

Environmental assessments

Support development and evaluation of
Queensland Water Plans

Environmental assessments

- Purpose
 - assess the ecological outcomes and effectiveness of existing water plans
 - review the effectiveness of the environmental strategies of the existing water plans; and
 - provide recommendations for the new water plans
- Total evidence approach
 - Ecohydrological risk modelling (ca. 120 year hydrological simulation)
 - Environmental monitoring (life of the plan)

Ecohydrological risk modelling

- Focusses on the environmental watering requirements of ecological assets
 - represent the ecological values of the plan area (linked to plan outcomes)
 - are critically dependent on aspects of the flow or groundwater regime; and
 - are vulnerable to the types of flow or groundwater alteration and water management reflected in the water plan
- Species (e.g. fish, turtles), habitats (e.g. waterholes, billabongs, wetlands), and processes (e.g. river forming processes)

- Flow spawning fish (Golden Perch)
- Stable low flow spawning fish (6)
- Migratory fish
- European carp
- Australian lungfish
- Barramundi
- Sea mullet
- King threadfin salmon
- Banana prawn
- Eastern snake-necked turtle
- Northern snake-necked turtle
- White-throated snapping turtle
- Cann's long-necked turtle
- Freshwater crocodile
- Floodplain vegetation
- Floodplain wetlands
- Riparian vegetation
- River mangrove
- River forming processes
- Waterholes as refugia
- Straw-necked ibis
- Riffles as habitat
- Floodplain subsidies to riverine productivity
- Groundwater dependent wetlands
- Groundwater dependent vegetation
- Springs




Ecohydrological risk modelling

- Partition the influence of water management on aquatic ecosystems from the influences of other human activities in the plan area—this is because the water plan only deals with water management
- Express results in terms of risk to long-term viability of the asset

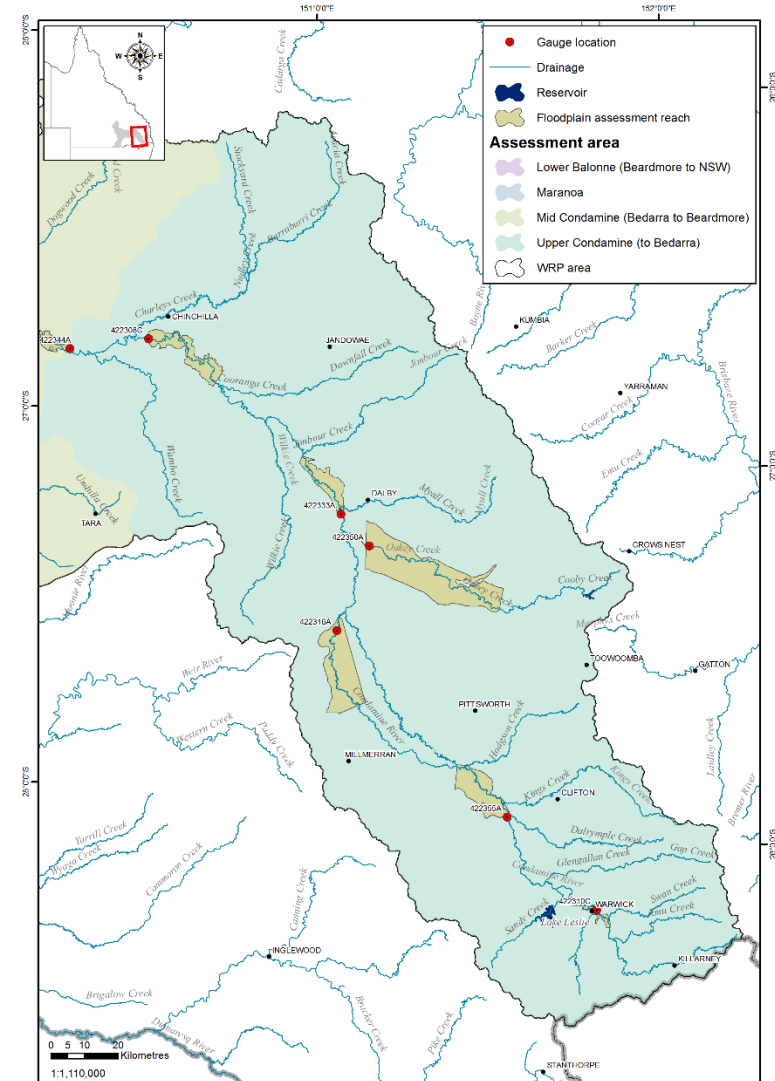
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A Risk-Based Ecohydrological Approach to Assessing Environmental Flow Regimes

