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Mitchell River Watershed, Stockroute/reserves Fisheries Audit

by

T.D. Vallance and A.E. Hogan



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**MARCH 2001.
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DPI WALKAMIN, Q4872.**

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Summary

The Mitchell River headwaters have a wide range of habitats. Near Julatten and Mt Molloy, the streams that drain the western Great Dividing Range also cross an upland floodplain containing a series of lagoons. During the wet season, much of the area floods, providing an opportunity for fish to move between the streams and lagoons.

The Mitchell River Watershed Management Group funded a short fish survey of the district to identify the fish species present, and any issues that may adversely affect the fish community. Fish diversity and abundance data was collected by electrofishing five sites in the headwaters. Water quality was sampled simultaneously. An additional seven sites were inspected for fish passage issues.

In general, fish species diversity and abundance was in a state of good health except for one lagoon that suffered from low dissolved oxygen levels and high turbidity. This was probably due to runoff from a nearby road. Fish passage is restricted at one site and possibly hampered at two others by artificial structures. Some instream works could rectify these problems.

1. Introduction

Stakeholder workshops were held in the Mitchell River catchment to develop a Mitchell River Watershed Management Plan. During these, the community identified a lack of base line data on which to formulate a plan. The Mitchell River Watershed Management Group (MRWMG) therefore applied for and secured funding from the Natural Heritage Trust (NHT) to conduct an environmental audit of the stockroutes and reserves in the upper Mitchell Catchment. This report is one of several commissioned by the group as part of the data audit. It focuses on the fish species in these areas.

The study area contains high flow rainforest streams; slower, occasionally intermittent streams surrounded by wet sclerophyll forest; and a unique upland offstream lagoon system. These lagoons were thought to play an important role in the life history of the local fish species.

During the wet season, large areas become inundated and fish have the opportunity to move between the streams and lagoons. We speculate that fish utilise these lagoons as spawning or nursery habitats, and as refuge during the dry season when many streams carry very little water or dry out. For this use to occur, natural fish passage needs to be maintained throughout the catchment. Artificial impediments to fish passage include high flows and turbulence created by poorly designed road culverts or causeways, and dams or weirs.

The Mitchell River headwaters have variable levels of human disturbance, with portions of relatively untouched areas of wet tropical rainforest through to grazing, rural township and intensive agricultural development.

The aims of this fish survey were to:

- identify fish species present and inspect water quality,
- identify problem areas for fish passage,
- identify any areas that should be protected,
- make recommendations to the MRWMG.

1.1 Scope

The Agency for Food and Fibre Sciences (AFFS) - Fisheries, Walkamin, was engaged by the MRWMG to undertake a fisheries audit of the Mitchell River headwaters, stock-routes and reserves as part of a Natural Heritage Trust project (NHT-982024).

Any views and recommendations expressed in this report are the views of the authors, not necessarily the Agency for Food and Fibre Sciences – Fisheries.

1.2 Methodology

AFFS-Fisheries, Walkamin, collected fisheries and water quality data from 5 sites in the Mitchell River headwaters. Fish were sampled using a Smith-Root boat mounted electrofisher. Water quality was collected at sample sites using a TPS 90-FL water quality meter.

An additional 7 sites were surveyed for fish passage by making observations of potential problem sites such as road crossings and culverts.

2. Site Description

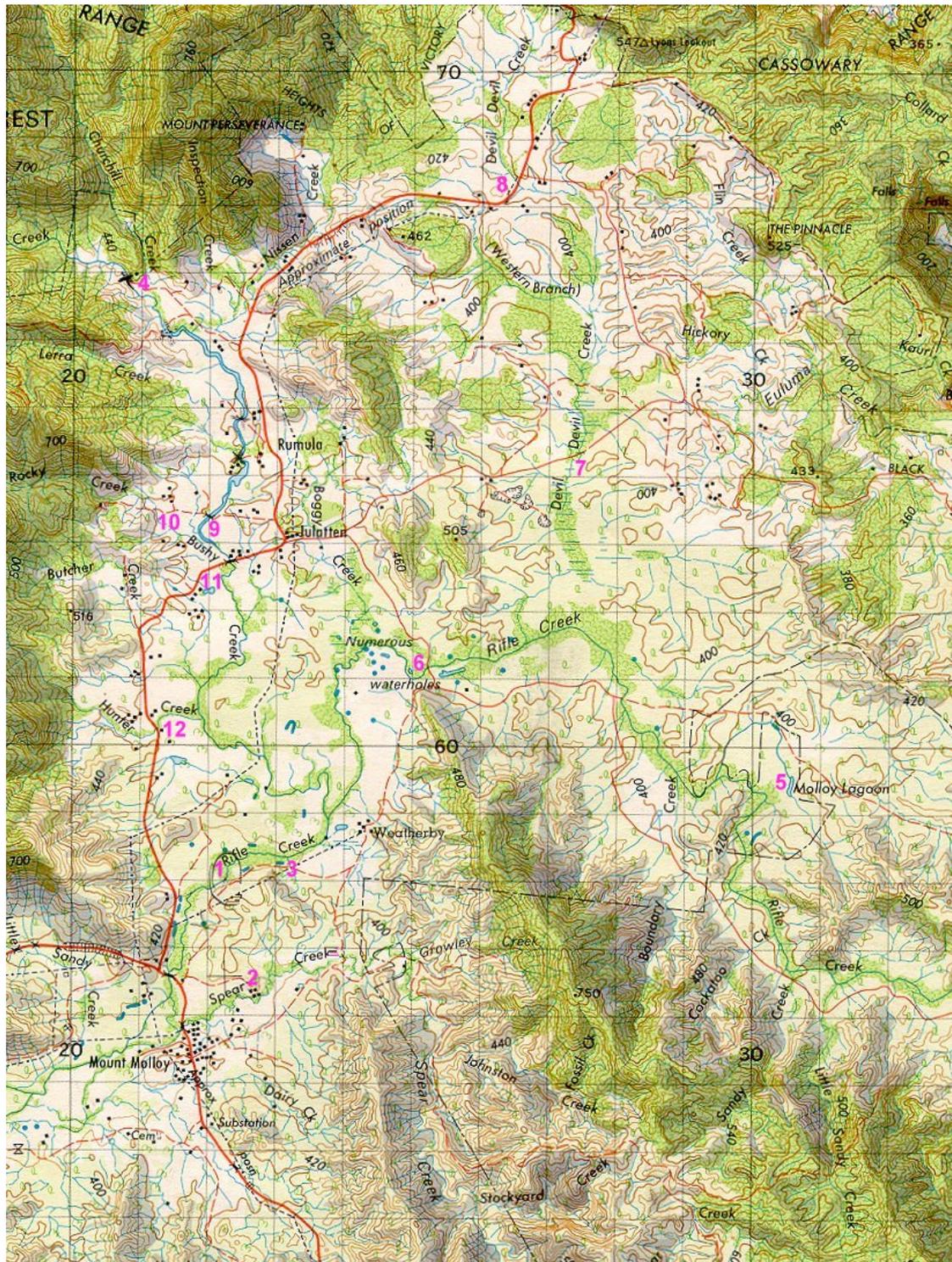
The upper Mitchell River catchment in the Mt Molloy and Julatten districts drains the western side of the Great Dividing Range (Figure 1). The eastern side of this section of the range is part of the wet tropics region, so is a high rainfall area. Some of this rain also falls in the upper Mitchell catchment. Such areas are covered by rainforest, and are drained by Bushy and Churchill Creeks. Other areas of the catchment are in a rainshadow, so are covered by wet sclerophyll forest. This is typical riparian vegetation of the study area drained by Rifle Creek. The section of the study area drained by Spear Creek has Gulf savannah characteristics.

Survey sites were chosen in conjunction with the MRWVG and included these streams and nearby lagoons. Despite the relatively short distance between survey sites, they were in remarkably different ecotones.

Table 1. Water Quality in the Mitchell River headwaters.

