# 5.0 DISCUSSION

## 5.1 Dairy farm management and riparian condition

The sizes, herd numbers and stocking rates of the 30 farms we visited for interviews were typical of dairy farms in Gippsland (Australian Bureau of Statistics 1998) and subsequently our findings are considered to be relevant across the region. Dairy farms in Gippsland are intensive enterprises, and owing to the activities of cattle (Fleischner 1994; Trimble & Mendel 1995) one predictable outcome is degradation of riparian habitats. Farms we visited for farmer interviews were typically small (most <200ha) with stocking rates between 25-73 $DSE.ha^{-1}$. In most cases farmers use all of their properties for pasture production to support their herds. Despite finding that a majority of farmers interviewed had some portion of their riparian areas fenced-off from stock, most paddocks that contained streambank habitat were generally managed in the same way as other paddocks, except when very wet, when farmers removed stock.

Large amounts of waste from dairies and holding areas present a challenge for dairy farmers. While most farmers interviewed had effluent ponds to manage waste, they were not managed with any consistent practice, and some farmers allowed waste to return directly to paddocks. Efficient effluent and fertiliser management is considered critical to sustainable pasture and ecosystem management in dairy regions (Anon. 2001).

An important step in managing the disposal of concentrated waste from dairy operations in a sustainable manner will be the maintenance of riparian strips to minimise transport of nutrients to waterways. The efficacy of soils and riparian strips to intercept phosphorus and other nutrients in the high rainfall, steep country typical of parts of the Gippsland dairy region varies with soil type and other factors. Much of the phosphorus mobilised during high rainfall events is in dissolved form which may not be intercepted by riparian vegetation strips at some sites (Nash & Halliwell 1999, Nash *et al*. 2000) but may be effectively trapped at others (Burkitt *et al.* 2001, Target 10 2002). Adoption of appropriate management strategies for the application of phosphorus fertiliser promoted by extension programs include soil testing and

appropriate timing and siting of application (not near streams prior to predicted high rainfall events) (e.g. Target 10 2002).

What was clear from interviews with dairy farmers was that due to the relatively small size of dairy properties in the region, the trade situation has led to the necessity to maintain high stocking rates. Consequently there is little 'room to move' for farmers wishing to protect their riparian habitats. While many farmers in the region are using fencing to exclude stock from streambank habitats, the most common reason given for fencing was to prevent cattle having access to neighbouring paddocks (i.e. for stock management purposes). Nevertheless, the very active Landcare groups in the region attest to the number of dairy farmers with a motivation for fencing and replanting of riparian habitats to conserve streambanks and associated biodiversity.

It is clear from our data that past and present management of the landscape for dairy farming in south and west Gippsland has resulted in severe degradation of riparian habitats. The severity of degradation was similar in the flat terrain of the Gippsland Plain and hilly terrain of the Strezlecki Ranges. The riparian sites in 'best' condition were in patches of fenced remnant riparian forest. However, even the remnants did not receive maximum condition index scores owing to abundance of weeds, the lack of vegetation complexity and only small amounts of organic debris (relative to reference site conditions).

Riparian sites that had been fenced off and replanted (=planted sites in our results) received relatively low condition index scores. Generally, this reflected the fact that rehabilitation of these sites was recent and most sites only planted canopy-forming species (i.e. no understorey). When we compared planted sites of different ages it was clear that it takes more than 16 years for these planted sites to attain an excellent condition index score.

Riparian sites in paddocks that are used for grazing of herds were generally in very poor condition. Clearing of vegetation to create pastures, past grazing and present intensive grazing practices with high stocking rates have resulted in riparian sites that have little or no overstorey, abundance of exotic pasture grasses and little or no terrestrial litter. There is consequently little or no shading of streams and little input of

terrestrial organic matter to streams, resulting in degraded in-stream habitat structure and food web dynamics (Bunn *et al.* 1999, Robertson *et al.* 1999). There is also little ground cover, coarse woody debris and leaf litter cover on the ground within riparian vegetation thickets, decreasing local biodiversity.

