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Centre for Tropical Water and Aquatic Ecosystem Research

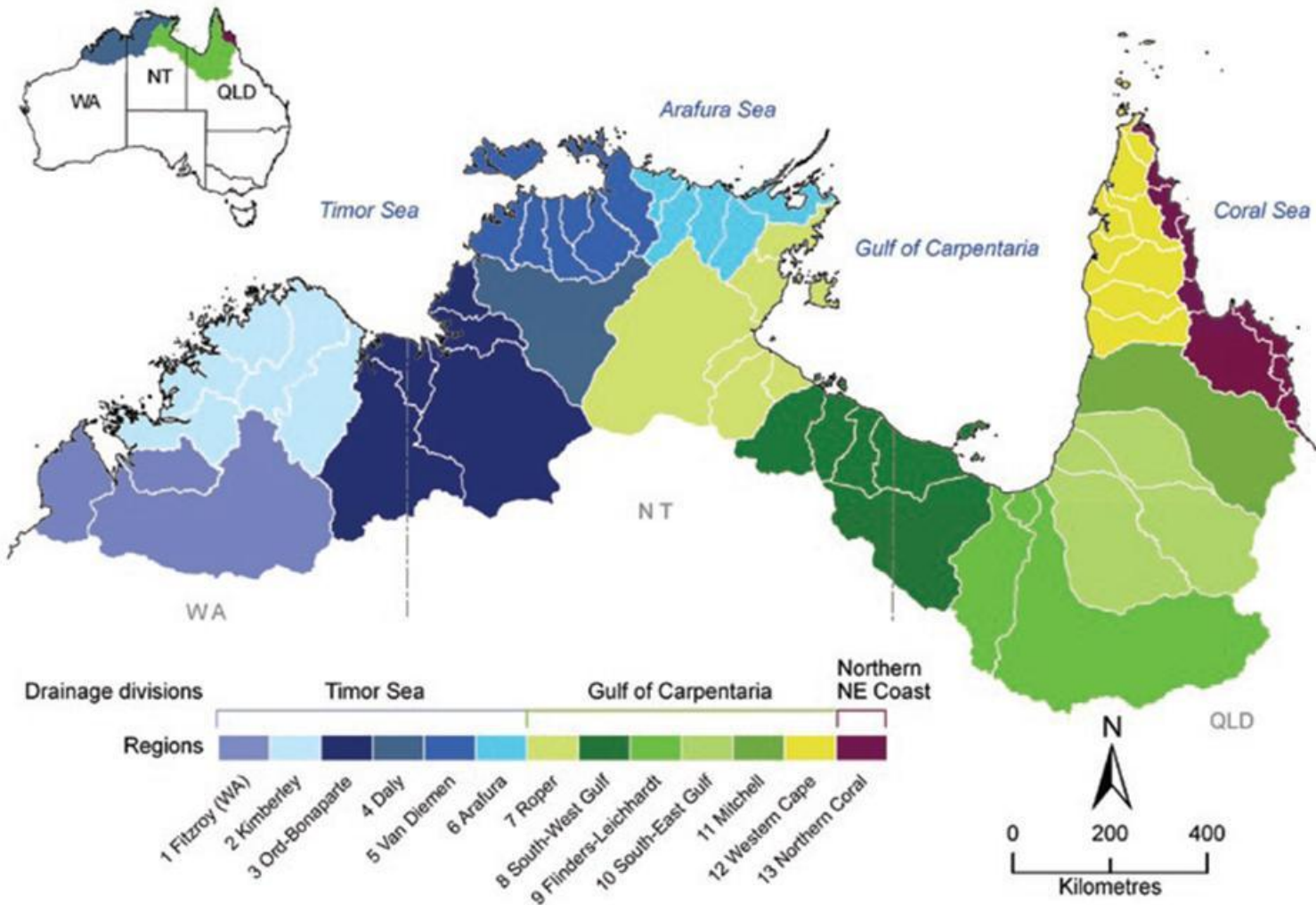
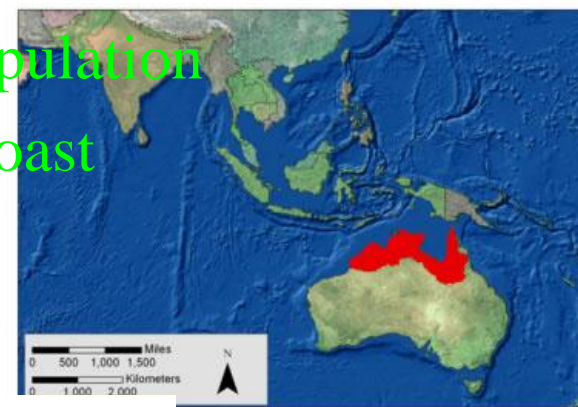
Predicting Impacts of Development and
Land Use Change Upon Complex
Wetland Systems in Largely Undeveloped
Catchments of Northern Australia

