

A Sunshine Coast case study Adapting regional models to develop tailored local catchment targets

27 February 2020



### Outline

- Sunshine Coast waterways & wetlands
- Environment & Liveability Strategy
- Overview of our catchment targets project
- Regional modelling => Catchment grades
- Supplementary modelling scenarios
- Synthesis & conclusions



# Sunshine Coast waterways & wetlands



### Sunshine Coast waterways and wetlands











### Our coastal catchments and waterways







# Sunshine Coast Environment & Liveability Strategy 2017



### **Environment and Liveability Strategy 2017**

#### Purpose

- Protect the natural environment
  the foundation for our way of life
- Manage our natural and built environments in an integrated way
- Respond to key regional challenges and opportunities





#### **Planning for change**

- Population growth
- Climate change
- Economic growth
- Technological innovation







#### Integrated structure – 3 interdependent sections



THE NATURAL ENVIRONMENT

focuses on the need to preserve and enhance our natural environment, while supporting opportunities for the community to benefit sustainably from the associated products and ecosystem services.

#### Themes:

Landscape and Character - - - Biodiversity I Waterways and Wetlands



focuses on the built
environment and in particular
growth management,
liveability and the sustainable
design of our neighbourhoods,
dwellings and open spaces.

#### Themes:

Open Space I Flooding and Stormwater I Neighbourhoods and Housing I Social Infrastructure I Sustainable Design



focuses on the tools that will equip us to live within the natural and built environments to build resilience and liveability through sustainable, adaptable and affordable living practices.

#### Themes:

Energy and Resources I Sustainable Living I Adaptation and Resilience



# Waterways and Wetlands

#### Outcome 2041:

Waterways and wetlands are healthy, resilient to change and valued by the community.

#### Target:

Maintain and improve the ecological health of waterways and wetlands across each of the river catchments to a good or excellent grade by 2041.

#### **Policy positions**

- Natural waterways and wetlands are preserved and enhanced to support healthy and diverse aquatic habitats and species
- Constructed waterbodies are minimised and managed efficiently to provide social and economic outcomes and preserve environmental values
- Waterways and wetlands are valued, respected and used sustainably to support our lifestyle, livelihoods and sense of place





# Sunshine Coast catchments: "Good to Excellent grades"



#### Healthy Land & Water Environmental condition grades

- Freshwater communities & processes 20%
- Estuarine water quality 20%
- Estuarine habitat 20%
- Freshwater habitat 20%
- Pollutant loads 20%



#### Enviromental Condition Grade





#### **Component studies**

Aug 2017



- Concept study
- => Link management options to Report Card grades
- Regional scenarios
  - => Report Card grades from state modelling project
- Locally refined scenarios

Sep 2018

- => Modelling of loads
   & water quality
- Synthesis report
- => Achievable grades
   & key management strategies



#### Mind map - links between management actions and Report Card changes

			Relative potential influence of generic action on Healthy Waterways Report Card indicators (See notes in red below)														
			1.Freshwater biophysical				2.F/w habl 3.Estuarine water quality					4.Estuarine habitat				5.Pollutant loads	
Group	Generic Action (relevant to report oard indicators)	Outcomes (relevant to RC indicators) (non-RC indicators grey)	1.Fish	1.Macro-invertebrate	1.Water quality	1.Ecosystem proces	2.Riparian habitat	3.Turbidity	3.Chlorophylka	3.Nitrogen	3.Phosphorus	3.Dissolved oxygen	4.Mangrove habitat	4.Casuarina habitat	4. Sattmarsh habitat	5.Sediment load	5.N,P loads
1.Fauna management	<ol> <li>Education and regulatory programs to maintain/improve native fish abundance and diversity</li> </ol>	Improve native fish communities	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.Habitat protection	<ol><li>Education and regulatory programs to protect instream habitats</li></ol>	Preserve estuarine habitat areas; Preserve freshwater instream habitats	2	2	2	2	1	1	0	0	0	0	2	2	2	1	0
	<ol> <li>Regulatory, education and incentive programs to protect riparian and wetland habitat areas</li> </ol>	Preserve riparian and wetland habitat areas	2	2	2	2	2	1	0	1	1	0	1	1	1	1	1
	<ol> <li>Regulatory, education and incentive programs to protect oatohment habitats</li> </ol>	Preserve catchment habitat areas	0	0	0	0	1	1	0	1	1	0	0	0	0	2	2
	<ol> <li>Public land purchases or tenure mechanisms to preserve or rehabilitate catchment and riparian habitats</li> </ol>	Preserve catchment vegetation; Preserve riparian habitats	1	1	1	1	2	1	0	1	1	0	1	1	1	2	2
	2.5.Planning and regulatory programs for sustainable environmental flows and groundwater reserves	Preserve freshwater flows; Preserve groundwater resources	2	2	2	2	1	0	1	0	0	1	0	0	0	0	0
3.Habitat restoration	<ol> <li>Rehabilitation and maintenance programs to improve and preserve instream habitats</li> </ol>	Restore estuarine habitat areas; Restore freshwater habitat areas	2	1	1	1	1	2	0	0	0	0	3	3	3	2	0
	3.2. Rehabilitation, maintenance and offset programs for riparian and wetland habitats	Restore riparian and wetland habitat areas	2	2	2	2	3	1	1	1	1	1	1	1	1	2	2
1.5	3.3.Hehabilitation, maintenance and offset programs for catchment habitats	Restore catchment habitat areas	0	0	0	0	1	1	0	1	1	0	0	0	0	2	2
4. Hural impact mitigation	4.1.Education and extension programs to reduce pollutant     loads from rural lands and roads	Reduce N,P export; Reduce sediment export	0	0	1	1	0	2	2	3	3	2	0	0	0	3	3
	9.2.Education and regulatory programs to minimise pollutant     loads from onsite wastewater systems and vessels     40.P	Heduce N,P export; Heduce organic export; Heduce pathogen export	0	0	0	0	0	0	0	1	1	0	0	0	0	2	2
<b>5</b> 111	<ol> <li>A. S. Hevegetation and engineering projects to reduce landslips and stream channel erosion</li> </ol>	Reduce sediment export; Preserve freshwater instream habitats	1	1	1	1	2	2	0	0	0	0	0	0	0	2	0
5.Urban impact mitigation	<ol> <li>Leducation and regulatory programs to improve construction practices for new developments and public infrastructure</li> <li>E.2.E.4.e.for and evelopments and public infrastructure</li> </ol>	Minimise sediment export; Minimise acid export	1	1	1	1	0	3	0	1	1	0	0	0	0	3	1
	5.2.Education and regulatory programs to improve w SUD practices in new developments and construction 5.2.Education equal to a substructive according to 5.2.Education equal to a substructive according to 5.2.Education and regulatory according to the substructive according to 5.2.Education and regulatory according to the substructive according to 5.2.Education and regulatory according to the substructive according to the	hydrology impacts	1	1	1	1	1	2	1	2	2	1	1	1	1	2	2
	reduce pollutant loads from infinistructure programs to	Reduce organic pollutant export; Reduce toxicant export	1	1	1	1	0	1	1	1	1	1	0	0	0	1	1
	5.4. Planning and intrastructure programs to protect and improve stormwater quality and flows and infiltration in urban	Heauloe IV,P export; Heauloe seatiment export; Milnimise hydrology impacts; Reduce toxicant export Reduce N Research Reduce seating all seat surgery Reduce	1	1	1	1	0	2	1	2	2	1	0	0	0	2	2
<u> </u>	<ul> <li>D. D. Hegulatory, infrastructure and re-use programs to minimise pollutant loads from wastewater network and discharges</li> </ul>	requee v., export; reduce organic pollutant export; Heduce toxicant export; Reduce pathogen export	0	0	0	0	0	1	2	3	3	2	0	0	0	1	3
o.n/a	o. I.nra	liid														<u> </u>	
			voices on potential errect ratings - taking into account feasible scale of actions     0 = no expected effect on report card indicator     1 = supports maintaining indicator or potential indirect/localised improvement     2 = important to maintain indicator or potential direct improvement														
			3 = potential notable and catchment-scale improvement to indicator														



# SEQ target loads modelling: Calculating report card grades



#### **Overview of EHP project**

#### **Methods**

- Source models
   => flows & TSS, TN, TP loads
- Linked to TUFLOW FV AED models
   => Turb, TN, TP, Chl-a, DO concentrations
- 14 SEQ catchments/receiving waterways

#### **Scenarios**

- 1. Current/baseline (2015)
- 2. BAU 2030
- 3. Full investment 2030
- 4. Partial investment (priority sub/cmts)
- 5. Partial investment (priority land uses)





#### **Partial investment – our catchments**





#### **Results – loads by catchment**

#### Maroochy



#### Figure 3-1 TSS catchment loads applied to the Maroochy receiving model



Figure 3-2 TN catchment loads applied to the Maroochy receiving model



Figure 3-3 TP catchment loads applied to the Maroochy receiving model



Mooloolah

Figure 3-9 TSS catchment loads applied to the Mooloolah receiving model



Figure 3-10 TN catchment loads applied to the Mooloolah receiving model



Figure 3-11 TP catchment loads applied to the Mooloolah receiving model

#### Pumicestone



#### Figure 3-17 TSS catchment loads applied to the Pumicestone receiving model

500 476 448 450 400 **a** 350 330 327 BASE 297 300 BAU Ĕ E FI 250 8 200 SCE LUF Z 150 100 50 0

Figure 3-18 TN catchment loads applied to the Pumicestone receiving model



Figure 3-19 TP catchment loads applied to the Pumicestone receiving model



# Sunshine Coast. Results – Maroochy River WQ









Figure 3-5 Comparison of TN medians across scenarios for Maroochy





#### Our value add

#### Calculating report card grades for each scenario





# Supplementary modelling – local scenarios



#### **Modelling methods**

- Same as SEQ study: Source ⇔ TUFLOW FV AED2
- By BMT and HARC (2019)







### **Changes from previous modelling**

#### Base data

- New urban areas added (>2012)
- New land-use in Beerwah area
   High-N horticulture

#### **Revised scenarios**

- Extended out to 2041 (from 2031)
- Medium/high urban infill areas modelled (BAU)
- 50% reduction of loads from High-N agriculture – Pumicestone
- 1-3m AHD rural lands => Wetlands
  - Maroochy











# Putting it all together...



### **Potential grades**

Scenario type	Maroochy	Mooloolah	Pumicestone			
Current	C to C+	C to C+	B- to B+			
Business as usual	D to C-	D to D+	D to B-			
Augmented BAU	C to C+	C to C+	B- to B+			
Stretch investment	C to B-	C to B-	B- to A-			
Maximum investment	B to A-	B- to B+	A-			



### **Catchment possibilities & priorities**

#### All catchments

- Augmented BAU
  - ~ increase investment in proportion to population growth

#### Maroochy

- B could be achieved...
- Priorities: Transition of low rural lands to conservation; Reduced rural pollutant loads; Reduced sewage loads

#### Mooloolah

- C (possibly B) could be achieved...
- Priorities: Beyond best-practice erosion & sediment control & water sensitive urban design

#### Pumicestone

- B (possibly A) could be achieved...
- Priorities: Beyond best-practice erosion & sediment control & water sensitive urban design; Reduced loads from high-N agriculture



## Thank you