



Department of
Primary Industries and
Regional Development

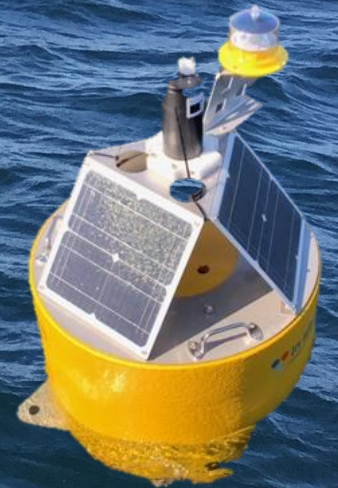


Department of
Primary Industries
Food Authority



Transforming Australian Shellfish Production

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Transforming Australian Shellfish Production



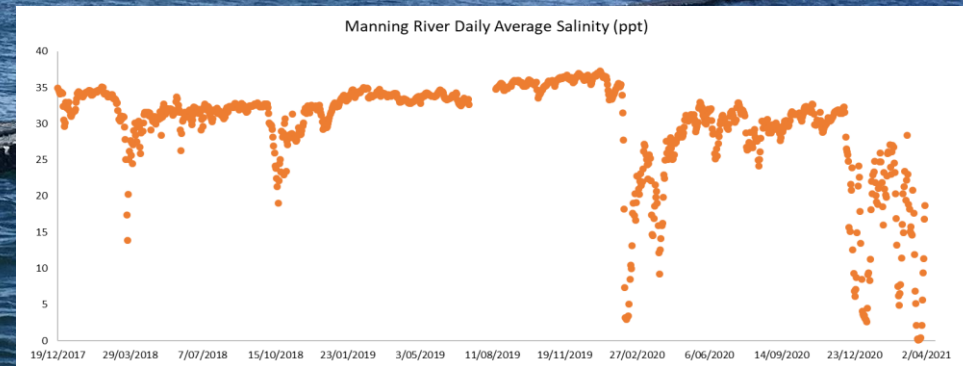
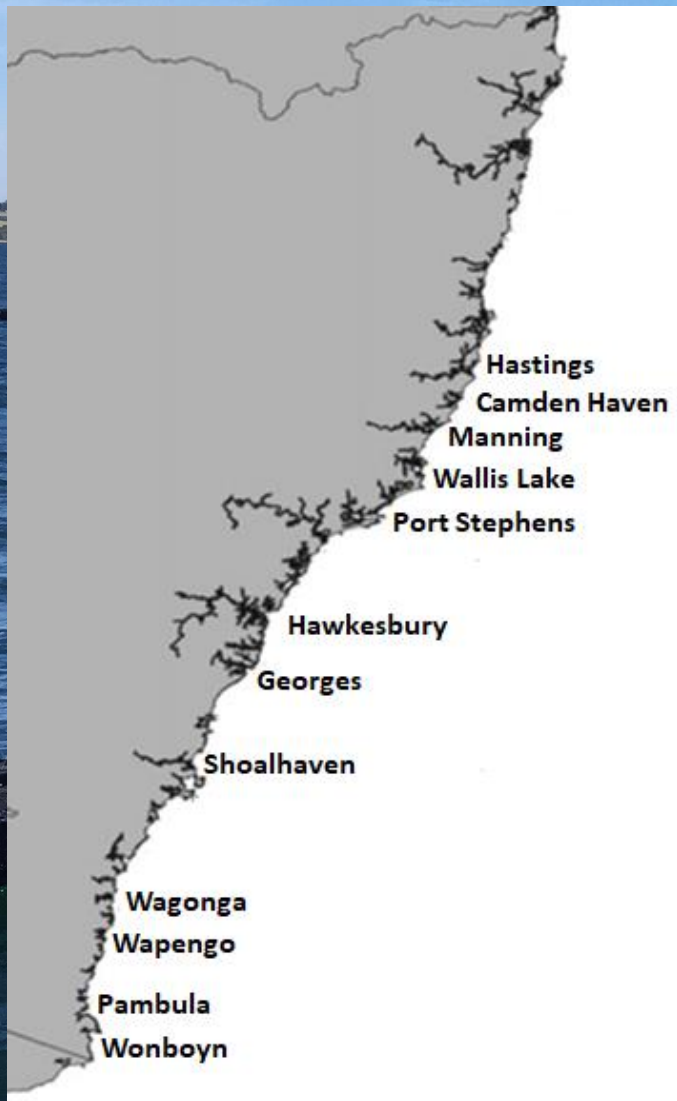
● Collaboration between industry, government and researchers

● Increase days available for oyster harvesting (real time sensing and molecular methods)

● Develop models for risk prediction

● Better informed and responsive management

Phase 1. 2017-2021



**Transforming
Australian
Shellfish
Production**



Phase 2. 2021-2024

1. Using backlog of environmental, biological and oyster samples, tailored reports and models are being delivered on an estuary by estuary basis
2. Two new NSW estuaries – Macleay River and Merimbula, and Oyster Harbour, Albany, Western Australia
3. Output of models embedded into oyster management apps and all data available online via eResearch @UTS.

Transforming Australian Shellfish Production



Results so far....

