Broads Angling Services Group

Maintaining the Broads Freshwater Environment

IFM Conference 22nd March 2023

BASG

Broads Angling Services Group

- Community Interest Company
- Broad Angling Strategy
- Skill Set
  - Fisheries Science
  - Strategic Management
  - Accountancy
  - Analytical Science
  - Data Collection
  - Naturalists
- Information and Data
  - 10,000's Hours on water
  - 1000's volunteer hours
  - Monitor Saline Incursion
  - Citizen Science network
- UK Largest Freshwater Fishery
  - 763 Hectares
  - Represent 1:5 Broads users
  - £120m per year
  - Angling Heritage

Salinity September 2022

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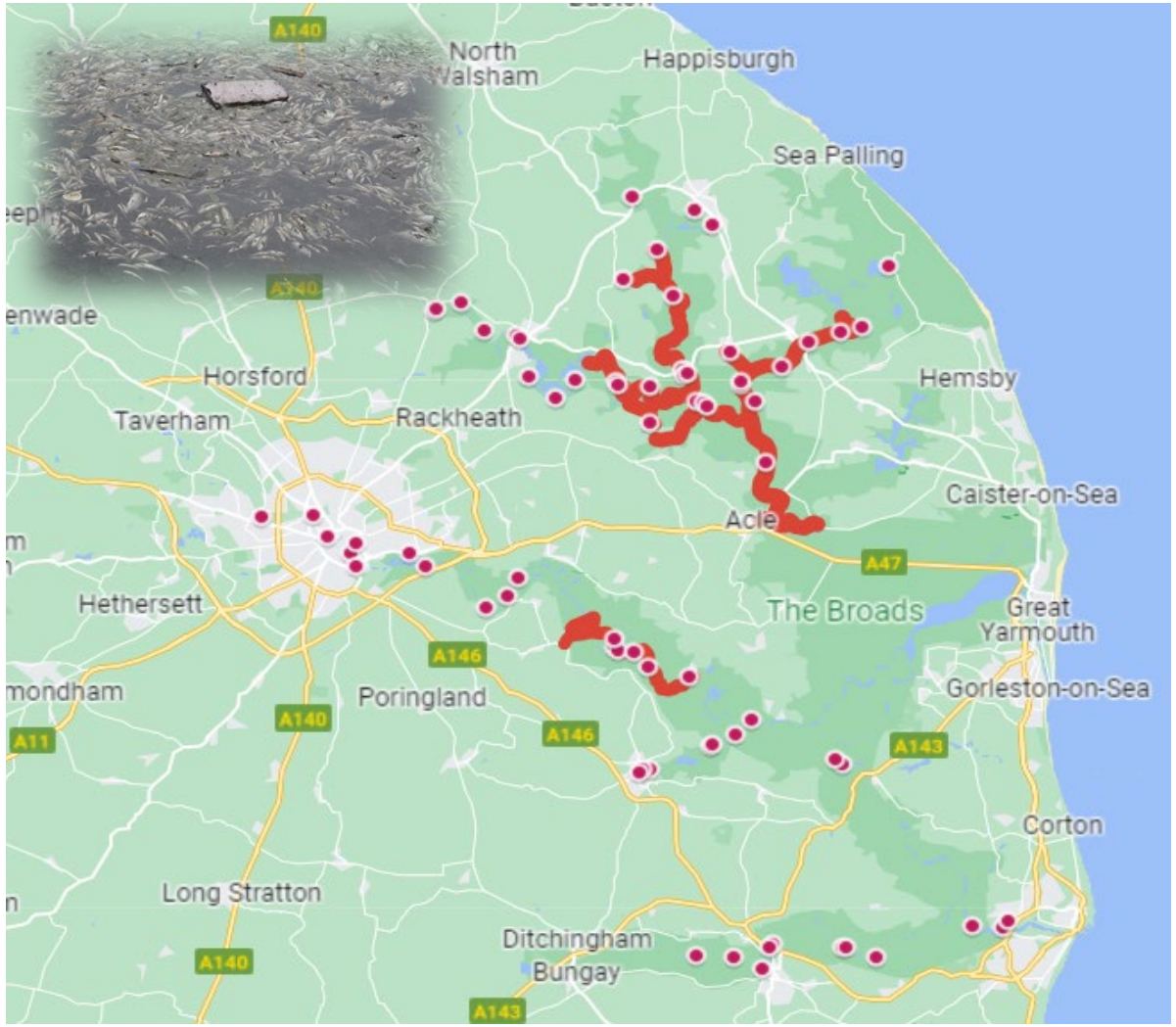

- Direct Connection to North Sea
  - No Barrier / lock system
  - Saline Incursion – Natural
  - In a heavily man modified environment?
- 2022 Drought Conditions
  - Reduced River Flows and Levels
  - Prolonged (14 days) and Deep (35km)
  - 53km of rivers
  - Worst since 1953?
- Citizen Data
  - 12000 - 40000 μScm^{-1}
  - Handheld, calibrated, multi depth
- LC50 (Gillis 2011)
  - Aquatic Bivalves from 200 μScm^{-1}
  - Daphnia 9,000 μScm^{-1}
  - Amphibia Larvae 12,000 μScm^{-1}
  - Pike 20,000 μScm^{-1} (Jacobsen 2007)
- Widespread Effect on FW System
  - 1 Million + Fish
  - Widespread reports of swan mussels
  - Reducing in aquatic insects

Maintaining the Freshwater Ecosystem

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- Long-term future Broads Undecided
  - BFI 50 -100 year Flood Models
  - Will the Broads remain Freshwater?
  - What percentage?
  - For How Long?
- Medium Term Adaption
  - Without the decision is made for us
- £500m Socio economics
  - Tourism based in Freshwater Ecosystem
  - The Estuarine Areas have little value
  - 28 SSSI
  - Largest Protected Wetland
  - 1500 Species of Conservation Concern
- No Solution,
- No Data?