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Assessment scales

- Environmental assessment node (stream gauge)
- Floodplain assessment reach (FAR)
- Assessment areas



Condamine and Balonne – surface water

Ecological asset indicator	Indicator measurement endpoint	Hydrological class
Refuge waterholes	Frequency of waterhole failure	No and low flows
Stable flow spawning fish (4)	Spawning and recruitment success of each species	Low flows
Golden perch	Annual and long-term population abundance	Medium and high flows
Fluvial geomorphology and river forming processes	Frequency and duration of bankfull flow events	High flows
Floodplain wetlands	Frequency and duration of wetland inundation events	High and over bank flows
Eastern snake-necked turtle	Frequency and high stress events	No and over bank flows
Narran Lakes	Frequency of successful bird breeding, vegetation inundation	High flows

Condamine and Balonne – groundwater

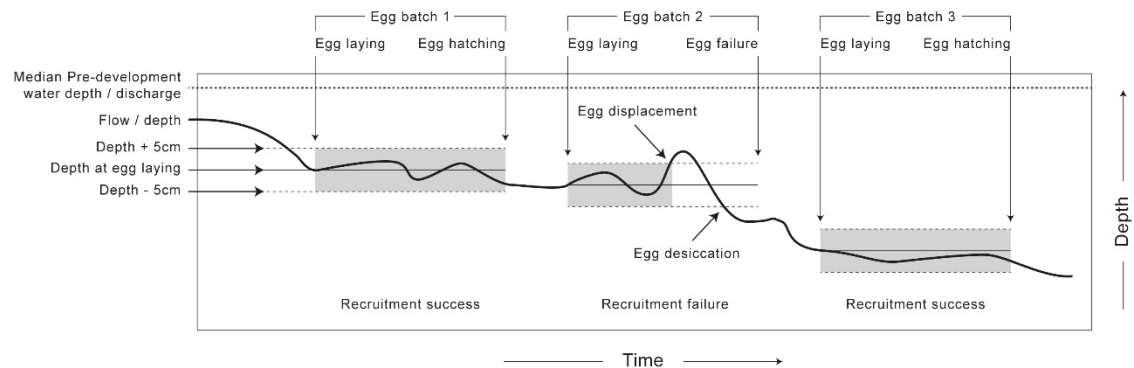
Ecological asset indicator	Indicator measurement endpoint	Hydrological class
Springs	Potential interaction between GDEs and groundwater take as altered depth to groundwater	Groundwater, depth to water table
Baseflow to streams		
Terrestrial vegetation		
Non-riverine wetlands		

Stable flow spawning fish

- Agassiz's glassfish
 - Purple-spotted gudgeon
 - Murray River rainbowfish
 - Carp gudgeon
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- Frequency of reproductive opportunities to support population viability

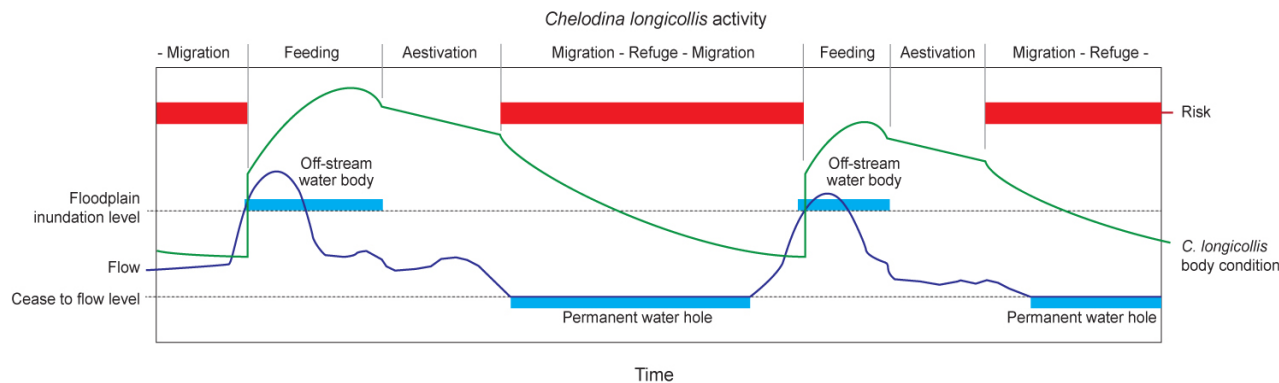


Agassiz's glassfish



Eastern snake-necked turtle (*Chelodina longicollis*)

