Role of Fish in Remediation of Nutrient Rich Irrigation Water in the Burdekin Region – Project Update

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Progress

Pilot Trial.

A pilot-scale trial was conducted on Burdekin Shire Council land at Groper Creek in simulated irrigation lagoons (10 000l tanks with flow-through water sourced from local irrigation channels). The tanks were equipped with artificial substrate to simulate real lagoon conditions.

The trial found that :

- naturally occurring aquatic weeds (mostly filamentous algae) removed more than 50% of nitrogen and phosphorous from incoming source water.
- Without fish, aquatic weed growth was prolific through the water column and on the water surface, with self-shading death and re-release of nutrients inevitable.
- With fish, growth of the weed was restricted to artificial substrates in the tanks, and there was no surface or bottom fouling.

On-ground Trial.

Aims :

1. Assess the efficacy of native fish in controlling fibrous macrophytes (absent from the pilot)
2. Assess occurrence of phytoplankton bloom caused by reduction of weeds.
3. Assess the ability of fish to prevent weed re-establishment and over-colonisation after manual removal. Funding was through the Burdekin Rangelands Reef Initiative.

An artificial barrier was placed mid-way along the channel chosen for the trial to allow a 175 m stretch to be screened to stop fish escaping. The adjoining upstream stretch served as the control site (i.e. no fish). In June 2002, the channel was mechanically harvested to remove weeds, and 500 mullet were released into the screened section.

Water quality was monitored weekly at start and end points of the trial site. The impact of mullet on the channel habitat was assessed by mapping weed regrowth in both the ‘Fish’ stretch and the Control stretch.

Progressive Results Summary:

- After 12 weeks, coverage of hyacinth was significantly less in the Fish site Hyacinth covered 0.7% of the surface of the Fish site and 7 % of the Control site – a ten-fold difference. Whether this can be truly attributed to mullet alone cannot be validated at this point without further replication of the trial.
- no phytoplankton bloom was witnessed. Cabomba, Hydrilla and especially the Curled Pondweed became successors.
- Mullet appeared to have no impact on these plants
- Curled Pondweed poses a more serious threat to routine farm operations than floating weeds as it restricts water flow through the channels. In addition, leaf fragments regularly clogged screens at the trial site causing management problem with the experiment. As such, the current trial was terminated.

Discussion/Continuing Work:

- A broad-based approach to channel weed control is needed.
- Potential control methods include tertiary municipal wastewater treatment, revegetation of channel riparian zones, and developing best-practice cane fertilizing regimes. Mechanical weed harvesting also has merit for removing nutrients.
- Inclusion of a greater range of predator species (eg. herbivorous fish and freshwater invertebrates such as filter-feeding mussels) to target all available food types may counteract the domination of single weed species as seen in the trials. This however is dependant on finding predator species that are native to the region so as to overcome stocking and translocation restrictions.

RECHARGE PIT TRIAL

A concurrent on-ground trial was funded by the South Burdekin Water Board to evaluate the role of fish in maintaining recharge efficiency in a selected ground water recharge pit. The concept was for the fish to graze on aquatic weeds on the substrate of the pit and keep particles locally suspended, thereby aiding water penetration. Approximately 1000 mullet were stocked into the recharge pit at Home Hill in June 2002.

Results.

Groundwater recharging was maintained for four months before efficiency was reduced due to clogging of the substrate. When the pit was drained, benthic samples were analysed. The cause of the clogging was not aquatic weed as previously encountered; rather it was a fine silt layer approximately 5 mm in thickness. This trial was not replicated due to the large numbers of mullet required for stocking the pit at an appropriate density, so the role of mullet in limiting pit algae growth cannot be validated at this time. However, the SBWB report that the recharge capacity of the pit was extended by one month over previous years. Further validation of the use of finfish in groundwater recharge pits is planned.