HATCHERY QUALITY ASSURANCE PROGRAM

for

MURRAY COD, GOLDEN PERCH

and

SILVER PERCH

Stuart J. Rowland

and

Patrick Tully

Murray cod

Maccullochella peelii peelii

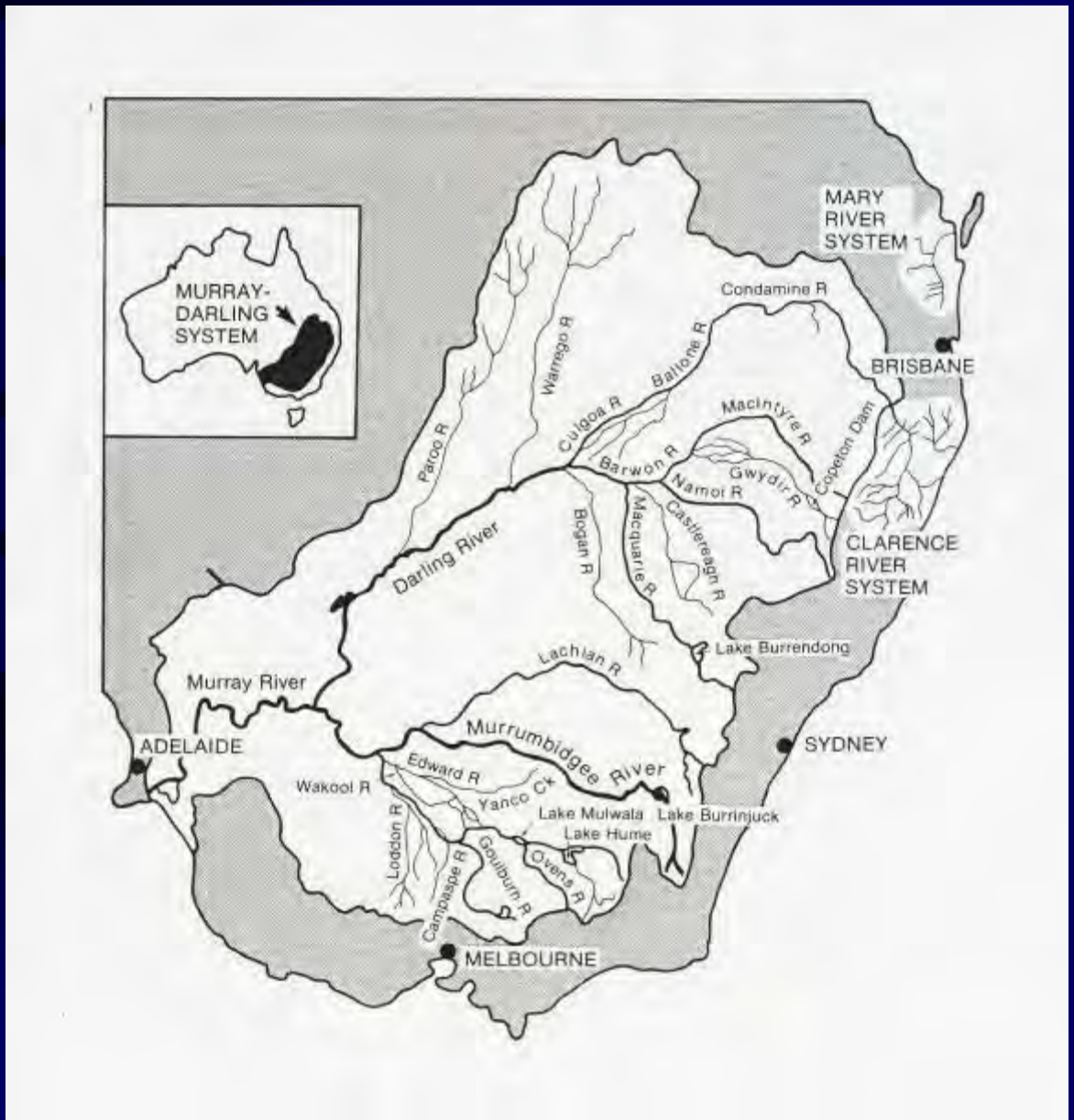
Golden perch

Macquaria ambigua

Silver perch

Bidyanus bidyanus

Murray-Darling River System



Conservation status

- Silver perch "Vulnerable"
  - International Union for Conservation of Nature and Natural Resources (IUCN)
  - Australian Society for Fish Biology
  - NSW Fisheries (Fisheries Scientific Committee)
  - South Australia "Protected"
  - Victoria "Critically endangered"
- Murray cod "Vulnerable"
  - Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
  - Victoria

Development of hatchery techniques

- 1971 - research commenced IFRS
- 1978 - Victorian Fisheries - MC
- 1982 - techniques developed

  large-scale production MC, GP, SP
- 1983 - First Freshwater Aquaculture Workshop, Narrandera
- 1982/83 - commercial industry

Inland Fisheries Research Station - 1980

(now the Narrandera Fisheries Centre)

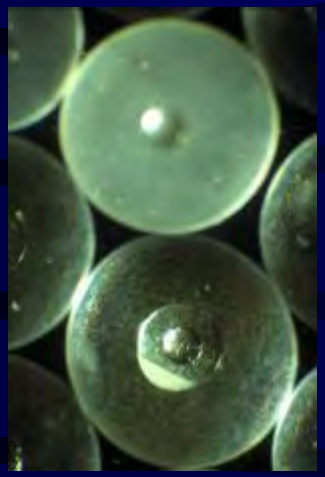
Hatchery techniques

- Broodfish - wild, farm dams, fish farms
- Induced spawning - MC, GP, SP
- Natural spawning - MC
- Larval rearing in earthen ponds
- Harvest fry/fingerlings
- Stocking and sale

Collecting broodfish from the wild

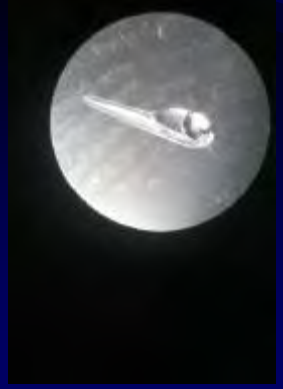
Injecting HCG to induce spawning

Golden perch



Fertilised and unfertilised eggs

Larva about to hatch



Hatched larva

Larval rearing pond

Dry winter and early spring

Filled and fertilised 10 - 14 days before larvae stocked

Harvesting, counting, stocking fingerlings

Hatchery production

- NFC ~ 2 million MC, TC, GP, SP
- GAC ~ 500,000 SP

- Commercial NSW 2 - 4 million
  Qld, others 2 - 4 million
- Total 5 - 10 million

Stocking

- Recreational fisheries - stock enhancement
- Conservation
- Aquaculture - commercial grow-out
- Farm dams

Concerns

- NSW Fisheries
- QDPI, other states
- Native Fish Strategy - MDBC
- Translocation & Stocking Workshop
  - Canberra , September 2002
  - World Wildlife Fund, MDBC

Major concerns

- Genetics
- Diseases
- Trash fish (non-target fish)
- Quality (size, condition, health, weaned, graded)

Genetics of MC, GP, SP

- Closely related species and sub-species
  - in other drainages
- Populations in M-D
  - differ genetically and biologically
  - natural selection and adaptation
- Low levels of genetic variation
  - in the wild
  - in hatcheries

- **Genetic diversity is raw material for evolution**

Genetics

- Hatcheries
  - minimum no. broodfish
- Broodfish
  - most from farm dams, other hatcheries
- Few parents
  - siblings
  - low variation
  - inbreeding
- Hybrids
  - SP X Welch's grunter

Genetics - NEED TO:

- Maintain GENETIC INTEGRITY
- Maximise GENETIC VARIATION
- Minimise DOMESTICATION

Diseases

- Pathogens on translocated fish
  - world-wide problem
- Introductions to wild and farms
  - white spot, *Chilodonella* to Australian
- Reports of diseased native fish ex hatcheries
  - ectoparasites
  - EUS
  - tail and fin rot

