Local Land Services Hunter

Hexham Swamp Rehabilitation Project

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Hexham Swamp Rehabilitation Project

Restoring Tidal Inundation to an Artificially Created Freshwater Wetland

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Hexham Swamp Rehabilitation Project

- Commenced 1996
- 20 Year Anniversary
- Hunter Local Land Services – and predecessors:
- Hunter-Central Coast Catchment Management Authority
- Hunter Catchment Management Trust

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Hexham Swamp - Location

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Hexham Swamp - Description

- Internationally recognised wetland
- 12 km from city of Newcastle
- Approximately 2,000 hectares
- Project area comprises Hunter Wetlands National Park, Hunter Local Land Services land, a Hunter River Estuary RAMSAR site and a small area of privately owned land
- Ironbark Creek - tributary of the Hunter River, primary watercourse into and out of Hexham Swamp

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The origin of impact

- Eight floodgates installed across the entire width of Ironbark Creek in the early 1970s
- Part of the Hunter Valley Flood Mitigation Scheme
- Reduce flooding impacts
- Maximise the use of land for agriculture

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Hunter Valley Flood Mitigation Scheme

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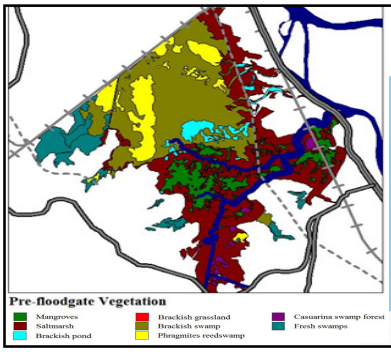
Floodgates / Flapgates



Pre- Floodgate Vegetation

(Winning 2006)

- Pre-1970
- Mosaic estuarine and freshwater wetlands
- Saltmarsh dominated

Impacts from floodgate installation

- Eliminated tidal flow
- Deterioration of estuarine habitat and water quality
- Saltmarsh and mangroves replaced by freshwater vegetation and pastures
- Over 30 years, estuarine habitat value degraded
- Increased dominance primarily of native freshwater reed *Phragmites australis*

Impacts from floodgate installation

- Decline in populations of fish, prawns and other marine fauna
- Decline in visitation by migratory shorebirds and wader birds
- 99 % loss of Saltmarsh - 900 to 6 ha
- 90 % loss of Mangroves - 180 to 22 ha
- 80 % increase in *Phragmites australis* - 170 to 1,005 ha

The Call to Action

- Detrimental impact on estuarine vegetation and habitat, water quality and soils
- Ironbark Creek Total Catchment Management Committee - 1996 Strategy
- Commonwealth and State Government funding
- 1996–2006 – 10 years in preparation
  - Baseline surveys
  - Land acquisition
  - Civil construction works

Project approval !

- $M & $M spent
- Project approved by Department of Planning in 2006
- Project was largest of its type proposed in NSW
- Assessed as a major project under the *Environmental Planning and Assessment Act 1979* – same as highway construction, mining operations and residential subdivisions

Approval conditions

- Staged floodgate opening
- Establishment of, and reporting to a Community Consultative Committee
- Implementation of a rigorous environmental monitoring program

Returning the tide

- Stage 1: One floodgate open
  - December 2008
  - Negligible change
- Stage 2: Three floodgates open
  - December 2009
  - 320 ha inundated
  - Mangrove re-colonisation commenced
- Stage 3(i): Six floodgates open
  - September 2011
  - More pronounced changes
- Stage 3(ii): Eight floodgates open
  - July 2013
  - Most notable changes

Mangrove colonisation

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Mangrove, mudflats and pools

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Mangrove expansion

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Estuarine habitat

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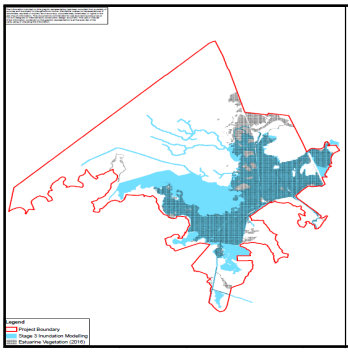
Saltmarsh recovery

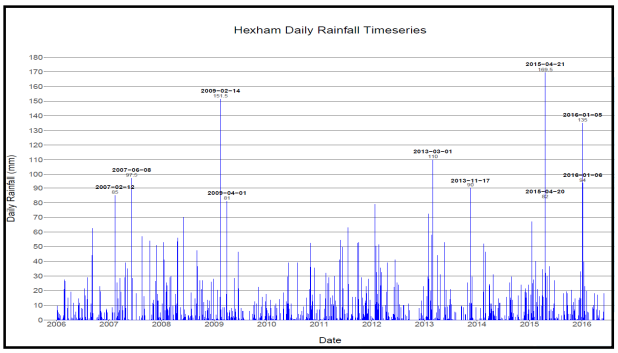


Inundation model - 8 floodgates open & 2015-16 extent of estuarine vegetation / habitat

Theories for slower transition

- Vegetation impediment

- Freshwater reed *Phragmites australis* acts as a physical barrier, both to tidal inundation and effective drainage
- *Phragmites* is tolerant of brackish conditions. Dieback from inundating salt water is hampered by diluted from retained freshwater.
- Dieback of *Phragmites* may result in an accumulation of organic sediment, resulting in a height increase in wetland topography preventing saline inundation and freshwater exit.
- physical vegetation barrier enhances sediment entrapment from catchment runoff, resulting in an increase in bottom sediment height, further preventing water exchange.



Theories for slower transition

- Prolonged wet periods
  - need a hot dry summer
  - Increased saline exposure, in conjunction with prolonged dry weather is required to accelerate vegetation transition.
- Increased freshwater input
  - increased creation of hard surfaces in residential and commercial developments in surrounding catchment reduces water infiltration.
- Ambitious computer modelling

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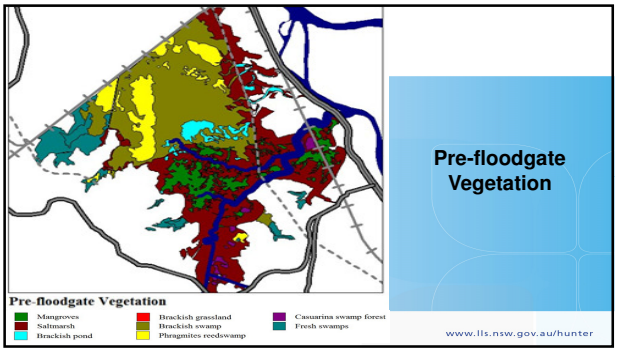

Pre-floodgate Vegetation

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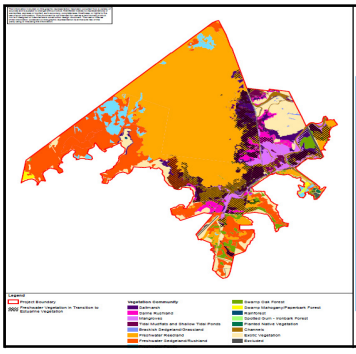

2015-16 Vegetation

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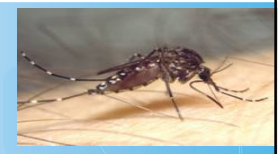
The achievements - Vegetation

- Vegetation used as surrogate for extent of tidal inundation
- 443 hectares of estuarine vegetation / habitat achieved

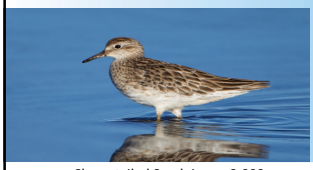
The achievements - Mosquito populations

- Mosquito populations responded as predicted
- Freshwater mosquitos have decreased
- Saltwater mosquitos have increased
- Populations of all species now consistent with other estuarine wetlands in Hunter River Estuary

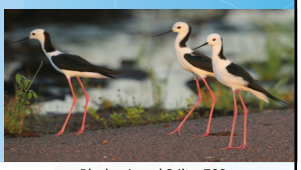


The achievements - Bird populations

- Total of 131 bird species 2015-16 surveys
- 9 migratory shorebirds covered by International Agreements



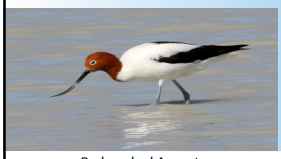
Sharp-tailed Sandpiper x 2,000



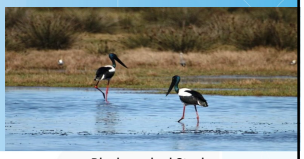
Black-winged Stilt x 700

The achievements - Bird populations

- 9 threatened species Cwth and NSW legislation
- Black-necked Stork – observed for first time in 30 years (2012); 2 x juveniles with adults in 2015



Red-necked Avocet



Black-necked Stork

The achievements - Fish and prawn populations

- Eastern King Prawns - 231 times more
- School Prawns - 98 times more
- Yellowfin Bream - 91 times more
- Flat-tail Mullet - 34 times more
- 90% reduction in introduced Mosquitofish

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The End

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