● 15 estuaries engaged in project (NSW and WA)

● 16 salinity-only management plans offered; six taken up and rest under consideration

● estimate ~\$3 million p.a. additional farm gate value in NSW if taken up state-wide

● qPCR assays designed for *E.coli* (bird, cow, human) and harmful algae (*Alexandrium*, *Pseudo-nitzschia*, *Dinophysis*, *Prorocentrum*)

Harvest Area Management Plans

Sensor Estuary (North to South)	Harvest area	Status
Hastings River	Lower Limeburners Creek	offered
Camden Haven	Gogleys Lagoon	pending review
Manning River	Pelican Point	adopted
Wallis Lake	Long Island (upstream)	offered
Port Stephens	Corrie	new sensor 2021
Port Stephens (DPI Fisheries Sensor)	Cromartys Bay	adopted
Hawkesbury River (HSC Sensor)	Coba Bay	adopted
Hawkesbury River (HSC Sensor)	Marramarra	adopted
Georges River	Quibray	offered
Shoalhaven/Crookhaven Rivers	Goodnight Island	offered
Clyde River (DPI Sensor)	Waterfall	offered
Clyde River (DPI Sensor)	Rocky Point	offered
Clyde River (DPI Sensor)	Moonlight	offered
Wagonga Inlet	Lower Honeymoon	offered
Wapengo Lake	Front Lake	adopted
Merimbula Lake	Top Lake	new sensor 2021
Pambula Lake	Pambula Lake	adopted
Wonboyn Lake	Wonboyn Lake A	offered
Wonboyn Lake	Wonboyn Lake B	offered



TRANSFORMING AUSTRALIAN SHELLFISH PRODUCTION

Pelican Point Harvest Area - Manning River

Report on Stage 1, December 2017-March 2021

A Food Agility CRC collaboration project partnering with the University of Technology Sydney and the New South Wales government.

Penelope Ajani, Mike Dove, Hazel Farrell, Wayne O'Connor, Matt Tesoriero, Arjun Verma, Anthony Zammit, Brian Hughes and Shauna Murray



TRANSFORMING AUSTRALIAN SHELLFISH PRODUCTION

Lower Honeymoon Bay Harvest Area - Wagonga Inlet

Report on Stage 1, December 2017-March 2021

A Food Agility CRC collaboration project partnering with the University of Technology Sydney and the New South Wales government.

Penelope Ajani, Mike Dove, Hazel Farrell, Wayne O'Connor, Matt Tesoriero, Arjun Verma, Anthony Zammit, Brian Hughes and Shauna Murray



MAJOR FINDINGS

8

Available data indicated that eight harvest area closures could have potentially been avoided between December 2017 and August 2021

75%

Salinity was a more reliable predictor than rainfall of faecal bacteria (3 out of 4 indicators tested), showing changed harvest area management would be safer and more discriminatory



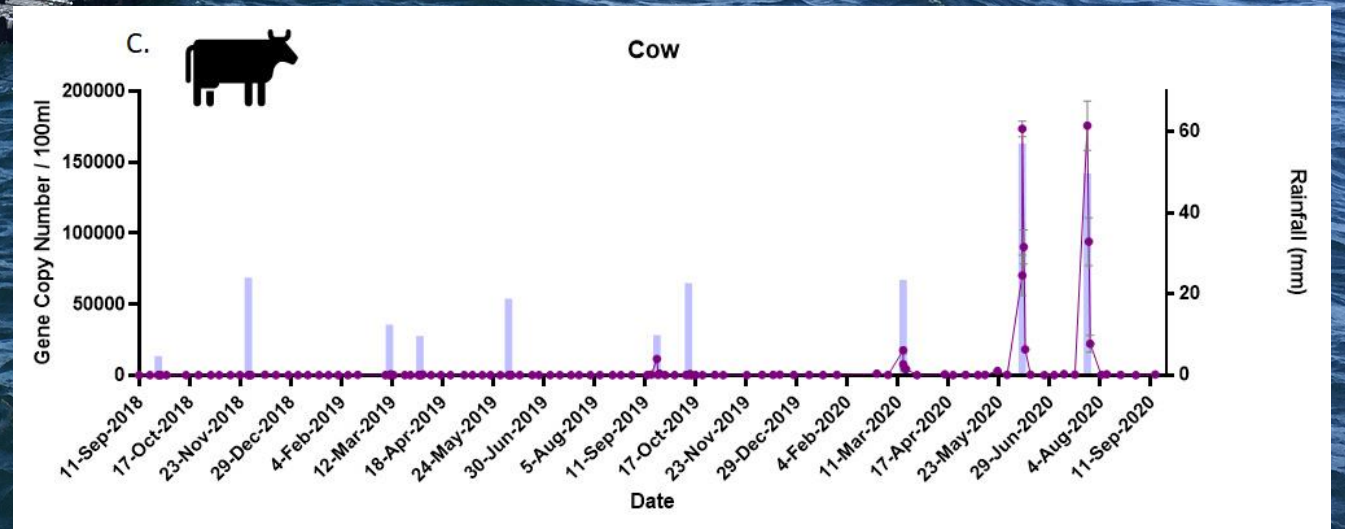
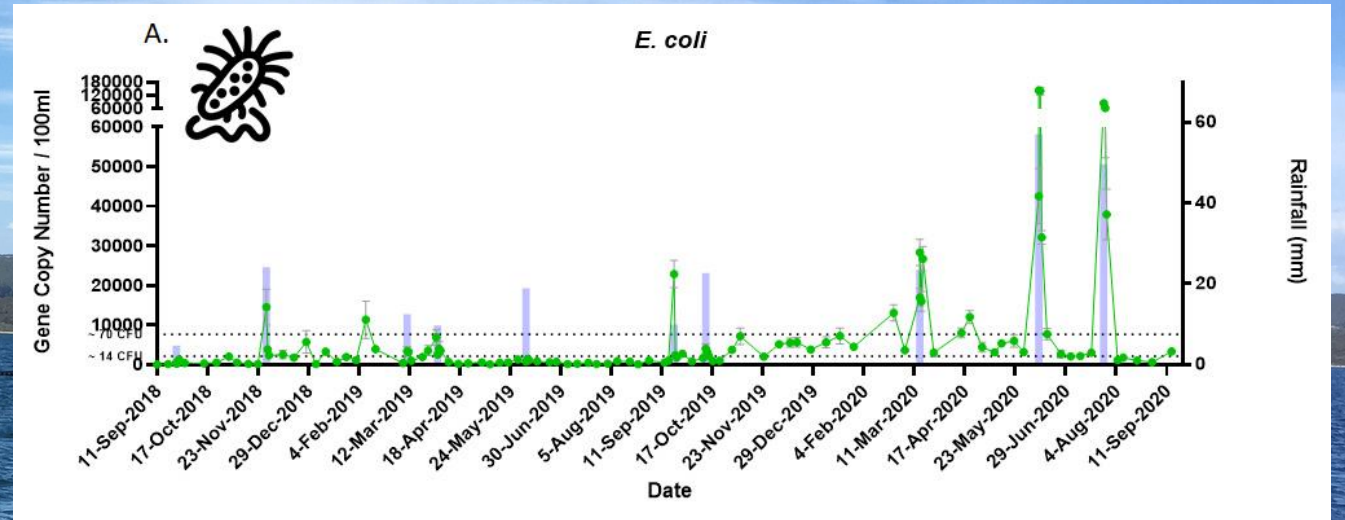
E. coli and cow faecal bacteria increased with rainfall, and generally dissipated after three days

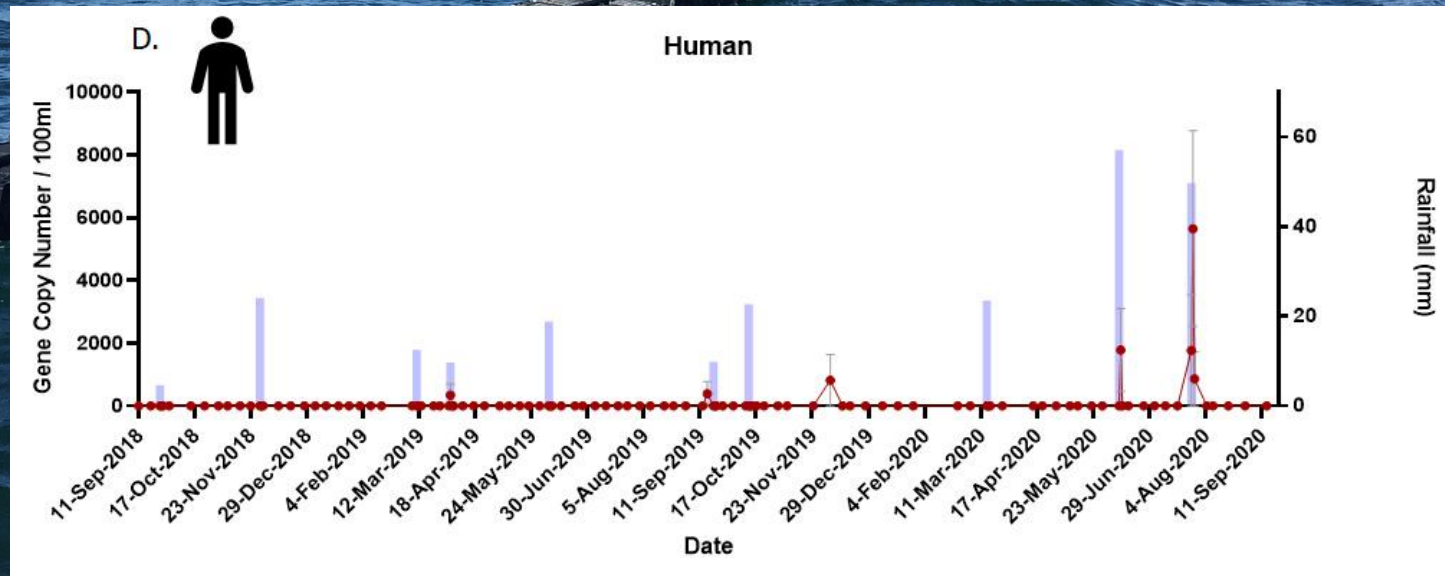
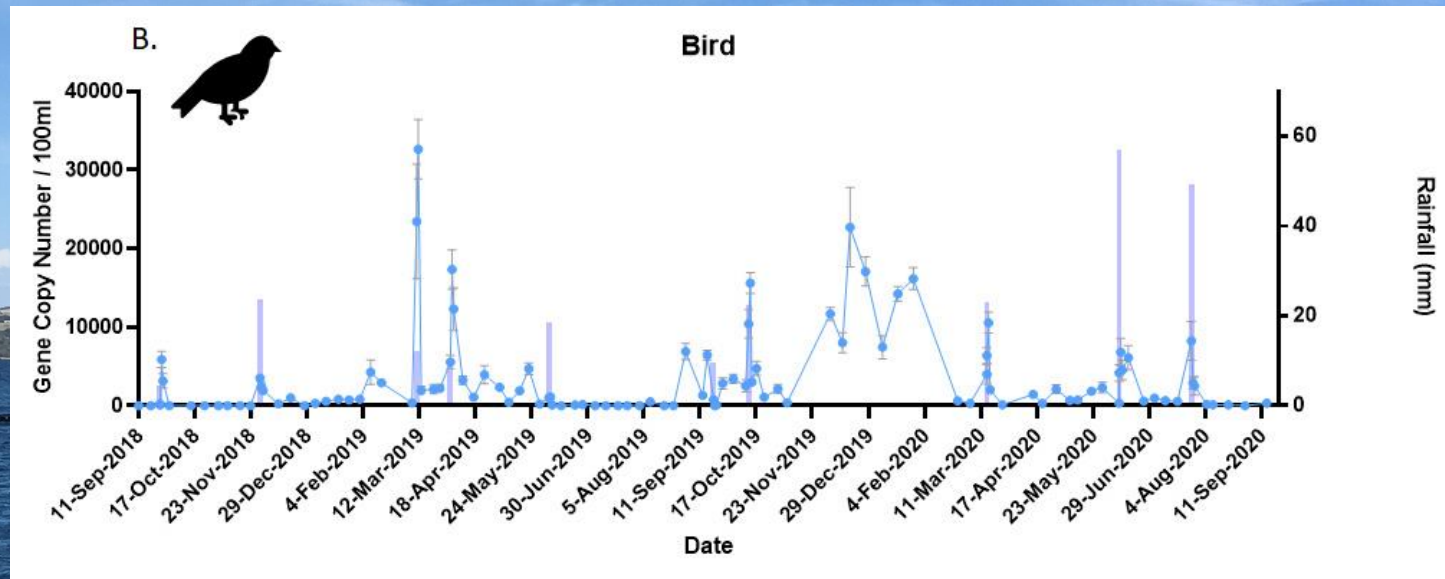


