Native Fish, Flow and Water Quality
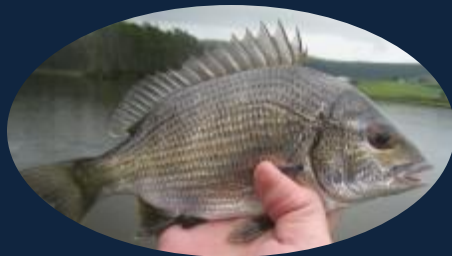
Iain Ellis - NSW Fisheries

NSW GOVERNMENT | Department of Primary Industries

MDB – Murray Darling Basin

What do fish need?

- Food
- Habitat
- Breed
- Movement (connectivity

FLOW VARIABILITY

Food

DRY

WET

PRODUCTIVITY
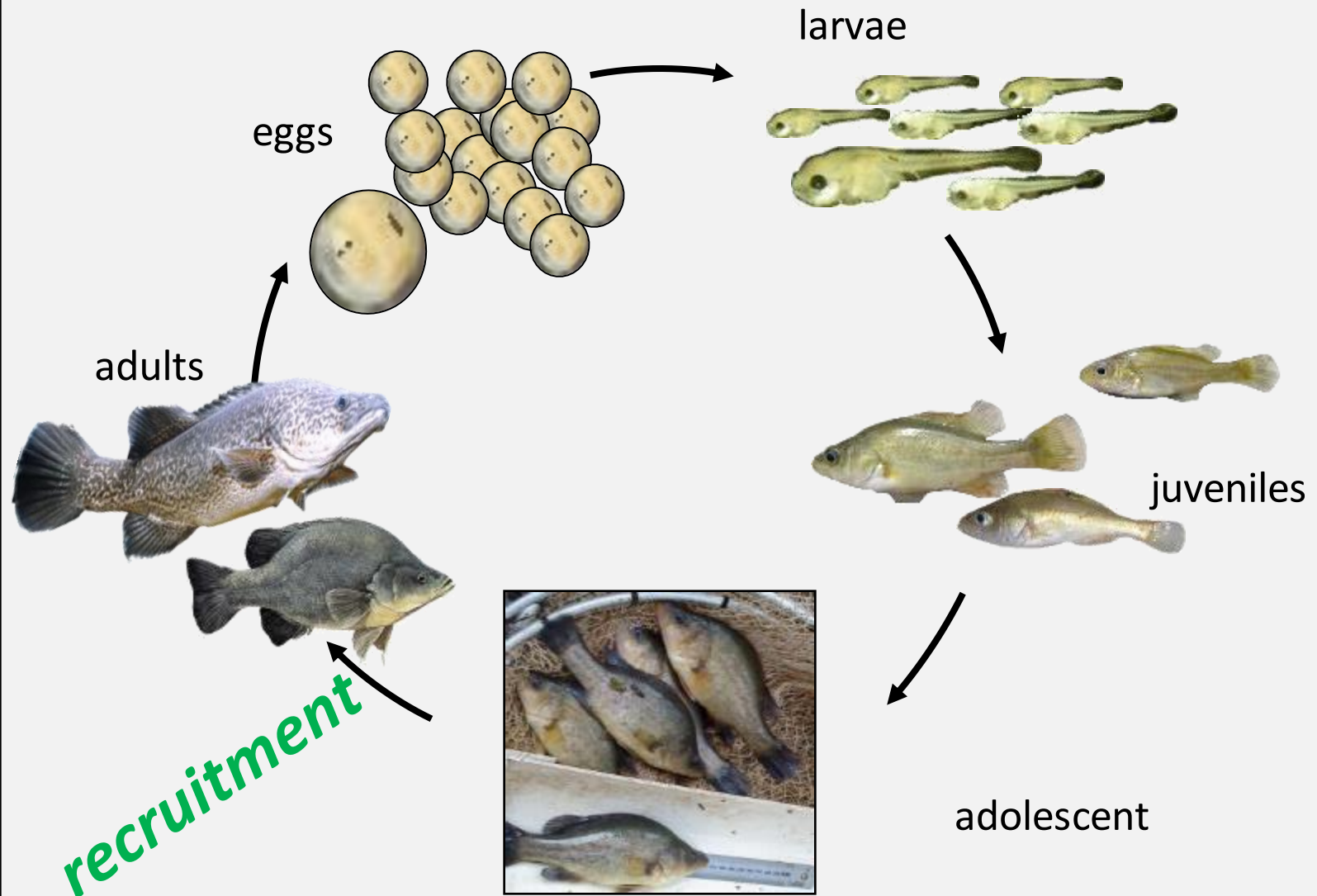
Habitat(s)

Murray cod

Murray hardyhead

Southern pygmy perch

Movement
CONNECTIVITY

Breeding

eggs

larvae

adults

juveniles

recruitment

adolescent

Golden perch – Movement AND Breeding

Sharpe 2008

Used to be heaps...

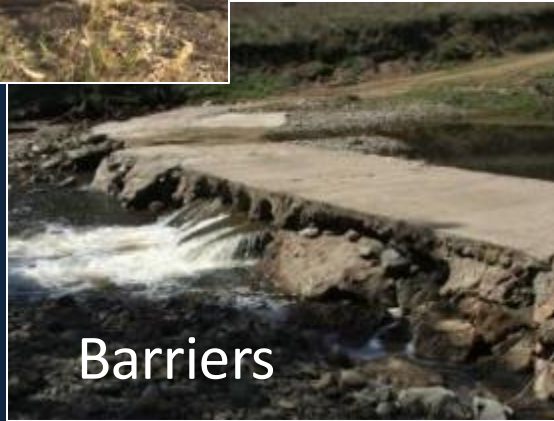## Ongoing decline

Why?