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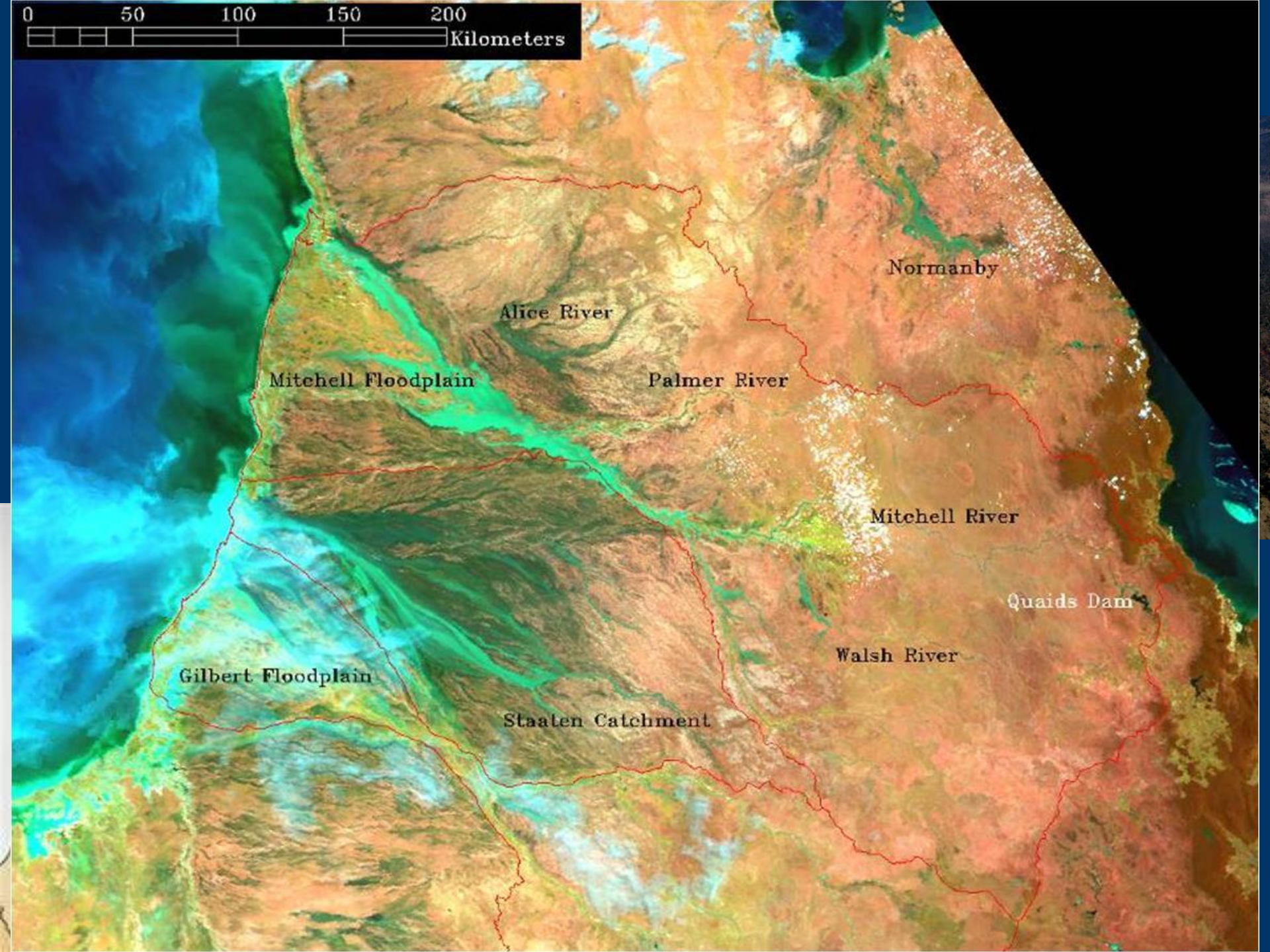
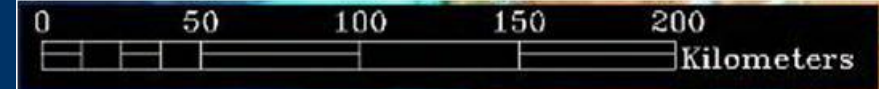
- Nearly 20% of Aust land mass, but <1% of population
- Most development is on small section of NE coast
- Only 300,000 in all of northern Australia
- Only 3 towns >10,000 people



Pressure to Develop North Australia

- Northern part of Australia has 24% of national runoff (equals 23,000,000ML) but <1% is allocated for all uses (urban, mining, irrigation) so essentially free-running rivers
- Grazing dominant land use
- There is now much pressure to further develop this vast region – to become an international foodbowl
- This would be a 21st century development of a relatively intact region - can we manage it right?





