

Impacts of Native Fish Stocking on Fish within the Murray-Darling Basin



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Native Fish Stocking

Important management tool

- augment fisheries
- conservation/restoration

environmental & ecological risks

extinctions

genetic changes

homogenisation

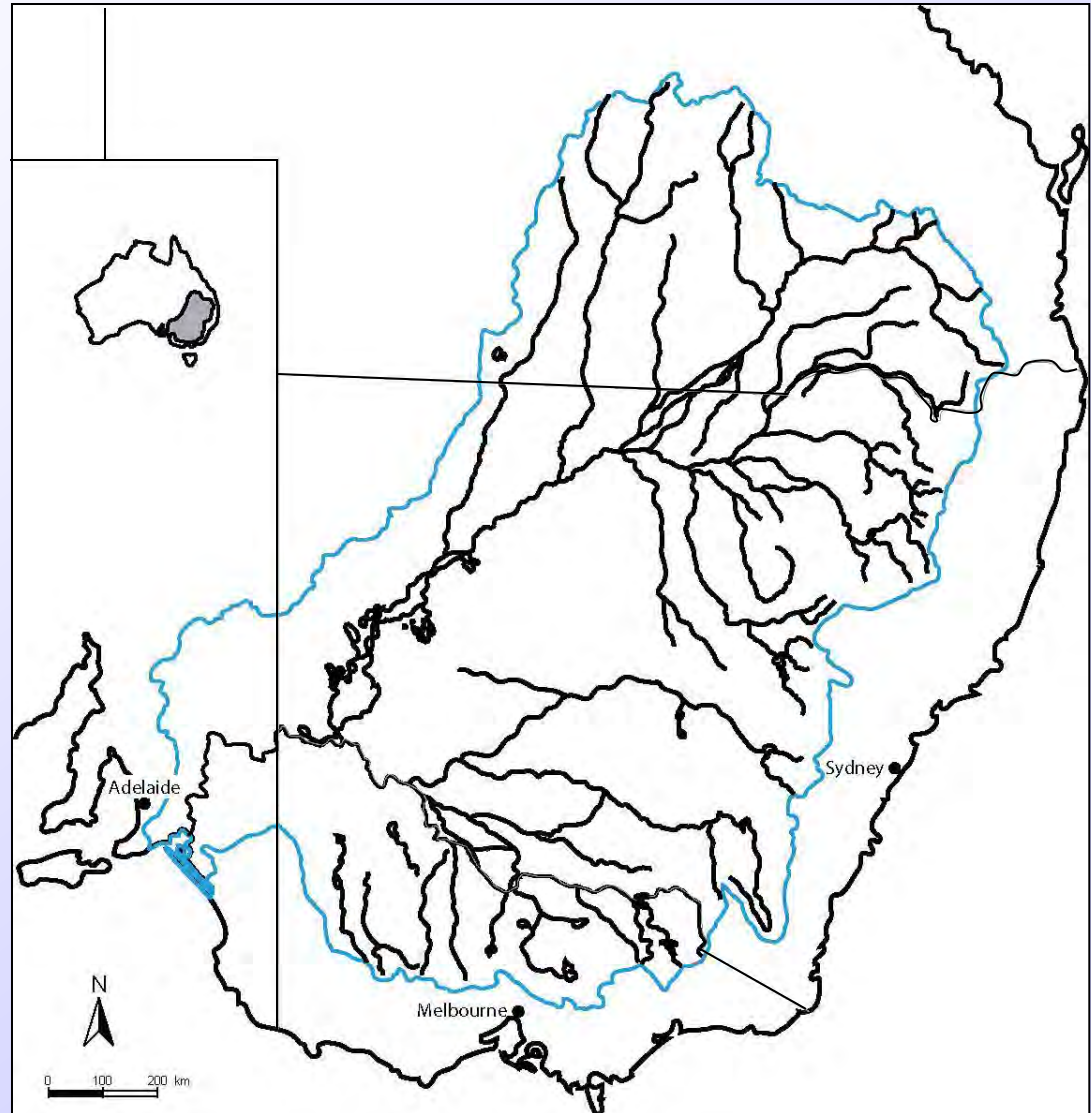


Native fish populations in the MDB

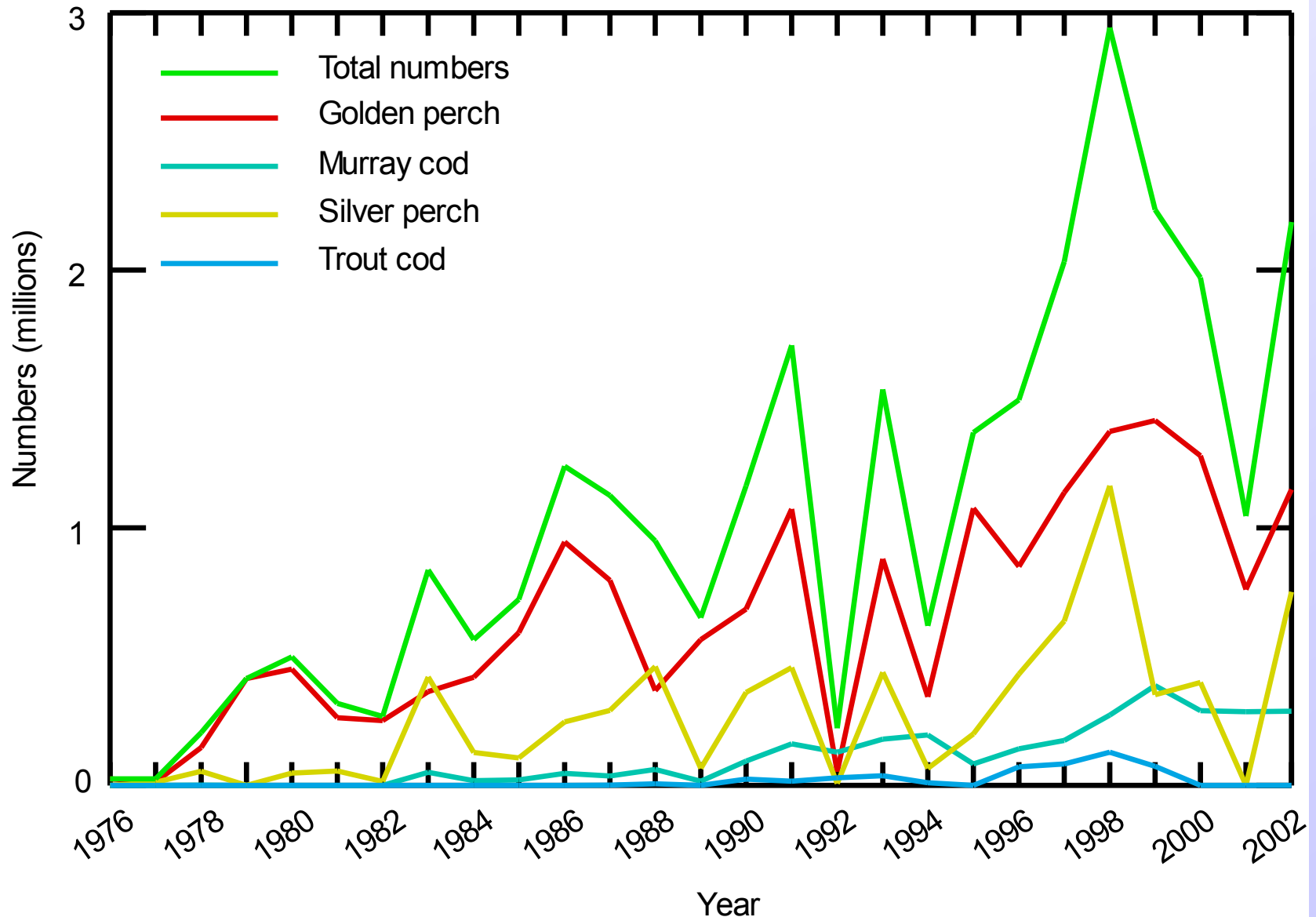
**~10% pre-European
settlement levels**

**threatened and
endangered species**

**extirpation of some
species**



Native fish stocking in the MDB



Objective

Literature Review:

- Stocking programs
- Potential impacts
- Likely effects in MDB

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Potential Impacts of Stocking

Key mechanisms

- 1. Abundance and behavioural effects**
- 2. Genetic effects**
- 3. Introduction of disease and pathogens**
- 4. Ecosystem level effects**

Abundance & Behavioural Effects

Competition

Direct

Indirect

food resources

habitat

behavioural changes

range expansion

displacement

Predation

Incidental capture

Abundance & Behavioural Effects

Risk to MDB

No studies in MDB

Difficult to predict

- **species and habitat dependent**
- **fish density and resource abundance**

Recommendations

Carrying capacity of system

Experiments to test competition



Genetic Effects

Direct

hybridisation

introgression

outbreeding depression

Indirect

predation

competition

disease

Hatchery

selection/domestication

genetic drift

stock transfers

Genetic Effects

Risk to MDB

Species dependent

Past hatchery practices

- **already have altered genetic composition of some fish in MBD**

Genetic structuring within MDB

- **loss of locally adapted populations**
- **high risk to smaller, less mobile species**

Genetic Effects

Recommendations

Improved hatchery management

- Hatchery Quality Assurance Program (NSW DPI)

Baseline genetic surveys

- Evolutionary Significant and Management Units

Monitoring stocked populations



Disease & Pathogens

Integral part of any natural system

Stockings and translocations increase risk of introduction

Little known about historic distribution and past impacts

- **not well documented**

examples:

***Myxobolus cerebralis* (whirling disease) – trout**

ENHV* in MDB (native species susceptible)

*Epizootic Haematopoietic Necrosis Virus

Disease & Pathogens

Risk to MDB

Always a risk

Extent and severity difficult to predict

- species specific
- host specificity
- population status (e.g. drought stressed)

Once introduced – impossible to eliminate

Disease & Pathogens

Recommendations

Good hatchery and stocking practices (certification)

- **Hatchery Quality Assurance Program (NSW DPI)**

Difficult to measure impacts in the wild

- **long-term monitoring**



Ecosystem Effects

Difficult to demonstrate

- typically introduced species

- **Exceed carrying capacity**
- **Trophic cascades/ecosystem shifts**
- **Extirpation or extinction**

Ecosystem Effects

Risk to MDB

Difficult to predict

High if lose critical species

Recommendations

Stocking programs need to be considered within an ecosystem context

Evaluation of risks and benefits

Conclusions

Impacts difficult to measure and predict

Short-term benefits (i.e. increased abundance)

Long-term negative impacts

Responsible approach to stocking

- **view in ecosystem context**
- **alternative options (e.g. habitat restoration)**
- **monitor and experiment with stockings (i.e. adaptive management)**

Acknowledgements

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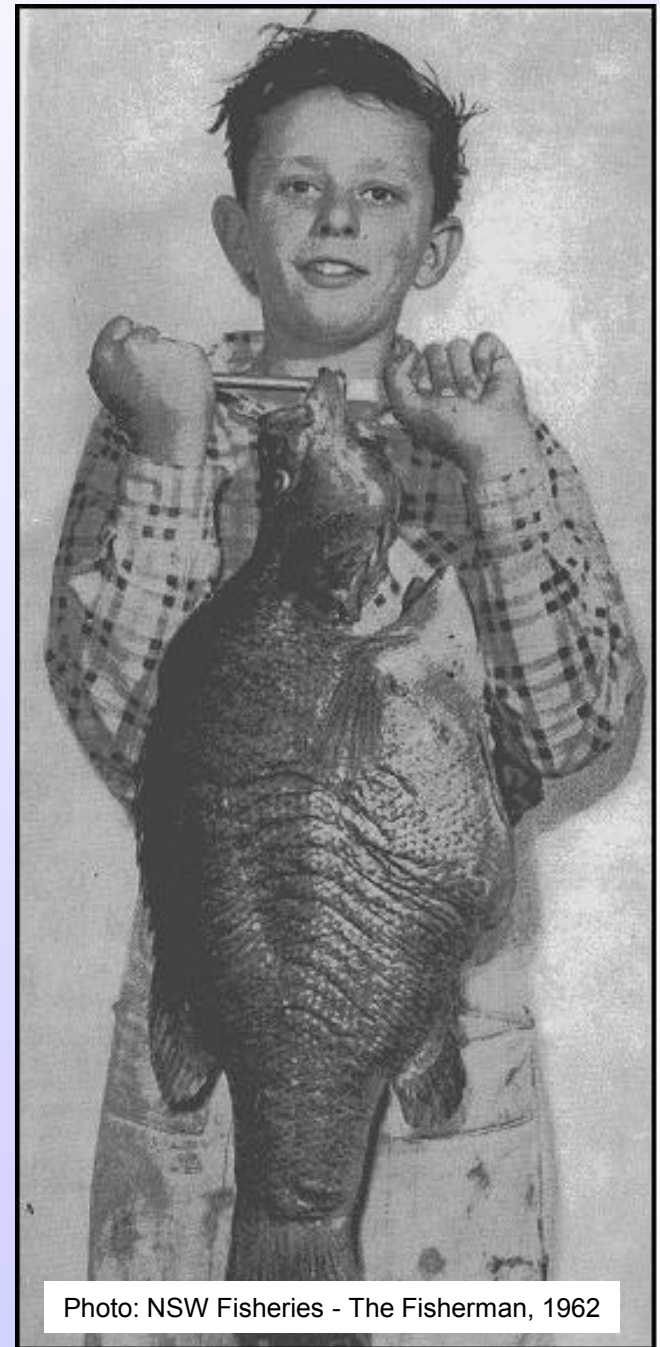


Photo: NSW Fisheries - The Fisherman, 1962