Water quality

Capture/storage

Flow regulation

Habitat loss

Barriers

Pests

Exploitation

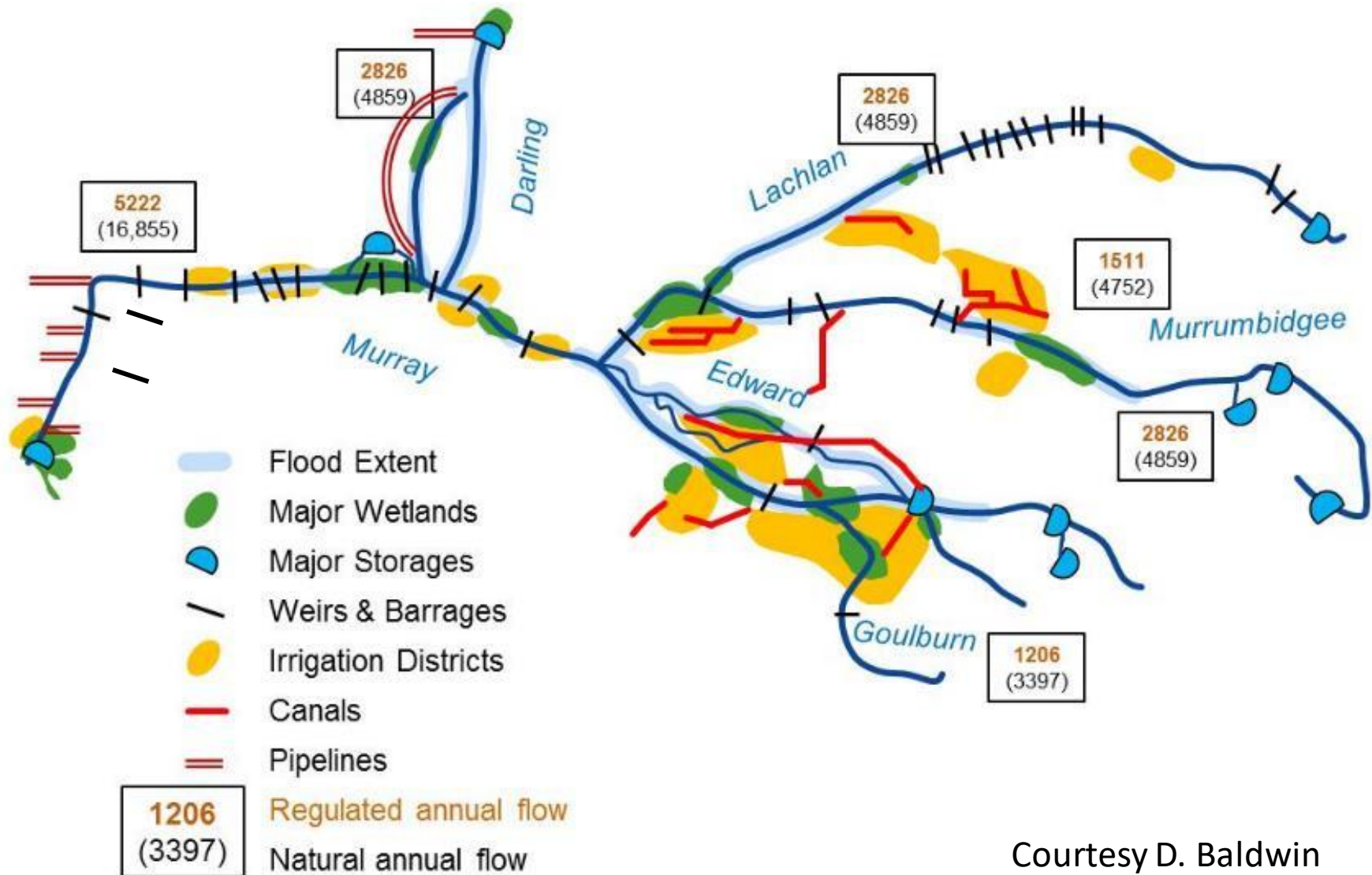Extraction

Altered Southern Basin
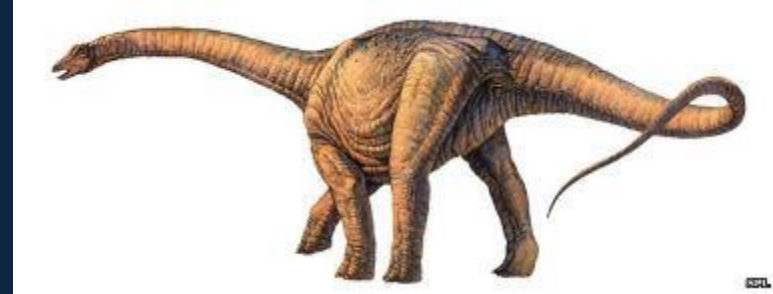## Dams, Weirs, Extraction