Analysis of Existing Broads Hydrology Data

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Environment Agency

Continuous monitoring data for the River Yare Cantley & Bure Acle 2016 to Jan 2023

This looks at the variance in river hydrology using level and salinity data and explores the impact of Breydon Water, acting as a natural defence to saline incursion.

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http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/
https://riverlevels.uk/river-bure-fleggburgh-acle-bridge-tidal

Continuous Broads Hydrology Data

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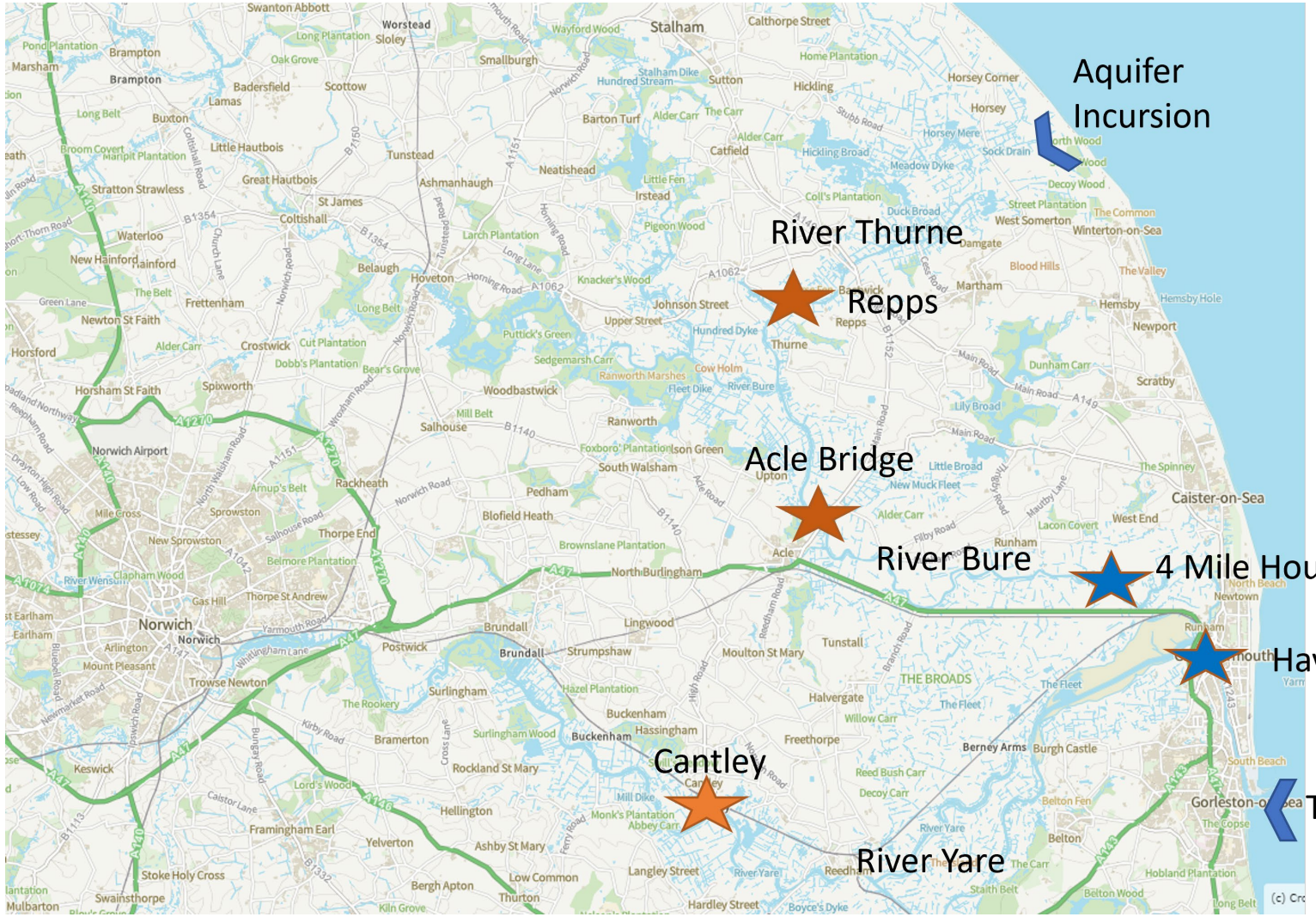