Human bacteria were very low across sampling period

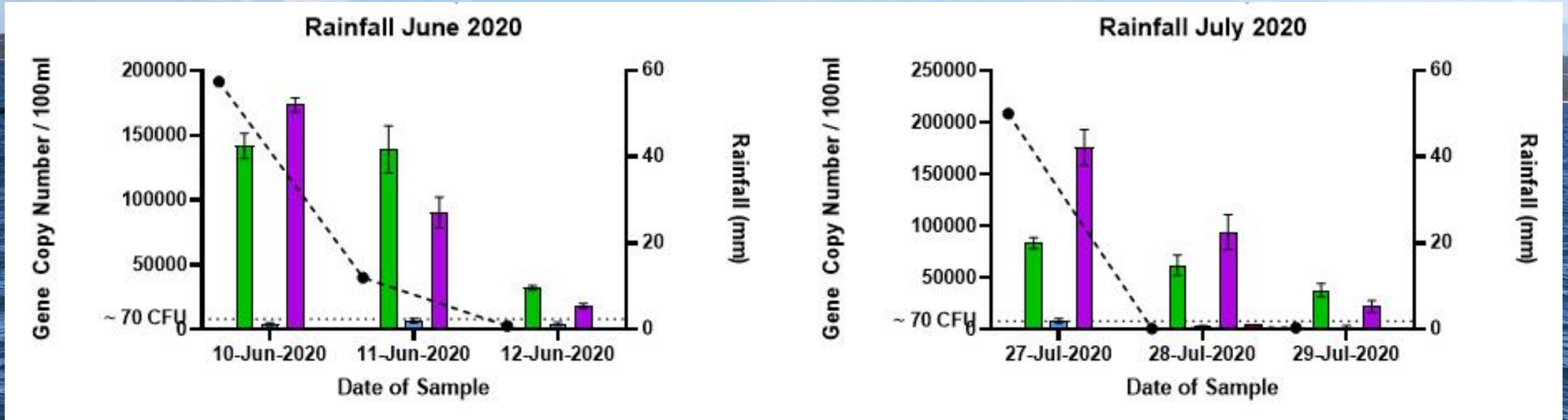
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No oyster mortality events that exceed background farming mortality occurred over the study period



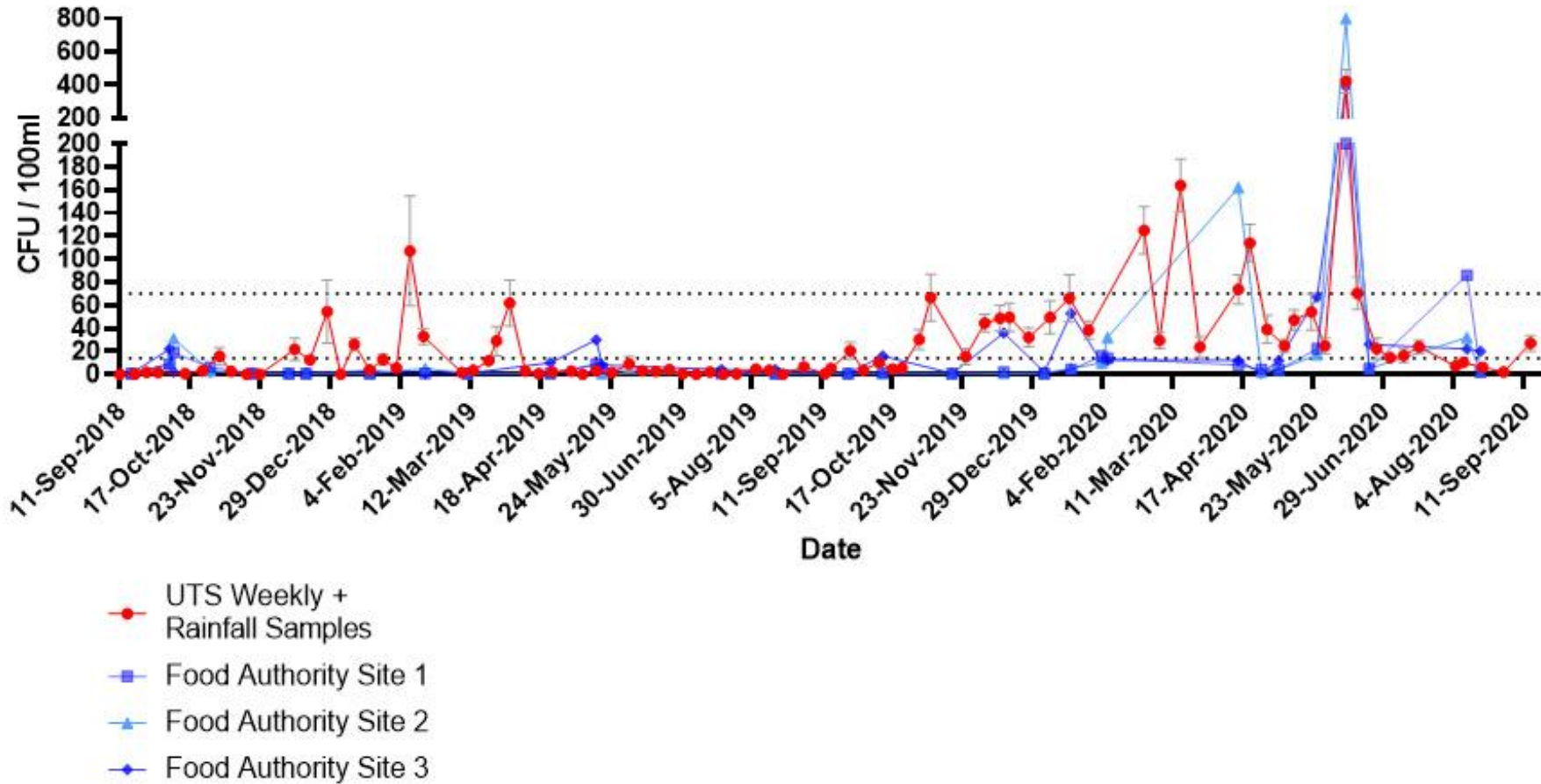


Results continued....



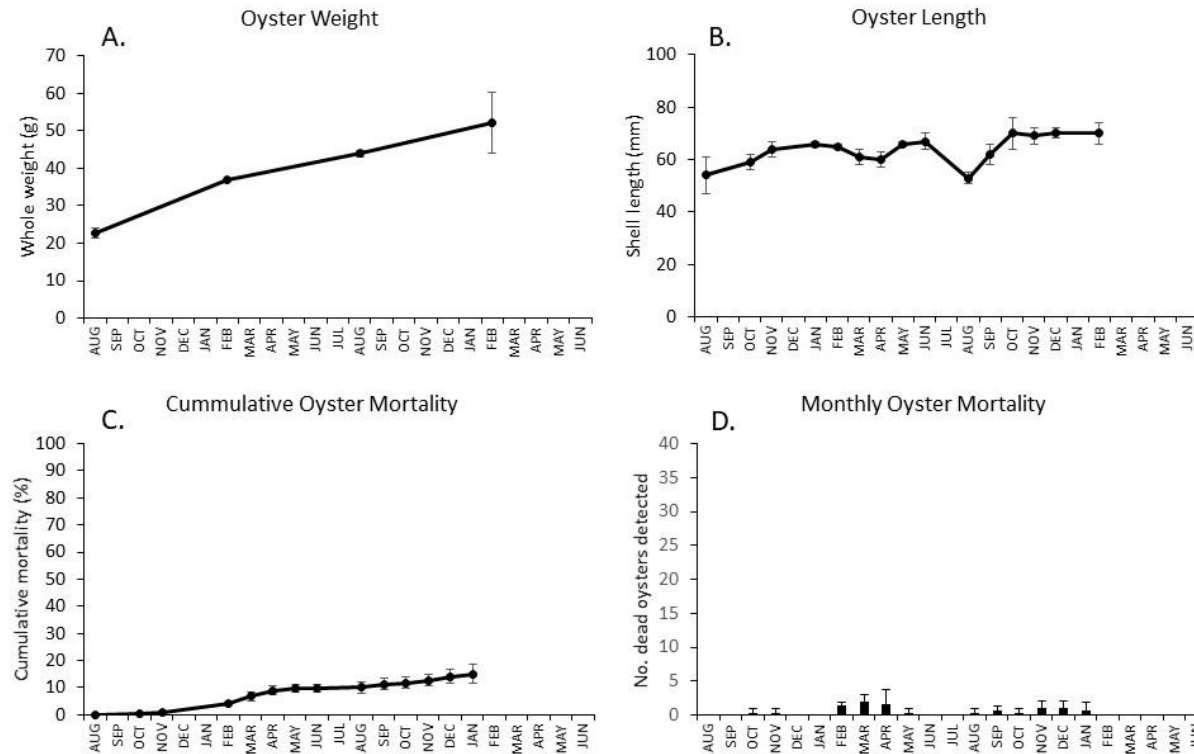
Bacterial load generally dissipated after 3 days

Weekly 16S E.coli/100ml to CFU/100ml



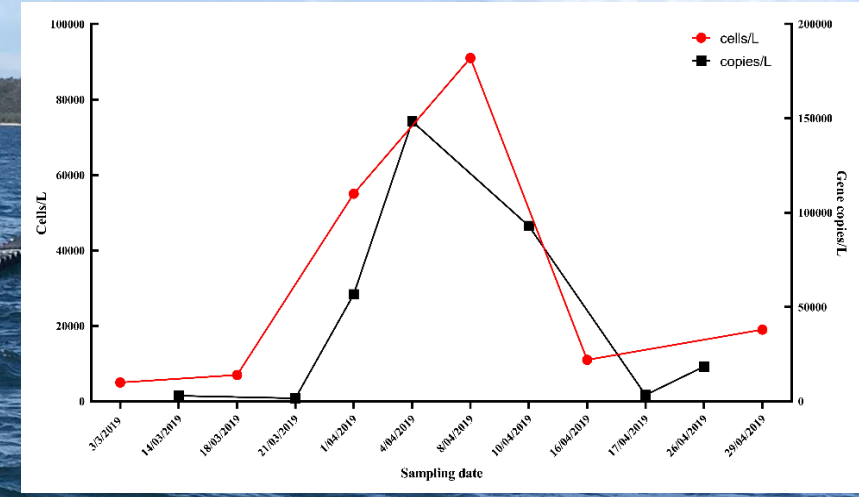
Max DPI = Max qPCR

Results continued....



Strongest predictor of growth = higher weekly salinity (79%)

qPCR for Toxic Algae Detection (*Alexandrium*, *Dinophysis*, *Pseudo-nitzschia*, *Prorocentrum*)



Harmful Algae 108 (2021) 102095

Contents lists available at ScienceDirect

Harmful Algae


journal homepage: www.elsevier.com/locate/hal

Original Article

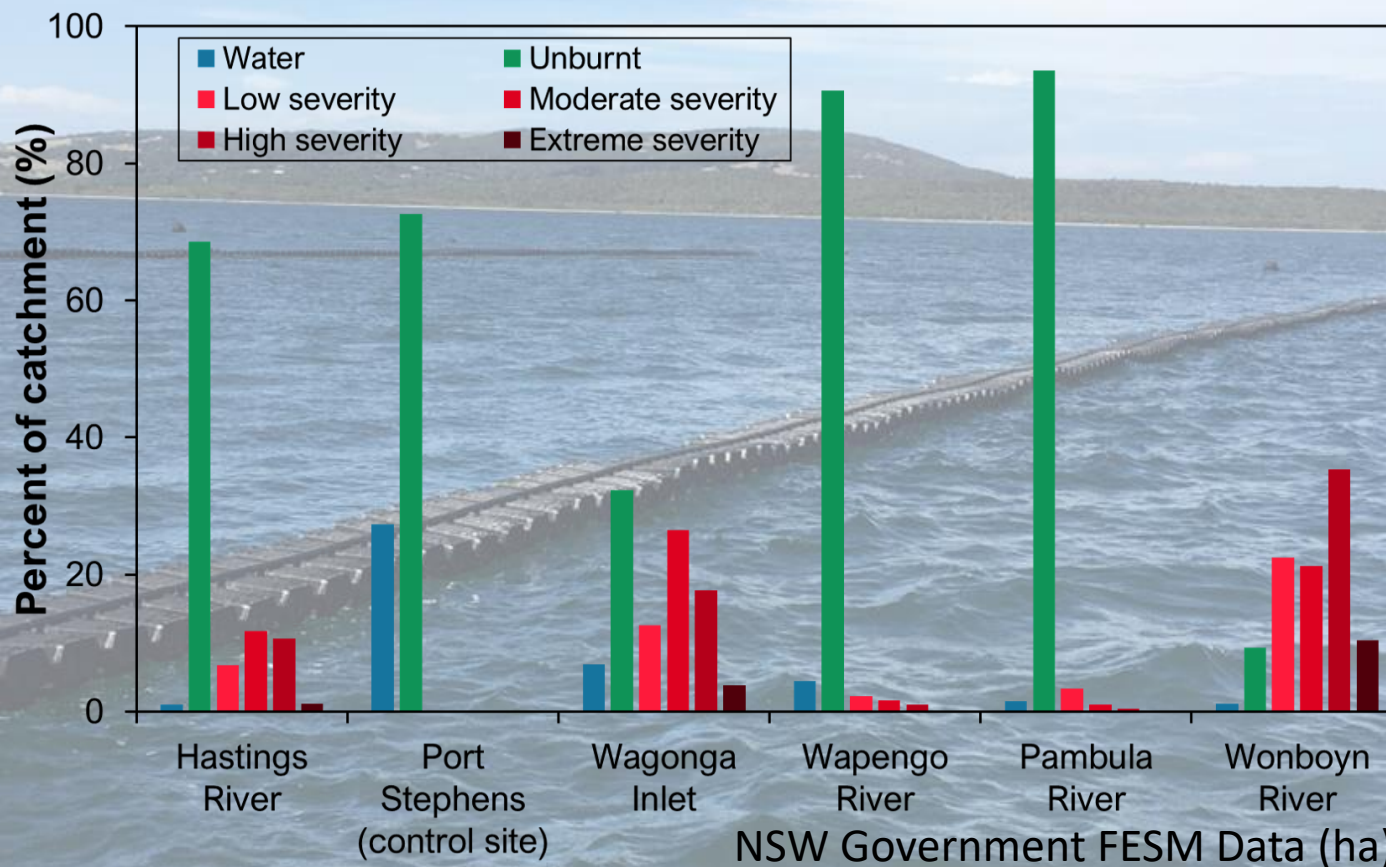
Using qPCR and high-resolution sensor data to model a multi-species *Pseudo-nitzschia* (Bacillariophyceae) bloom in southeastern Australia

