MDB – Murray Darling Basin
What do fish need?

• Food
• Habitat
• Breed
• Movement (connectivity

FLOW VARIABILITY
Food

Floodplain carbon drives productivity

PRODUCTIVITY

DRY

WET
Habitat(s)
Movement

CONNECTIVITY
Breeding

eggs → larvae → juveniles → adolescent → recruitment → adults

Breeding cycle in fish.
Golden perch – Movement AND Breeding

Sharpe 2008
Used to be heaps...

Ongoing decline
Why?

Capture/storage
Water quality
Habitat loss
Barriers
Pests
Flow regulation
Extraction
Exploitation
For perspective...

1 mm = 1 year
1 m = 1000 years
1 km = 1 Million years

65 Km

30 km

~ 60-80 meters

~ 25 cm

~ 5 m

~ 2 m
- Less flow variability
- More frequent and longer dry periods
• Less flow variability
• More frequent and longer dry periods
Less variability – reduced food frequency

Lock 1, Blanchetown (1886 – 1973)

Smaller & less frequent flooding
Weir pools

- Remaining lotic habitats
- Lock 11 (Mildura)
- Lock 15 (Euston)
- Lock 26 (Torrumberry)
- Hume Dam

Elevation (m)

Distance from the sea (km)
Weirs and dams = altered habitat

A) Natural

Elevation

B) Regulated by Weir

HYDRAULICS

Courtesy of Mallen-Cooper and Zampatti
Less flooding
BLACKWATER

Bacteria ↑ Oxygen ↓
HYPOXIA
• Less flow variability
• More frequent and longer dry periods
Thermal stratification

- **Blue Green Algal Bloom**
  - Algal flourish in warm and still conditions, particularly in the absence of high flow

- **Surface Water Layer**
  - Warm, high nutrient load from run off
  - Dissolved oxygen by day, depletion overnight
  - Limited fish habitat

- **Deep Water Layer**
  - Cooler, low light penetration, low dissolved oxygen (hypoxia), Poor fish habitat

- **Decomposition of organic matter**
  - Depletes dissolved oxygen

- **Warm Water**
  - Limited dissolved oxygen

- **Cool Water**
  - Low dissolved oxygen
De-stratification ("Turn over")

- Sudden weather events or small increases in flow
  Can mix the warmer surface water and cooler deep water – essentially breaking down the temperature stratification

- These changes can mix the warmer surface water with cooler deep water.
  Algal blooms may also be disrupted, potentially increasing decomposition (and further depleting oxygen).
  This means even at the surface dissolved oxygen levels can become critical, killing fish.
Fish kills
What can we do?

- Refined operational delivery of water
- Environmental water

Components like a “natural flow regime”
Flows for fish

- Base flow
  - Movement
  - Nesting
  - Baby food
- Large fresh
  - Movement
  - Spawning
  - Nesting
- Small fresh
  - Movement
- Overbank
- Bankfull

Water quality

Refuge

July

June
Complementary measures: