Invasive Animals Cooperative Research Centre



Guidelines to inform the selection and implementation of carp management options at wetland inlets: a test case for South Australia

Ben Smith, Leigh Thwaites and Anthony Conallin









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"Together, create and apply solutions"

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Government of South Australia

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Report prepared for the Invasive Animals Cooperative Research Centre's Freshwater Products and Strategies Program.

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Cover images (left to right): Close-up carp, Mark Ainsworth; Carp below weir at Blanchetown, SARDI; Ben Smith with carp, SARDI.

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Purpose of the guidelines

These guidelines are designed for Natural Resource Managers (for example, Fisheries Agencies, Natural Resource Management Boards (NRMB), Catchment Management Authorities (CMA) and Local Action Planning (LAP) groups etc) to assist in the selection and implementation of carp management options for use at wetlands. The guidelines are not intended as a 'stand alone' document but rather one to supplement existing wetland management guidelines. For example, the South Australian Murray-Darling Basin Natural Resources Management Board (SA MDB NRMB) has published a series of four 'Your Wetland' guidelines to help wetland managers and contractors to plan, implement, manage and monitor on-ground works for their wetland in an informed way. These guidelines provide some important information taken directly from the 'Your Wetland: On-Ground Works' publication (Sustainable Focus 2007; with permission from the SA MDB NRM Board, Rebecca Turner, Pers. Comm.) as well as supplementary information which is specific to the selection of appropriate carp management interventions.

The aim of these guidelines is not to assist in forming decisions about management strategies or prioritising wetland management objectives for incorporation into a wetland management plan, but to ensure successful outcomes in relation to managing carp at wetland inlets through careful planning and detailed knowledge of the site in question (eg baseline fauna and flora surveys undertaken in the last three years). Essentially, the guidelines will help community groups and wetland managers to establish whether carp management option for a particular wetland type. The guidelines require that a wetland management plan has already been developed and carp management is a high enough priority to warrant action. Key to developing wetland management plans is to conduct a rigorous assessment as to whether the proposed actions will deliver the intended environmental benefits. Success should then be monitored using an appropriate monitoring program. Sometimes, the best solution is not the most obvious. Poorly selected, designed or implemented projects can cause more environmental harm than benefits. Sometimes, the best action is no action.

As well as providing information on carp biology and behaviour, these guidelines present an overview of the legal issues that need to be considered in a step-by-step format. More detailed information on how a proposed management intervention will fit within the disparate legislative requirements, or within the range of administrative and policy boundaries in South Australia, is presented in Sustainable Focus (2007, Introduction and Appendix C). While these guidelines will help decision-making the planning and implementation process at most wetlands, the complexity of sites makes it impossible to address all issues in one document. If in doubt, always consult a colleague or expert.

Finally, the information in these guidelines is a synthesis of current knowledge that should not be considered definitive; it is a framework of the present understanding which can be updated, reviewed, challenged and changed as new data become available. The last point is especially noteworthy, given that much of the understanding of carp biology/vulnerabilities has come from research undertaken during the past eight years of zero/low flow conditions and is therefore subject to review, especially during high-flow or flood conditions.

Background

Carp are a declared pest and the most abundant large-bodied fish in lowland rivers and wetlands of the Murray-Darling Basin (MDB) in south-eastern Australia. They also comprise the majority of the fish biomass and are implicated in a range of ecological impacts: increasing turbidity, disturbing and redistributing benthic (bottom) seeds and invertebrates, up-rooting delicate shallow rooted vegetation, reducing the establishment and growth of seedlings, competing with native fishes and other aquatic fauna for food and space, and indirectly promoting the development of toxic algal blooms.

Adult carp use shallow wetlands during the warmer months (spring through autumn) for feeding and spawning (that is, wetlands are the major point-source of new carp recruits) and then disperse to overwinter in deeper river water. The annual migration of adult carp between shallow wetlands and the river can be blocked by barriers such as carp exclusion screens fixed to flow control structures (for example, culverts) at wetland inlets. When confronted by barriers, migrating carp have an innate desire to jump over, or push through them. Field observations suggest that these behaviours are persistent during the day and night, include mature carp of diverse sizes and are so vigorous that they can lead to body wounds (video footage available at http://tiny.cc/9fYWq accessed November 2009). In contrast, native freshwater fishes of the Murray-Darling Basin, of a comparable size to adult common carp, are not able to (or simply do not) leap from the water, and they tend not to use shallow wetland habitat (a notable exception is bony herring, *Nematalosa erebi*). Furthermore, there are no reports of large native freshwater fish attempting to push through barriers as they migrate.