EA Combined Level and Salinity Logger 19km from Confluence

EA Level Logger

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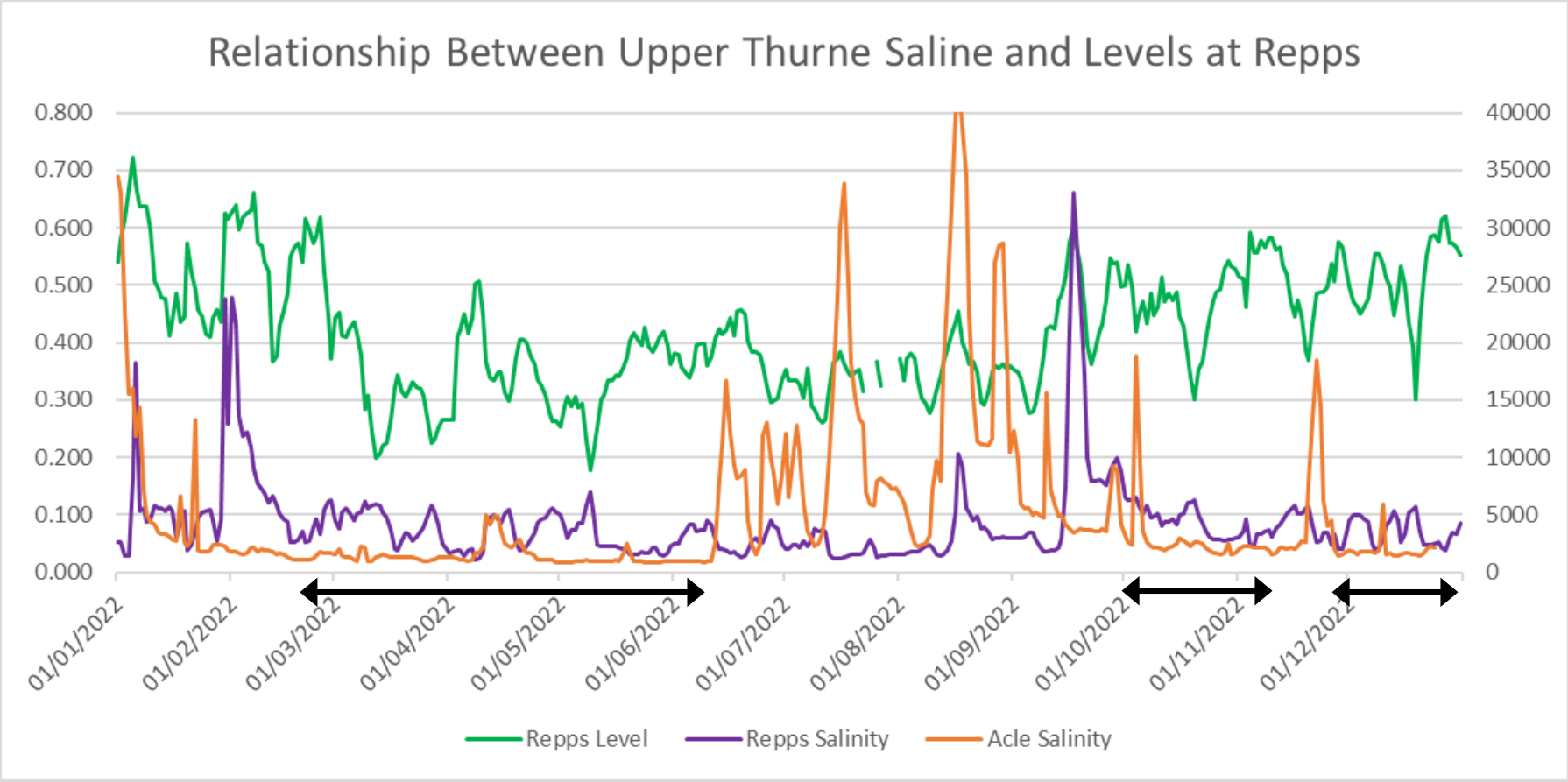

- Underlying upstream saline ingress very evident
- Low mean salinity levels Cantley 1985 μScm^{-1}
- Low mean salinity levels Acle 2378 μScm^{-1}
- Low mean salinity levels Repps 3521 μScm^{-1}
- 48% higher than Acle
- Salinity rises on seaward flow
- Aquifer Incursion never reaches lethal levels
- Threat comes from River Mouth

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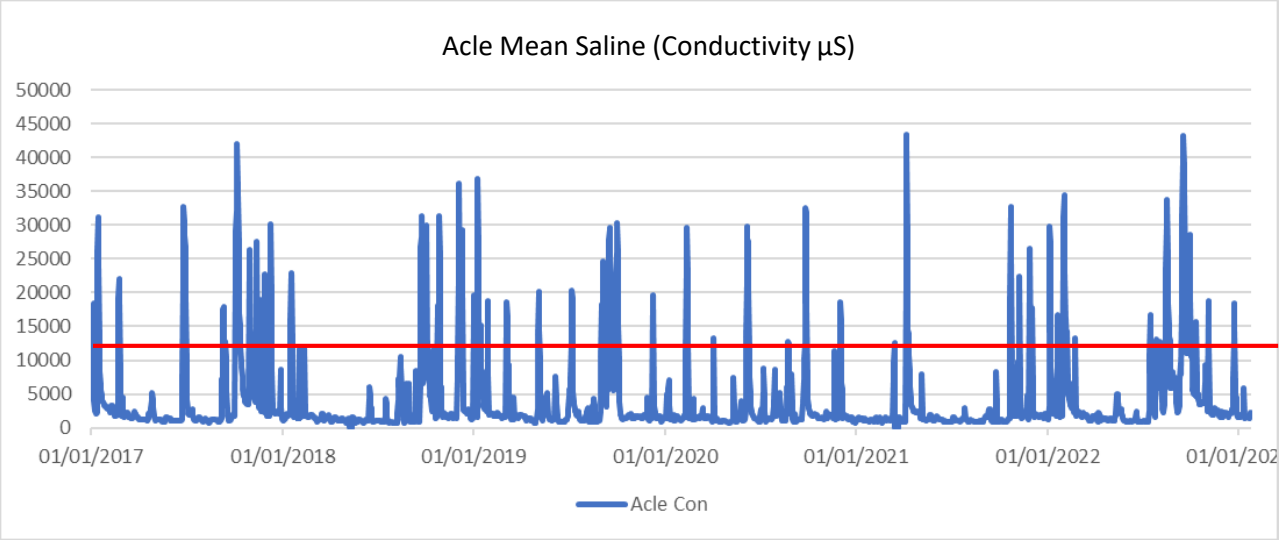
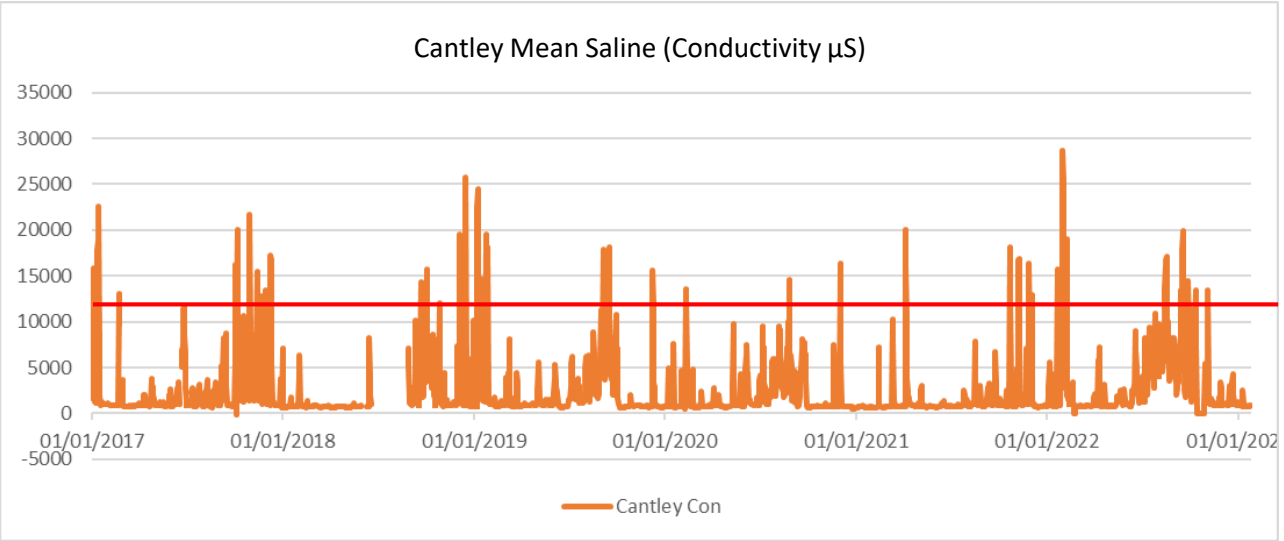


Saline Measures 2017-2023
Average Deviation 3696
86 Days > 20,000 µS mean
Equivalent to 4% of the time at Acle Bridge



Saline Measures 2017-2023
Average Deviation 2093
10 Days > 20,000 µS mean
Equivalent to 0.5% of the time at Cantley