Site	Dissolved Oxygen mg/l	Conductivity $\mu\text{s/cm}$	pH	Water Temperature $^{\circ}\text{C}$
Molloy Lagoon	3.6	25.9	5.9	24.3
Bushy Ck @ Churchill Ck	8.23	39.5	7.25	21.2
Roadside Lagoon	2.85	33.6	6.22	22.8
Spear Ck Lagoon	6.47	39.4	6.86	24.3
Old X-ing Weatherby Rd	6.8	65.5	6.47	21.5

Figure 1. Map of sites in upper Mitchell River catchment.



(modified from NATMAP, 1975)

Site 1.

Rifle Creek near the old Weatherby Rd crossing appeared to be in a relatively good condition with riparian vegetation intact and very little disturbance (Figure 2). Water quality was good (Table 1). Fish habitat consisted mostly of logjams and undercut banks. Fourteen species of fish were sampled in this section of river (Table 2). No introduced species were detected.

Figure 2. Rifle Ck at old Weatherby Rd crossing.



Table 2. Fish sampled at Rifle Creek (old Weatherby Rd crossing).

Common Name	Species Name
Banded Grunter	<i>Amniataba percoides</i>
Sleepy Cod	<i>Oxyeleotris lineolatus</i>
Spangled Perch	<i>Leiopotherapon unicolor</i>
Sooty Grunter	<i>Hephaestus fuliginosus</i>
Bony Bream	<i>Nematolosa erebi</i>
Mouth Almighty	<i>Glossamia aprion</i>
Hyrtl's Tandan	<i>Neosilurus hyrtlii</i>
Purple Spotted Gudgeon	<i>Mogurnda mogurnda</i>
Black Catfish	<i>Neosilurus ater</i>
Chequered Rainbowfish	<i>Melanotaenia splendida inornata</i>
Barcoo Grunter	<i>Scortum barcoo</i>
Maclaey's Perchlet	<i>Ambassis macleayi</i>
Sailfin Perchlet	<i>Ambassis agrammus</i>
Freshwater Sole	<i>Brachirus selhemi</i>

Site 2.

Spear Creek lagoon is an artificially enhanced wetland area on private property. It fills during the wet season when Spear Creek floods overland. Riparian vegetation is sparse with some areas of regrowth. The construction of a dam wall has increased the depth of this lagoon and probably increased its fish habitat values. Fish habitat included extensive weed beds, lily pads and the occasional log (Figure 3). Eight fish species were sampled (Table 3) and water quality was good (Table 1).

Figure 3. Spear Ck. Lagoon.



Table 3. Fish sampled at Spear Ck Lagoon

Common Name	Species Name
Chequered Rainbowfish	<i>Melanotaenia splendida inornata</i>
Fly-specked Hardyhead	<i>Craterocephalus stercusmuscarum</i>
Spangled Perch	<i>Leiopotherapon unicolor</i>
Mouth Almighty	<i>Glossamia aprion</i>
Bony Bream	<i>Nematolosa erebi</i>
Striped Sleepy Cod	<i>Oxyeleotris selhemi</i>
Maclaey's Perchlet	<i>Ambassis macleayi</i>
Sailfin Perchlet	<i>Ambassis agrammus</i>

Site 3.

This site was a small lagoon on the roadside not far from Rifle Creek near the old Weatherby Rd crossing (Figure 4). The riparian vegetation was largely intact except for portions near the road where the local council pumps water for roadworks. The water at this site was highly turbid, probably due to runoff from the road. Fish habitat was sparse. There was a lack of weed beds and only one visible log. Dissolved oxygen was low at this site (Table 1) as was fish abundance (Table 4). Only six fish species were recorded at this site.

Figure 4. Roadside lagoon – Rifle Ck.



Table 4. Fish sampled at Roadside Lagoon (Rifle Ck).

Common Name	Species Name
Chequered Rainbowfish	<i>Melanotaenia splendida inornata</i>
Fly-specked Hardyhead	<i>Craterocephalus stercusmuscarum</i>
Bony Bream	<i>Nematolosa erebi</i>
Striped Sleepy Cod	<i>Oxyeleotris selhemi</i>
Maclaey's Perchlet	<i>Ambassis macleayi</i>
Sailfin Perchlet	<i>Ambassis agrammus</i>

Site 4.

