Impact of ice on intertidal mussel beds

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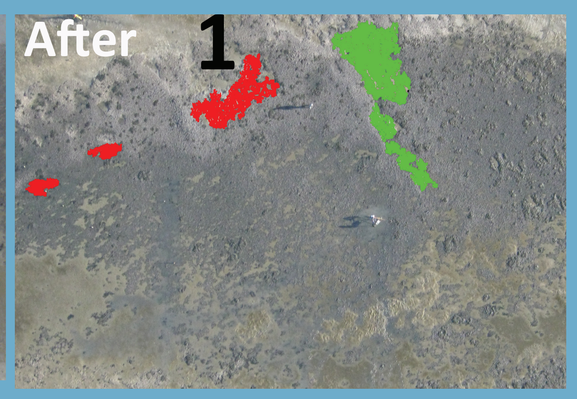
Background

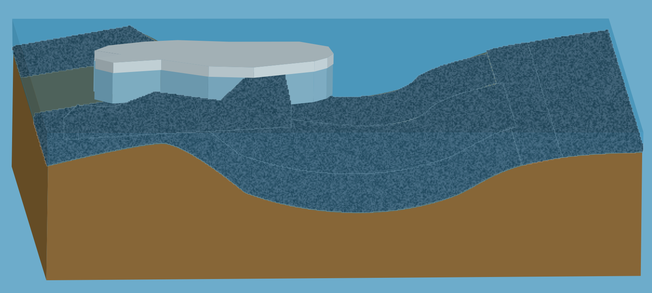
- After cold winters losses in mussel areal are observed.
- Drift tracks are found in mussel beds (a).
- Small holes are found inside the bed (a,b).
- Drift ice found with mussels frozen into it (b).
- This suggests 2 mechanisms play a role, Ice drift (a) and bouyancy(b).



Goal: determine which mechanism is most important, and which areas are most vulnerable

Mechanisms

a) Drift

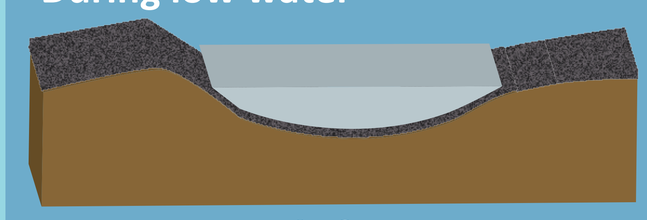


- Ice forced over mussel bed
- Forced by wind and ice

Leads to:
- Damage to higher areas
- Mussels are dispalced
- Drift tracks through bed

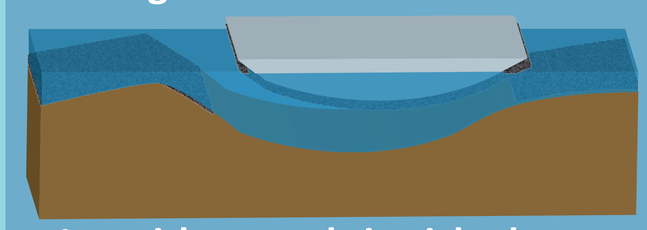
b) Bouyancy

During low water



- Water ponds freeze

During Flood



- Ice with mussels is picked up

Leads to:
- Damage to isolated lower areas
- Mussels in ice
- Small holes in bed

Method

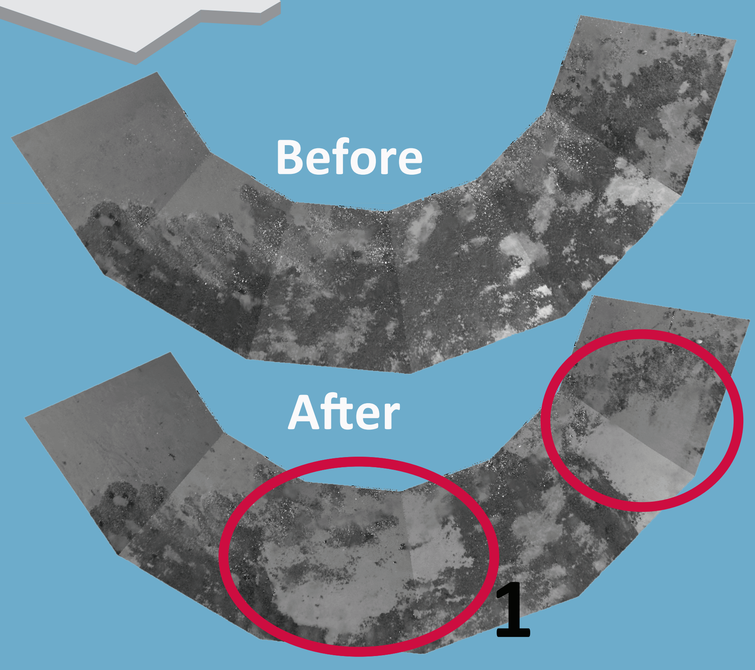
Determine which mechanism results in the most damage, and which areas are most exposed.

