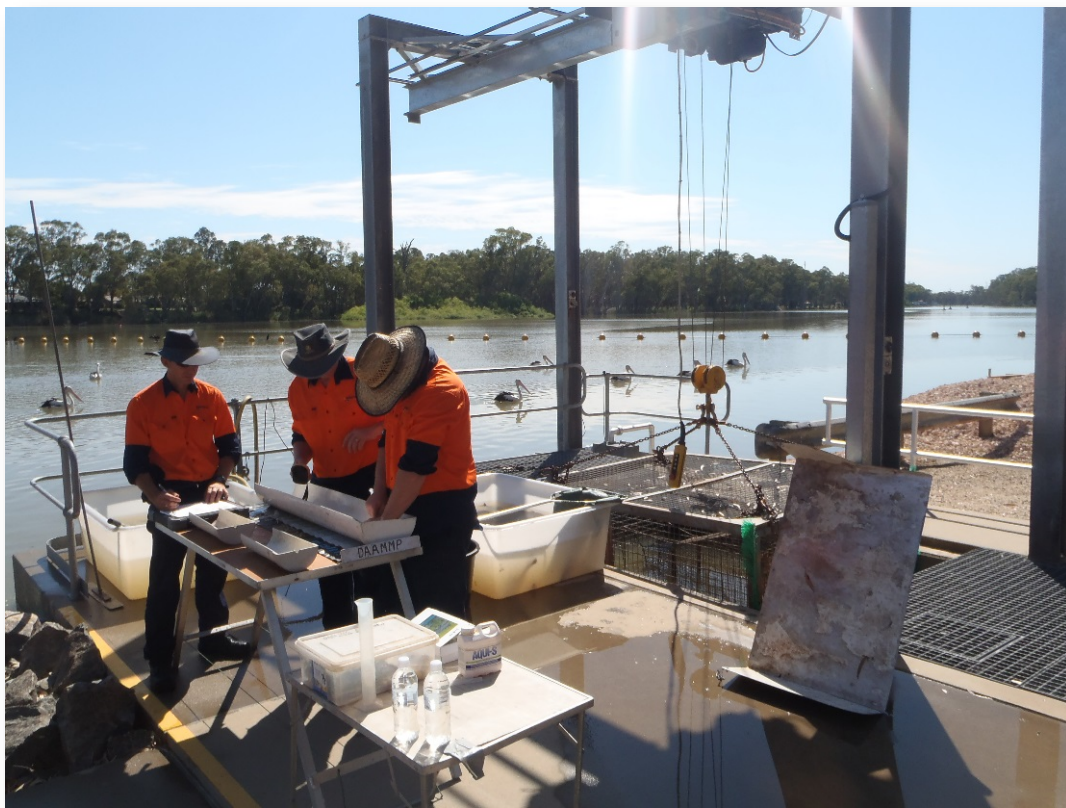# Lock Keeper's guide to PIT tagging fish at Lock 10

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Manual

Final Report

Lock Keeper's guide to PIT tagging fish at Lock 10

Final Report prepared for the Murray–Darling Basin Authority by The Murray–Darling Freshwater Research Centre.

This report was prepared by The Murray–Darling Freshwater Research Centre (MDFRC). The aim of the MDFRC is to provide the scientific knowledge necessary for the management and sustained utilisation of the Murray–Darling Basin water resources. The MDFRC is a joint venture between La Trobe University and CSIRO.

Cover Image: Lock staff tagging Golden perch at Lock 10 on the Murray River, 2016

Photographer: Scott Huntley

User guide to PIT tagging fish at Lock 10

Document history and status

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	1	Daniel Burke, Water NSW

1   Background

Since the conclusion of the Murray River Fishways Assessment Program in 2014, numbers of tagged fish in the Murray River have declined below those necessary to produce meaningful data from PIT tag readers installed on fishways. In an effort to increase the number of PIT tagged fish in the river (and potentially using the fishway), training is being provided to lock staff in the anaesthesia, tagging, handling and care of fish caught in fishway traps. This document outlines the equipment, procedures and handling of data for lock staff to undertake this work after initial training.