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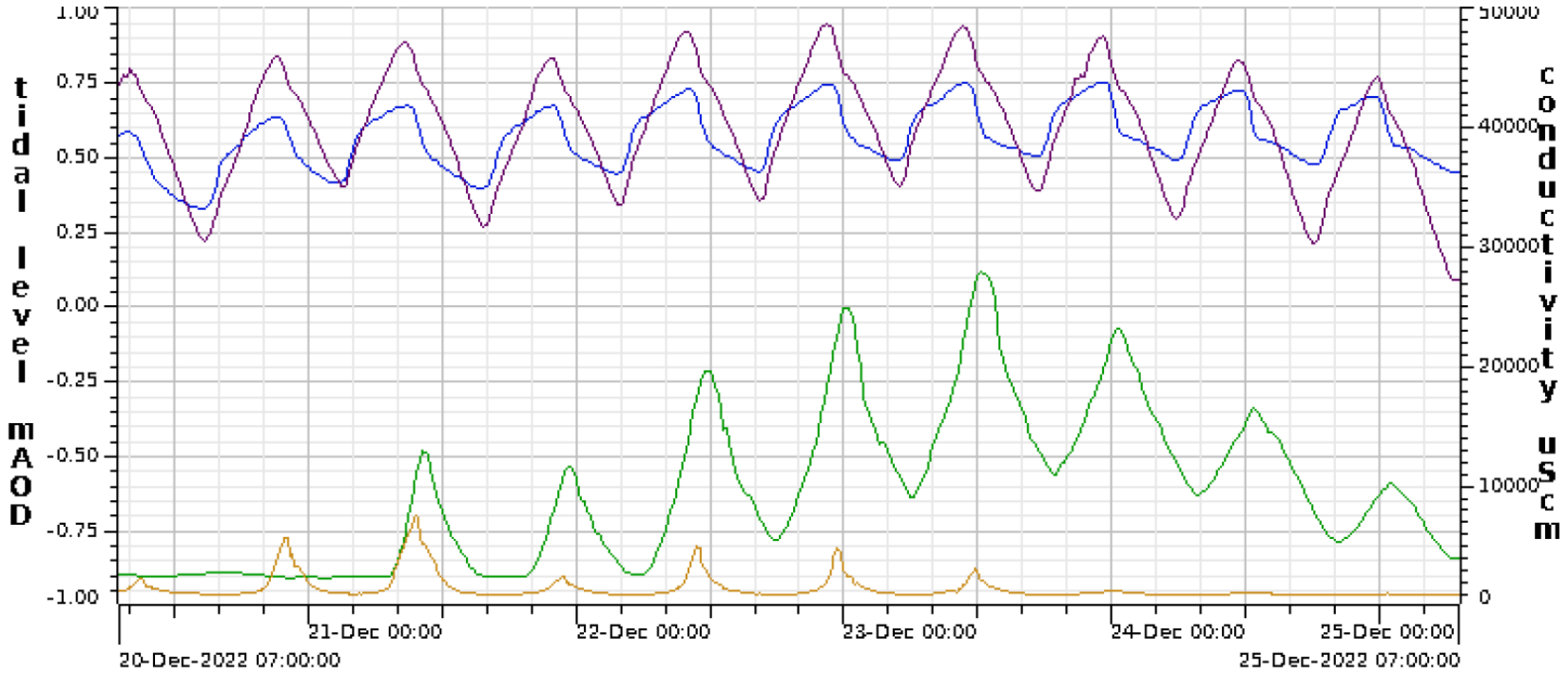
Chart showing salinity and tidal levels at Acle, Repps, Cantley .



Trend	Tag Name	Address	Value Axis
	ACLEBT TIDE LEVEL S	E23931	Left
	ACLEBT SALINITY	E23930	Right
	CANTLT TIDE LEVEL T	E23060	Left
	CANTLT SALINITY	E23061	Right

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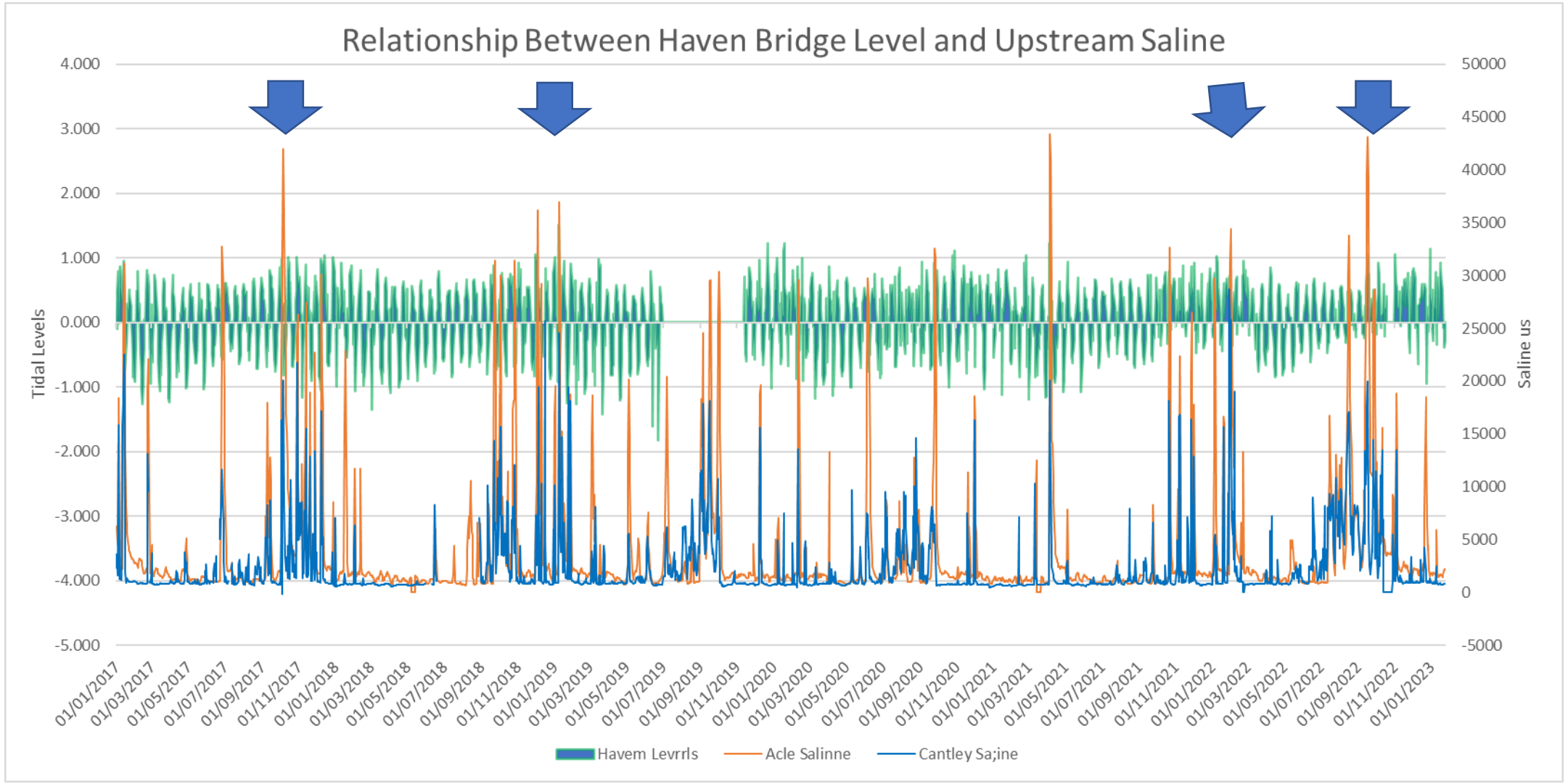

