DEVELOPMENT OF INDUSTRIAL-SCALE INLAND SALINE AQUACULTURE (ISA): COORDINATION & COMMUNICATION OF R&D IN AUSTRALIA

DESCRIPTION OF FACILITIES AND R&D ACTIVITIES

FACILITY: Inland Saline Aquaculture Research Centre, Wakool, NSW.

CONTACT OFFICER: Dr Geoff Allan, NSW Fisheries, Port Stephens Fisheries Centre, Private Bag 1, Nelson Bay, NSW 2315. 0249163909 PH; 0249821107 FAX.
allang@fisheries.nsw.gov.au

Description of facility:
In May 2002, NSW Fisheries opened the Inland Saline Aquaculture Research Centre (ISARC) adjacent to the Wakool/Tullakool Sub-Surface Drainage Scheme that is the largest groundwater interception and evaporation scheme in Australia. The ISARC is approximately 30 km from Wakool, NSW. This project has been co-funded by the owners and operators of the Drainage Scheme, Murray Irrigation Limited (MIL). The NSW Department of State and Regional Development and Murray Land and Water Management Plan have also invested in the project.

The ISARC includes:

1. five, 500 m^2 plastic-lined earthen ponds,
2. one, 600 m^2 plastic-lined reservoir pond (all ponds are netted to fully protected them from bird predation),
3. temperature-controlled bioassay system with 54, 60L tanks,
4. 16, 500L polyethylene tanks,
5. 3, 2000L polyethylene tanks
6. saline water supply (from either a low salinity basin [5-20 ppt] or a high salinity basin [>35 ppt])
7. freshwater storage dam
8. office-laboratory.

Ownership and approvals:
MIL own the land and permanent infrastructure. All necessary approvals to conduct research at ISARC have or will be obtained by NSW Fisheries (includes permits to transfer animals for farming experiments and animal care and ethics approvals).

Purpose of facility:
The major purpose of the project run at this facility is to determine if a number of marine or salt-tolerant freshwater species can be cultured 'economically' in inland areas and if groundwater interception and evaporation schemes are suitable for aquaculture.

Summary of progress:
In the two years since research at the new ISARC commenced, survival and growth trials have been conducted with silver perch (a salt-tolerant, native freshwater fish), mulloway (an estuarine fish), black tiger prawns (a marine prawn tolerant of a wide range of salt concentrations) and rainbow trout. Silver perch survive and grow in water of salinity at or below 10 mg/L without potassium adjustment, trout grow at salinities up to those equivalent to full strength sea water and provided potassium is added for mulloway and prawns, survival and growth in tanks is similar to that in water with salinity adjusted using ocean salts.

Trout survival and growth over the period April to November was excellent and equivalent to that recorded in freshwater raceway systems. A pilot-scale production trial (aiming for up to 5 t; equivalent to 20t/ha) is planned for the winter of 2004. A pilot-scale prawn production trial (aiming for approximately 300kg/0.05 ha pond; equivalent to 6 t/ha) is nearing completion. This trial includes a comparison between ambient ponds and one passively heated using a greenhouse-type cover. Overall results for ambient pond are unsatisfactory – high survival, low growth. However, growth in covered ponds is excellent.

There are still key technical issues that need to be addressed before inland saline aquaculture technology can be transferred to the private sector. Temperature management for prawn culture and marketing and economics for trout need to be investigated. Occasional mortality of fish (silver perch, mulloway and snapper but not prawns) has been recorded in ponds, even where potassium has been adjusted. This may be due to unusual pond sediments or other ecological processes within the ponds not experienced in coastal ponds. The solutions are likely to be simple but require focused experimental research. The composition and taste of fish and prawns grown is inland saline water needs to be confirmed and economic modeling is needed to ensure that any ventures can stand-alone financially.

Estimated potential for aquaculture industry growth:
Should the R&D described above be successful, there is enormous potential for establishment of large-scale industrial aquaculture in the Murray Darling Basin and other saline affected areas in Australia. Coastal and inshore systems in Australia are limited or inaccessible and industry development in these areas will be slow. In contrast, 2.6×10^6 ha of land in Australia is affected by salinity and there are 11 groundwater interception schemes operating in the Murray Darling Basin alone (total pond surface area of these schemes exceeds 6,300 ha, they cost more than $108 million to construct and $3 million annually to operate and dispose of more than 50,000 million litres of water/yr). Another 8 schemes are being constructed or operated with many more likely on the future. 74 rural towns in WA, NSW, Vic and SA are threatened by rising saline groundwater and groundwater interception schemes and evaporation ponds are probably the only viable engineering solution to that problem.

Provided the water is 'suitable, and all preliminary studies' suggests it is, incorporating aquaculture ponds into these evaporation schemes will not only provide an economic return to the extremely costly business of building and operating groundwater interruption schemes and evaporation ponds but greatly reduce costs of establishing aquaculture ponds.

Commitment to ongoing R&D:

NSW Fisheries and Murray Irrigation Limited are committed to R&D at ISARC on inland saline aquaculture. NSW Fisheries have secured a grant from the Australian Centre for International Agricultural Research (ACIAR) to conduct collaborative research with the The Central Institute for Fisheries Education at the Rohtak Centre, India. This project is poised to start as soon as the agreement is signed by the Indian Government and is for a three-year period (2004-2007).

Plan for demonstration activities for 2004-2007:

1. Two Open days. Target 100 people for each day. Local and state advertising. Talks, displays, tour.
2. Two training workshops (one on trout production and one on prawn and research methodology).

3. Production of technical production (culture) manual – focus on acclimation, fortification of potassium and "unique" aspects of ISA culture (will collaborate with WA on trout and Qld on prawns if possible)
4. 2 Scientific manuscripts/yr (2004 will be on mulloway and silver perch; 2005 will be on trout and prawns; 2006 will be on economics & marketing)
5. Non-technical articles (at least 2 project)
6. Organise ISA session and present at AA04
7. Present at AA06
8. Coordinate data and inputs to generic ISA economic analyses and business planning models
9. Provide information for web site (update to NAC communications officer every 3 months)
10. Facilitate commercialization (partnership) of industrial scale ISA (with MIL), firstly on trout and later on other species (eg prawns if economic analysis looks favourable)