What was clear from the information we collected was that, apart from fencing riparian habitats from the activities of cattle, other recommended management initiatives aimed at reducing the impacts of livestock on riparian zones will not be effective in rehabilitating riparian habitats under the current stocking rates used on Gippsland dairy farms. For instance, different rotations of stock in riparian paddocks and the provision of off-stream watering points (LWRRDC 1996) are often effective in protecting riparian habitats in drier regions where stocking rates are low (Elmore 1992, Jansen & Robertson 2001a, MacLeod 2002). However, for Gippsland dairy farms we found no relationship between stocking rate and the index of riparian condition. Although stocking rate is generally a poor predictor of the activities of livestock on riparian habitats (Robertson 1997), with the small size of paddocks in Gippsland dairy farms cattle are likely to exert similar pressure on all vegetation within the paddock. It is thus not surprising that we observed only a very weak relationship between cowpat counts (our index of cattle activity in the riparian zone) and condition scores. This contrasted to our previous work in beef-grazing country on the floodplain of the Murrumbidgee River in New South Wales, where cowpat counts explained significant proportions of the variation in riparian condition index scores and biodiversity responses in riparian habitats (Jansen & Robertson 2001a,b).

We also found no evidence that the positioning of alternative watering points resulted in better condition index scores for riparian sites. In lower rainfall areas, where mean annual stocking rates were generally <5 DSE.ha$^{-1}$ and paddock sizes are much larger, there is good evidence that the provision of off-stream watering points form part of successful strategies to improve riparian condition (Jansen & Robertson 2001a, Macleod 2002).

Interestingly we found a statistically significant correlation between distances of riparian sites from dairy sheds and riparian condition index score for those sites. Since our condition index was based on structural features that are used as proxy measures

of riparian function (Table 1), it is likely that a cause of such a relationship is proximity to dairy sheds increases the likelihood of physical damage to riparian vegetation by cattle. Gourley and Durling (2002) have reported that soil phosphorus levels increase with proximity to dairy sheds in Gippsland, presumably as a result of dairy cow waste being concentrated in these areas. This indicates both that most soils are efficient traps for phosphorus and that placement of dairy sheds as far as possible from streams will decrease the loss of nutrients to streams as well as physical damage to riparian habitats.

One of the most vexing questions relating to the restoration of river/creek banks is what width of riparian vegetation is required to maintain natural functions of riparian systems. There is no simple answer to such a question, since riparian habitats support a variety of ecosystem functions (Naiman & Decamps 1997). Within regions, variation in each functional attribute can occur with position in catchment, soil type, season and stream flow.

In this study when scores of riparian index condition were plotted against width of riparian vegetation (for 18 sites that had intact remnants of riparian vegetation communities) we found that condition values reached a plateau when vegetation was 30 metres wide on either side of a stream. Thus, it appears that such a width is required in the Gippsland dairy region to obtain an excellent condition score.

## 5.2 Recommendations

We set out to explore relationships between the management of dairy farms and the condition of riparian habitats across Gippsland, and consequently to identify possible best management practices. These would be further investigated at demonstration sites to be established on dairy farms. Our recommendations are not tempered by what might be cost-effective, but rather what would be most beneficial from an ecological point of view.

The following recommendations regarding best practice arise directly from the results of this study.

- Rehabilitation of degraded riparian sites currently subject to direct access by dairy cattle is best achieved by fencing-off riparian areas. Other recommended practices such as the provision of off-stream watering points and 'spelling' of riparian paddocks are not as effective on dairy farms in Gippsland given current stocking rates.
- In order to restore riparian sites to near excellent condition (as measured by our index of riparian condition) fenced riparian strips will need to be at least 30 metres wide on either side of a stream or river.
- When siting new dairy sheds on farms, they should be as far away from streams as possible.