Courtesy D. Baldwin

For perspective…

1 mm = 1 year

1 m = 1000 years

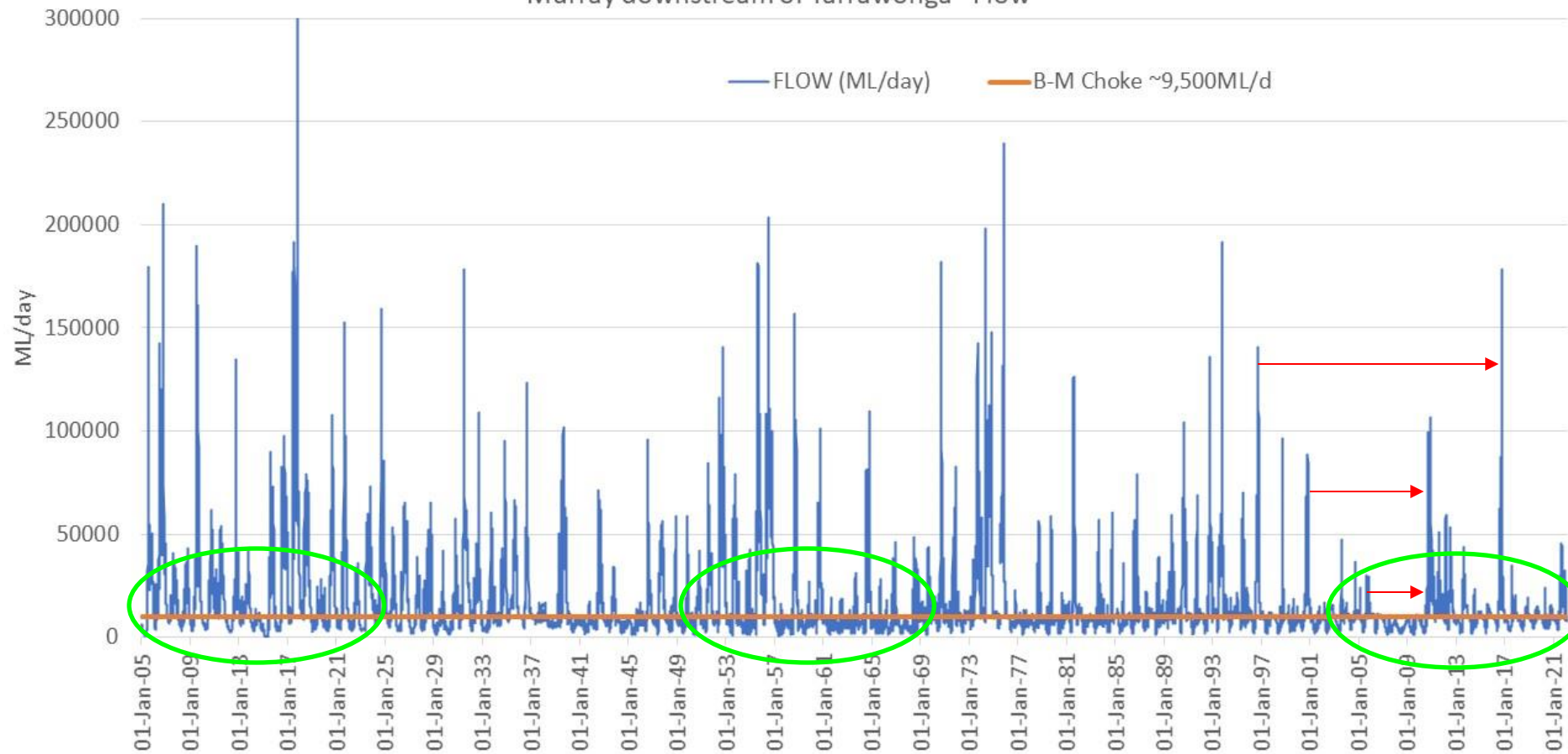1 km = 1 Million years
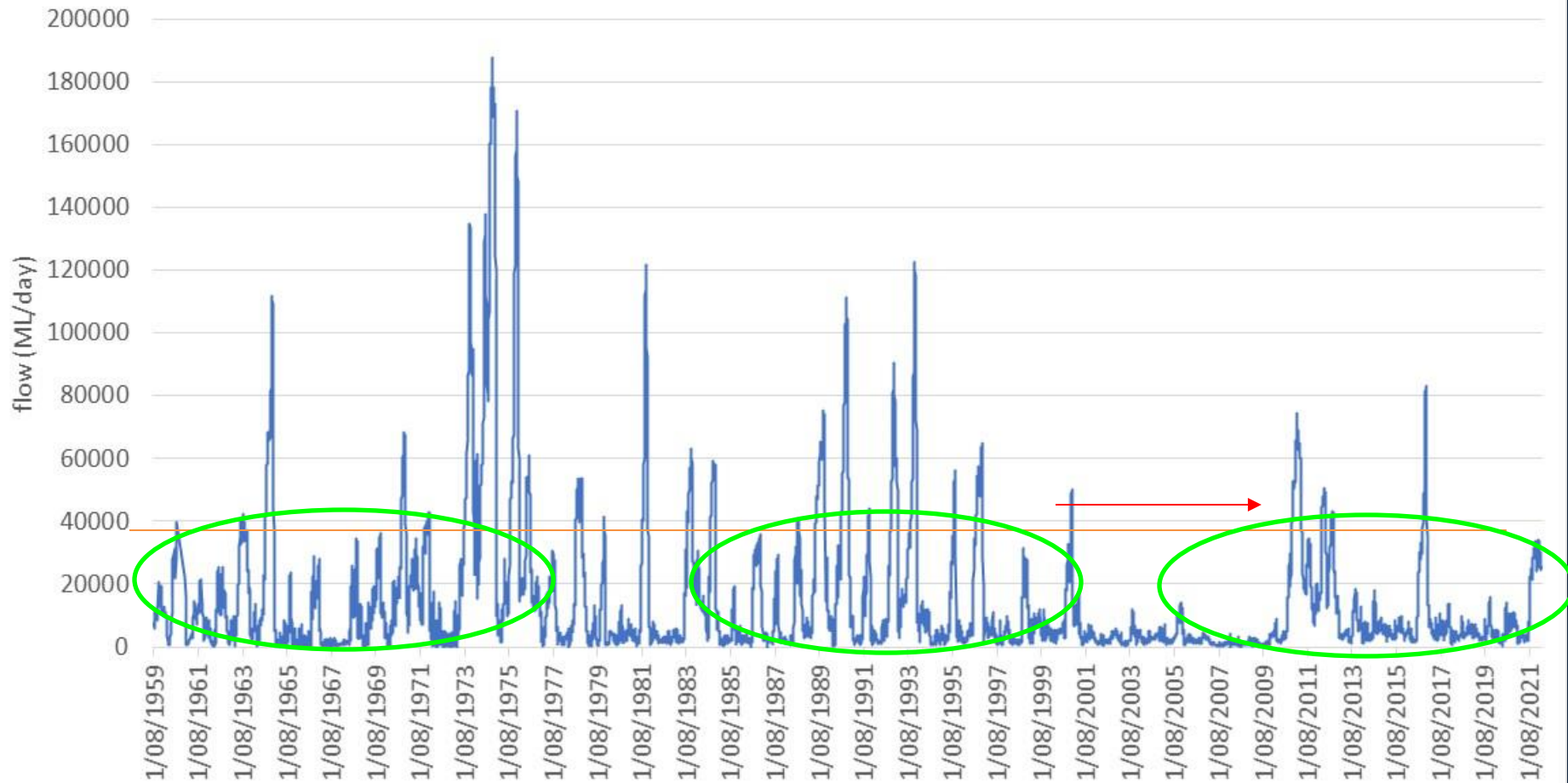
65 Km

30 km

~ 60-80 meters

~ 5 m

~ 2 m

~ 25 cm

Murray downstream of Yarrawonga - Flow

- Less flow variability
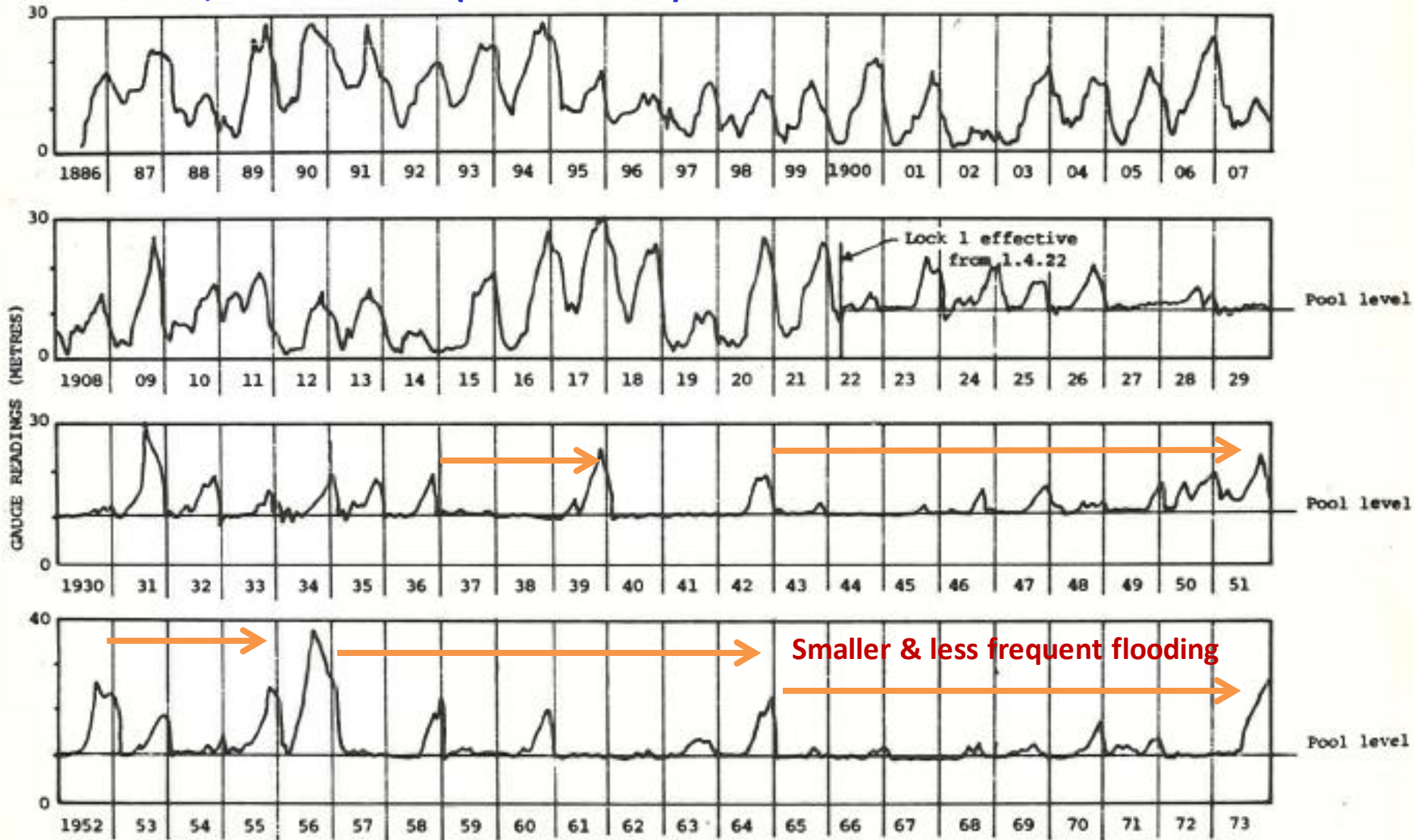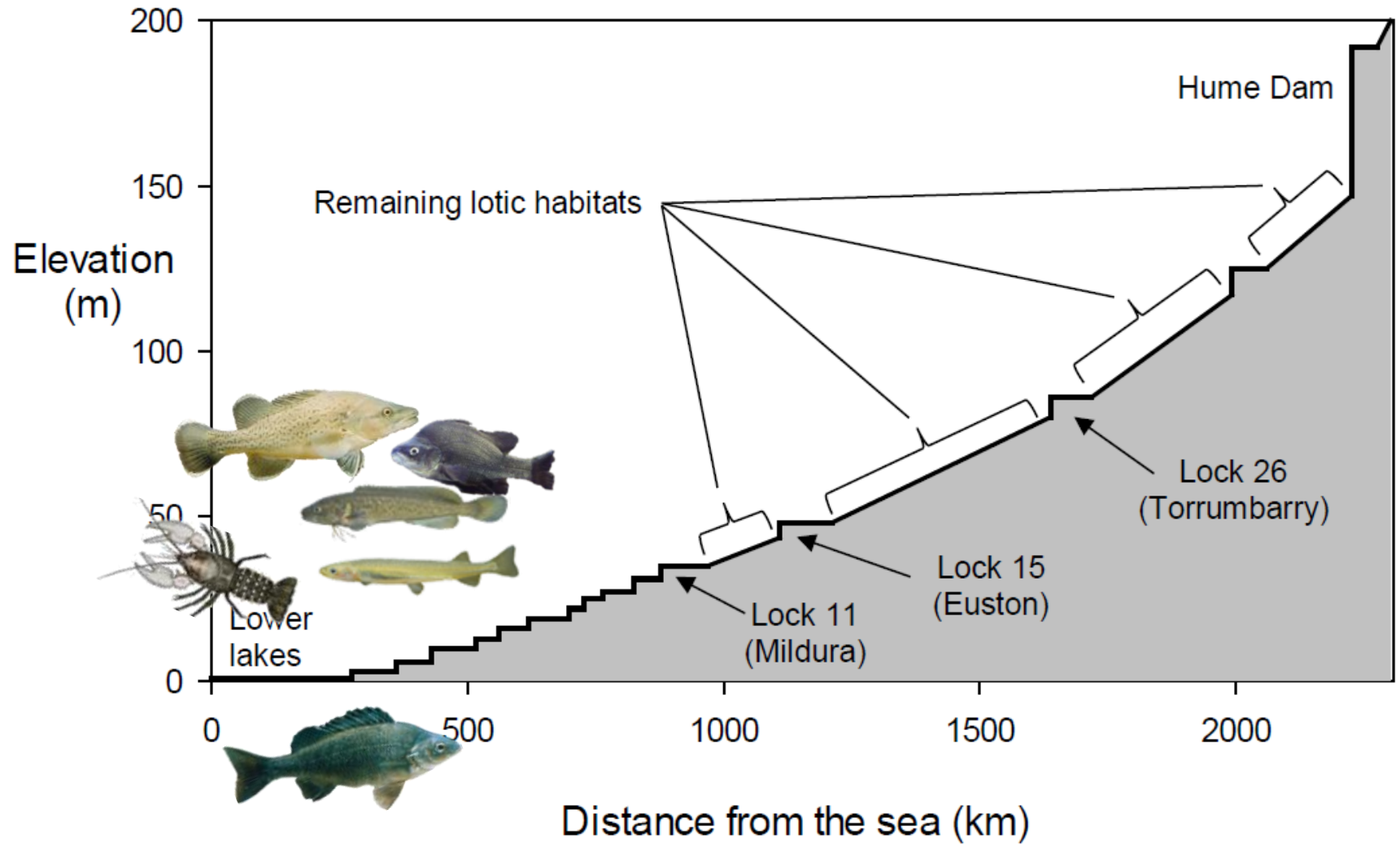- More frequent and longer dry periods