- Constant monitoring of bed to determine when losses occured.
  - Camera system
  - During winter 2011/2012

- Determine height variations
  - 3D laserscanner
  - DEM before measurements
  - Multiple DEMs after ice period.

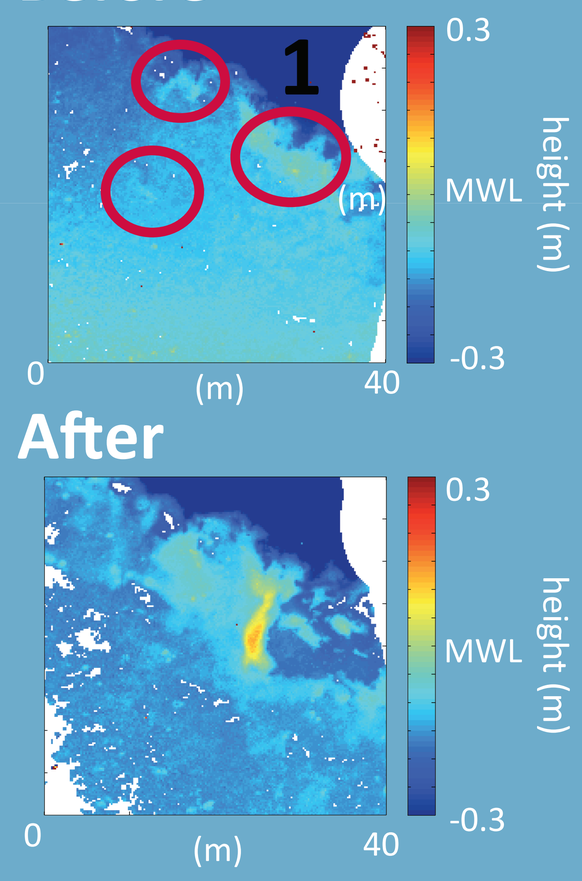
Also recovery of mussel bed from ice forcing is recorded.

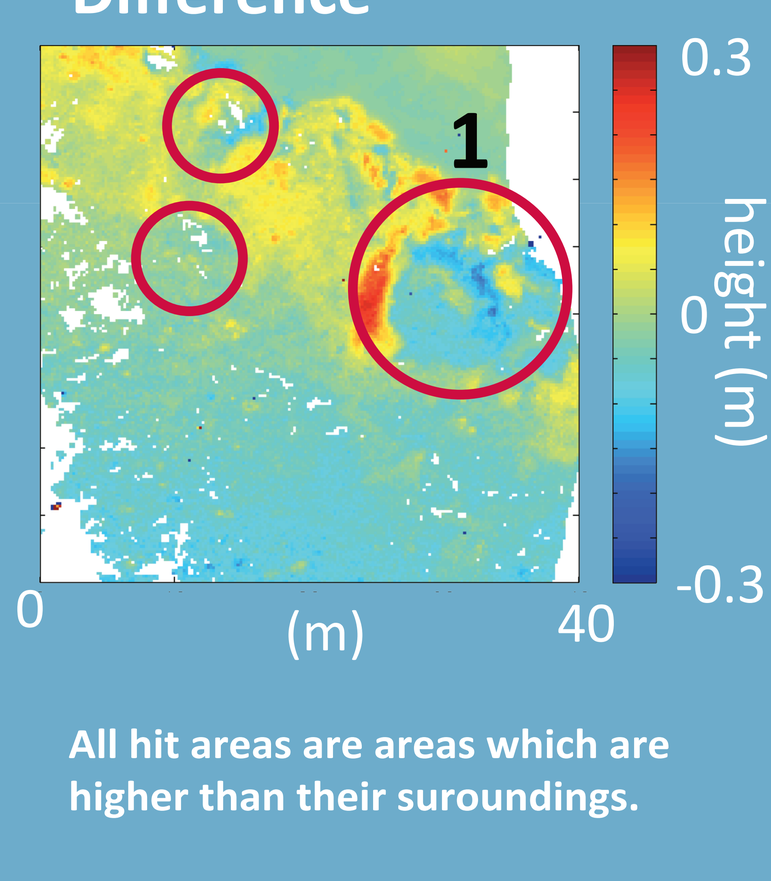
Results



- Calculations show that in areas with sufficient mussel cover:

Bouyancy force<< Mussel attachment strength





All hit areas are areas which are higher than their suroundings.

Conclusions

- Higher parts of the mussel bed are hit by ice drag.
- Mussel attachment strong enough to withstand bouyancy force.
- Ice drift mechanism causes most damage to mussel bed
- Mussel beds with more height variation more exposed to ice drag.

1= same area

MOSSELWAD
Project Mosselwad is funded by the Wadden Fund