Penelope A. Ajani^{a,b,*}, Arjun Verma^{a,b}, Jin Ho Kim^c, Stephen Woodcock^a, Tomohiro Nishimura^d, Hazel Farrell^e, Anthony Zammit^e, Steve Brett^f, Shauna A. Murray^{a,b}

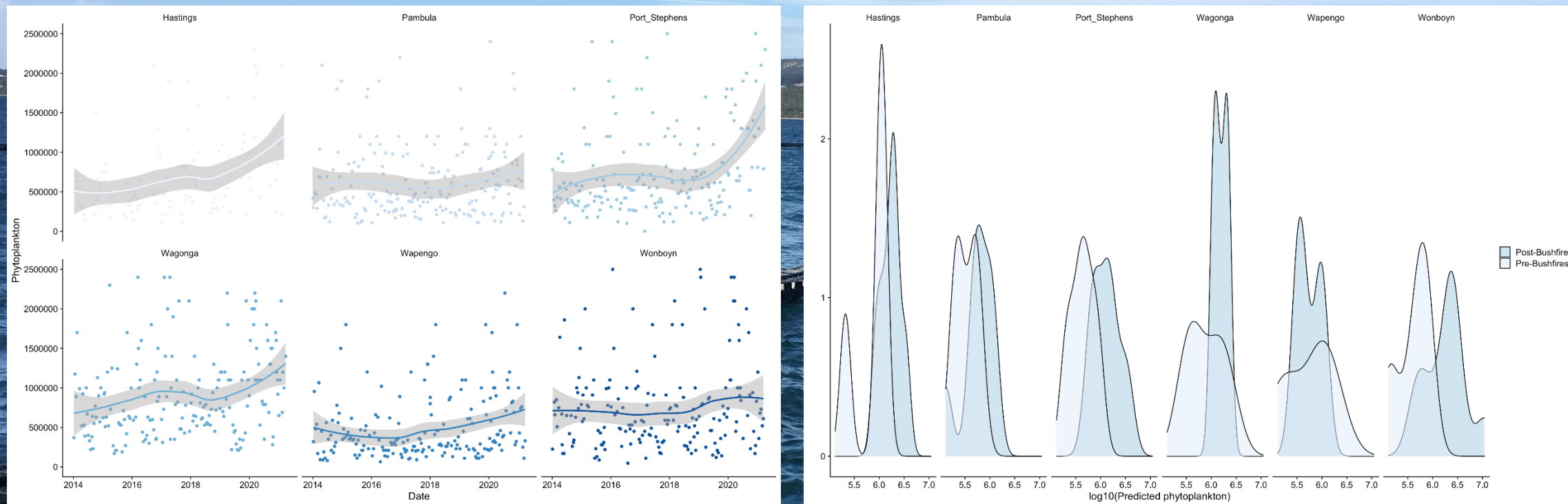
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^f Microbial Services, 308 Tucker Rd, Ormond 3204, Australia



Drought, fire, flood: the effect of extreme weather events on estuarine water quality

