Impacts on mangrove and saltmarsh habitats, and pathways to recovery

DEW

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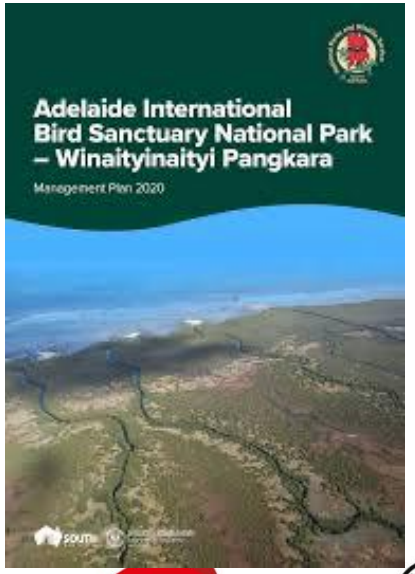
Government of South Australia
Department for Environment and Water

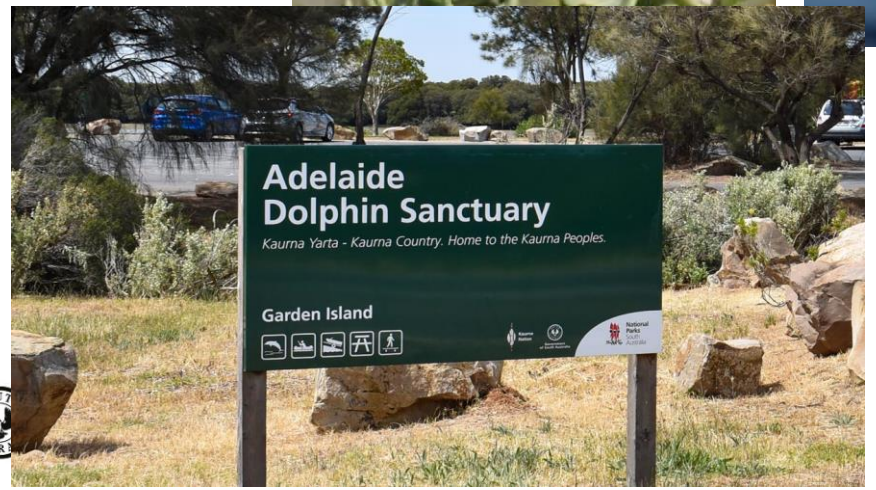
Outline

- Ecological value of the landscape
- What we know about the ecological impacts
  - aerial imagery
  - ecophysiological inference
- What we need to know
  - Impact assessment – on-ground vegetation assessment, assessment of likely impacts on other values (fish, birds, threatened/iconic species)
  - Pathways to recovery
    - Monitoring network
    - Removing stressor, lag to plant recovery and recruitment
    - Need for active restoration, plants, soil?
- Longer-term and larger scale outlook
  - area of interest is within a broader landscape
  - DEW is currently considering options for the management of this broader landscape (e.g. tidal trial)

Ecological values

- Significant intact area of native vegetation
- Contains nationally listed threatened species and ecological communities
- Provides nursery habitat for ecologically important and commercially important fish species
- Birds
  - combination of tidal mudflats, saltmarsh and functional ponds has driven habitat value for migratory shorebirds for a long time
  - this combination a big driver for these shorebird values that underpin the Adelaide International Bird Sanctuary





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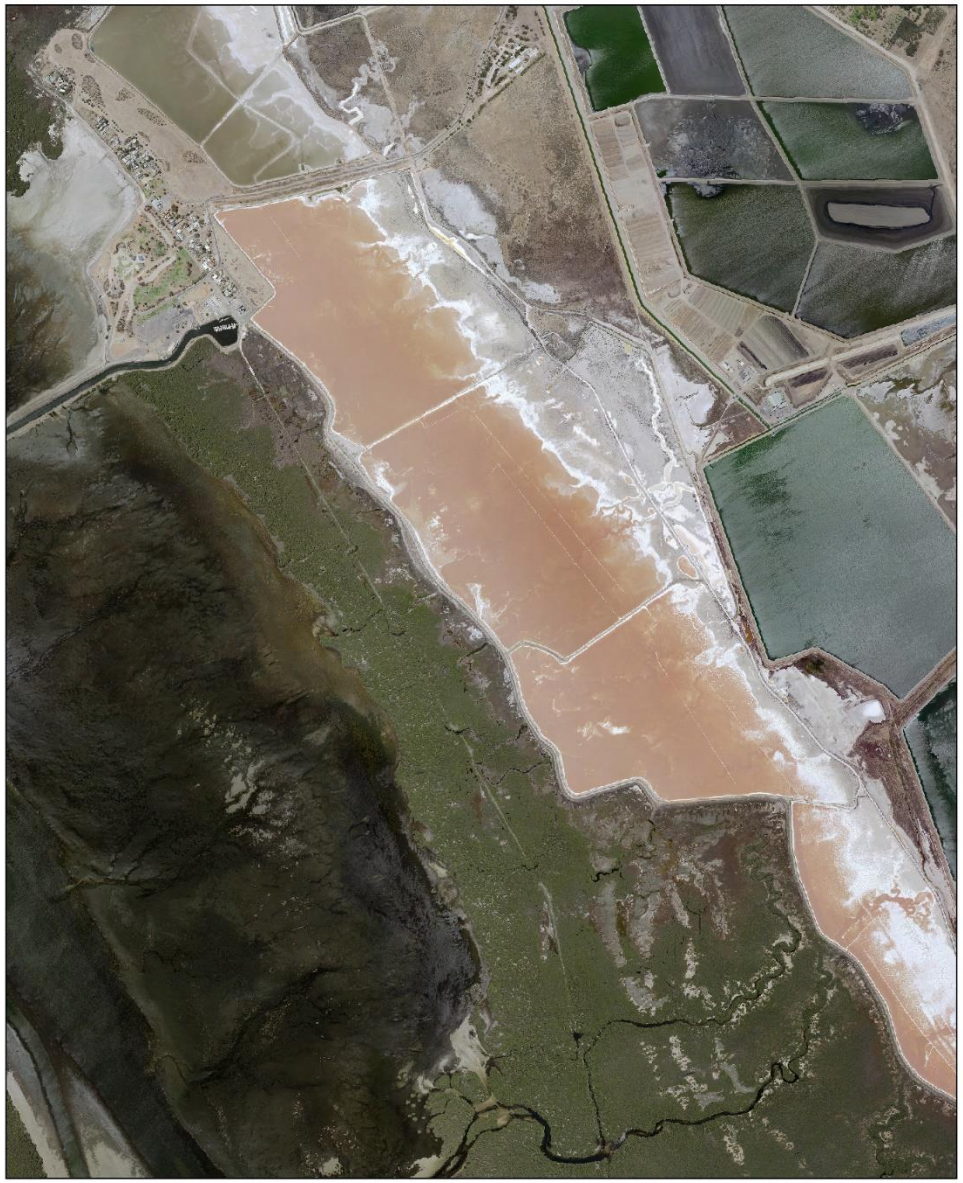
Changes to vegetation communities

- Primary tool in measuring impact has been interpretation of aerial and satellite imagery
  - preliminary on-ground vegetation assessment also done
- In our initial assessment we have primarily used high res aerial imagery at different time slices to detect dieback ("death")
  - easier to detect in mangroves than saltmarsh
  - supported by visual interpretation of other products, eg multispectral satellite imagery
- Longer-term strategy for change detection below
  - including measuring change in different condition classes
  - including measuring change through time (repeat measures)

