

Profitable farming and healthy streams: progress within the Bog Burn catchment

What we're doing

The Bog Burn Catchment Study is one of five predominantly dairy farming catchments that are being monitored on behalf of the New Zealand dairy industry; the others being in the Waikato (Toenepi), Taranaki (Waiokura), Canterbury (Waikakahi) and West Coast (Inchbonnie).

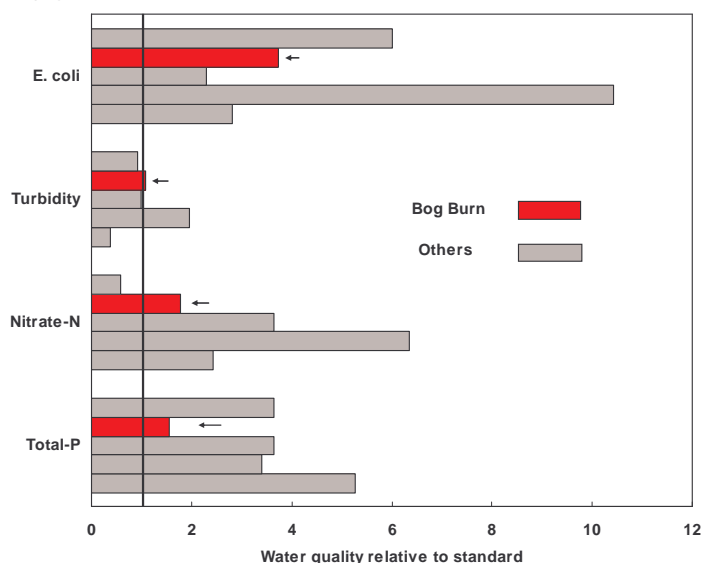
Water quality and flow, farm management practices, and soil quality levels are being monitored over the long-term in each catchment, to benchmark the status of the physical resource. Best Management Practices (BMP's) are being formed by:



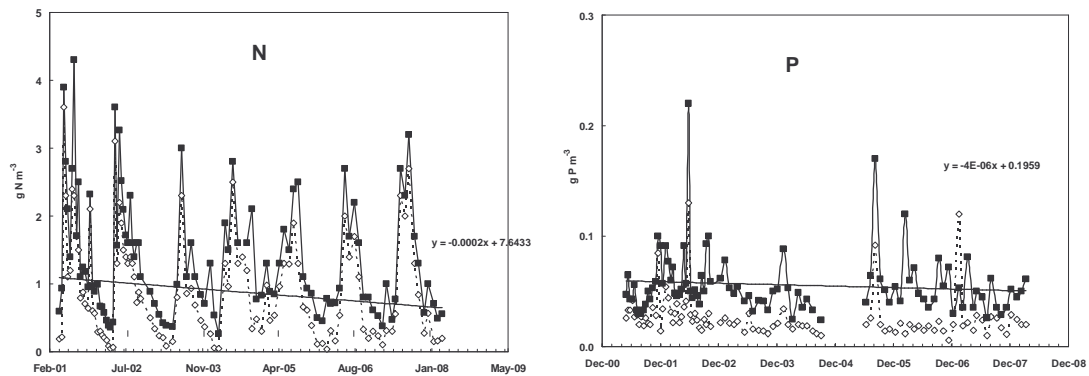
- § Understanding the links between land management activities and water quality,
- § Appreciating the local water quality issues,
- § Determining the most practical ways of achieving a balance between profitable farming and environmental sustainability.

Water quality monitoring and trends

- § Water quality and flow have been monitored since 2001.
- § A key focus is the rapid change in land use to more intensive farming, and that effect on stream quality.
- § Bog Burn is similar to other rural streams with levels of nitrogen (N), phosphorus (P), sediment and faecal matter.



Trends of slightly decreasing N and P, but not *E. coli* or sediment



Performance of a constructed wetland

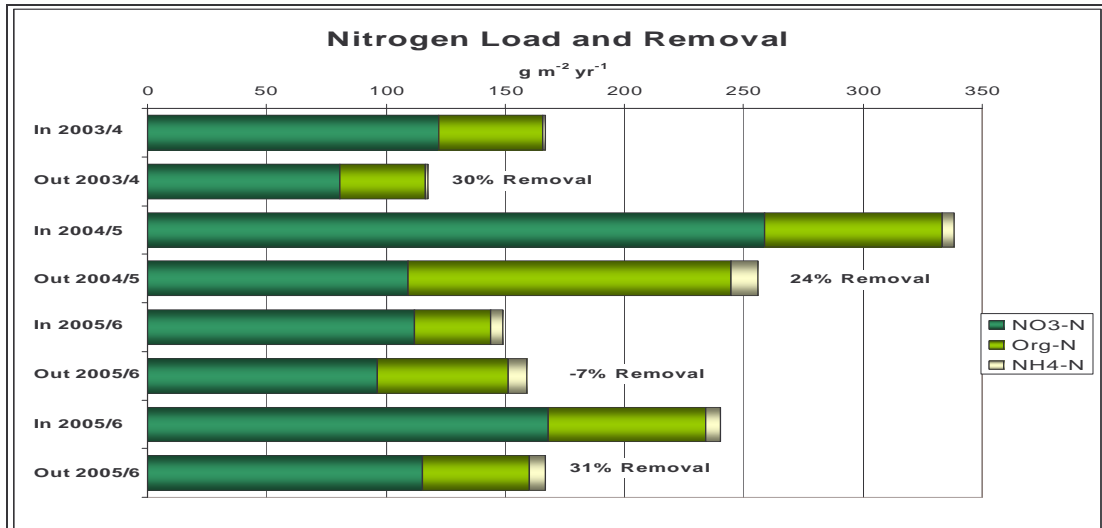
A man-made wetland has been constructed on a dairy farm in the Bog Burn catchment, in a Southland National Dairy Farming Focus catchment. The wetland receives sub-surface drainage water from 1.7 hectare area.

The wetland is a single stage, surface flow wetland cell of 113 square metres, of around 0.75% of the catchment area. Ideal effective wetland size appears to be within 1 to 2.5 percent of the agricultural land being treating. Because the area available was small, and flows from the drainage system were highly pulsed, this wetland has a specially designed inflow arrangement (an HS flume) allowing all flow to $\approx 600 \text{ ml s}^{-1}$ to enter the wetland, but which by-passes it during high flow events.

The wetland is designed to reduce the amount of nitrate in drainage water reaching open drains/streams. The nitrate is microbially converted to N_2 gas, a process called denitrification, to achieve this. Denitrification requires an external energy source, which is supplied through leaf litter. The wetland is therefore planted with the native bulrush, raupo, which drops its leaves in autumn and winter to provide the necessary leaf-litter and denitrification. Straw-bales were added to the wetland at the start of the trial to give an initial leaf litter “boost.”



Bog Burn site, summer 2004, showing early establishment of raupo.



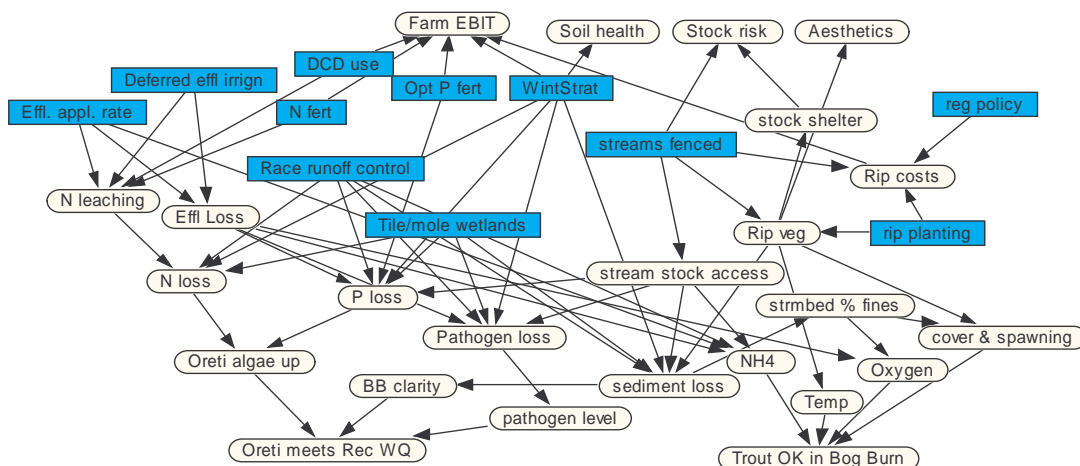
Farm and waterway values

At Bog Burn the key waterway values identified by the stakeholder group (farmers, Environment Southland, DOC, Fish and Game) were trout (spawning and rearing) in Bog Burn itself, along with downstream Oreti River values of fishing, contact recreation, and as water supply for half the population of Southland. Sediment management was identified as a key issue for enhancing Bog Burn fishery, whereas phosphorus and faecal pollution were the key issues for protecting the Oreti values and farm finances (EBIT) was the key farmer value.

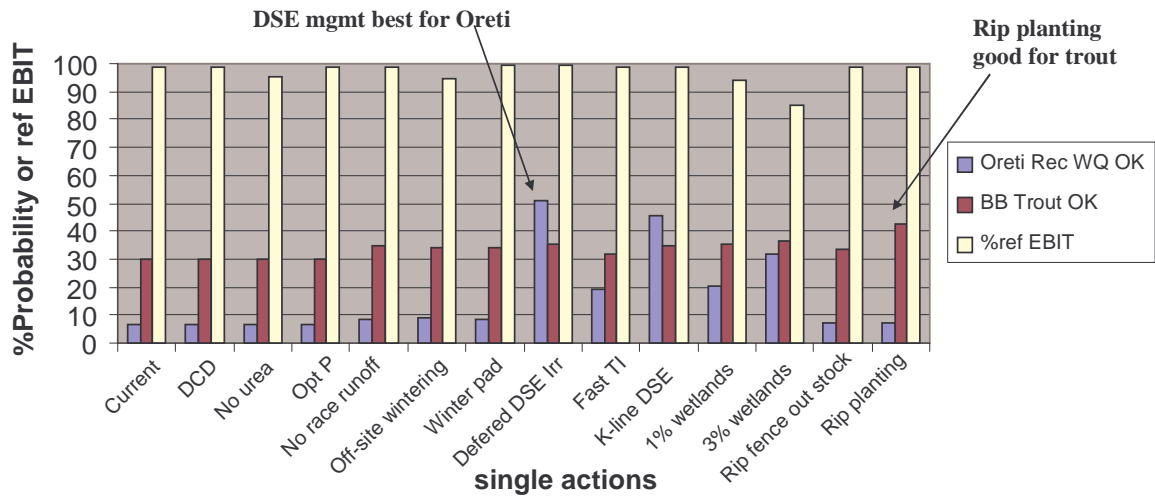
The Bog Burn model evaluates what practices will be effective and their optimal combinations. The model was used to evaluate the effects of management practices, applied singly and in combination scenarios, on farm EBIT and waterway values.

Of the single management actions, deferred effluent irrigation was predicted to have most benefit for the Oreti values, while riparian fencing and planting had most benefit for trout in Bog Burn. Combining practices that reduce farm pollutant losses produced more benefit and cost less than simply focusing on edge of field controls with riparian management and wetland treatment systems for tile drainage. However, combining the best of these practices had added benefits for relatively low cost.

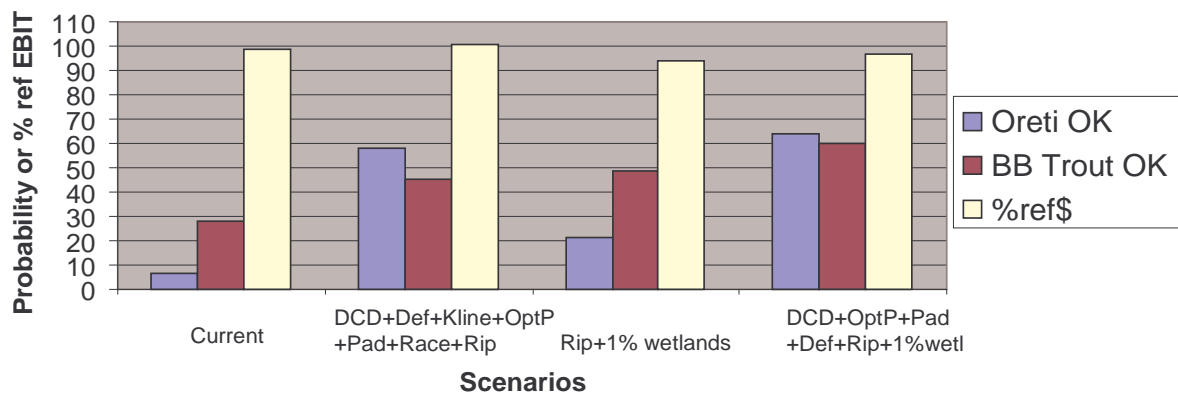
Bog Burn farm-waterway linkage Model



Single management actions: Modelled effects on farm economics, Oreti water quality and Bog Burn trout.



Combined management actions: Modelled effects on farm economics, Oreti water quality and Bog Burn trout.



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