- 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

Weirs and dams = altered habitat

A) Natural

Elevation
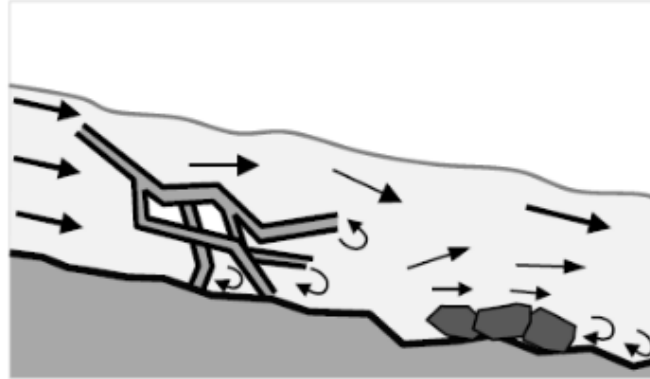
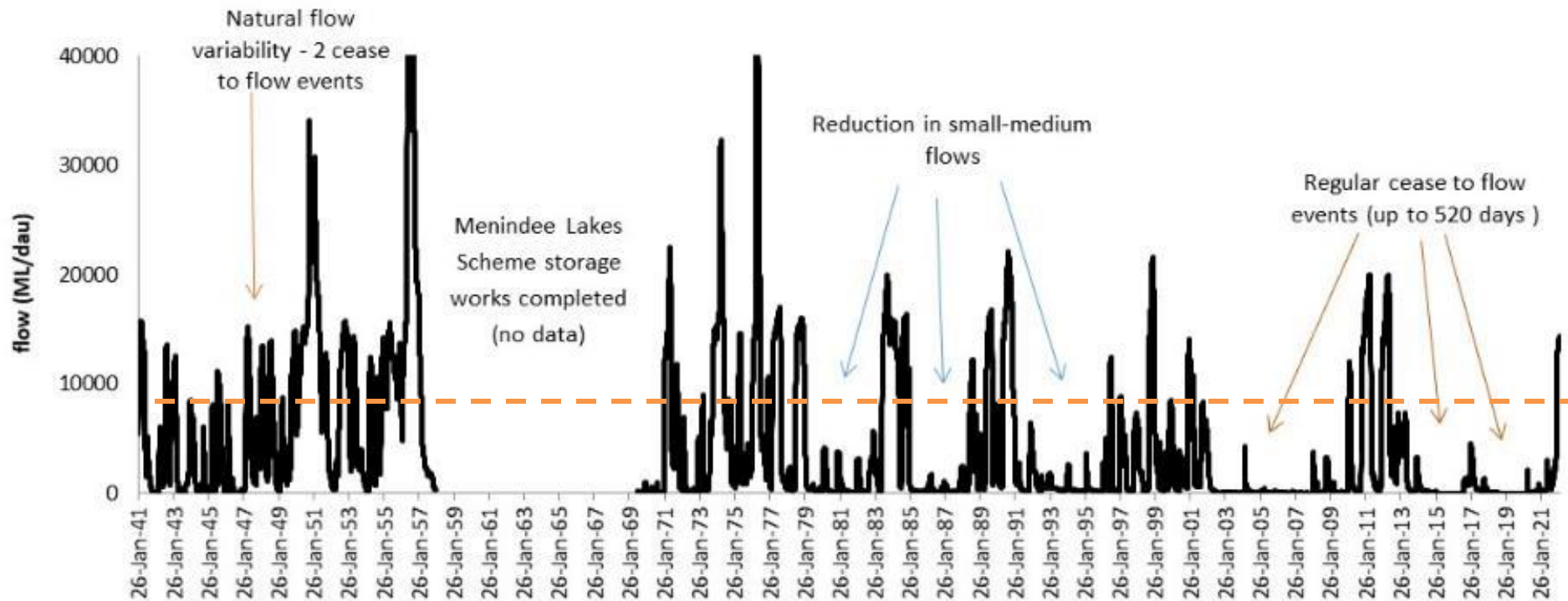B) Regulated by Weir