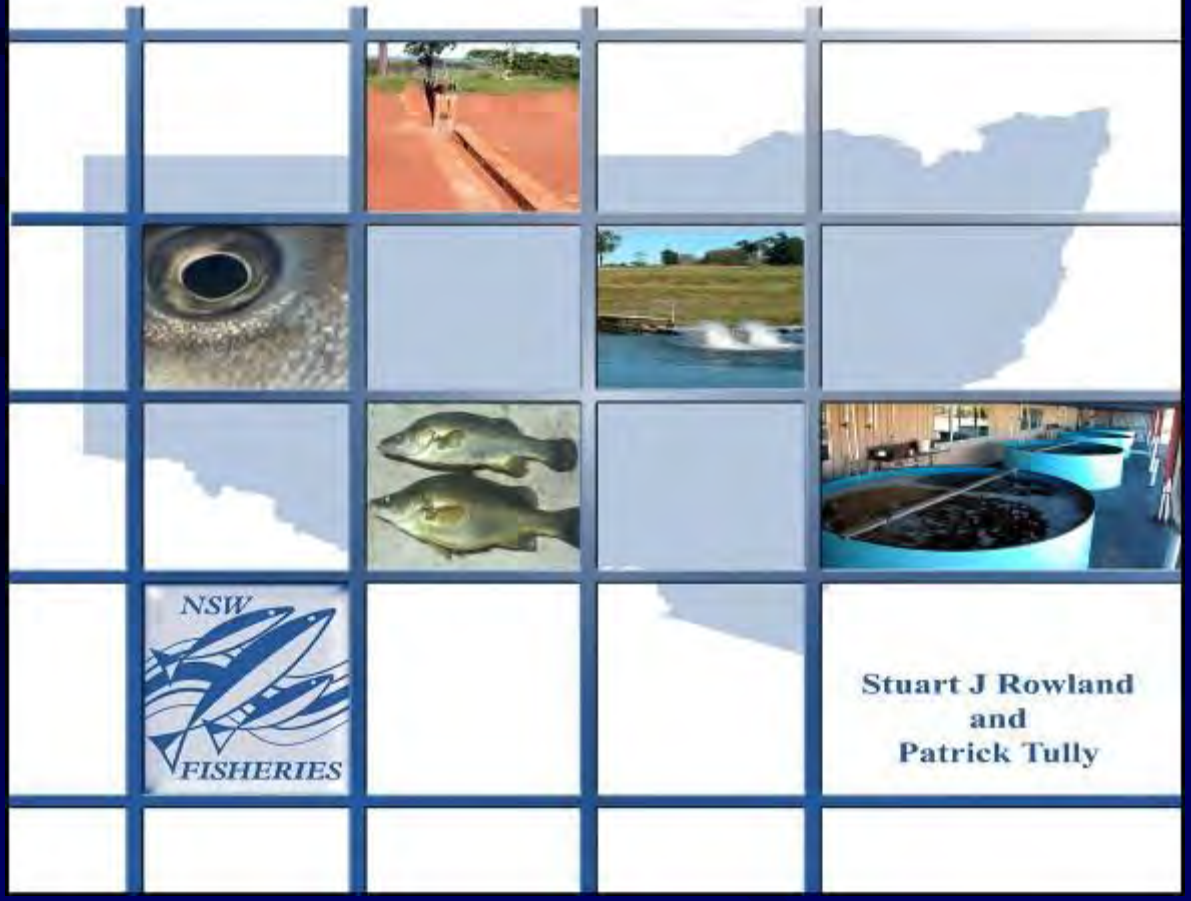
Translocation of "trash" fish

- Fish farms implicated - CARP
- Trash fish on farms
  - ex water supply; eels, gudgeons, carp, Gambusia
- Trash fish in consignments
  - up to 4 species; SP in GP; GP in SP
- Banded grunter
  - NT and NQ; now S-E Qld and Clarence R. NSW
  - in batches of SP ex Qld hatcheries

HATCHERY QUALITY ASSURANCE PROGRAM

for

MURRAY COD (*Maccullochella peelii peelii*)
GOLDEN PERCH (*Macquaria ambigua*)
and
SILVER PERCH (*Bidyanus bidyanus*)



Stuart J Rowland
and
Patrick Tully

HQAP - Chapters

- Site Selection
- Design and Operation
- Water Quality
- Disease and Health Management
- Chemicals and Drugs
- Broodstock and Population Genetics
- Breeding Programs
- Translocation and Stocking

HQAP

- Describes key features of hatchery
- *Essential Criteria*
- Accreditation and auditing
- Production and sale of MC, GP, SP
  - stock enhancement, conservation
  - commercial grow-out

Earthen Ponds: *Essential Criteria*

- Drainable by gravity
- Separate inlet and outlet
- Screens
- Harvest sump
- Records
- Sufficient ponds for species and breeding programs

Hatchery Building: *Essential Criteria*

- Filtration of water
- Spawning tanks
- Quarantine tanks
- Incubation tanks
- Screens on all tanks
- Aeration
- Office
- Support building(s) and workshop

Diagnosis of Disease: *Essential Criteria*

- Laboratory
  - closed room, bench, sink, lighting, water
- Microscope
  - high power x40 to x400
- References
- Data sheets
- Dissecting equipment
  - scalpels, scissors, slides

