Long-term responses of mollusc assemblages to partial harvesting, wildlife habitat strip retention and wildfire

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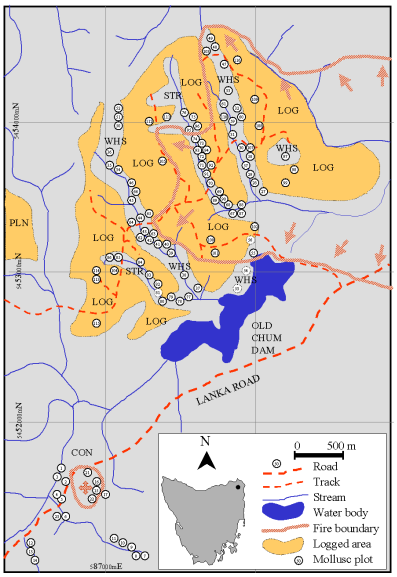
A long-term study site near Pioneer in northeast Tasmania was established in 1989 to allow research on the effectiveness of wildlife habitat strips in maintaining fauna in dry sclerophyll production forests. This poster reports on a 'before-after-control-impact' study of land molluscs.

Methods: Surveys involved hand-searching 114 circular plots (diameter 10 m) located throughout the study area (right). Surveys were first conducted in 1989-90, before any logging had taken place. Comparable surveys were conducted ten years later, following partial harvesting over the period 1990-1993, which had involved the retention of mature forest in wildlife habitat strips (WHS) and streamside reserves (STR) in the partially harvested (logged) forest matrix (LOG). An unharvested mature forest control area (CON) nearby was surveyed on both occasions for comparison. Wildfires burnt a significant proportion of the treatment area in 1991 (after logging), substantially burning 36 plots and lightly burning four others. Another fire burnt part of the control area (containing 4 plots) some time between 1993 and 1998. These fires allow comparison of the effects of fire and logging in isolation and in combination.



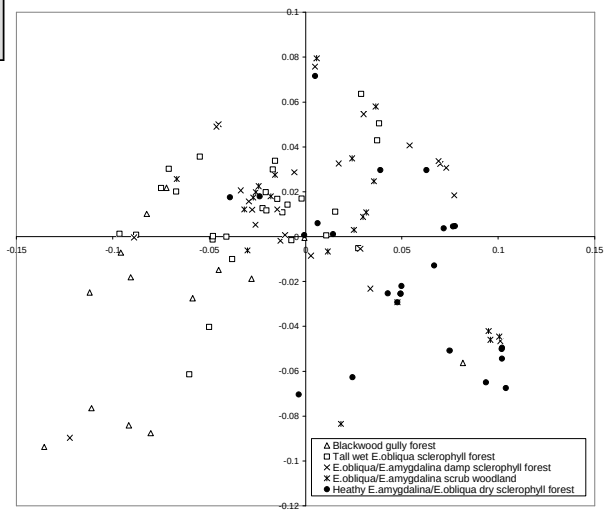
Results - 1: Overall numbers

In total 2390 molluscs, belonging to thirteen species in five families, were recorded alive from these plots over the two surveys (see table below). All twelve species recorded before management intervention were also recorded in the post-logging survey.

Species	Family	1989	1999
Helicarion cuvieri Ferussac, 1821	Helicarionidae	406	353
Cystopelta petterdi Tate, 1881	Cystopeltidae	289	390
Elsothera ricei (Brazier, 1871)	Charopidae	240	210
Pernagera officeri (Legrand, 1871)	Charopidae	114	39
Caryodes dufresnii (Leach, 1815)	Caryodidae	50	90
Prolesophanta sp.	Rhytididae	33	30
Dentherona subrugosa (Legrand, 1871)	Charopidae	32	30
Victaphanta lampra (Reeve, 1854)	Rhytididae	13	38
Roblinella gadensis (Petterd, 1879)	Charopidae	2	16
Thryasona diemenensis (Cox, 1868)	Charopidae	4	3
Paralaoma spp.	Punctidae	2	3
Trocholaoma parvissima (Legrand, 1871)	Punctidae	1	1
Discocharopa mimosa (Petterd, 1879)	Charopidae	0	1

Results - 2: Vegetation effects

The chart (right) arises from a canonical analysis of principal coordinates (CAP) examining the relationship between mollusc assemblage composition and vegetation, derived from 1989 survey data. It shows that different vegetation types in the study area have subtly different mollusc assemblages. Since vegetation type is also partially related to treatment (e.g. streamside reserves tend to support riparian vegetation), it confounds analyses of treatment effects.



Results - 3: Treatment and wildfire effects

All species recorded in the 1989 survey were found in unburnt plots in the 1999 survey, but four of these were completely absent from substantially burnt plots. Total mollusc abundance increased in substantially burnt plots (from 338 to 389), largely accounted for by a threefold increase in *Cystopelta petterdi*.

The table (below) indicates whether or not there was any change in mollusc assemblage composition between the two study periods for different combinations of treatment and wildfire. For unburnt parts of the study area, there were no significant changes except in the control area. For substantially burnt areas, there were no significant changes for wildlife habitat strips or the control, but the logged areas and in streamside reserves changed.

	Unburnt	Substantially burnt
Control	*	
Logged		*
Streamside reserves		*
Wildlife habitat strips		

Results - 4: Key ecological associations

This study enabled the establishment of some key ecological associations and responses for some of the commoner mollusc species recorded. This should facilitate their use in future studies. In the table (below), a '+' signifies a positive association/response; a '-' signifies a negative association/response; and a '0' signifies no apparent association/response.

	Tolerant of heathy/open conditions	Tolerant of humid/closed conditions	Response to burning	Response to logging and fragmentation	Unexplained population change
Cystopelta petterdi	+++	--	+++	++	0
Pernagera officeri	++	-	0	0	--
Helicarion cuvieri	+	+	--	+	0
Elsothera ricei	---	+++	---	--	0
Caryodes dufresnii	0	0	-	+	0
Prolesophanta sp.	-	+	0	0	0
Victaphanta lampra	0	0	-	0	+
Dentherona subrugosa	-	++	0	0	0

Summary: Overall, the mollusc fauna appeared robust to the effects of selective logging and wildfire over the time-scale of this project. Assemblage composition varied most noticeably according to the vegetation community, a pattern that largely persisted despite the logging and wildfire disturbances. The effects of wildfire were easier to detect than those attributable to logging. Streamside reserves appeared more vulnerable to disturbance than wildlife habitat strips, perhaps because their narrower width and dominant vegetation types made them more susceptible to drying out once exposed by logging or wildfire.

Conclusion: These findings point to wildlife habitat strips having a useful function in maintaining local mollusc assemblages in forests exposed to logging and wildfires. Logging-induced and natural effects are likely to be synergistic, but their relative importance may only become apparent over a time scale of decades.