Bushy Creek at the Churchill Creek junction is a relatively pristine rainforest stream. There is very little disturbance upstream of this site. Riparian vegetation was intact and fish habitat was abundant including logjams, undercut banks, sedges, small boulders, and riffles (Figure 5). Water quality was high although water temperature was much cooler than other sites which is common in rainforest streams (Table 1). Nine fish species were sampled at this site which was high considering the size of the stream. Most species were highly abundant and this was the only site where Coal Grunter was sampled (Table 5).

Figure 5. Bushy Ck – top of sample site.



Table 5. Fish sampled at Bushy Ck.

Common Name	Species Name
Spangled Perch	<i>Leiopotherapon unicolor</i>
Sooty Grunter	<i>Hephaestus fuliginosus</i>
Coal Grunter	<i>Hephaestus carbo</i>
Bony Bream	<i>Nematolosa erebi</i>
Hyrtl's Tandan	<i>Neosilurus hyrtlii</i>
Purple Spotted Gudgeon	<i>Mogurnda mogurnda</i>
Black Catfish	<i>Neosilurus ater</i>
Chequered Rainbowfish	<i>Melanotaenia splendida inornata</i>
Sailfin Perchlet	<i>Ambassis agrammus</i>

Site 5.

Molloy Lagoon is approximately 0.6 km from Rifle Creek and fills with overland flows during flood events. This area and surrounding lagoons can remain inundated for several weeks (pers.com P. Pal). The lagoon is on private property, has no development close by, and as such remains in excellent condition. Dissolved oxygen was lower than generally acceptable however all other parameters were good (Table 1). Nine species of fish were recorded during this survey with an additional two detected in a previous survey (Table 6).

Table 6. Fish sampled at Molloy Lagoon

Common Name	Species Name
Banded Grunter	<i>Amniataba percoides</i> [#]
Chequered Rainbowfish	<i>Melanotaenia splendida inornata</i>
Fly-specked Hardyhead	<i>Craterocephalus stercusmuscarum</i>
Spangled Perch	<i>Leiopotherapon unicolor</i>
Mouth Almighty	<i>Glossamia aprion</i>
Bony Bream	<i>Nematolosa erebi</i> [#]
Sleepy Cod	<i>Oxyeleotris lineolatus</i>
Striped Sleepy Cod	<i>Oxyeleotris selhemi</i>
Maclaey's Perchlet	<i>Ambassis macleayi</i>
Sailfin Perchlet	<i>Ambassis agrammus</i> *
Black Catfish	<i>Neosilurus ater</i> *

* additional species found on survey conducted by Ryan in 1998 (in prep.)

species not sampled by Ryan in 1998.

3. Discussion

Fish diversity and abundance

Rapid fish surveys such as this are useful for identifying species present at the immediate point in time and provide a general overview of fish abundance and diversity within the catchment. However, to detect migratory species and ensure all fish species present are sampled surveys on a regular basis over a number of seasons is necessary.

No unusual or unexpected fish species were detected during this fish survey. Fish populations in the streams and most lagoons appeared to be in good shape. The roadside lagoon (Site 3) had a relatively low fish population and species diversity. This is probably due to the poor water quality at this site, notably oxygen and turbidity. The turbidity may have been caused by runoff from the dirt road nearby and low oxygen due to light being unable to penetrate the water to allow photosynthesis to occur.

We suggest that to ensure the future health of the stream and lagoon systems in the Mitchell River headwaters efforts should be made to maintain good water quality and fish passage. In particular, ensure excess organic matter and silt is not washed into these waterways.

Other threats to fish populations is the risk of exotic weeds (eg. hymenacne) clogging the waterways and reducing water quality. Constant monitoring of the headwaters and immediate removal of any infestations is recommended.