Lets look at 4 specific events

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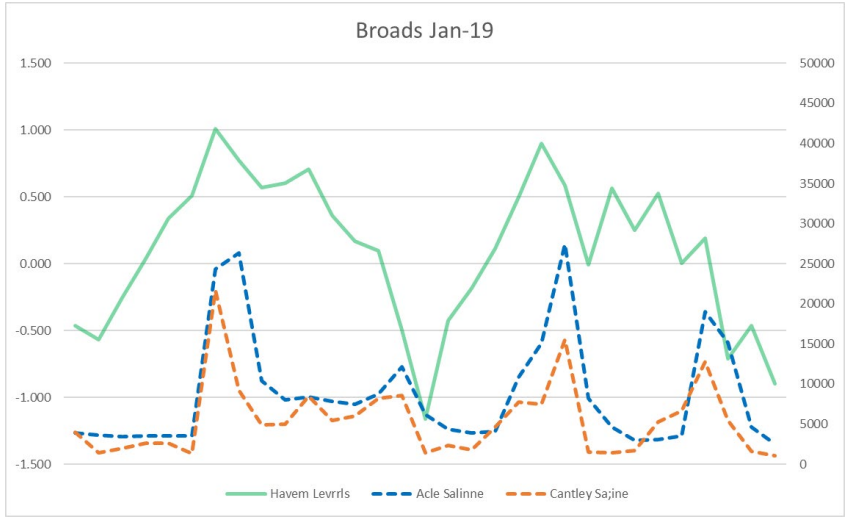