HYDRAULICS

Courtesy of Mallen-Cooper and Zampatti
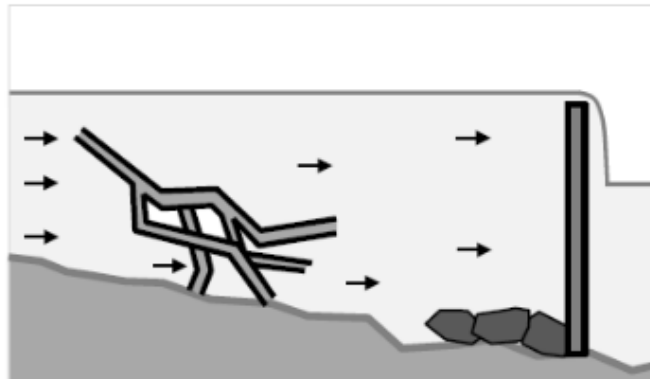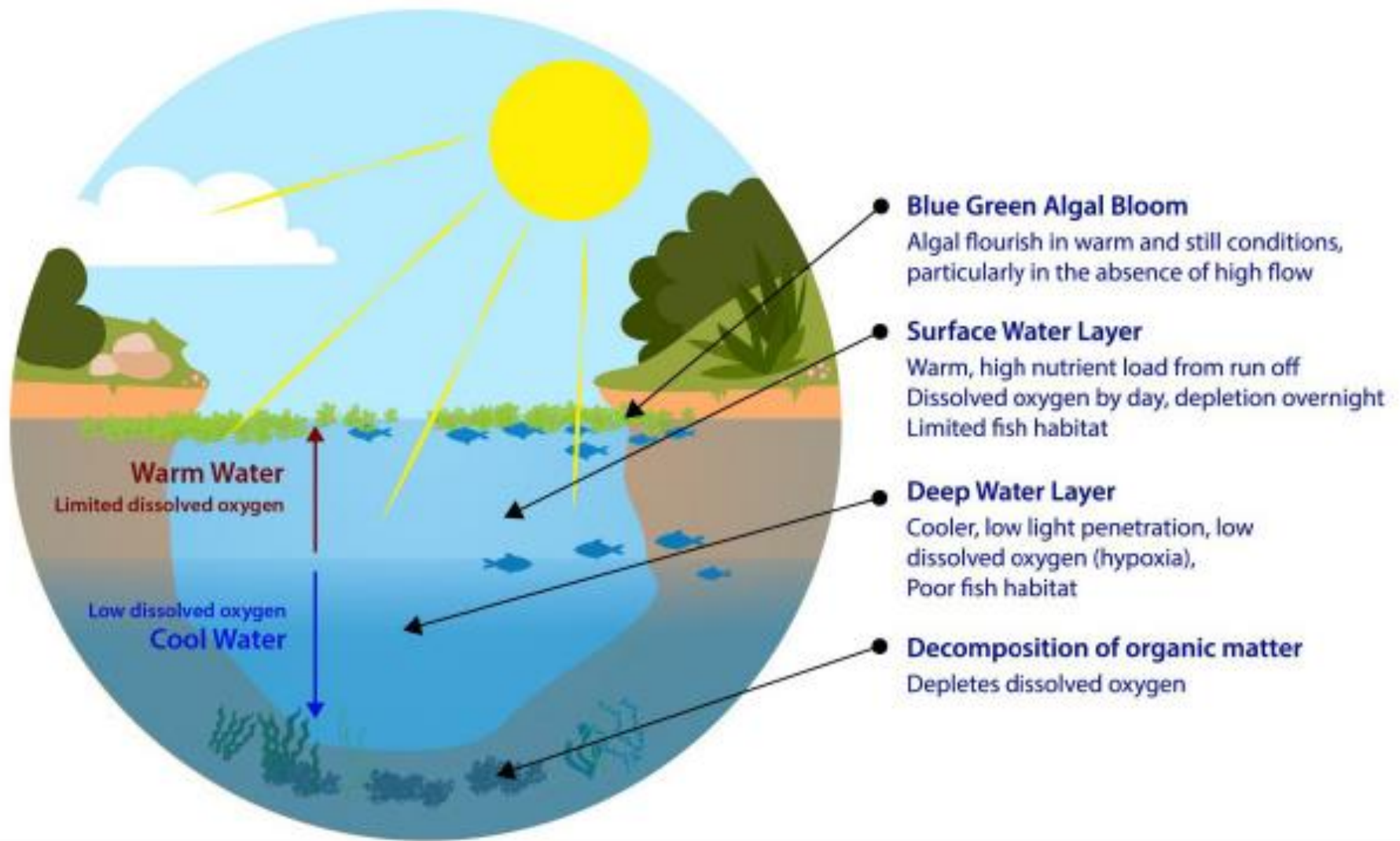
Less flooding BLACKWATER