Aerial Imagery: True Colour

March 2020

January 2021



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Aerial Imagery: True Colour

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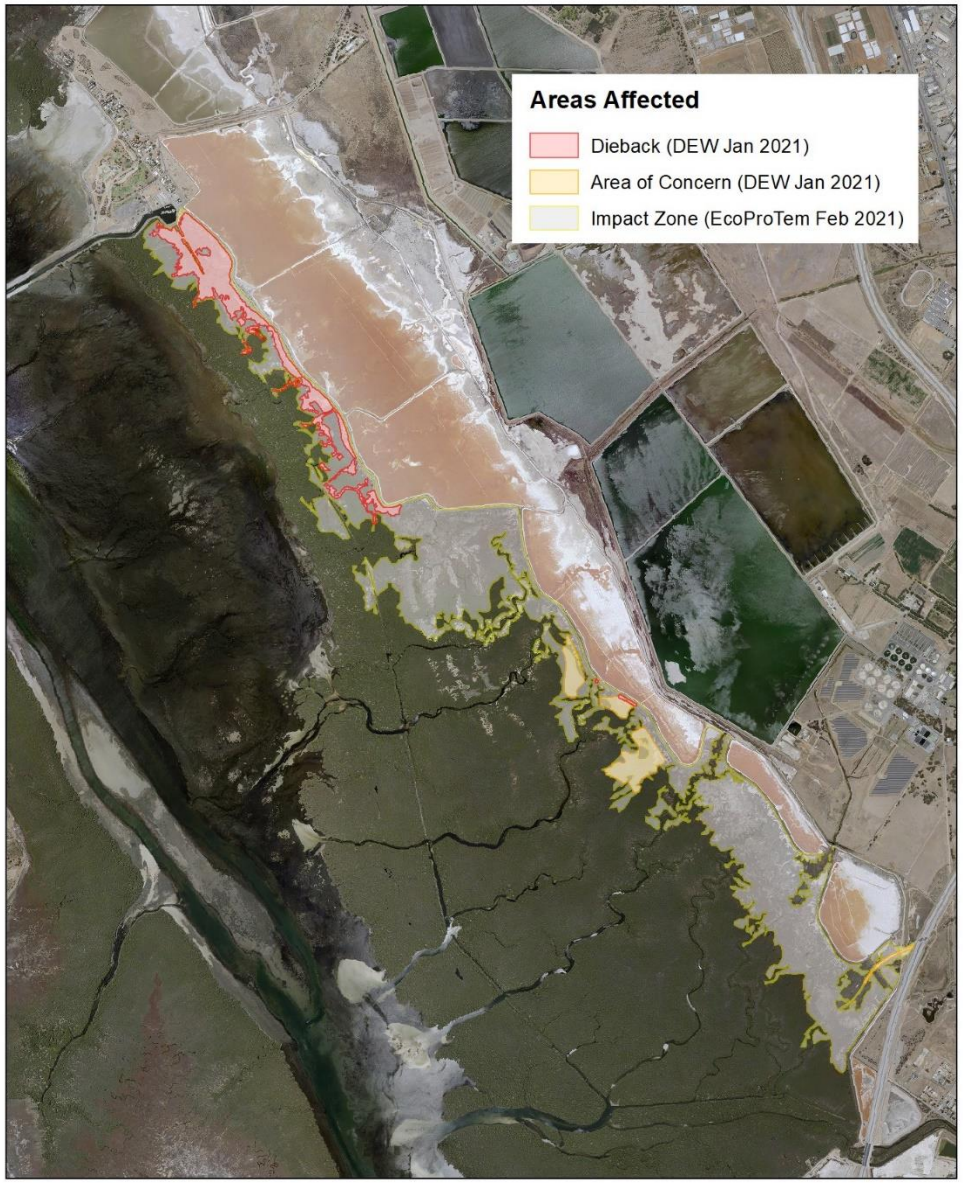