Normanby

Alice River

Mitchell Floodplain

Palmer River

Mitchell River

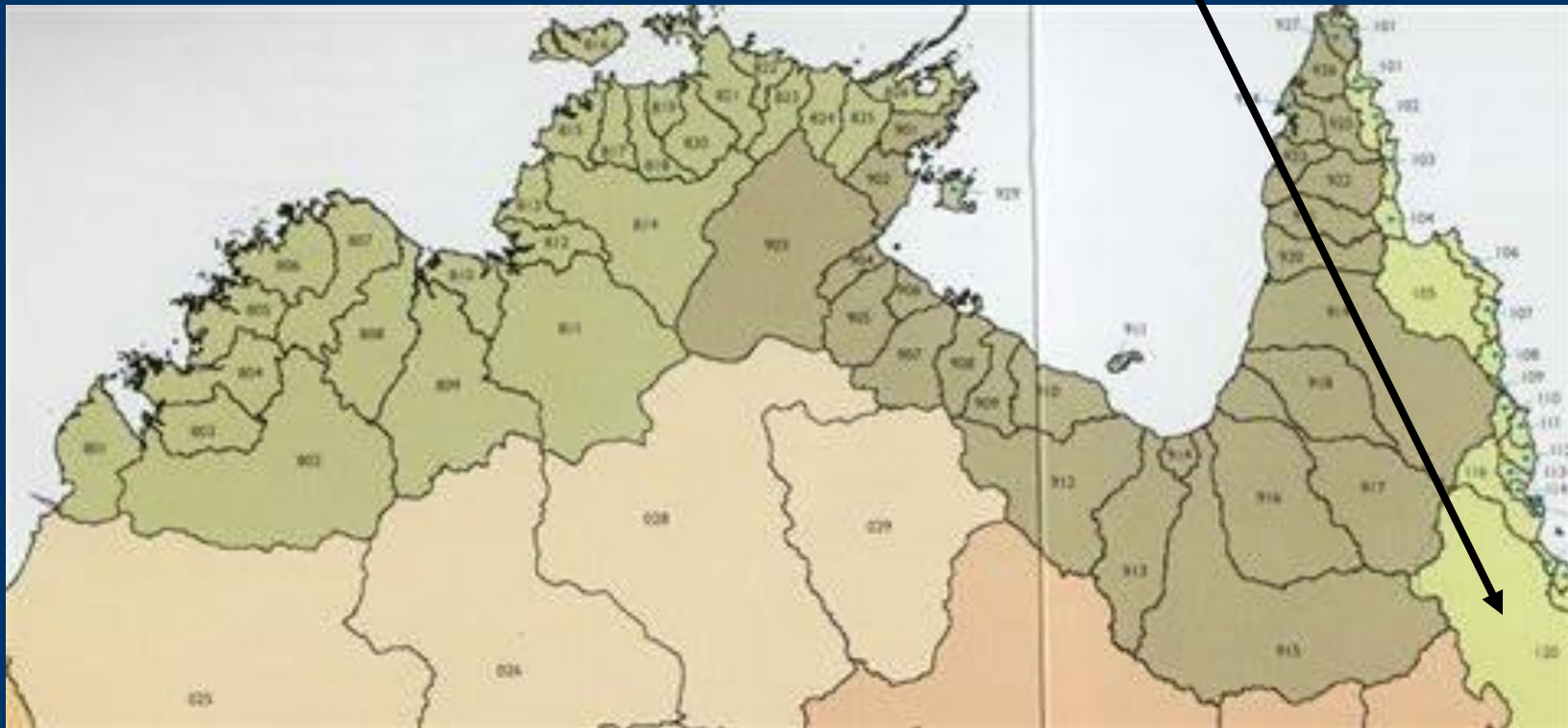
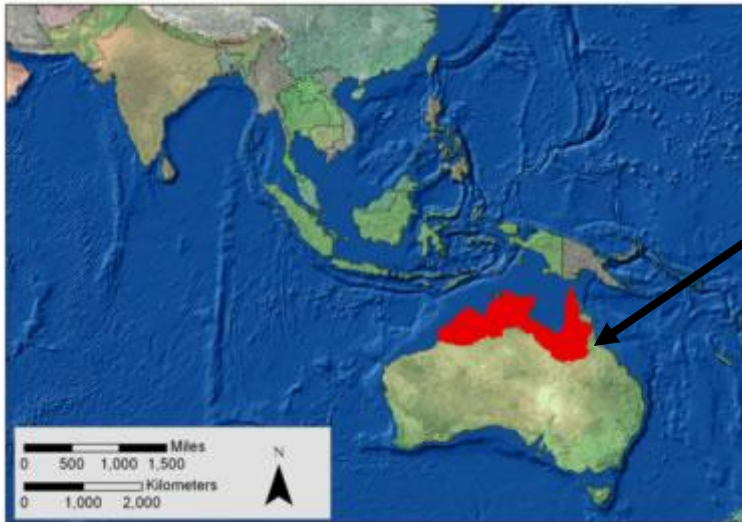
Quaid's Dam

Walsh River

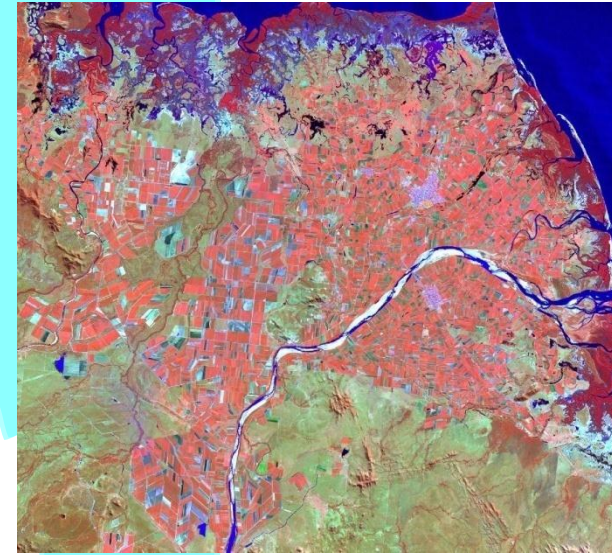
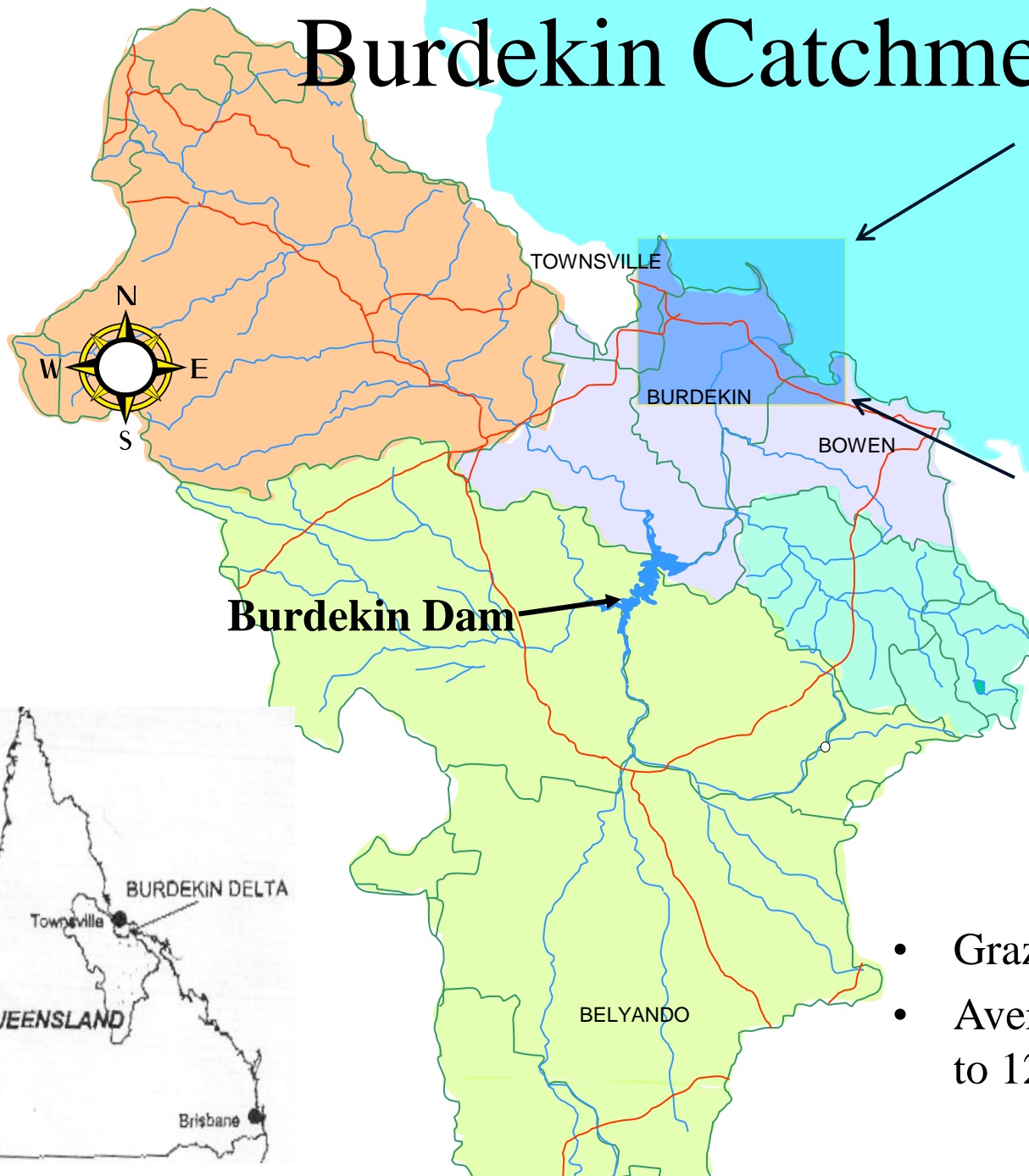
Gilbert Floodplain

Staaten Catchment

Burdekin Catchment, northern Australia



Burdekin Catchment and Dam



- Grazing = 88%, cropping = 1%
- Average Annual Rainfall: 800 to 1200mm

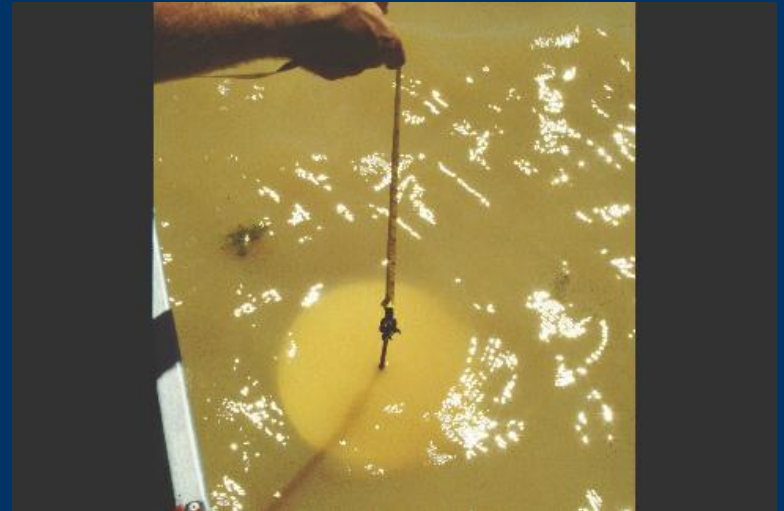
Dominant Wetland Management Issues

- Impacts of Dams
- Management of Aquatic Weeds
- Management of Livestock Grazing



Burdekin Falls Dam

- Built 1987, stores 1.8 million megalitres of water
- Captures runoff from 86% of catchment
- Supports increased irrigation development on the Burdekin delta and floodplain
- Seasonal river with large floods but low dry season flow