Blocking the migration pathways of adult carp using carp exclusion screens, and exploiting their innate pushing and jumping behaviours through the application of newly developed carp jumping/pushing traps in wetland inlets (and other migration pathways), promises to exclude adult carp from wetlands and thereby contribute to carp management efforts — without significantly affecting native fishes. In late 2008, optimised carp exclusion screens, with vertical bars spaced 31mm apart, was shown to efficiently exclude adult carp and pass more native fishes of a larger size-range than current designs. Concurrent trials of a prototype wetland carp cage incorporating jumping/pushing trap components at Banrock Station, South Australia, successfully demonstrated the utility of this carp exclusion and harvesting method, confirmed key design elements, and stimulated significant interest from community groups, landholders, wetland managers and NRM/CMA groups in implementing carp management interventions.

With a great diversity of wetland types, diverse and variable fish populations and densities in different wetland sites, and enquiries from a range of natural resource and other interested stakeholders, the need for a communication package containing detailed information to assist in the selection of carp management interventions at wetland inlets was clear. Hence, this publication summarises the outcomes and recommendations from a range of research recently undertaken by SARDI Aquatic Sciences with funding from the Invasive Animals Cooperative Research Centre (IA CRC), the South Australian Murray-Darling Basin Natural Resources Management Board (SA MDB NRMB) and The Living Murray initiative of the Murray-Darling Basin Authority (formerly the Murray-Darling Basin Commission).

Format of the guidelines

These guidelines are presented in three sections. Section 1 describes current wetland carp management options, section 2 provides a three-step flow-chart to assist in selecting the most appropriate carp management option(s) in relation to particular wetland types and wetland features and section 3 presents an overview of the relevant approvals and licences required to implement on ground works associated with the application of carp management infrastructure.

Information relating to questions posed in the three-step flow chart is to be recorded on the application form presented in Appendix 1, with regard to the maintenance, monitoring and reporting schedules that are detailed for each management option in Appendix 2. This information is to be evaluated by South Australia's Carp Management Advisory Committee (CMAC), which comprises representatives from management, policy, and research organisations.

The role of CMAC will be crucial in providing ongoing support for new installations, coordinating future research and monitoring, and ensuring that all new carp management infrastructure is:

- 1) warranted
- 2) documented
- 3) will not adversely affect the passage requirements of threatened native fauna
- has resources (time/money) allocated so that it can be properly managed in terms of maintenance, monitoring and reporting requirements (Appendix 2)
- 5) accords with current legislation and has secured the relevant permits (Section 3)
- 6) is based on the latest scientific research
- 7) conforms to recommended design standards, and
- is standardised across locations to enable the quantitative scientific and cost-benefit evaluation of the success of the different carp management options, and the universal retrofitting of future design improvements.

This last point is noteworthy, given that the options described are all relatively new or novel, and therefore require ongoing evaluation and refinement across a range of wetland and habitat types.



SECTION 1:

Overview of wetland carp management optons

There are primarily three main combinations of carp management options that can be considered for application within a carp migration pathway, such as a narrow connecting channel between a river and a wetland. The selection of the most appropriate option or combination of options will be determined by applicants completing the three-step flow chart (Section 2) and having CMAC review the information provided in the application form (Appendix 1), but a general overview and illustration of each option is presented below. The options range from simple and cheap (for example, carp exclusion screens) to complex and expensive (carp traps with associated lifting infrastructure). More complex designs will require greater investments of money, time and energy to maintain and monitor, but will provide the added benefit of removing large quantities of carp from the system. The selection of the most appropriate option should be tailored to specific wetland management objectives. The three-step flow chart presented in Section 2 will assist in this process.