Bacteria ↑ Oxygen↓
HYPOXIA

Lower Darling River Discharge flows at Burtundy

- 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

Low dissolved oxygen
Cool Water

De-stratification ("Turn over")
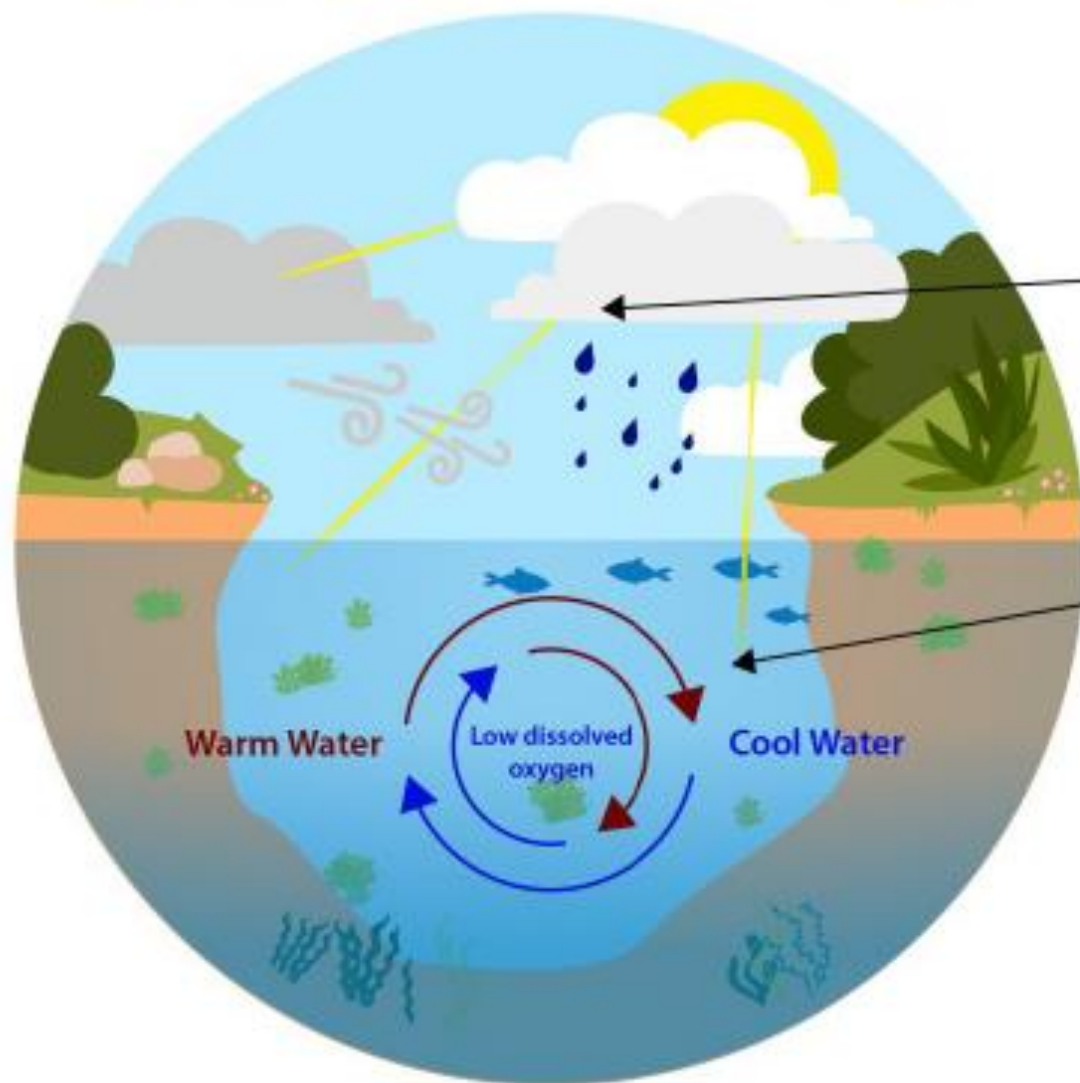
Sudden weather events or small increases in flow

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).

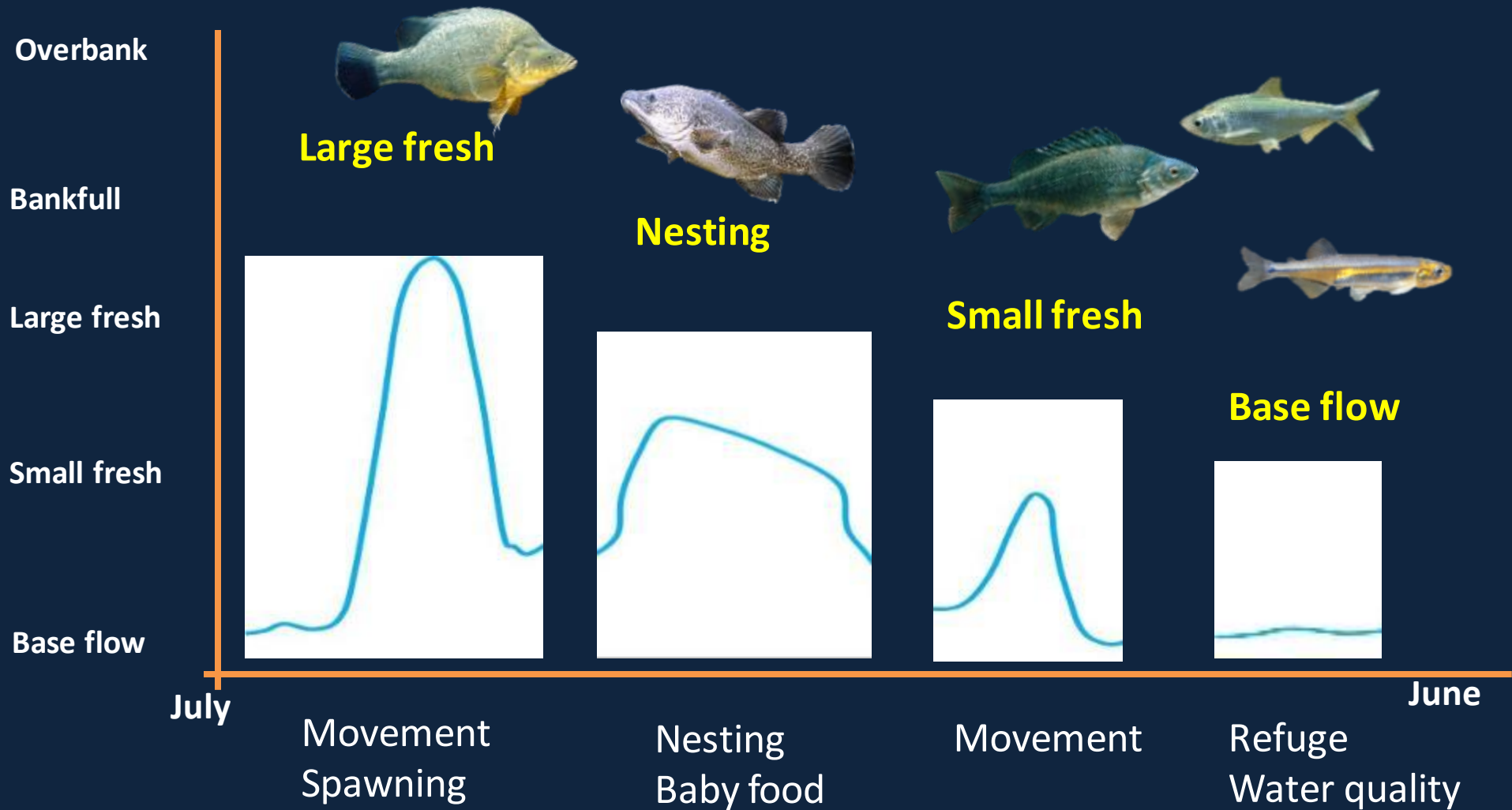This means even at the surface dissolved oxygen levels can become critical, killing fish.