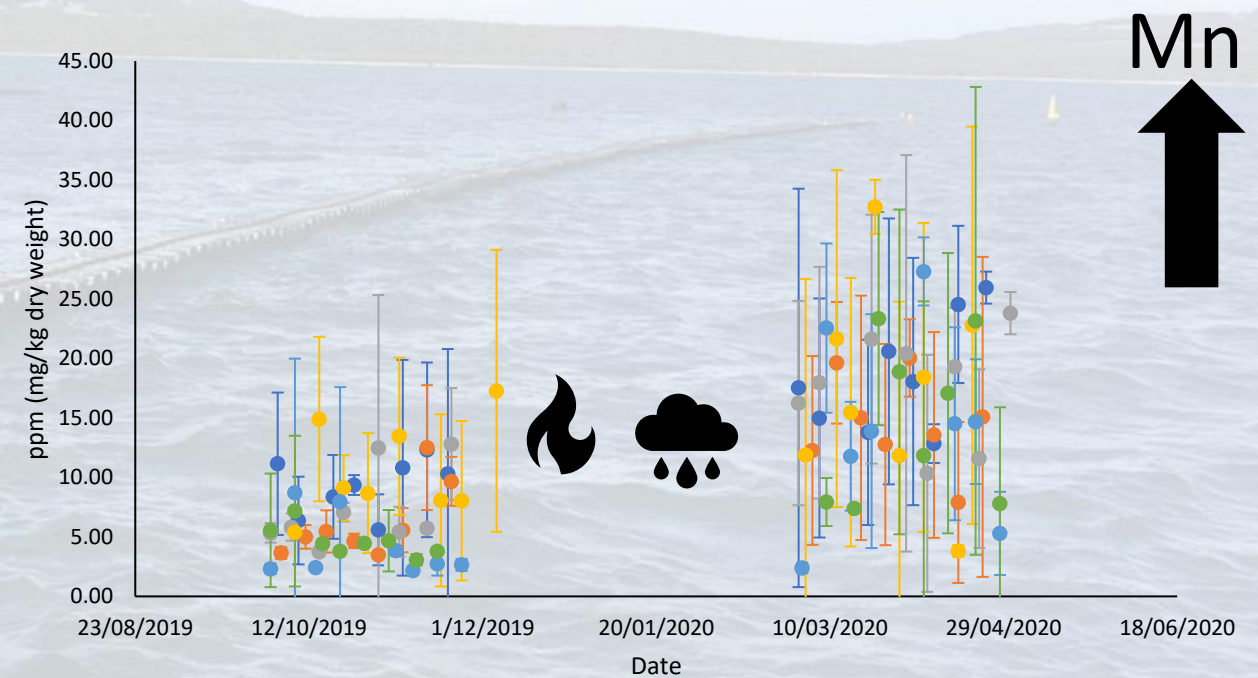
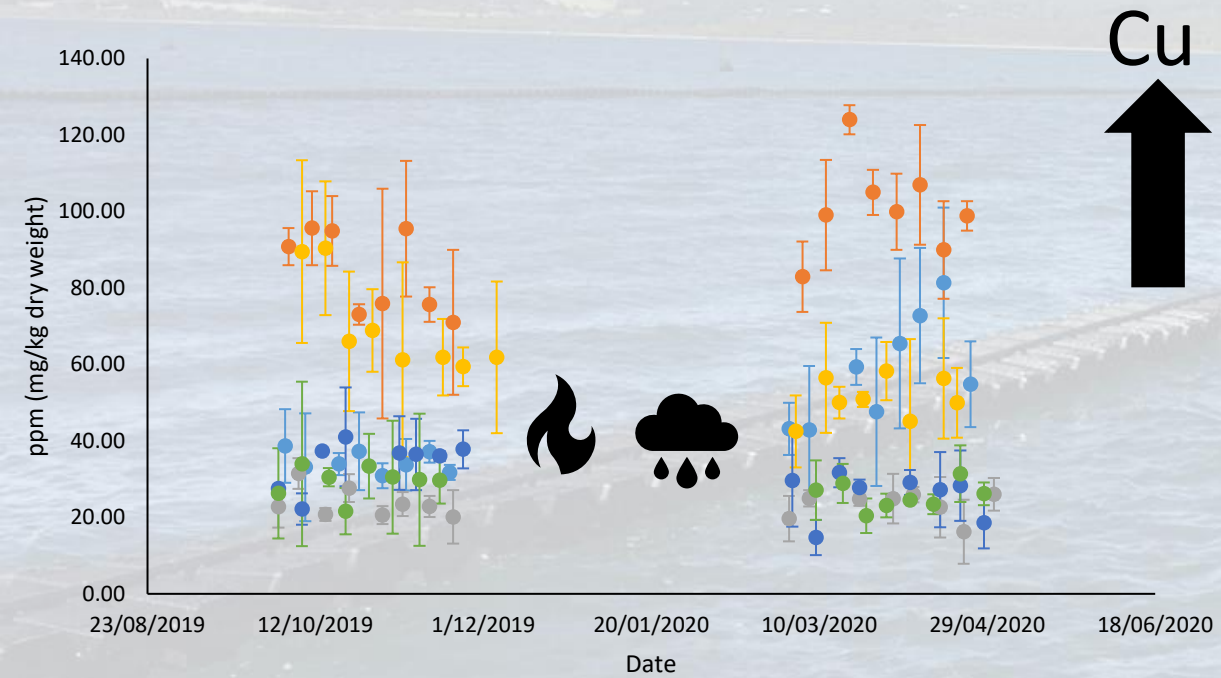


Total Phytoplankton 2014 -2021: impact from extreme weather events



Extreme weather events = **Extreme** phytoplankton abundance

Trace Metals – impact from extreme weather events



● HASTINGS ● WAGONGA ● WONBOYRN ● PORT STEPHENS ● WAPENGO ● PAMBULA

● HASTINGS ● WAGONGA ● WONBOYRN ● PORT STEPHENS ● WAPENGO ● PAMBULA

Conclusions so far....

- Real time temperature and salinity sensing shows considerable promise allowing rapid harvest area opening and closure decisions
- If widely taken up, will increase profitability and allow for growth of the industry
- Considerable scope for co-benefits, ie modelling and prediction of harmful algal blooms, oyster growth, on farm monitoring, ecosystem health

Acknowledgements

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- Food Agility CRC – Chris Komorek
- Sensor Providers – The Yield, ICT, In Situ Marine Optics
- Hunter Local Land Services – Brian Hughes
- **NSW Oyster farmer samplers (many!, 1300+ hours of sampling)**