- Long-lived species which utilises ephemeral floodplain wetlands and riverine waterholes
- Time spent in waterholes = stress periods
- 4 year risk threshold relating to wetland inundation return frequency

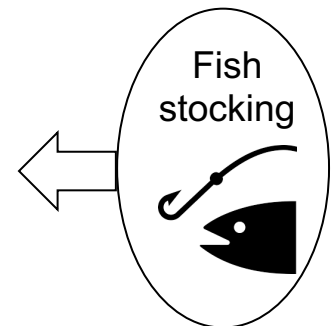
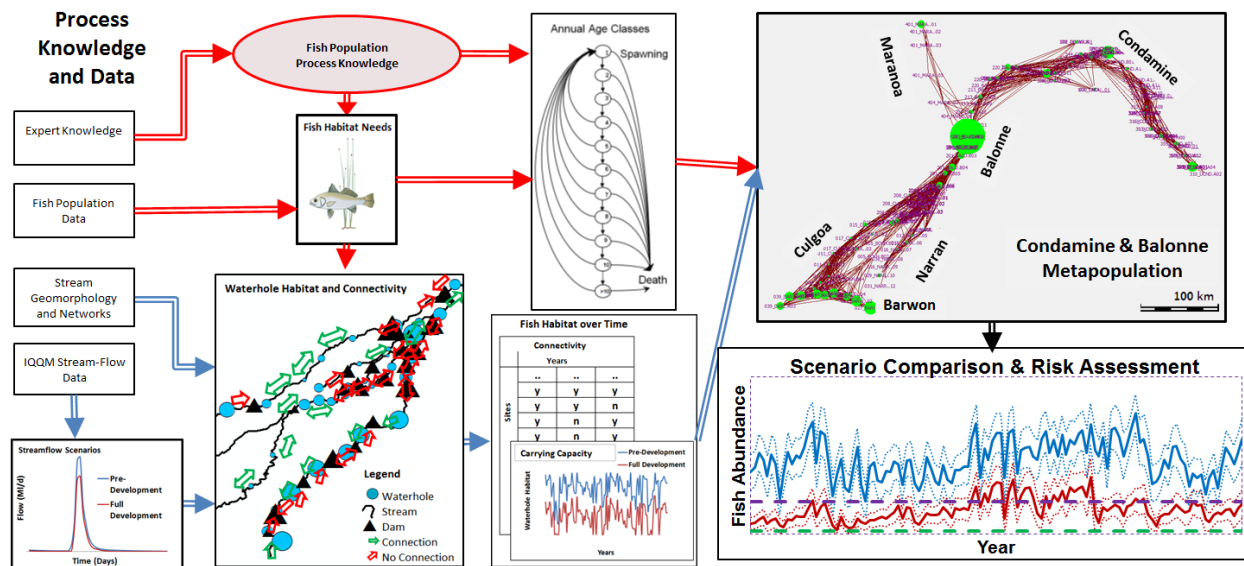


- Metapopulation model
- Generates annual time-series of Golden perch population abundance for 161 sub-populations



Golden Perch (*Macquaria ambigua*)

- First post-winter flow
- Waterhole persistence and size
- Connectivity between waterholes and channels
- Waterhole pumping



Golden Perch (*Macquaria ambigua*)

Three risk thresholds each representing a different level of risk and spatial applicability

1. Minimum viable population size (MVP)
2. Minimum pre-development population size (MPP)
3. Reach-length persistence (RLP)



Photo Gunther Schmida

Summary of monitoring

- Summarises relevant ecological monitoring undertaken in the water plan area since its implementation
 - Government agencies
 - ROL Holders
 - MDBA
 - CEW
 - NRM
 - Universities and other science providers
- Assessment of existing environmental management rules (ROP)
 - Use of waterholes, storage operating levels, change in rate of release, flow event management rules, etc.

Environmental assessment

- Assess the effectiveness of the water plan
 - Ecological outcomes
 - Environmental strategies
- Provide recommendations on potential mitigation strategies to minimise identified environmental risks
- Provide recommendations and priorities on areas requiring future research