2   Equipment

A checklist of equipment needed to conduct an efficient session of PIT tagging 100 fish is displayed in Table 1. It is imperative to ensure there are sufficient stocks of consumable/disposable items after each session to ensure that there are provisions for the next session.

Table 1. PIT tagging equipment per session. * indicates consumable or disposable items.

Item/equipment	Quantity (minimum)	Check
PIT tags*	100	
Biomark MK10 implanter (1 + spares)	3	
Biomark NHDX needle (1 for every 50 fish)*	2	
Biomark 601 reader and spare batteries	1	
1 L Aqui-S aquatic anaesthetic (1 L will last 200 sessions)*	1	
5 mL plastic pipette (for measuring Aqui-S)*	1	
Fish measuring board with fish holder (i.e. half polypipe design)	1	
Fish-friendly landing net (knotless mesh)	1	
Large holding tubs — 500 L (1 for holding, 1 for recovery)	2	
Small holding tub — 50 L (for anaesthesia)	2	
Table to measure and tag fish on	1	
Submersible pump (for filling tubs and wash down)	1	
Aerator (preferably with 4 separate air-stones)	1	
Data sheets and pencil*	1	

3   Setting up a tagging workstation

3.1   Fishway trapping

Fishway traps should be set the afternoon before the day of the PIT tagging session in line with lock fishway trapping procedures. This will ensure sufficient time (no longer than 24 hours) has passed to allow fish to ascend the fishway and into the trap.

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3.2   Workspace set-up

One of the large 500 L tubs — which will be used as the holding tub — is to be placed as close to the exit of the fishway trap as practical to ensure that fish only experience minimal handling and exposure when they are being removed from the trap. The second large 500 L tub — which will be used as the recovery tub — is to be placed as close as is practical to the point of release after fish have recovered.

Sedation tubs (50 L) are to be placed in front of the holding tub, in between the holding tub and the table used for tagging fish. The table will hold the measuring board, PIT tags, implanters and data sheets.

All tubs are to be supplied an aerator stone from the aerator, which is particularly vital during warmer weather when oxygen levels in holding/recovery tubs can be quickly depleted. Aerators will also increase the efficiency of the anaesthetic solution.

3.3   Anaesthesia

When using new chemicals, it is important to read and understand the safety data sheet (SDS) associated with the particular brand of chemical (available from the supplier's website). The SDS for the anaesthetic solution recommended in this guide, Aqui-S, is available from http://www.aqui-s.com/index.php/aqui-s-products/aqui-s.

Aqui-S can be diluted to a stock solution (as per instructions on the back of the product container) and added per L to your anaesthesia tub, or a recommended dose of 3 mL per 50 L will provide a medium sedation for the majority of species to be encountered. The number of fish being sedated in each tub may vary depending on the number of staff participating in the tagging session, but no more than 2–3 fish per 50 L should be sedated in each tub at a time

Sedation usually takes between 1–2 minutes and is evident by a loss of equilibrium (fish start to roll over) and opercula rates (gill cover movements) become slow or irregular. It is recommended that fish reaction to sedation be continually monitored throughout the tagging session, as this will inform on the length of time required for sedation.

If fish sedation is too rapid, or too deep, dilute the concentration of Aqui-S by adding fresh water to the tub. If sedation is too light or takes too long, increase the concentration by adding another 0.5 ml of stock solution to the 50 L tub.

3.4   Recovery

Recovery from medium sedation should take around 5–10 minutes. It is important that each fish has recovered fully before being released back into the river to ensure that they do not involuntarily descend the fishway and produce a false descent in the database.

The recovery tub should be kept well-aerated and freshwater should be pumped into it periodically to ensure good water-quality. Once in this tub, fish should show basic recovery within 5 minutes, gradually gaining balance and holding themselves upright (typically 10+ minutes). They should remain in the recovery tub until they fully recover their activity level (they should not be too easy to catch with the net). Once fully recovered, fish should be moved from the recovery tub to their release-point in the weir-pool using the net. Avoid transferring 'hand-held' fish, as they are easily dropped and this may cause unnecessary stress or even injury.

4   Tagging fish

4.1   Species to be tagged

Golden perch (*Macquaria ambigua*), Silver perch (*Bidyanus bidyanus*) and Carp (*Cyprinus carpio*) should be tagged. Only tag fish that are 20 cm in total length or larger.

As of June 2016, Lock 10 staff had received training to tag these species. Until trained to handle and tag large Murray cod (*Maccullochella peelii peelii*), this species is outside the scope of the current PIT tagging program. Large cod (over 70 cm long) should be handled with extra care. This may involve limiting their time outside the water or providing extra support under their gut region when they are out of the water. Exposure to air for large cod can have serious deleterious effects in a short period of time. If large cod are trapped during PIT tagging operations, they should be immediately released without tagging.

4.2   Tagging procedure

If there are more than 30 fish found to be caught upon pulling in the fishway trap, then only remove ~25–30 fish at a time and place them in the holding tub. The remaining fish can be lowered back into the water and left in the trap until all of the fish in the holding tub have been tagged.

- Once all equipment is set up and ready to go, including data sheet details (Appendix A), place 2–3 fish in each sedation tub.
- After sedation has been reached, remove 1 fish and place it in the measuring board/fish holder and record its species code (Appendix B) and length.
- Before inserting the PIT tag into the peritoneal cavity of the fish, scan the fish to ensure it has not been previously tagged. If it has, then mark it as a recapture on the data sheet and record the number.
- If the fish is untagged, scan the PIT tag with the reader before implantation and record the full unique number sequence (15-digits) on the data sheet.
- Once the PIT tag is inserted into the implanter, use the tip of the needle to remove one scale and insert the PIT tag. The angle of implantation should be shallow and as close to parallel to the fish as possible, while still maintaining enough angle to pierce and enter the peritoneal cavity. This will ensure that no vital organs are pierced or damaged. Depress the syringe handle to discharge the PIT tag into the fish and then withdraw the needle.
- Once the PIT tag is implanted, re-scan the fish to ensure the tag is still readable and double-check the recorded number.
- The fish can now be placed into the recovery tub.

5   Fish welfare

If preferable, fish handling gloves can be used; however, it is not compulsory. Sedated fish should be easily handled, and not flicking their tail around on the measuring board. If this is the case, then place fish back into the sedation tub until correctly sedated. Un-sedated fish (i.e. before anaesthesia or after recovery) should never be handled 'by-hand' (for example, always use the net to transfer such fish between tubs etc.). Also, no fish should be handled by their lips, gills or eyes. All fish can be picked up by placing one hand under the fish around the pectoral fins, and the other hand near the base of the tail.

For recovered fish, it is best practice to use an 'Environet' style landing net to release them back into the river, as they will be fully active and hard to handle safely.

Only tag fish in good health. Signs of stress should be monitored throughout the tagging session. Typical signs of stress would include gulping at the surface, inability to maintain balance (i.e. an upright position), unusual or non-uniform colouration (very dark/very light or patchy), irregular and erratic breathing (opercula movements), or extremely rapid breathing.

6   Data capture to FishNet database

This is the essential part of the whole process — the actual reason why fish are to be tagged is to have them recorded in the database.

Data is to be entered into the FishNet PIT tagging data Excel-template developed by KarlTek (Appendix C) — within 24 h of tagging the fish.

It is important to use the exact template, as the process for checking the data is automated and it requires the template in order to work. To avoid errors, the format of each column in the template must be followed as specified in the example (Appendix C).

NB: The 'Weight_g' and 'External_Tag_ID' columns are not compulsory to complete as these are outside the scope of this program. Every other column requires an entry.

Once all the new PIT tagged fish are entered into the template, it can be emailed to Karl Pomorin at Karl@karltek.com.au and he will run it through a diagnostic program to ensure the integrity of the data before uploading it to FishNet. If there are any errors, duplicates or discrepancies, an error report will be sent back to be rectified. Once all errors are corrected, the data can be resubmitted to Karl to be uploaded into FishNet.

Appendices

Appendix A: Fish tag out template

Tagging Summary Sheet

MRFA Project

REFERENCE No.

Date operation began

d	m	y	Collector	Lock No.

Health	Code	Health	Code	Health	Code
Red Spot	RS	Deformity	D	Running Ripe	RR
Lernaea	L	Cysts	C	Wound	W
Fin Rot	F	Tumor	T	Other Parasites	O
Ulcer	U	Hook Wound	HW	Ripe	R

Tag Codes

Tag	Code
Radio Tag	R
Dart Tag	D
Pit Tag	P
T-bar	T

Gear Codes

Gear	Code
Hotwire	HO
ACDC	AC
DrumNet	DN
FrogNet	FN

Bank Codes

Bank	Code
Left	L
Right	R
Middle	M

Time Sampled	Genus	Species	L (mm)	Sex	Tag Number	Code	Pit Tag number	Distance from lock (m)	DS or US	Health	Gear	Head width
2												
3												
4												
5												
6												
7												
8												
9												
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Return to Fishways Project Officer, Narrandera Fisheries Centre, PO BOX 182, Narrandera, NSW 2700, Ph 02 6959 9021, Fax 02 6959 2935

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Appendix B: Fish species code list (those likely to be encountered at Lock 10 are highlighted)

Species_Code	Family	Species_Name	Common_Name
angaus	Anguillidae	*Anguilla australis*	Short-finned eel
angrei	Anguillidae	*Anguilla reinhardtii*	Long-finned eel
bidbid	Terapontidae	*Bidyanus bidyanus*	Silver perch
caraur	Cyprinidae	*Carassius auratus*	Goldfish
cypcar	Cyprinidae	*Cyprinus carpio*	Carp
	Gadopsidae	*Gadopsis bispinosus*	Two-spined blackfish
gadmar	Gadopsidae	*Gadopsis marmoratus*	River blackfish
	Geotriidae	*Geotria australis*	Pouched lamprey
	Terapontidae	*Leiopotherapon unicolor*	Spangled perch
macmac	Percichthyidae	*Maccullochella macquariensis*	Trout cod
macpee	Percichthyidae	*Maccullochella peelii peelii*	Murray cod
macamb	Percichthyidae	*Macquaria ambigua ambigua*	Golden perch
	Percichthyidae	*Macquaria australasica*	Macquarie perch
	Mordaciidae	*Mordacia mordax*	Short-headed lamprey
mugcep	Mugillidae	*Mugil cephalus*	Bully mullet
	Nannopercidae	*Nannoperca australis*	Southern pygmy perch
	Nannopercidae	*Nannoperca obscura*	Yarra pygmy perch
nemere	Clupeidae	*Nematalosa erebi*	Bony herring
	Plotosidae	*Neosilurus hyrtlii*	Hyrtl's tandan
perflu	Percidae	*Perca fluviatilis*	Redfin perch
	Plotosidae	*Porochilus rendahli*	Rendahl's tandan
pseurv	Bovichthyidae	*Pseudaphritis urvillii*	Congolli
	Cyprinidae	*Rutilus rutilus*	Roach
	Salmonidae	*Salmo salar*	Atlantic salmon
saltru	Salmonidae	*Salmo trutta*	Brown trout
tantan	Plotosidae	*Tandanus tandanus*	Freshwater catfish
	Cyprinidae	*Tinca tinca*	Tench

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Appendix C: FishNet template and example

Agency	Site_Name	Site_Latitude	Site_Longitude	Tagged_Date	Tagged_Time	Species	Length_mm	Weight_g	Pit_Tag_ID	Recapture	External_Tag_ID	Full_Survey_Data_File	Comments
MDBA	Lock 10	-34.1113	141.9033	27/04/2016	10:00	MACAMB	430		982000404693328	N		(Where saved)	

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