Wet and Dry Season Differences



Above and Below Burdekin Dam

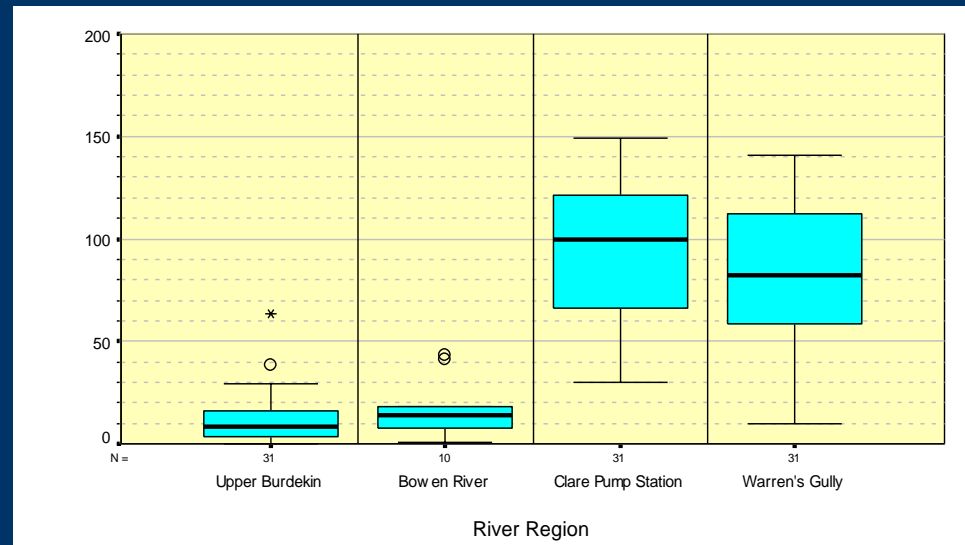


Upper Burdekin River, above dam



Lower Burdekin River, below dam

- Upper Burdekin turbid after stormflows, but runs clear shortly after
- Dam traps stormwater and remains persistently turbid
- Distributes turbid water downstream



Downstream Implications



- Water from the Burdekin Dam is pumped into floodplain creeks and wetlands for irrigation distribution
- 159km of river below the dam now persistently turbid

Managing the Turbidity of Burdekin Falls Dam

- Elevated turbidity commonly blamed on poor land management
- However, dam turbidity due to its size and location and the seasonal nature of the streams
- The 'cause' of turbid water in the lower catchment below the dam cannot be treated - we must manage the symptoms



Northern Dam Sites

- Likely to suffer same problems depending on their size
- Fortunately, NALWT downplayed the likelihood of dam construction due to:
 - inadequate (shallow) storage sites;
 - distance to suitable agricultural areas
 - economics

Aquatic Weeds in Burdekin Coastal Wetlands

- Coverage of lagoons by floating weeds such as water hyacinth
- Invasion by exotic grasses such as *Urochloa mutica* (paragrass) and *Hymenachne amplexicaulus*



Removal of Water Hyacinth



Before clean-out – 7-8 fish species
Anoxic water column

After clean-out – 14-16 fish species
Much improved dissolved oxygen

Hyacinth Removal Projects



Before



After



Gulf Irrigated Creeks

- Upstream, not floodplain, so no water hyacinth



Livestock as Management Tools

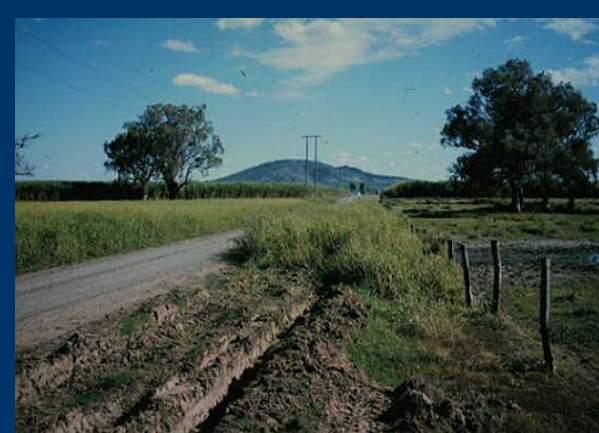
- In irrigated areas, cessation of grazing or conversion of land from grazing to agriculture, allowed introduced grasses to dominate wetlands



Photos Jim Tait

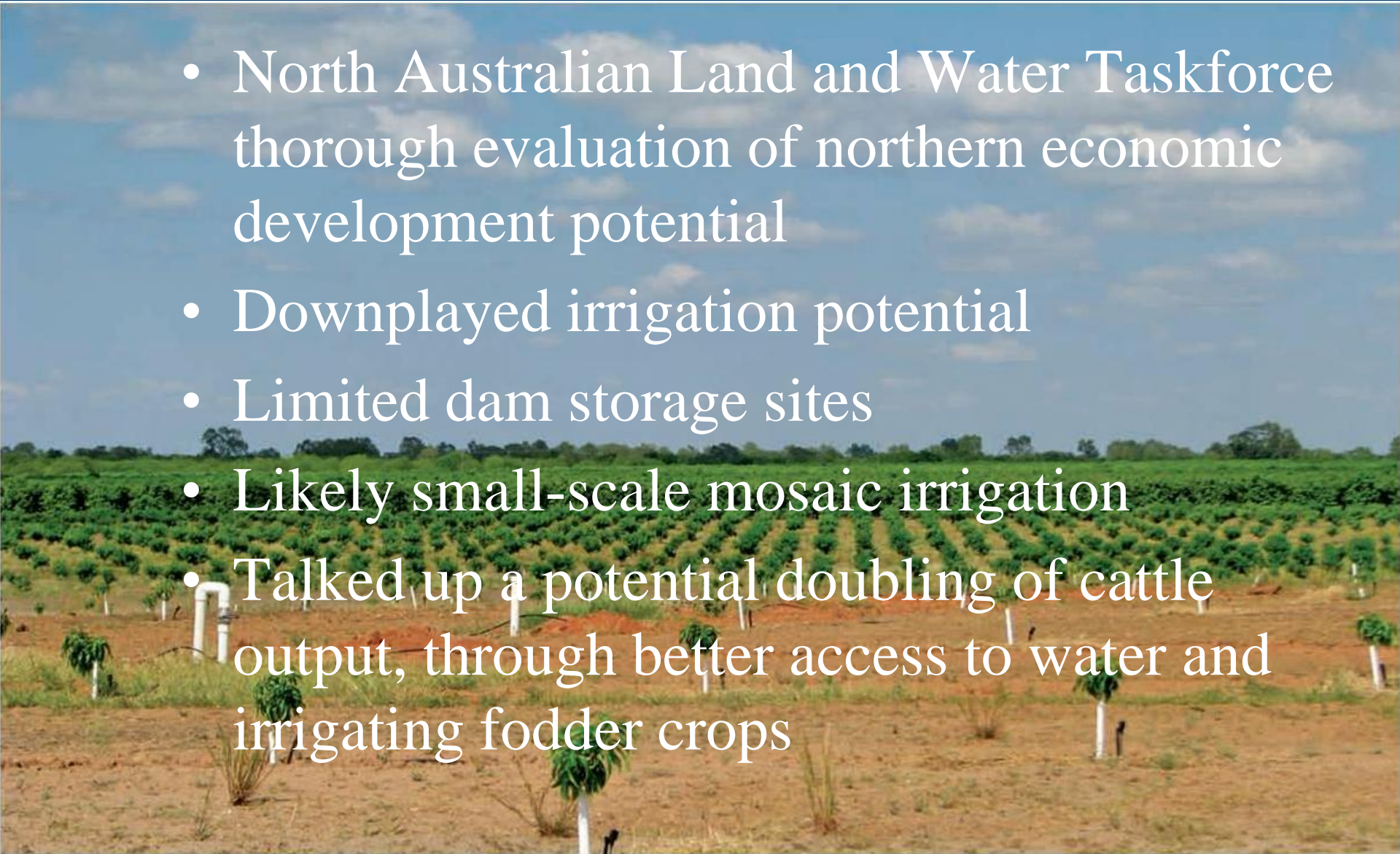
Restoration Through Grazing and Fire Management

- Use grazing as a management tool to control weeds and restore wetlands



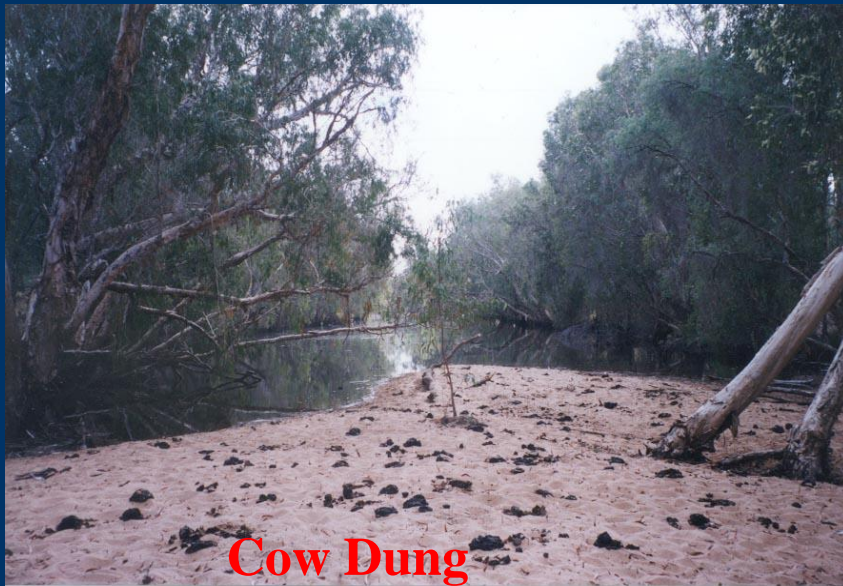
North Aust Land & Water Taskforce

- North Australian Land and Water Taskforce thorough evaluation of northern economic development potential
- Downplayed irrigation potential
- Limited dam storage sites
- Likely small-scale mosaic irrigation
- Talked up a potential doubling of cattle output, through better access to water and irrigating fodder crops



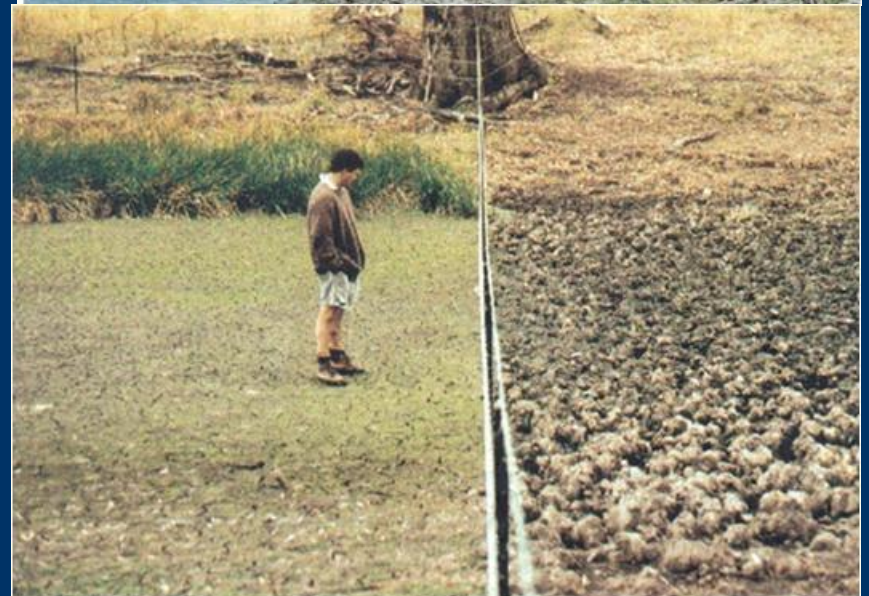
Livestock Management

- Dominant land use (by area) in the catchment
- A series of non-flowing waterholes – vulnerable to disturbance



Riparian Fencing of Inland Waterholes

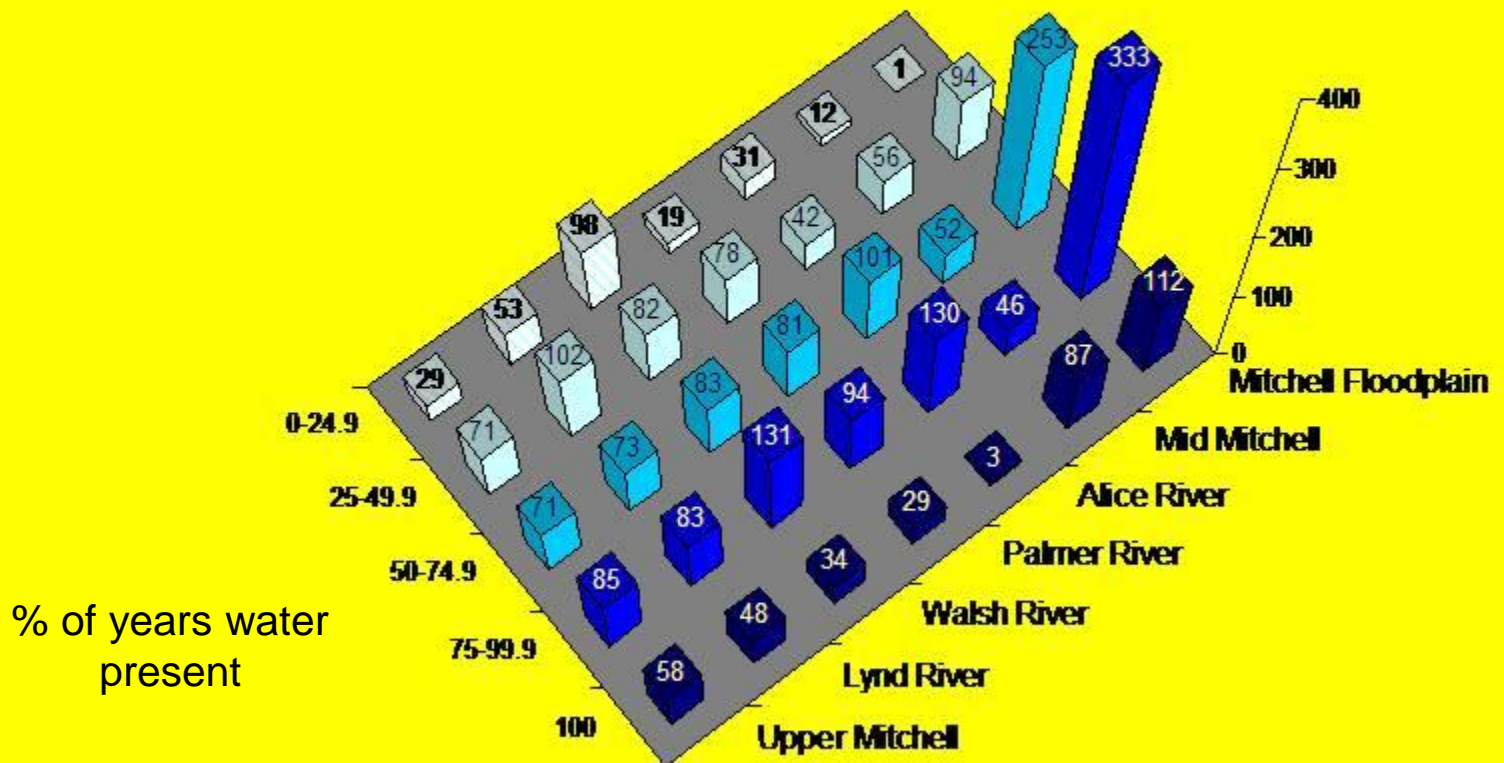
- Thousands of km's of river frontage country fenced to manage stock access, not exclude them altogether
- Adoption of wet season spelling
- Significant improvement in water quality and riparian vegetation cover
- High degree of adoption by landowners and govt incentives – considered to be very successful