Dispatch of Fish: *Essential Criteria*

- Quarantine all fish for 24 h+ after harvest

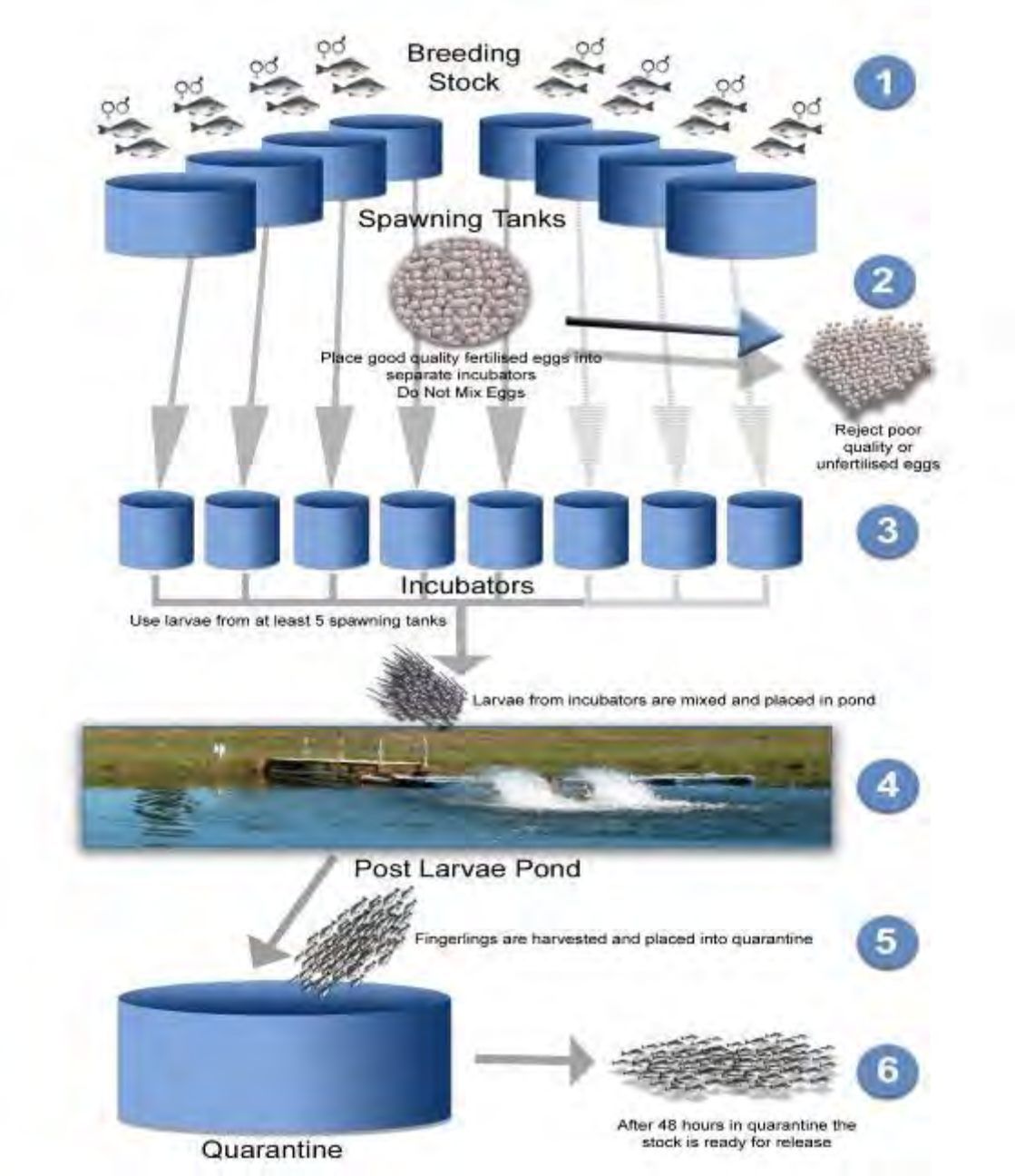
- Chemical treatment in quarantine
  - 2.5 g/L NaCl; 10 g/L NaCl + 50 mg/L formalin

- Examine 5 fish, 24 h prior to dispatch
  - parasites on gill and skin tissue
  - abnormalities; moribund or emaciated fish removed
  - Dispatch Statement

Broodstock: *Essential Criteria*

- At least 10 pairs MC and GP
  - from each river/population to maintain integrity and variation
- Do not use fish from farm dams
  - unknown origin, genetics, parentage, age
- Records
- Tag all broodstock
- Hold fish from each river separately
  - separate pond, cage, tank
- Replace GP and SP after 4 - 5 years

Breeding Program



HQAP

- Guidelines for Best Practice
- Basis for Accreditation and Auditing
- Benefits
  - CONSERVATION
  - RECREATIONAL FISHERIES
  - POPULATIONS of NATIVE FISH
  - COMMERCIAL AQUACULTURE

HQAP – status

- Fish Stocking Fisheries Management Strategy (FMS)
- Hatcheries contacted/visited
  - 2006
- Hatchery Accreditation Scheme
  - accreditation
  - auditing
  - in place 2008

BENEFITS of the HQAP