consider it appropriate to provide landholders with access to irrigation water from water savings they generated.

New Proposal Being Drafted.

With recent developments and recognition of the need for equity in good natural resource management and the priority given environmental water to be accessed through water savings, the landholders again met with David Harris Regional Director DIPNR. At his suggestion an alternate proposal is currently being drafted that would produce water savings of 11.5 ggalitres, when approved, that could be redirected to environmental flows.

Water savings have been identified through the development of the option to reduce the replenishment flows at Warriston Weir below the current minimum of 36.5 GL. The revised target flows are 25Gl at Warriston Weir so the water savings generated are estimated at a minimum of 11.5GL annually.

The plan would

- Return flows below *Rhyola* to unregulated natural ephemeral stream flood flows.
- Enhanced biological diversity in the lower Forest Creek & Murgha Creeks through the creation of new habitat
- Provide landholders with the financial ability to develop, service and maintain appropriate re-watering infrastructure and fencing where the Creek has acted as a permanent fence.
- Ensure landholders are not disadvantaged by asset devaluation.

From an ecological, economic and social perspective, this option was selected by all interest groups as the most appropriate way to deal with this management issue, This option is consistent with the vision statement in that it would:

- *Enable the efficient supply and delivery of good quality stock and domestic water to landholders in the lower reaches of the Forest Creek all year round (via an alternate supply);*
- *Allow for the efficient passage of unregulated flows;*
- *Maintain, and where possible enhance, the ecological sustainability of the Forest Creek system.*

The proposal from the landholders should be embraced and endorsed by the government as it was the only option that provided a “triple bottom line” outcome by:

- Generates water savings for a minimum annual environmental flow of 11.5 Gl
- Positive environmental outcome for habitat and sustainability
- Controls the negative financial impacts on the six landholders
- Can be implemented immediately
- Importantly, this option would improve the overall operational efficiency of the Billabong/Yanco Creek system, and generate water savings in the Murrumbidgee Valley.

The plan has had strong “in-principle” agreement from the Regional Director DIPNR, David Harris and Jon Cobden, Regional Director Pratt Water, and clearly fits all recently stated government objectives in resource management.

Importantly, this option would improve the overall operational efficiency of the Yanco/Billabong Creek system, and generate water savings in the Murrumbidgee Valley that could be shared between the environment and consumptive users.

Water savings have been identified through the development of options to reduce the replenishment flow at Warriston Weir below the current minimum 36.5Gl. The revised target flows are 25Gl at Warriston Weir so

the water savings generated are estimated at a minimum of 11.5GL annually to be shared between the environment and the properties below *Rhyola*.

IMPACTS OF FLUCTUATING FLOWS ABOVE RHYOLA.

Considerable concern has been expressed regarding the impact of rapid and unexpected fluctuations in water levels below Warriston Weir resulting from supply error or extractions upstream in excess of water orders. This exposes mudflats and has implications for the safety of stock. While it is recognised that the Yanco/Billabong creek system is a very complex system to manage, landholders believe that greater control of flow (particularly below Warriston Weir during summer) needs to be achieved. In the future, State Water will be able to meet water orders with increasing accuracy. It is the responsibility of landholders to ensure that water orders match water use.

ACTION 3.27(A)

That the landholder proposal currently being drafted be supported and endorsed on completion to expedite its implementation to return 11.5 GL's of water for environmental flows.

Responsibility: DIPNR and State Water

Timeframe: 2004

Priority: high

ACTION 3.27(B)

That the following revised target flows for Warriston Weir be implemented as soon as possible,

Target 1. Unregulated/rain rejection flows

- That unregulated/rain rejection flows be permitted to pass through the Forest Creek system for environmental purposes. (It should be noted that from an operational point of view this is extremely difficult to implement because of the inadequate capacity of the Forest Creek off-take and the Forest Creek Regulated Section to allow those flows to pass through.)

Target 2. 'Summer' target flow at Warriston Weir

- That a target flow of 80ML/day at Warriston Weir be provided from the beginning of November to end March,

Target 3. 'Winter' target flow at Warriston Weir

- That a minimum target flow of 60ML/day at Warriston Weir be provided from beginning of April to end October.

Responsibility: DIPNR and State Water

Timeframe: 2004

Priority: High

ACTION 3.27(C)

That funding be secured for infrastructure to return flows to Billabong Creek.

Responsibility: DIPNR, State Water, YACTAC

Timeframe: 2005

Priority: high

ACTION 3.27(D)

That proposed changes to the flow regime be monitored annually to assess the social, economic and environmental impact.

Responsibility: DIPNR, State Water and interest groups

Timeframe: commence 2005

Priority: high

ISSUE 3.28

Management of the Wanganella Swamp System

Management of water within and through the Wanganella Swamp system is regarded as an issue from both an environmental and a supply perspective. From an environmental perspective, the wetland system supports a relatively rich diversity of plant species (Roberts and Pasma, 1990) and is considered to be of regional significance for waterbirds (*pers. comm.* Maher, 1999). The wetland system also provides other important ecological and social benefits including improved water quality, flood mitigation, opportunities for scientific research, recreation, education, and aesthetic values.

From a supply perspective, the Wanganella Swamp and McCrabb's regulator are regarded as restrictions to flow. Water slows down as it passes through cumbungi and disperses through inundated low-lying areas, before finally passing through the regulator (600mm pipe) (or flowing over the adjacent spillway if the water level is high enough) and into the Forest Anabranch.

In addition, during times of high flow return flows to Billabong Creek reduce the potential flow-through to downstream users. Water breaks away from the Wanganella Swamp to the north in three locations, and these three breakaways converge to flow under the Zara Road and into Billabong Creek. These flows are not controlled by structures, and vary significantly with the size of the flow entering Wanganella Swamp under the Cobb Highway. Water used to escape from the wetland only during flood flows, however since construction of McCrabb's regulator (1987) and the creation of a weir pool, breakaway flows have generally occurred every year between May and December (*pers. comm.* McCrabb, 1999).

The Murrumbidgee Regulated Water Sharing Plan allows for a 100 ML per day system flow and this is for the unregulated section of Forest Creek which facilitates the requirements of Wanganella Swamp. This flow rate exceeds the minimum requirements of the swamp for both summer and winter periods to facilitate bird breeding requirements.

ACTION 3.28(A)

That the operation of the Forest Creek off-take regulator and its impact on the Wanganella Swamp be considered in wider YCS assessment of environmental outcomes and related flows.

Responsibility: DIPNR, State Water

Timeframe: 2005

Priority: high

MODIFICATION OF McCRABB'S REGULATOR AND ADJACENT SPILLWAY

McCrabb's regulator and adjacent spillway were installed on the western edge of Wanganella Swamp in 1987 (without the prior knowledge or consent of the landowners). The purpose of these structures was to maintain a relatively stable water level in Wanganella Swamp after a natural flood event had initiated waterbird breeding. A number of concerns have been raised regarding the design, location, operation, and overall impact of these structures.

Design

The regulator comprises drop boards and a steel gate that can be manipulated to control the flow of water through a 600mm pipe. Experience suggests that the size of this pipe can be insufficient to meet downstream requirements, particularly during summer (*pers. comm.* Holden, 2000).

Location

The location of the regulator creates a weir pool that extends approximately 1, 200m upstream. This is a smaller pool than had originally been intended. For example, most Ibis breed beyond the extent of the weir pool, just downstream of the Cobb Highway. Due to the gradient of land through Wanganella Swamp it is not possible to extend the influence of the weir pool any further.

Operation

McCrabb's regulator has not been operated since 1990 due to staffing changes within DIPNR (*pers. comm.* Holden, 2000), and the structure has remained open since this time. This is thought to have contributed to a considerable build-up of silt within the weir pool, as water has remained backed up at a constant shallow level without the ability for higher velocity freshes to carry silt through the wetland. There has also been less opportunity for seasonal fluctuations in water level, which are important for maintaining natural ecological processes within the wetland.

The combination of these factors has led to the conclusion that the existing regulator and spillway do not serve a useful purpose within Wanganella Swamp.

It has been proposed that the regulator and spillway be modified to accommodate 100 ML per day plus flows. It has also been identified that some initial de-silting (subject to relevant Government Agency consent) upstream of the regulator may be required to facilitate the passage of flows. This may not be necessary as the silt is very soft, and the flow of water may carve a path through the silt very easily. Any work would need to be undertaken with regard to the local topography, as a natural levee here is responsible for pooling water where waterbirds breed (*pers. comm.* Maher, 2000). The natural topography of the site should not be disturbed, and work would also need to be consistent with environmental legislation. Government Agencies such as DIPNR, NSWF and DEC are available to assist in any design modifications and formulation of operating protocols.

If a new regulatory structure is required, it has been suggested that Murray Irrigation Limited (MIL) be approached for assistance, as they have previously expressed interest in developing a joint venture for the management of Wanganella Swamp (Molino Stewart, 1999).

MAINTAINING A FLOW PATH THROUGH THE WANGANELLA SWAMP

According to Roberts and Pasma (1990), siltation was still occurring through the Wanganella Swamp system (particularly Wanganella Swamp), but was probably most severe in the weir pool above McCrabb's regulator. Their study showed that the flow-path through Wanganella Swamp was consistently less than 0.5m. In contrast, the main channel in Eight Mile Creek was generally 1.5-1.85m deep, except for one 'hole' of about 2.4m just upstream of the Cobb Highway. Recent observations have shown that a channel does still exist through Wanganella Swamp, but that a considerable quantity of very fine organic material and silt has settled in the channel and on the bed of the wetland, particularly in the vicinity of the channel.

It is envisaged that modification of the McCrabb's regulator may need to be accompanied by a proposal of desilting and removal of some cumbungi in the Eight Mile Creek channel just upstream of the regulator, to facilitate the passage of flows. The condition of the flowpath should be assessed each year to determine the extent of siltation and whether changes in the growth pattern of cumbungi are dramatically affecting the passage of flow. Any work must be consistent with environmental legislation.

ACTION 3.28(B)

That McCrabb's regulator and adjacent spillway be modified and appropriately upgraded.

Responsibility: DIPNR and State Water

Timeframe: 2005

Priority: high

PROPOSED ACTION 3.28(C)

That the operation of McCrabb's regulator be monitored as a consequence of the modifications in (B) above.

Responsibility: DIPNR and State Water

Timeframe: 2005

Priority: high

ISSUE 3.29

Flooding of the Cobb Highway, Wanganella

The Cobb Highway at Wanganella has been covered by flood-water when particularly high flows are experienced in the Eight Mile Creek. Large flood events are beyond the control of most structures. The Cobb Highway will at times be flooded because at Wanganella, the Highway crosses low-lying floodplain country that is readily inundated when flows overtop the shallow banks of Eight Mile Creek.

Two arms of the Eight Mile Creek pass beneath the Cobb Highway. The southern arm (smaller) passes through two box culverts and the maximum capacity of these two culverts has been calculated as approximately 1,000Ml/day. The northern arm passes through four box culverts and the maximum capacity of these four culverts is approximately 1,900Ml/day. This would enable a total flow in Eight Mile Creek of approximately 2,900Ml/day. This is a theoretical maximum based on a head difference of 0.1m across the culvert, and assumes that the water can get away on the downstream side. Given that there is a considerable build-up of cumbungi on the downstream side of the culverts, water will tend to back-up and slow the flood flow. Therefore, the maximum capacity is likely to be less than this calculation suggests (*pers comm.* Nankivell, 1999).

Local observations have identified that water does back up against the eastern side of the Highway during floods, and that floodwater will also back-up against the western side of the Highway, and move from west to east through small balancing culverts under the road (*pers. comm.* McCrabb, 1998).

This issue is linked to the redesign and refurbishment of McCrabb's regulator. This will enable the flow regime to be better managed to mitigate flooding of the Cobb Highway at Wanganella.

It is not the purpose of this Plan to prevent flood events from occurring, as it is recognised that they play an important role in sustaining the ecology of creek and river systems. Options for managing cumbungi and improving flow through the Wanganella Swamp (for example, removal of McCrabb's regulator and spillway, and some de-silting subject to relevant government agency consent to facilitate the passage of flows) will help to address problems that currently occur during small and moderate floods because of the growth of cumbungi in the Wanganella Swamp system.

ACTION: 3.29

That flooding of the Cobb highway at Wanganella be mitigated by redesigning and refurbishing the Estuary Creek Regulator and McCrabb's regulator.

Responsibility: State Water and DIPNR

Timeframe: 2005

Priority: High

4. IMPLEMENTATION COSTS OF YCS NRMP

The implementation of the YCS NRMP represents an investment in a secure future of the environmental integrity of the entire system and improved efficiency of water delivery. This investment is expected to require financial and in-kind outlay by the community at large, Governments and water users over a minimum period of 10 years, for most of the works items. Obviously, some works for the maintenance of the system will be ongoing.

The YCS NRMP is a strategic plan and thus provides background and context, outlines core issues and possible actions, and provides indicative costings. The Implementation Plan will specify proposed works such as willow control and removal/realignment of LWD, detailed costings, and prioritise works within each section of the YCS. Along with this is the need for staff to be employed to undertake the management of any contracts that are let for physical works. Additionally there is a need for a project officer who will undertake duties such as making funding applications, liaising with statutory authorities and assisting with policy development.