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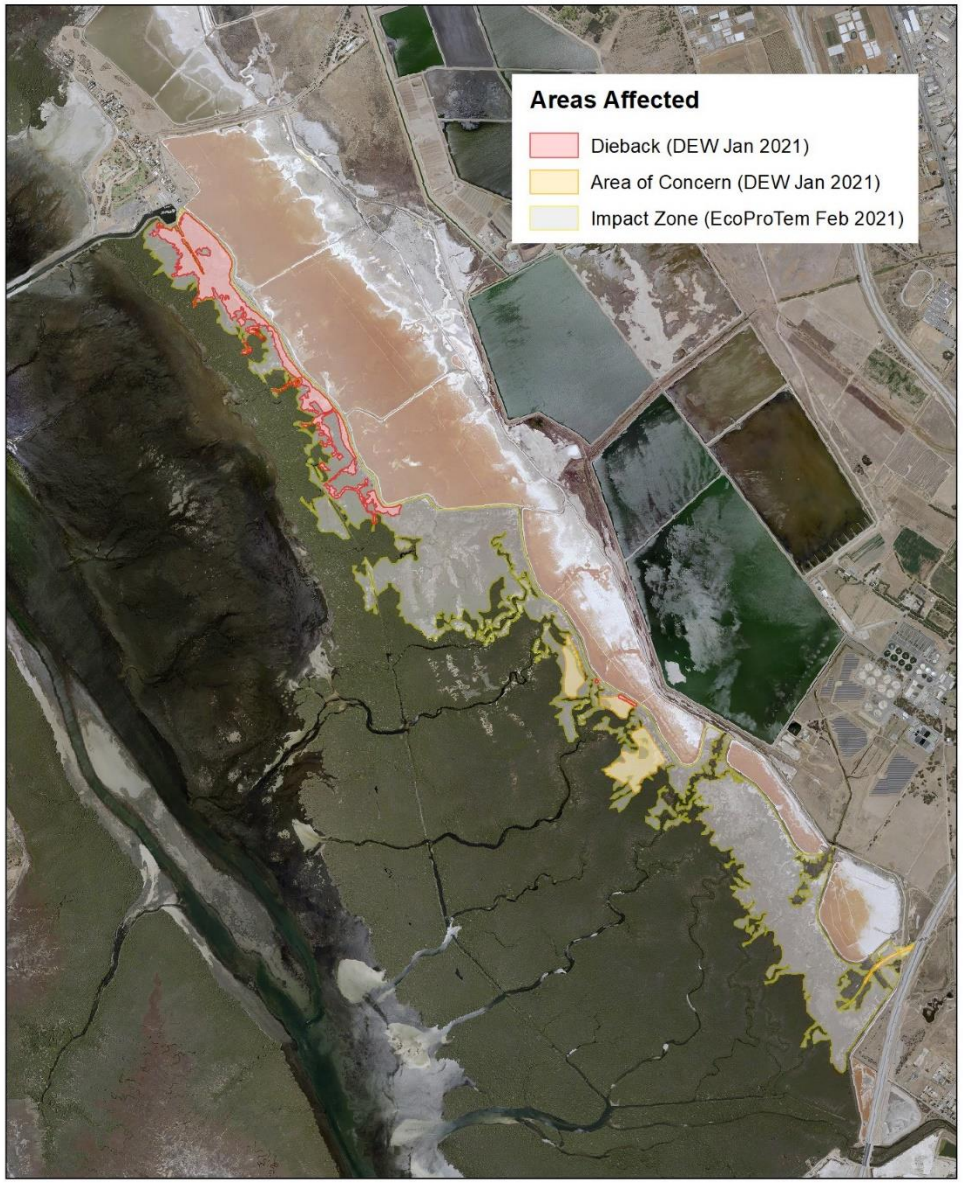
Aerial Imagery: True Colour

January 2019

January 2021



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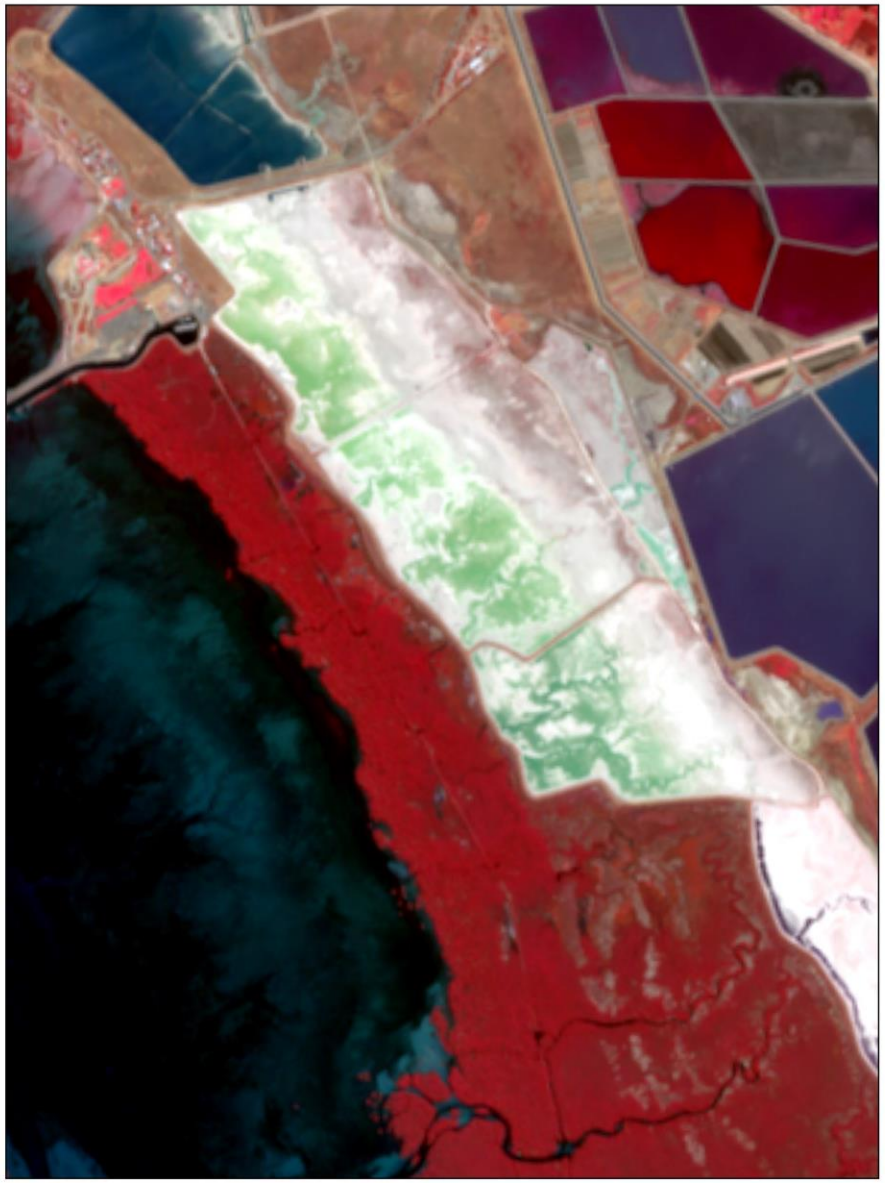
Satellite Imagery: Sentinel-2 False Colour

October 2019



October 2020

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Ecophysiology

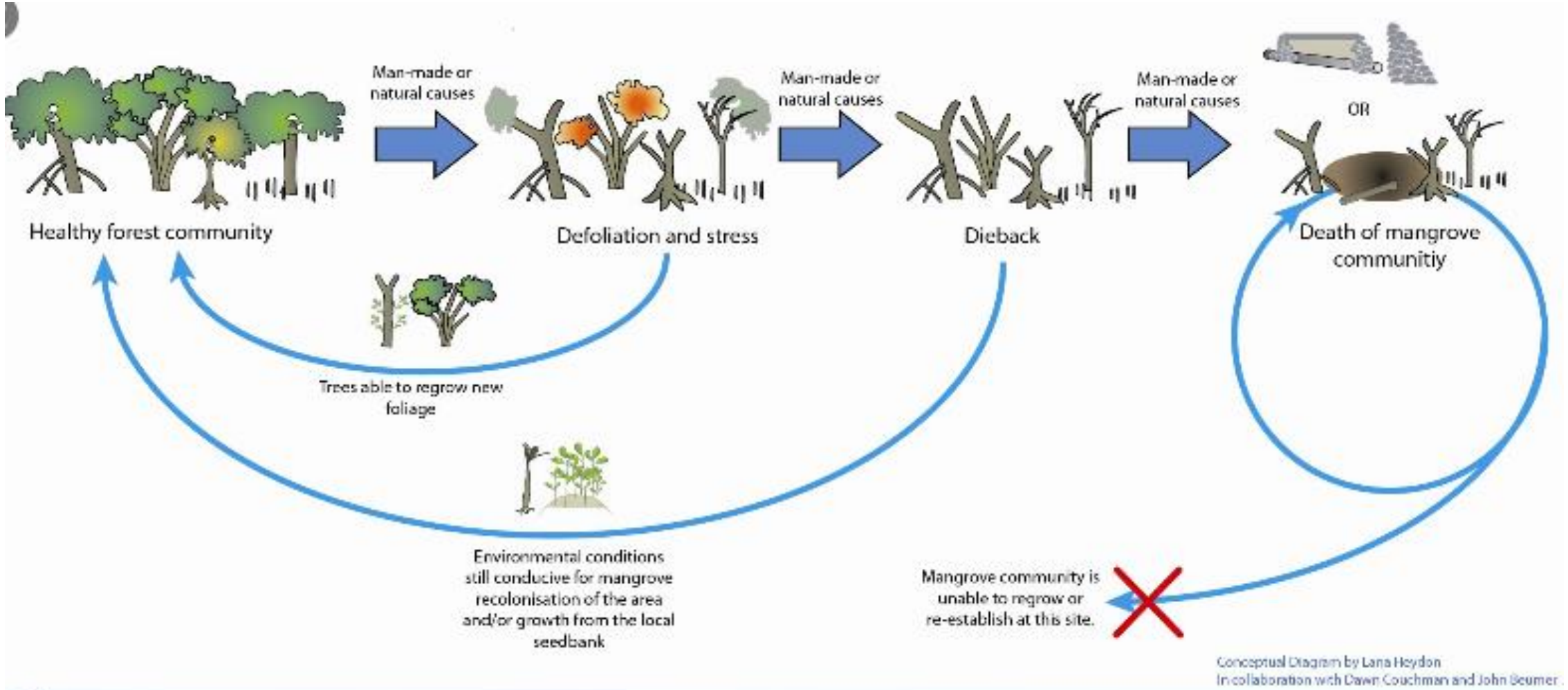
- *Avicennia marina* (Grey mangrove):
  - seedling recruitment optimal at salinities <seawater (35 g/L)
  - adult mortality at salinities 70-100 g/L
  - salinity at sites of high impact (death) >130 g/L
  - can recruit quickly under favourable conditions (though tree growth can be slow)
- saltmarsh habitats
  - more complex, many species, different tolerances
  - potentially higher salinity tolerances, but typically less tolerant to waterlogging (higher in elevation)
  - already under threat, particularly from sea-level rise
  - recovery can be slow, with the potential for some elements to require active re-establishment

What we need to know – impact assessment

- ongoing vegetation and imagery analysis
  - working with NGOs and others to measure broader impacts (not just 'dieback'), particularly to identify areas under stress
  - will undertake aerial data capture and analysis regularly (weekly-monthly)
  - coupled with regular and quantitative on-ground vegetation assessment for validation of imagery
- impacts on broader ecosystem and values
  - fauna habitat assessment, including impact on coastal marine fauna

What we need to know – recovery

- once the hydrological conditions are “right”…
- forecast recovery pathways
  - will biological intervention (revegetation) be required?
  - will other interventions (e.g. soil remediation) be required?
  - how long until we know we need to intervene?
  - are some interventions “no regrets”?
- use monitoring data to determine when interventions should be implemented (and to hopefully demonstrate passive recovery!)



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