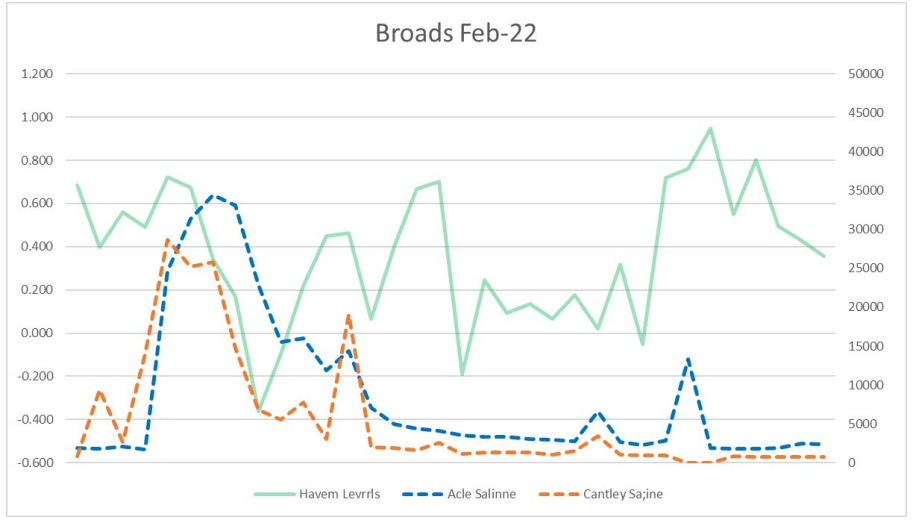

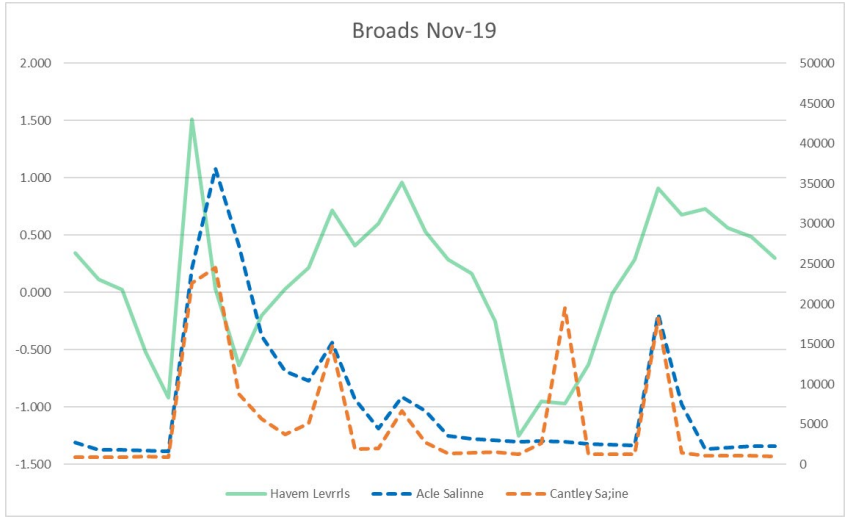

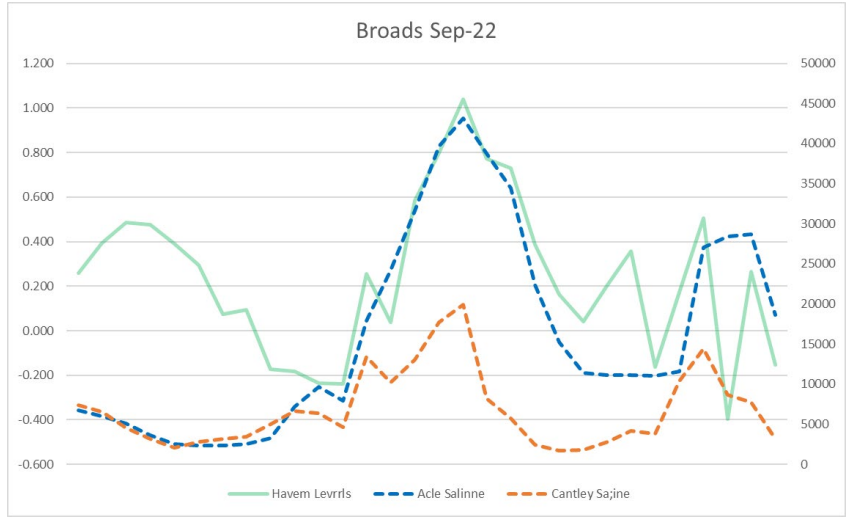

- Peak salinity ingress inked to Sea Levels at Great Yarmouth
- But clearly Acle is must more pronounced than Cantley
- Indeed 8:1 in terms of days at Lethal levels.
- What influence does Breydon Water have?
- Clearly its acting as a buffer Zone, slowing down saline ingress.

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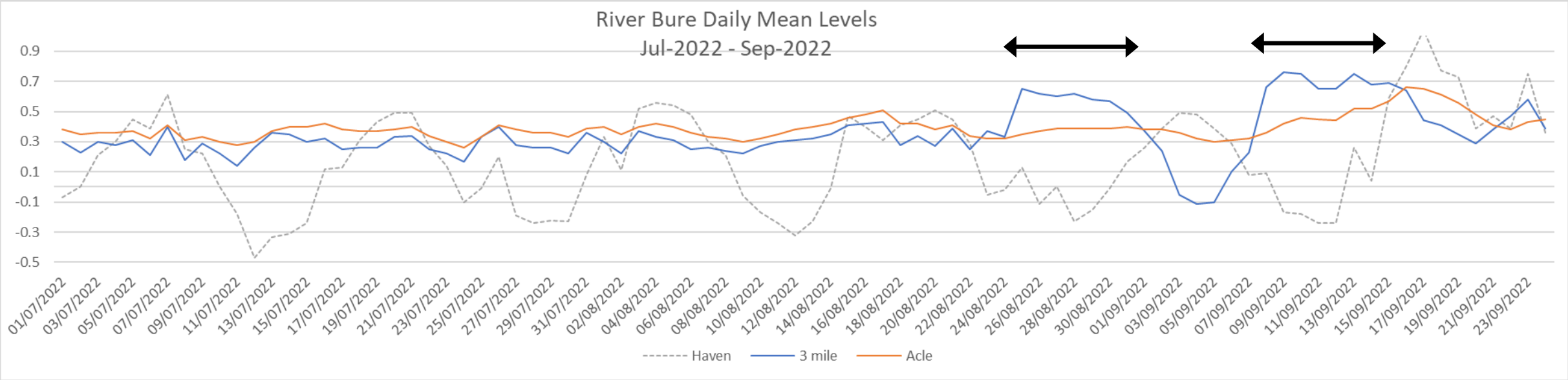

River Bure levels show a complex variance between the 16 kms channel between Haven Bridge and 4 Mile House and Acle.

Periods of tidal locking pronounced.