Preliminary estimates for implementing the YCS NRMP are expected to cost \$23.4 Million. Costings of works for the implementation of the YCS NRMP were prepared following detailed on ground surveys of the entire length of the creek system by officers of State Water and DIPNR. Works included in the plan can be seen below in Table 7.

Funding Considerations

It is proposed to source funding mainly from external sources being primarily the Catchment Management Authorities, Murray Darling Basin Commission and the Joint Government entity. At the October 2003 consultation meetings, YACTAC put a funding proposal to members that they pick up 20% of costs in cash and 20% in kind. The cash component would be done via a levy on their water accounts in July. The levy would consist of a \$1.50 per megalitre charge on entitlement and a \$2.00 per megalitre charge on usage. It is proposed to put the levy on for a period of three years and then review it.

Costing Considerations

Works have been largely costed using standard costs (exclusive of GST) for natural resource management works compiled in the preparation of the Murrumbidgee Catchment Blueprint. In some instances, other cost sources were used. In some instances, best estimates were used as a basis for the budget with the realisation that individual projects would have to be properly specified and put to tender to determine accurate pricing. This would be done prior to funding being released from the government or other funding agencies.

Based on the need to develop and manage cost sharing arrangements, the extent and size of natural resource management issues along the YCS, and the timeframe of implementation required, provision is made for employment of a Project Co-ordinator and Implementation Co-ordinator.

ACTION: 4.1(A)

That YACTAC seek external funding to initiate on-ground works which includes the employment of implementation personnel.

Responsibility: YACTAC, State Water and DIPNR

Timeframe: 2004

Priority: High

ACTION: 4.1(B)

That all water users in the YCS contribute to the NRMP via a levy being \$1.50 per megalitre on entitlement and \$2.00 per megalitre on usage. This to be charged as part of State Water annual water accounts.

Responsibility: YACTAC

Timeframe: 2004

Priority: High

Table 7: Costing Schedule for Works Identified in YCS NRMP

Focus	Activity	Unit	Duration	\$/Unit	Sub Totals	Comment
Staffing Project Co-ordinator	Co-ordinate an inter agency approach for assessments and approvals, prepare funding proposals and administration	eft/pa	3 years	95,000	285,000	includes on-costs, vehicle running and overheads
Implementation Co-ordinator	Implement on ground works, prepare contract and tender documents, prepare implementation plan and Administration	eft/pa	5 years	95,000	475,000	as above
Scoping Consultancies	Scope engineering works Benefit/cost analysis of proposals	Contract	5 years		1,000,000	
Willows initial	initial removal of willows	per tree	3 years	1250	4,375,000	in excess of 3500 individual willows to be removed
ongoing	Rehabilitation of stream banks after willow removal ongoing eradication program	pa	10 years	75,000	750,000	to be reviewed after 5 years
LWD initial	management control works	per LWD	5 years	350	4,550,000	in excess of 12,980 LWD to be managed.
ongoing	ongoing maintenance program	pa	10 years	35,000	350,000	to be reviewed after 5 years
Floodrunners initial	construction of banks to prevent escape flows and losses	per runner	5 years	7,350	500,000	in excess of 68 floodrunners to receive improved management
	construction of regulators to effectively operate environmental flows.	per runner	5 years	33,000	500,000	in excess of 15 wetlands to be more sensitively managed to mimic natural conditions.

Cumbungi initial	maintenance of problem areas	per area	5 years	50,000	500,000	50 major problem areas
ongoing	study and maintenance	pa	10 years		200,000	
Weirs private	Weir investigation and re-engineering solutions including re-regulation capabilities		5 Years		1,500,000	in excess of 26 private weirs
State	Investigation	per weir	12 months	0	0	To be investigated cost bourn by State Water
Revegetation** native tree planting	replanting denuded areas affected by maintenance works	per km	5 years	2,000	950,000	in excess of 475 kms requires Replanting with overstorey and Understorey species
Fencing**	protect tree planting areas	per km	5 years	3,000	712,500	in excess of 475 kms of fencing Required to protect replanting
Fish Stocking	Re stock creek with native fish		10 years	10,000	100,000	
Total					18,247,500	
Incidental Costs		10%			1,824,750	
Establishment of an improved Water Quality Monitoring and Evaluation System.		10%			1,824,750	
Data Collection and Recording for Environmental Performance Monitoring					1,500,000	
Project Total					23,397,000	

Note: ** 50% of total cost being borne by landholders