Option 1: Carp Exclusion Screen (CES) only

Description: CES comprise fixed vertical 'jail bars' with gaps between the bars of 31mm (Figure 1). They will block the entry of adult carp larger than a nominated size of 250mm total length, whilst allowing the passage of all small bodied native fishes as well as the juveniles of large-bodied native fishes that utilise wetlands. Up to 98 per cent of larger bodied but laterally compressed native bony herring will also pass through. The minimum exclusion threshold of 250mm total length was nominated as it reflects the minimum size at sexual maturity for common carp in south-eastern Australia, and mature carp (especially females) are the target for exclusion and/or trapping. Jail bar exclusion screens also comprise a section of vertical gridmesh on either side to permit the passage of turtles.

Application: CES are fitted directly onto the river side of flow regulating structures (typically, box or pipe culverts). They should principally be considered for installation at seasonal/ephemeral wetlands, which dry out every one to two years. This will minimise the number of small carp which pass through the screens and subsequently grow to become destructive, spawning adults (greater than 250mm in total length), and will enable those carp that do enter and grow to be killed via desiccation when the wetland dries by preventing them from dispersing back into the river. At a permanent wetland where access limitations may prevent other more preferred carp management options, CES can still be used by ensuring that they are removed prior to winter (May) to allow carp in the wetland to migrate out into the main river channel (it is the wetland carp population that is being managed, not the broader carp population in the river). However, in this case, the screens must be repositioned by late-July to ensure that carp are excluded upon their return in spring.

Option 2: CES fitted with a one-way push trap element

Description: This option blocks adult carp with body length over 250mm attempting to move from the river to the wetland, but also allows the movement of adult carp (that entered the wetland as juveniles and grew) from the wetland back into the river. Like the CES only option, the majority of the screen (upper section) is comprised of fixed vertical 'jail bars' with gaps between the bars of 31mm, but the lower section is comprised of a pushing trap element (Figure 1). Turtle passage is permitted as above. The pushing trap element consists of a series of weighted one-way steel 'fingers', hinged from individual sleeves over a supporting shaft (the sleeves maintain the gaps between fingers and negate the lateral movement of fingers) suspended within a frame. Again, the gap between the 'fingers' is set at 31mm, and 'finger' weights are minimised to allow the easy passage of carp equal to or larger than 250mm out of the wetland (the pushing force required to lift to 90 degrees is less than 100g). To 'push through' the one-way element, carp must push (lift) at least one finger or between the lifted and adjacent fingers. Once a carp has pushed through, the finger(s) then fall shut, preventing carp from pushing back through the fingers. The element can be easily 'shut down' during wetland

draining events to enable trapping of carp within the wetland (if present, large-bodied native fishes such as golden perch may need to be rescued prior to or during draining).

Application: A CES with one-way push trap element would be fitted directly onto the river side of a flow regulating structure; the screen and one-way push trap element 'fingers' prevent the entry of carp to the wetland, but the push trap element allows the exit of large carp from the wetland back into the river. This option could be applied at seasonal/ephemeral wetlands, or at permanent wetlands where the key management objective is to maintain a low adult biomass but where trapping is not feasible - perhaps due to access restrictions.



Figure 1: An illustrative box culvert with two chambers; the left chamber is fitted with a CES only, while the right chamber is fitted with a CES with a one-way push trap element. Note: turtle mesh is not illustrated.

Option 3: Wetland carp separation cage

Description: This option facilitates the trapping of adult carp longer than 250mm in total length attempting to enter or leave a wetland. It also allows for the initial monitoring of the passage requirements of large-bodied native fishes. The cage incorporates jumping and pushing trap elements. With the exception of finger weights being maximised (the pushing force required to lift to 90 degrees is 440g) to discourage the passage of native fish, the pushing trap element is identical to the element described under Option 2. The jumping trap element is simply a height adjustable mesh barrier extending and maintained approximately 15cm above the water's surface (at 'pool level') that carp must jump. It incorporates a non-return slide on the wetland side of the barrier to prevent carp from jumping the barrier in the reverse direction. Whilst most carp (around 80 to 90 per cent) that enter the 'holding zone' will proceed to either jump or push their way into the 'carp cage' (Figure 2), some will remain in the holding zone and need to be sorted from large-bodied native fish, which must be returned to the water. All adult carp that pass the trap elements, via jumping or pushing, are contained within a holding cage to enable removal. Furthermore, because the end of this cage is constructed from the same jail bars as the CES (31mm gaps) it acts as a carp exclusion screen allowing the passage of all small and medium-sized native fishes that use wetlands, as well as a majority of the larger-bodied but laterally compressed native bony herring.

Due to the large quantities of carp that can be trapped (up to two tonne per lift), this option requires appropriate infrastructure to lift and empty the cage. This infrastructure may be an overhead gantry, hoist or generator (the latter should be used for remote locations without access to power) (Figure 3 – designs available via consultation with SARDI Aquatic Sciences). Turtle escape is facilitated via an escape chute which incorporates grid mesh. Fish escapement from the holding zone is minimised by using a funnel entrance, fitted with plastic escape deterrent mesh (gutter guard). Ongoing monitoring at each wetland, over at least 12 months, would contribute to an assessment as to whether the continued use of the holding zone was warranted.

If required, native fish passage may be provided in a similar manner to that described by Stuart et al (2006a). Instead, the floor of the holding zone could be omitted, so that native fish can swim out when the trap is lifted.

Application: The WCSC should be positioned within an open-top box culvert, or otherwise sited on a concrete pad on the wetland side of an existing closed-top culvert. It could also be applied in an open channel such as a tributary stream or irrigation canal, depending on state legislation (see Section 3), predicted current velocities and the expected maximum water depth and depth variation. This option could be applied at seasonal/ephemeral wetlands, or at the outlet to permanent flow-through wetlands.

Depending on seasonal changes in the direction of carp movements (into wetlands in spring through autumn; out of wetlands during winter), the cage orientation can be altered as required.



Figure 2: A funnel and trap (jumping/pushing) and carp holding cage combination.



Figure 3: Schematic representation of the preferred lifting infrastructure design, which has been reviewed by engineers to conform to all Australian design and South Australian Occupational Health, Safety and Welfare standards. The construction and installation of wetland carp separation cages and the associated lifting infrastructure is facilitated through CMAC.



SECTION 2:

Three-step flow chart







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SECTION 3:

Relevant legislation

Carp control infrastructure for use at wetland inlets will typically be retrofitted to existing flow control structures (for example, box or pipe culverts), or be designed in conjunction with the installation of flow control structures. Consequently, anyone interested in applying for wetland carp control infrastructure in South Australia must be familiar with the SA MDB NRM Board's existing guidelines for undertaking on-ground works (see Sustainable Focus 2007), as well as local, regional, state and national planning and development approvals and licences.

Often getting the right approvals can take time and the information in this document, as well as in Sustainable Focus 2007 and the other *Your Wetlands* manuals will assist planning. These requirements are designed to ensure that carp management works avoid any unintended and undesirable consequences and that all issues are considered and managed in a timely way.



The following list details eight steps to ensure that any proposed on-ground works comply with current legislative requirements. Steps one to six are from Sustainable Focus 2007; steps seven to eight are specific to the installation of carp management infrastructure. To streamline the process of applying for approvals/permits/exemptions, several steps may proceed concurrently, and approvals may be sought for a number of different sites at a time.

Step 1 – Obtain approval from the landholder

Contact should be made with the landholder and approval obtained before any on-ground works are undertaken. This may be the local council, a private landholder, leaseholder, or the State Government (for example, the Department for Environment and Heritage, DEH) for Crown Land. Note: most council reserves and conservation areas are Crown Land.

Crown Land approval and Native Title

A licence is required for any work on Crown Land, which will include native title clearance. The Crown Lands Office will liaise with the Native Title section of the Crown Solicitor's Office to

check whether there are any current or potential native title claimants on the land in question. If native title clearance is required, the Crown Lands Office will advise on the process.

Contact: Relevant landholder. For Crown Lands, contact the Crown Lands Office of the Department of Environment and Heritage (DEH) (see contact details, Appendix A, Sustainable Focus 2007).

Timing: If native title has not been extinguished, allow up to four months.

Application forms (for work on Crown Lands) http://www.deh.sa.gov.au/mapland/pdfs/clsa04.pdf

Step 2 – Consider Aboriginal heritage issues

This may be done concurrently with Step 1.

When working on *any* land, Aboriginal heritage (including culturally significant sites, objects or remains) must not be damaged, disturbed or removed. Even Aboriginal heritage which is not recorded on the Aboriginal heritage register is protected, so if any objects or remains are unearthed during works, work must cease immediately and the Aboriginal Heritage Branch must be contacted (see contact information below). Before starting any on-ground work, contact the Aboriginal Heritage Branch. They will advise as to whether any Aboriginal heritage sites are registered or recorded for the land in question and if Aboriginal heritage surveys have already been conducted. The register is not publicly available. If there are no known sites, work may proceed. Before work starts it is recommended that a heritage survey is completed. This is not a legal requirement, but is recommended in the SA MDB NRM Board's protocols for engagement with Indigenous groups.

Contact: Aboriginal Heritage Branch, Department of the Premier and Cabinet, Aboriginal Affairs and Reconciliation Division. You should also consult local contacts – for example, Indigenous Facilitator, SA MDB NRM Board (see contact details, Appendix A, *Sustainable Focus* 2007).

Timing: Allow three to four weeks for the register search. For an on-site heritage survey, refer to the SA MDB NRM Board's protocols of engagement and allow at least six weeks. Note: allowances should be made for costs involved with heritage surveys.

Step 3 – Environment Protection and Biodiversity Conservation Act 1999

This may be done concurrently with steps 1 and 2.

A project must not cause 'significant impact' to a protected matter of national environmental significance. The areas that may fall within the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) in the SA MDB NRM Board area include:

- Wetlands of international importance (Ramsar wetlands).
- Threatened species and ecological communities listed under the EPBC Act.
- Migratory species listed under the EPBC Act.

If a project is within an area of national environmental significance regulated by the EPBC Act, a self-assessment process needs to be carried out. If it is likely that a proposed action will cause a significant impact to a protected matter of national environmental significance, then the Department of the Environment, Water, Heritage and the Arts (previously the Commonwealth Department of the Environment and Water Resources) needs to be consulted to consider the available options.

Reference: Refer to Appendix C, *Sustainable Focus* 2007 for further information about the EPBC Act 1999.

Contact: Department of the Environment, Water, Heritage and the Arts (previously the Commonwealth Department of the Environment and Water Resources; see contact details, Appendix A, *Sustainable Focus* 2007).

Step 4 – Is this 'development'?

Dependent upon location, development approval may be required before installing a flow control structure or carp management infrastructure. If the project is within the River Murray Floodplain

Protection Area (see Map 4, *Sustainable Focus* 2007) as described within the *River Murray Act* 2003, development approval is required and works must comply with the objectives of the River Murray Act.

Outside of the River Murray Floodplain Protection Area, development approval may be required by the Local Council. Some works (for example, the installation of flow control structures) will require development approval for excavating and/or filling of land, or the forming of a levee or mound, in a Watercourse Zone, Flood Zone or Flood Plain.

Contact: Local council. For advice about the River Murray Act, contact the Development Planning Group, Department of Water, Land and Biodiversity Conservation (DWLBC, South Australia) (see contact details, Appendix A, *Sustainable Focus* 2007).

Application form: Obtain from Local Council. If an application is being made on behalf of a Crown Agency (for example. SA MDB NRM Board, applications should be made directly to the Development Assessment Commission).

Timing: The approval process is likely to take approximately three months. Government agencies, like DWLBC, have eight weeks to respond.

References: DWLBC: Fact Sheet on the River Murray Act <u>http://www.dwlbc.sa.gov.au/files/fs35_overview.pdf</u>

DWLBC: Fact Sheet – referrals under the River Murray Act <u>http://www.dwlbc.sa.gov.au/files/fs36_referrals.pdf</u>

DWLBC: User guide to River Murray Act (See Appendix C, *Sustainable Focus* 2007 for further information.)

Step 5 – Is this a 'water affecting' activity?

A permit for the erection, construction or placement of any building or structure in a watercourse or lake, or on the floodplain of a watercourse, pursuant to Sections 127(5)(b) of the *Natural Resources Management Act 2004* (refer to Map 5, Sustainable Focus 2007) may be required.

The following principles should be considered:

- A building or structure should not be located where it is likely to adversely affect the migration of aquatic biota.
- The design and construction of a building and the design, construction and operation of a structure should not alter the hydrology of a stream in such a way as to adversely impact on the ecology.
- Structures that impede the flow of water, including but not limited to weirs, should be designed to provide a low flow by-pass mechanism (excluding those structures authorised for the specific purpose of measuring stream flow).
- Buildings and structures should be maintained in an appropriate condition to perform their intended function.
- An 'authorised structure' means a structure authorised by a Local Government Authority or the Minister.

Contact: For general advice, contact the SA MDB NRMB (see contact details, Appendix C, Sustainable Focus 2007).

Application form: Contact DWLBC

Timing: Allow six weeks.

Step 6 – Consider native vegetation issues

This step may be done concurrently with steps 1 to 5.

If any naturally-occurring native vegetation is to be cleared, either directly or indirectly, through the installation of a structure and the disposal of carp (including depositing fill), a management plan must be submitted to the Native Vegetation Council for approval. If spoil is to be dumped on native vegetation, if track-widening destroys vegetation, or if flooding or drying is going to change existing vegetation communities, approval will be required. The Native Vegetation Council is happy to give advice on individual projects over the phone (see contact details, Appendix A, *Sustainable Focus* 2007). A Management Plan, submitted under Regulation 5(1)(zj) of the Native Vegetation Act, must address the following points:

- It must be clearly demonstrated that there will be a benefit or gain to biological diversity.
- The landowner must provide written evidence that they agree to the clearance and associated works taking place.
- It must be demonstrated that there will not be an impact on vegetation away from the channels (for example, from movement of excavators or deposition of spoil), or if there will be an impact, then this will be minimised and managed appropriately (for example, flagging off sensitive areas, revegetating spoil heaps).
- An accurate description of any vegetation to be removed (area/quantity), and location including parcel details (section) and title reference (folio/volume) must be included.
- Details should be given of any ongoing monitoring proposed for the site to assess the
 effects of the clearance and overall benefits (if any) to the wetland.
- An aerial photograph of area to be cleared must be provided.

The level of detail should be appropriate to the scale of works — that is, if a project involves a few square metres, provide approximately one page. Contact the Native Vegetation Council (see Appendix A, *Sustainable Focus* 2007) to discuss specific requirements.

Different requirements apply if the earthworks will take place in an artificial channel, and if the species to be removed are Typha or Phragmites spp. (see the summary of the Native Vegetation Act 1991, Appendix C, *Sustainable Focus* 2007, for more information).

Contact: Native Vegetation Council (see contact details, Appendix A, Sustainable Focus 2007).

Timing: Consult with officers of the Native Vegetation Council during the early stages of a project to discuss clearance and whether a Management Plan is likely to be required. Allow four weeks for approval of minor clearance. For larger clearance, which may need to be referred to the Native Vegetation Council and require site inspection, allow at least two to three months.

Reference: Native Vegetation Council webpage: http://www.nvc.sa.gov.au/

Step 7 – Consider permits and exemptions required under the *Fisheries Management Act* 2007 for the capture, handling and euthanising of carp

Management and regulation of fishing in South Australia comes under the *Fisheries Management Act* 2007, which replaces the *Fisheries Act* 1982. Currently, carp (along with redfin perch, *Perca fluviatilis* and eastern gambusia, *Gambusia holbrooki*) are listed on the noxious fish list which means that they pose a significant threat to the aquatic environment and that they may not be held or traded in South Australia without specific authorisation (PIRSA Fisheries recommends euthanising carp via a sharp blow to the head). Furthermore, carp traps are a nonstandard fishing gear and their use may inadvertently capture native fishes. Thus, appropriate permit exemptions need to be obtained.

Contact: PIRSA Fisheries.

Timing: Consult with PIRSA fisheries officers during the early stages of a project to discuss the process of securing the appropriate exemptions to the FMA 2007 (for using non-standard fishing gear and for transporting and disposing of captured carp). Allow 8 weeks.

Reference: PIRSA Fisheries webpage: http://www.pir.sa.gov.au/fisheries

Step 8 – Consider Environment Protection Authority (EPA) permits for disposing of unwanted carp

An applicant proposing to dispose of harvested carp on private property needs to take all reasonable and practicable measures to prevent or minimise environmental harm by, for example, disposing of carp in small volumes in a location(s) well away from surface waters,

bores or houses likely to be affected by odours associated with decaying carp. The Environment Protection Authority regulates the waste and resource recovery industry through the provisions of the <u>Environment Protection Act 1993</u> (the Act). In addition, the EPA has specific powers in relation to conditions of approval for activities that require approval under the <u>Development Act 1993</u>.

Carp may also be harvested and transported by commercial fishers licensed under the *Fisheries Management Act* 2007.

A third option may be disposal of captured carp in a BioBiN to be utilised in the supply chain of value-added products such as soil conditioners.

Contacts: EPA, PIRSA Fisheries, local council. Zoning for local councils within the SA MDB NRM region: see Map 2 in Sustainable Focus 2007.

Timing: Allow 8 weeks.

References: EPA web page http://www.epa.sa.gov.au/

BioBiN: http://www.biobin.net/images/ProfileBiobin.pdf

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APPENDIX 1:

Application for Carp Management Infrastructure

CMAC SARDI Aquatic Sciences 2 Hamra Avenue West Beach SA 5024	Carp Management Advisory Committee
1. Applicant	
Community Group /Landholder name	
Contact Name	
Address	
City, State, Postal Code	
Phone	
Website	
2. Associated Government Agency (ie NRM Board)	
Name of Agency	
Contact Name	
Address	
City, State, Postal Code	
Phone	
Website	

3. Wetland Features

Wetland Name				
Wetland Location (Easting and Southing))			
Permanent		or	Seasonal/Epheme	eral 🗌
Terminal		or	Flow Through	
One Inlet		or	Multiple Inlets	
Has a wetland Baselir (If yes, please attach a	ne Survey been comple a copy)	eted?	□ y	ves 🗆 no
Year of survey				
Name of organisation	that completed survey			
Contact Name				
Phone				
Web site				
Have wetland and fish this wetland?	n management objectiv	es been det	ermined for 🛛 🗆 y	es 🗆 no
(If yes, please attach a	а сору)			
Are any threatened sp	pecies present in this w	etland?	□ y	es 🗆 no
(If yes, please list)				
1.				
2.				
3.				
4.				

4. Infrastructure		
Is there existing infrastructure, such as flow control reculvert?	egulator or	□ yes □ no
(If yes, please attach a picture)		
Will all weather access be available to the proposed	infrastructure?	□ yes □ no
5. Preferred Carp Management option		
Based on the above factors, what is the preferred ca chart – Step 3) and, if applicable, how will captured c	rp management op arp be disposed?	tion (Refer to flow
6. Resources		
Are resources to construct, maintain, monitor and rep the preferred option currently available?	port on the use of	□ yes □ no
(Refer also to Appendix 2) eg funding, labour, time		
If no, how will the required resources be obtained (ie	funding opportunit	ies)?
Applicant's Signature	Date	

APPENDIX 2:

Activity	Options	Reason	Daily	Bi-weekly	Weekly	Fortnightly	Monthly Qu	arterly	Bi-Annual (June & Dec)	Annual
Minimum maintenance requirements	All Wetland carp	 Debris build-up Vandalism General Maintenance (inspect integrity of flow control structure and all fittings; replace or repair any worn and corroded parts). End of day wash down during trapping 	•			• •		•		
	schar auon vage	 Ochetatol and motel set vicing (plus petrol. oil etc.) 								•
Monitoring	Wetland carp separation cage	 Lift and empty cage (if needed), record catch details separately for each cage section including, for each species, estimated number and total weight. Also, for each lift, take a photo of each cage section (from a standard point - to also estimate catch) and record details of any fish with external tags. 		mid-Aug to mid-Oct	mid-Oct to late-Jan	late-Jan to late-May	June to mid-Aug			
Reporting	Wetland carp separation cage	 Summary report to be provided to CMAC, to evaluate catch against stated wetland management objectives. Records of fish with external tags to be provided to SARDI Aquatic Sciences. Refine wetland management objectives based on catch details provided in summary report 							•••	

NOTE: The schedule below is indicative for each carp management option in terms of maintenance, monitoring and reporting requirements. It excludes operational protocols. All of these are site specific, and will be advised by CMAC.

Maintenance, monitoring and reporting schedule

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Carp Management Guidelines: a test case for South Australia

