



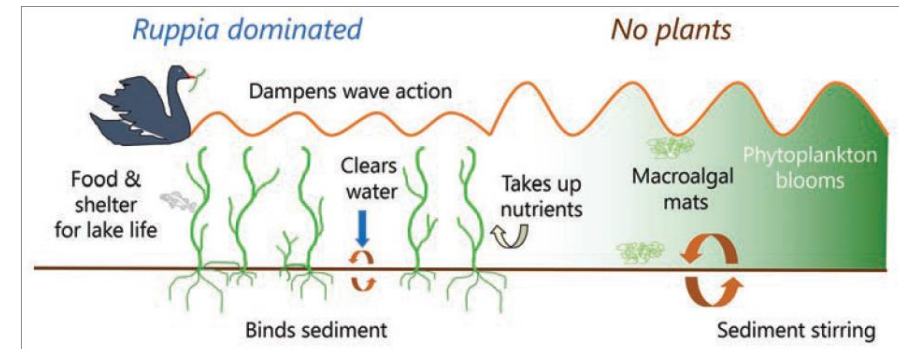
# Vegetation Status in Waituna Lagoon: Summer 2021

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NIWA monitoring results

# Why monitor Ruppia populations?

- There are two species of aquatic plant, known as Ruppia, that exist in Waituna Lagoon. *R. megacarpa* & *R. polycarpa*
- Ruppia tolerate fluctuating levels of salt water in the lagoon but are not found in the sea
- When Ruppia grows densely it protects water quality, dampens wave action and stops the bed being stirred up.
- If the Ruppia populations become too stressed they can collapse and the lagoon will enter a new, dirty water state with high resuspended sediment and algae blooms instead of plants.
- Ruppia is the key indicator of lagoon ecosystem health





# What impacts Ruppia populations?

- High amounts of nutrient and sediment entering the lagoon - increases macroalgae that can contribute to collapse of ruppia population
  - Frequency and timing of lagoon openings – spring/summer openings are detrimental to ruppia growth
  - Low lagoon water levels – reduce available habitat and increase sedimentation and wave action, reducing growth
  - High lagoon water levels (>2.5m) – reduces the amount of light available for plants to grow
  - Maintaining ecosystem health relies on fluctuating opening/closing of the lagoon and on the maintenance of intermittent esturine and freshwater conditions
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# What is monitored?

- There are six ecological targets for ruppia in Waituna Lagoon
  - Lagoon closed during ruppia growing season (spring/summer)
  - >30-60% cover of Ruppia across the 48 monitoring sites (on average)
  - <10% cover of macroalgae
  - >1000 average for ruppia 'biomass index' (% cover x height)
  - >40% of ruppia samples in flowering or post-flowering life-stage
  - >20% of the sites record ruppia megacarpa



# Results from 2021

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Ecological target	Targets met?	Comment
Lagoon closure	✘	Lagoon was open for the entire <i>Ruppia</i> growing season.
<i>Ruppia</i> cover	✘	Lagoon-wide <i>Ruppia</i> cover was only 1/10 <sup>th</sup> of the target (>30% cover).
<i>Ruppia</i> biomass index	✘	<i>Ruppia</i> biomass index was only 1/10 <sup>th</sup> of the target (>1000).
Macroalgae cover	✘	Macroalgae development exceeded the acceptable threshold of 10% cover.
<i>Ruppia</i> reproductive success	✘	Reproductive success was 1/10 <sup>th</sup> of the target (≥40% of samples flowered).
Status of <i>Ruppia megacarpa</i>	✘	<i>Ruppia megacarpa</i> was limited to 1/3 <sup>rd</sup> of the target sites (≥20% sites).

- No targets were met in 2021
- *Ruppia* was not found in over half of the lagoon area (south-western sector). This means recovery of *Ruppia* in these areas will be dependent on seed banks and their successful germination and establishment
- Recovery may not occur if there is insufficient seed bank, indicated by poor reproductive success seen in 2020 and 2021

# Ecological targets over all monitoring years

- Ecological targets for Waituna Lagoon are not met when lagoon opening occur over late spring/summer
- Two or more consecutive years of openings during the main growth period should be avoided so that ruppia can regenerate successfully
- At least two consecutive years of favourable closed lagoon appear to allow better ruppia development
- There are tradeoffs between stable closed lagoon for good ruppia development and risk of nutrient build up fueling macroalgae and phytoplankton blooms
- Ecological targets for lagoon-wide ruppia cover and biomass index are likely to be met when *Ruppia megacarpa* is more prevalent, due to its ability to form tall, high cover beds

Table 8: Summary of results for six ecological targets over all monitoring years. Darker rows indicate greater numbers of targets were met.

Year	Lagoon closure	<i>Ruppia</i> cover	<i>Ruppia</i> biomass index	Macroalgae cover	<i>Ruppia</i> reproductive success	Status of <i>Ruppia megacarpa</i>	Targets met
2009	✓	✗	✗	✓	✗	✗	2
2010	✓	✗	✗	✓	✗	✓	3
2011	✗	✗	✗	✓	✗	✗	1
2012	✓	✗	✗	✓	✓	✗	3
2013	✗	✗	✗	✗	✗	✗	0
2014	✗	✗	✗	✓	✗	✗	1
2015	✓	✗	✓	✗	✓	✗	3
2016	✓	✓	✓	✗	✓	✗	4
2017	✗	✗	✗	✗	✗	✗	0
2018	✓	✗	✓	✓	✓	✓	5
2019	✓	✓	✓	✗	✓	✓	5
2020	✗	✗	✗	✗	✗	✓	1
2021	✗	✗	✗	✗	✗	✗	0