Fish Passage

Most Australian native freshwater fish need to move up and down the streams they inhabit. All the species sampled during this survey would undergo some form of migration, most likely during the wet season. Such movements may be to establish a home range in which to find food sources and habitat, for predator avoidance, for spawning or as a consequence of changed environmental conditions (Mallen-Cooper, 1992). Many migrate as juveniles, so have poor swimming capabilities. Others are reluctant to enter darkened areas such as pipes (O'Brien, 2000). Most native species are unable to leap. Thus there are instream structures that can form barriers that restrict this movement. As a result, fish populations can be divided genetically (Vallance et. al., 2000). Barriers also reduce access to freshwater habitat and can change community composition by excluding migratory species and reducing colonisation opportunities following events such as floods or drought (O'Brien, 2000).

Seven sites in the upper Mitchell catchment were assessed for fish passage, with brief notes listed in Table 7. Further discussion of problem sites follows.

Table 7. Fish Passage inspection sites

Site No.	Location	Comments
6	Rifle Ck, M ^c Leans Bridge	Old culvert crossing beside bridge may restrict fish movement post flooding. Could be removed.
7	Devil Devil Ck, Euluma Ck Rd	Bridge in place, no restrictions to fish movement.
8	Devil Devil Ck, Rex Range Rd	Large culverts full width of stream, no restrictions.
9	Bushy Ck, M ^c Dougall Rd	Box culverts full width, but 300mm drop downstream side. Probably OK at low/flood flows. Medium flows needs further investigation.
10	Rocky Ck, M ^c Dougall Rd	Some stream diversion works and rock wall construction could inhibit fish passage in low flows.
11	Rocky Ck, Rex Range Rd	Two pipes under road. Appear OK at present.
12	Hunters Ck, Rex Range Rd	New bridge excellent. Old causeway terrible and may need removing (requires further investigation).

The old culvert crossing at Site 6 is adjacent to the high level bridge. It consists of three pipes covered in concrete and appears to be redundant (Figure 6). During the survey period flows may not have restricted fish movement, however when flow rates increase we suspect that many fish would have trouble negotiating the structure. We suggest that this structure be removed. It would be a relatively simple task with earthmoving equipment and eliminate any potential fish passage issues at this site.

Figure 6. Old culvert crossing, Rifle Ck – M^cLeans Bridge (Site 6).



The Hunter's creek road crossing on Rex Range (Site 12) is another site where a new bridge has been constructed and a redundant causeway crossing left in place. This crossing is approximately 1.5 metres above the downstream river level and during low flows all water diverts through a small pipe (Figure 7). We believe fish would be unable to negotiate this instream structure even during flood flows due to the large drop and turbulence created. Further investigations into the extent of upstream habitat are required before making any recommendations for improving fish passage. The cost of repairing this site may outweigh any benefits gained.

Figure 7. Old causeway, Hunter's Ck – Rex Range Rd (Site 12).



Figure 8. Small rock wall at Rocky Ck, M^cDougall Rd (Site 10).



Site 10 is flooded completely during high flows and may not cause any problems for fish passage at this time. However, to create a pool for pumping water some stream diversion has taken place upstream of the road crossing and a small rock wall approximately 0.7 metres high has been constructed downstream (Figure 8). This would inhibit fish passage during low flows but is likely to burst and/or drown out during flooding. Education of local farmers of potential fish passage problems with such structures and providing them with advice to improve the situation may be the best course of action.

Conclusions

The maintenance of appropriate habitats, fish passage and water quality is essential for healthy fish populations. The survey sites investigated during this short fisheries audit contained generally healthy fish populations and good water quality. The only exception to this was a roadside lagoon which had poor water quality and hence poor fish abundance and diversity.

There are 3 sites where fish passage is impeded at some time throughout the year. We recommend removal of the old culvert crossing on Rifle Ck (M^cLeans Bridge), further investigation of the old highway crossing on Hunters Ck to determine the extent of habitat upstream, and education of local farmers in instances such as the stream works on Rocky Ck (M^cDougall Rd).

We suggest that to ensure the future health of the stream and lagoon systems in the Mitchell River headwaters efforts should be made to maintain good water quality and fish passage. In particular, ensure excess organic matter and silt is not washed into these waterways.

4. Acknowledgments

The authors would like to thank Jeff and Hillary Kuhn and Peter and Sue Pal for their assistance during these fish surveys. Without their invaluable local knowledge of the waterways and backroads we may still have been searching for a suitable place to launch a boat.

5. References

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