Warm Water

Low dissolved oxygen

Cool Water

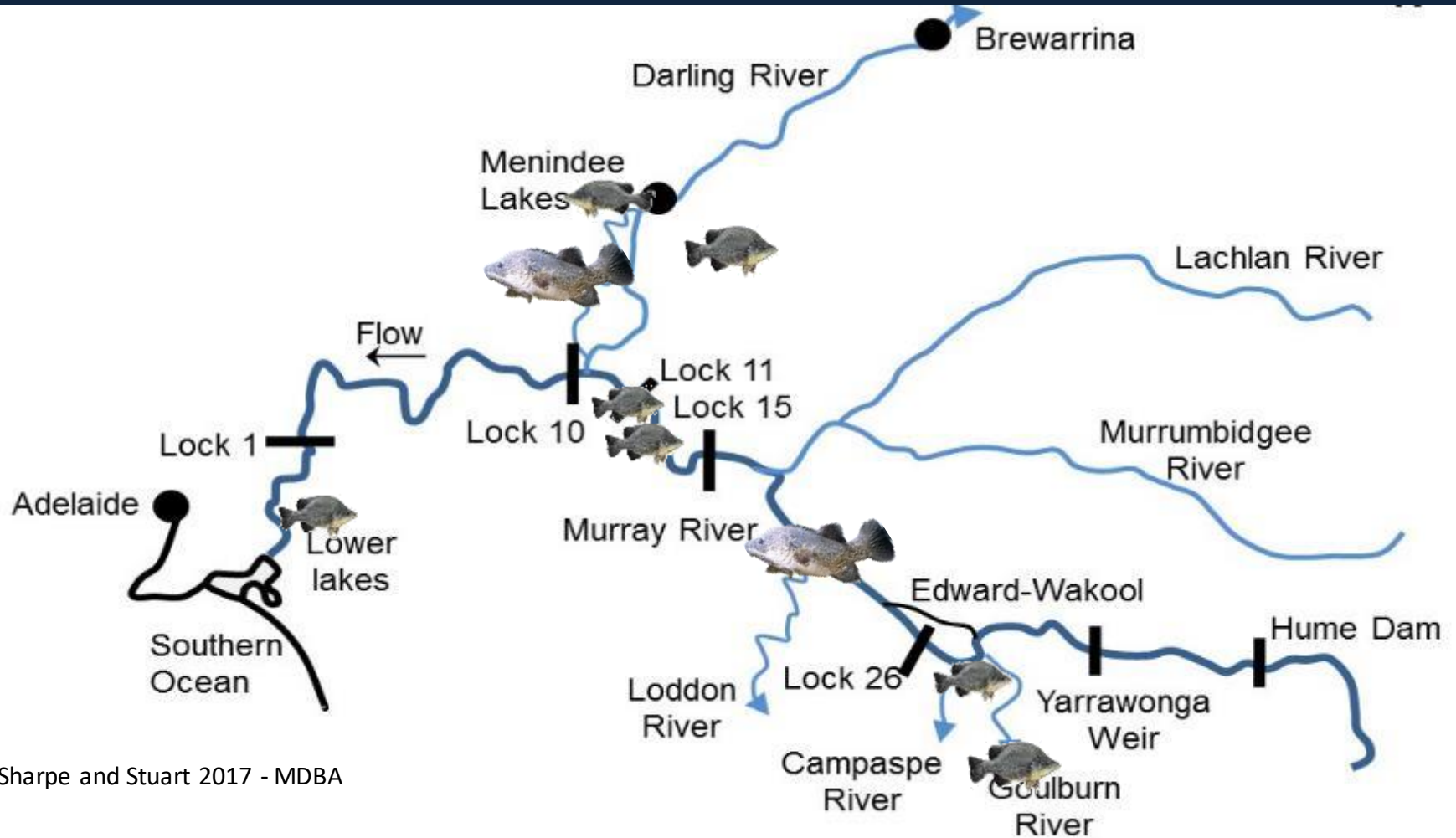# Fish kills

What can we do?

- Refined operational delivery of water
- Environmental water

Components like a "natural flow regime"

Flows for fish

Connect Rivers

Sharpe and Stuart 2017 - MDBA

Complementary measures: