



Nullaki (Wilson Inlet) – Overview of the modified sandbar opening decision framework

For more than 100 years the Nullaki (Wilson Inlet) sandbar has been breached (manually opened) to prevent flooding of low-lying areas in the catchment. Following the non-opening in the dry year of 2007, a review of the sandbar opening protocol was completed resulting in an updated protocol.

Since 2007, there have been three more years when the sandbar remained closed, affecting the inlet's ecology. As a result, we have reviewed the current sandbar opening protocol, as one tool in the management of the inlet's health in the context of climate change. In this document we summarise a decision framework for opening the sandbar at water levels lower than 0.7 metres Australian Height Datum (mAHD).

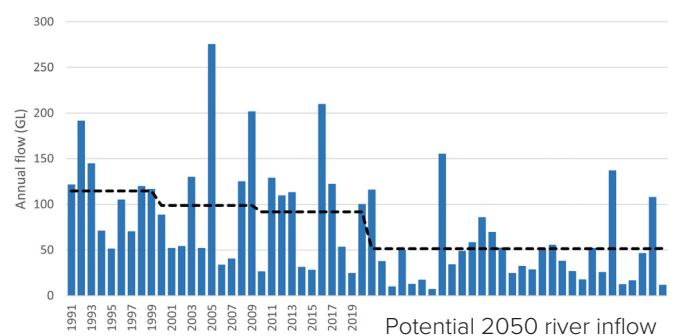
Protection of the rivers, inlet, wetlands, fringing vegetation and entire catchment area is considered essential to protect Noongar values related to water. Local Elders explain:

“That whole inlet and the surrounds is the cultural landscape” and “The preservation of cultural values at [Nullaki] Wilson Inlet is dependent upon maintaining ecological values”

The modified approach for sandbar opening respects these values and aims to preserve and improve the inlet's ecological health.

Future climate predictions

Climate models predict that because of decreased rainfall and increased temperatures, river flow into the inlet will decrease by about 50 per cent over the next 30 years. Under the current sandbar opening protocol, this would likely result in the sandbar being opened on average only once every three years.



As a result, we reviewed the conditions required to open the sandbar to better manage risks to the inlet's ecology.

Modified approach

When flooding occurs, the sandbar must be breached to comply with the *Water Services Act 2012*. When flooding does not necessitate the opening of the sandbar, the decision on whether or not to open the sandbar and the timing of any opening should be based on the best outcome for the inlet's ecology. The modified approach provides more flexibility on when and at what water level the bar can be opened.

In summary:

- The bar will be opened to mitigate flooding.
- Bar opening decisions aim to minimise ecological risks.
- Bar openings can now occur if the water level is above 0.5 metres Australian Height Datum (mAHD).
- There is no time restriction on when the bar can be breached.
- Consecutive non-openings are to be avoided.

Decision framework

Water level	Bar management	Considerations
Higher than 0.7 mAHD	Breach the sandbar	Timing of breach will be determined by considering flooding and conditions for channel formation.
Between 0.5 and 0.7 mAHD	Breach or do not breach	Whether and when the sandbar will be breached will be determined by assessing the ecological risks using the framework.
Lower than 0.5 mAHD	Do not breach the sandbar*	Breaching would be considered under unusual circumstances, for example to prevent consecutive non-openings.

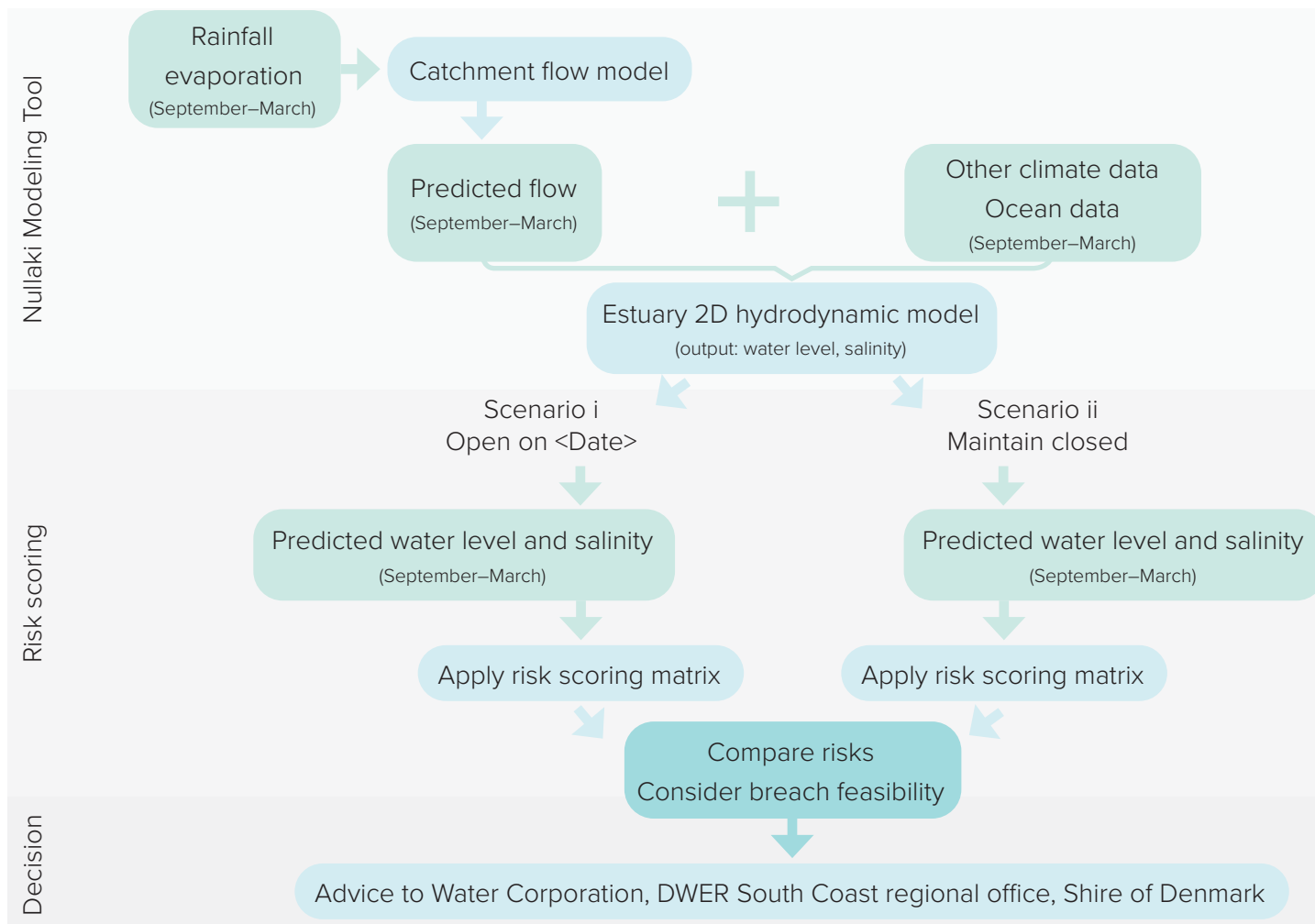
*If maximum water level is lower than 0.5 mAHD, risks to water level dependent ecological components have been identified to be low.

The determination of risks and examples of how they will be applied will be presented in detail in a technical report on the Nullaki (Wilson Inlet) sandbar opening decision framework, expected to be published in 2023.

To use the sandbar opening decision framework, we need to be able to predict the water level and salinity of the inlet from September to March. The Department of Water and Environmental Regulation is developing the Nullaki (Wilson Inlet) Modelling Tool that uses catchment and estuary models combined with forecast meteorological and ocean data to estimate water levels and salinity. The forecast inlet water levels and salinities will then be used with the risk scoring matrix to determine the better bar management option – open or maintain closed.

When the bar is not opened, it is recommended that the decision framework is applied weekly until winter inflows are substantially reduced (about the end of October).

Short opening duration may require additional risk assessment to determine if a subsequent opening should be attempted, as spring–summer rain could lead to unfavourable inlet conditions the following summer – autumn. Similarly, an unseasonal rainfall event that produces large inflows might also invoke a risk assessment.



Risk scoring matrix

The matrix summarises the risks to five ecological components and social amenity of the inlet:

- water quality
- seagrass
- fringing vegetation
- fish and shellfish
- shorebirds
- Prawn Rock Channel (amenity).

The risk to each ecological component is considered for six potential inlet conditions:

1. A bar breach before 7 September at a water level of 0.7 mAHD** or greater that results in a long duration opening
2. A bar breach before 7 September at a water level greater than 0.7 mAHD that results in a short duration opening
3. A bar breach before 7 September at a water level less than 0.7 mAHD, with the assumption that a short duration opening occurs
4. A bar breach after 7 September, with the assumption that a short duration opening occurs
5. Non-opening
6. Consecutive non-openings.

** 7 September and 0.7m AHD are the criteria from the current sandbar opening protocol (2009)

Legend



Scenario		1. Open before 7 Sept; Long opening	2 & 3. Open before 7 Sept; Short opening	4. Open after 7 Sept; Short opening	5. Do not open	6. Consecutive non- openings
Water quality	Nutrient availability					
	Phytoplankton activity					
	Harmful algal blooms					
Seagrass	Self-shading Month breached			 Sept Oct-Nov Dec-Apr		
	Seagrass desiccation Water level (mAHD)		 >0.4 mAHD	 between -0.4 and -0.5 mAHD	 <-0.5 mAHD	
	Seagrass health					
Vegetation	Fringing vegetation Water level (mAHD)		 >0.3 mAHD for ≥110 days	 >0.3 mAHD for ≥21 days in Dec to Apr	 otherwise	
Fish & shellfish	Commercial fishery					
	Recreational fishery					
	Blue mussels Autumn salinity (ppt)		 > 25ppt	 between 20 and 25 ppt	 <20 ppt	
	Lamprey					
Birds	Shorebirds Water level in February (mAHD)		 <-0.1 mAHD	 between -0.1 and 0.1 mAHD	 >0.1 mAHD	
Prawn Rock Channel	Prawn Rock Channel Amenity					



Alongside the *Water Quality Improvement Plan* currently being developed for Nullaki (Wilson Inlet), the *Sandbar Opening Decision Framework* aims to improve the inlet's condition and health, supporting the inlet's Aboriginal heritage. Continued stakeholder input to the management of the inlet is essential and appreciated.

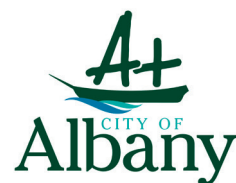
Thanks to:

- Wilson Inlet Catchment Committee
- Pibulmun and Menang-Noongar Elders and leaders
- Wilson Inlet Restoration Group
- Denmark Bird Group
- Denmark Environment Centre
- Green Skills
- Estuarine fishers
- Wilson Inlet Seafood/Aquaculture
- Denmark Chamber of Commerce
- Denmark Surf Life Saving Club
- South Coast Bushcare Services (SCBS)
- Denmark Riverside Club Inc.
- Denmark Dragon Boat Club
- Denmark Residents & Ratepayers Association
- The broader community.

Nullaki sandbar management working group:



Department of **Water and Environmental Regulation**
 Department of **Primary Industries and Regional Development**
 Department of **Biodiversity, Conservation and Attractions**



Nullaki (Wilson Inlet) sandbar opening protocol 2022

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