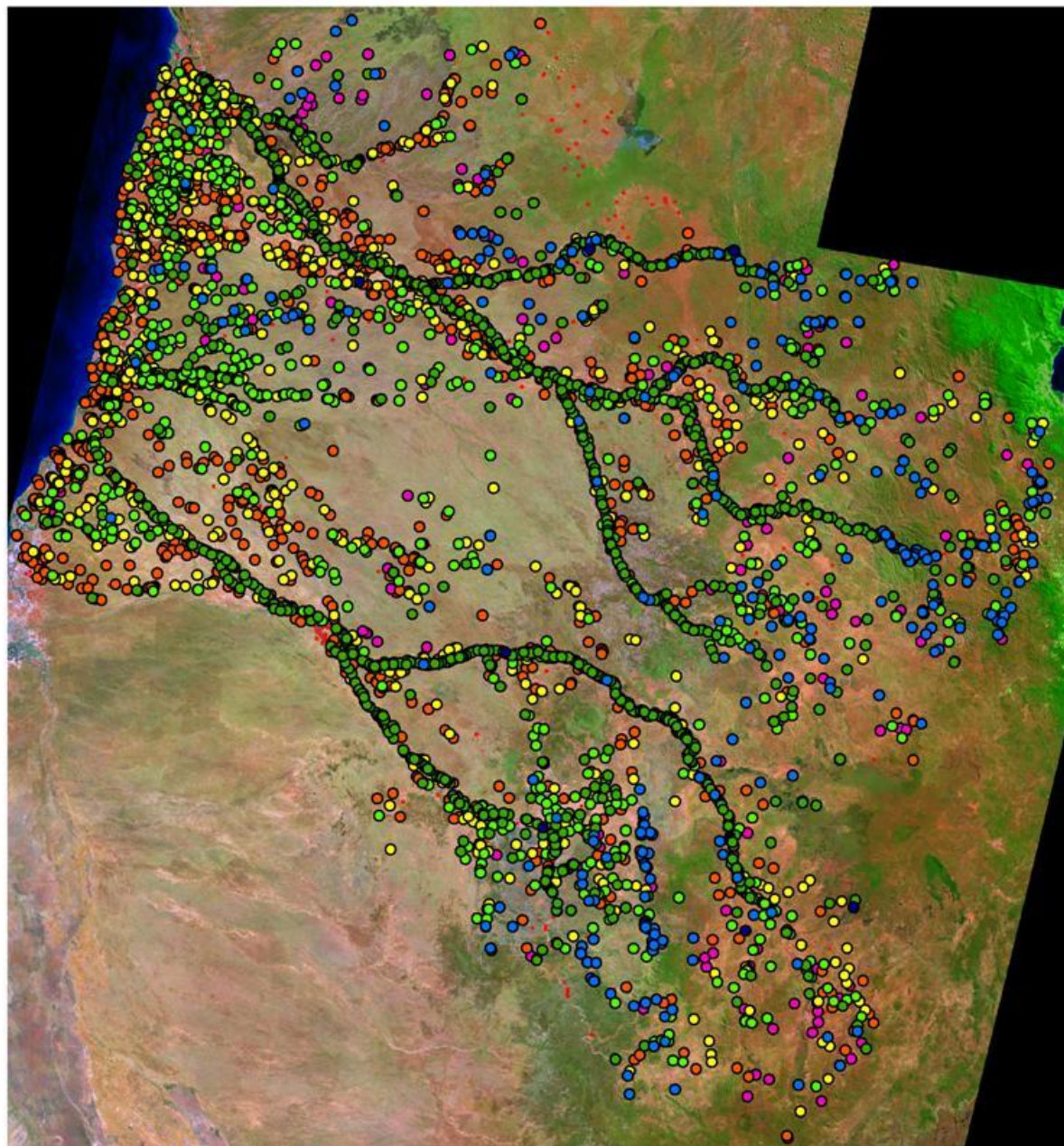
Waterbody Permanence

Comparison of Mitchell subcatchments

Abundance and permanency of waterbodies (n=2755)



Waterbody Clarity



Legend

Always very clear



Very clear to clear



Always clear



Usually clear



Usually turbid



Always turbid



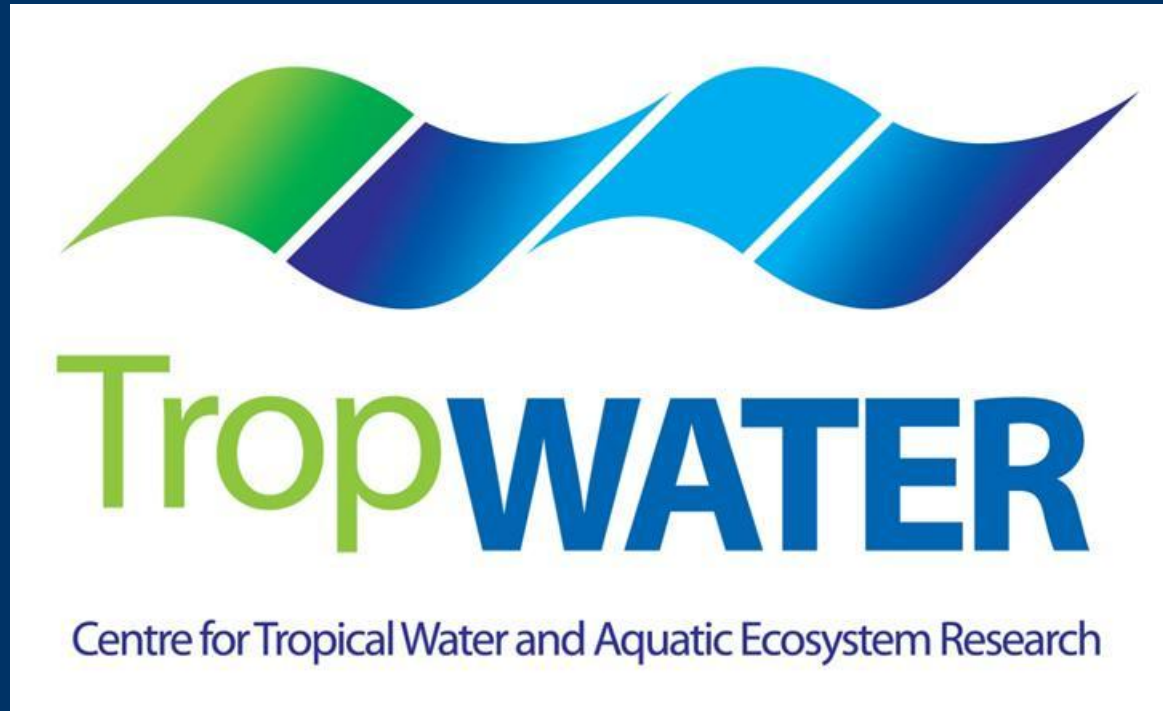
Very clear to turbid



Conclusions

- Gulf and other northern rivers and wetlands relatively undeveloped
- Pressure to develop irrigation and/or double cattle turnoff
- Dams found to have high impact and low reliability
- Mosaic irrigation via harvesting floodwaters with pumps, and gradual increase in cattle herd more likely
- Maintaining connection between land managers and their aquatic/riparian systems is key

Questions??



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