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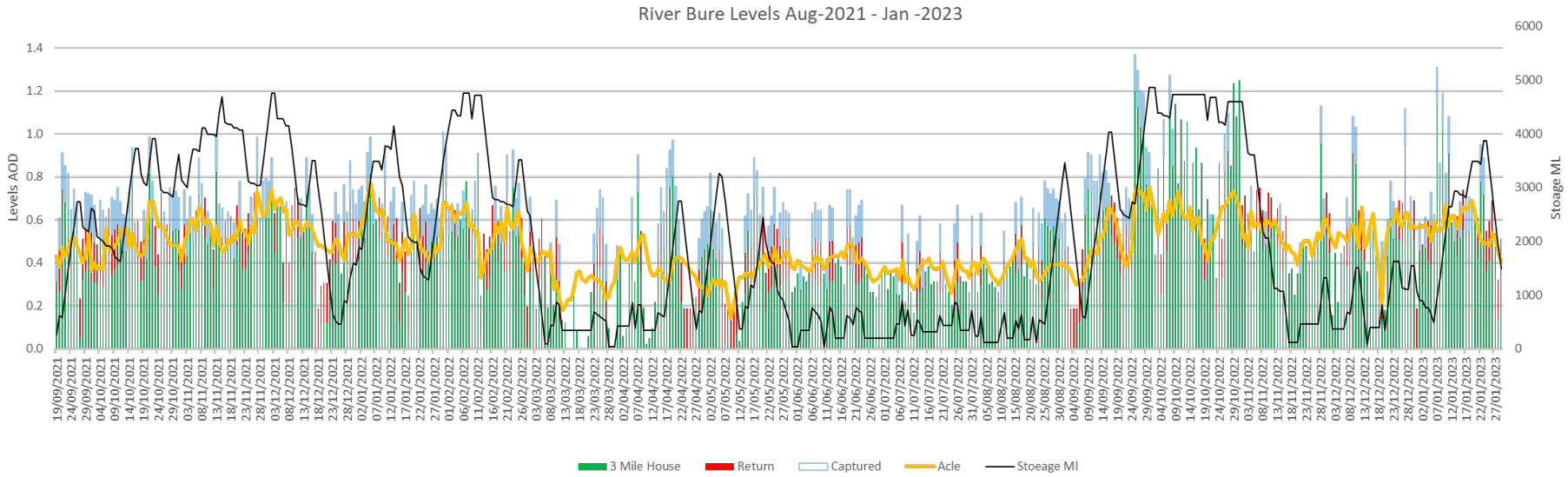
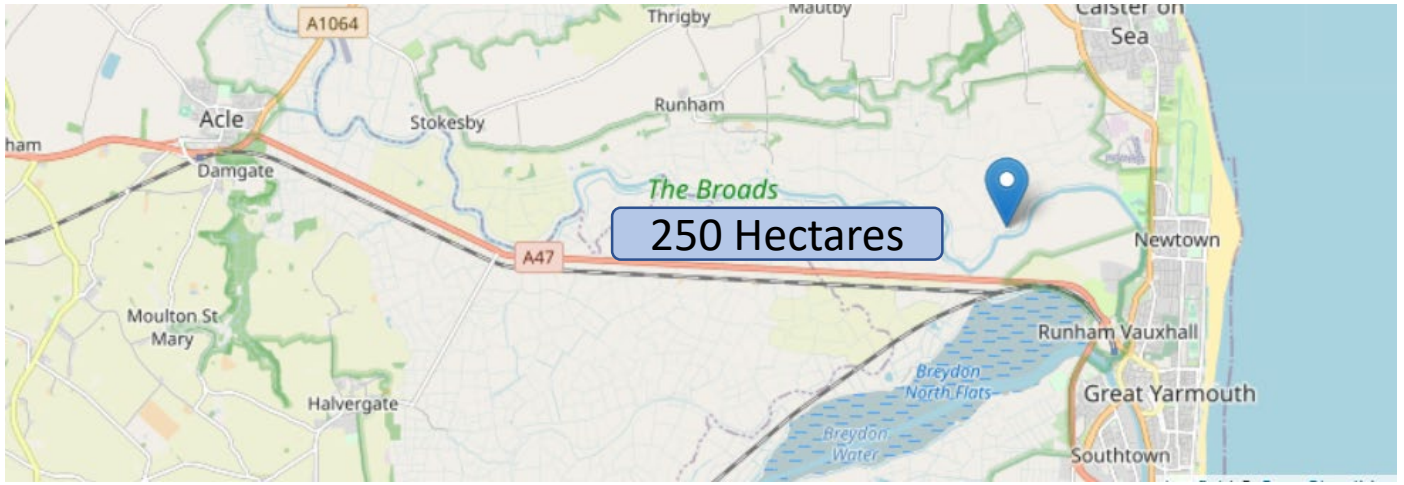


- Adaptation by introducing a 250 hectare floodplain as existed some 400 years previous, could be one solution.
- A model has been used to understand this, as shown in the above graph.
- This buffer would act like Breydon water on the River Yare



Conclusion

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- The highly modified and impounded River Bure channel has a significant influence on natural flows and resultant ability to transgress saline water from Great Yarmouth upstream.
- This is significant when climatic weather brings Southern North Sea levels to greater than 3.0m MSL or 1.5 OD.
- The ingress of salinity from the Upper Thurne is evident, but only at low levels
- Upper Thurne pumped water becomes impounded due to tidal locking
- Current data does evidence that more detailed analysis could drive outcomes and potential adaptation.
- Consumed by Data, lesson from Forefathers
- November Conference UEA