



Department of  
Primary Industries

# Using digital technologies to enhance on farm decision making. A case study surrounding NSW oyster farmers operating on the Clyde River.

Dr Harvey Bates

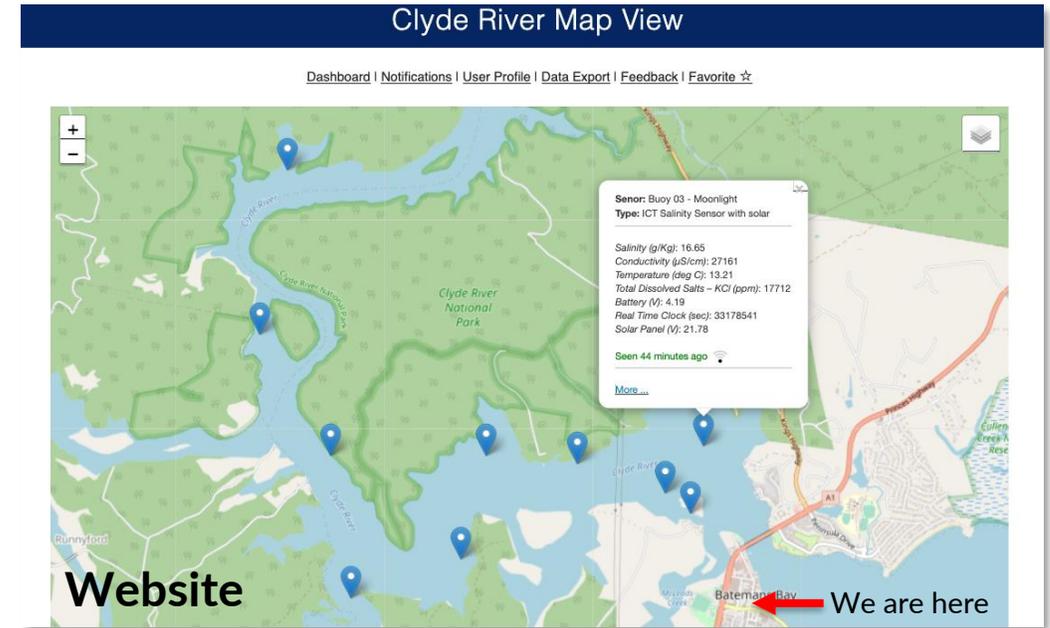
# Climate Smart Pilots

- Demonstrate novel technologies across a range of agricultural settings
- Focus on providing real-time environmental data through the internet of things (IoT)
- Supporting the adoption of emerging technologies in these industries
- Research and development of tools that fill gaps in agricultural technologies



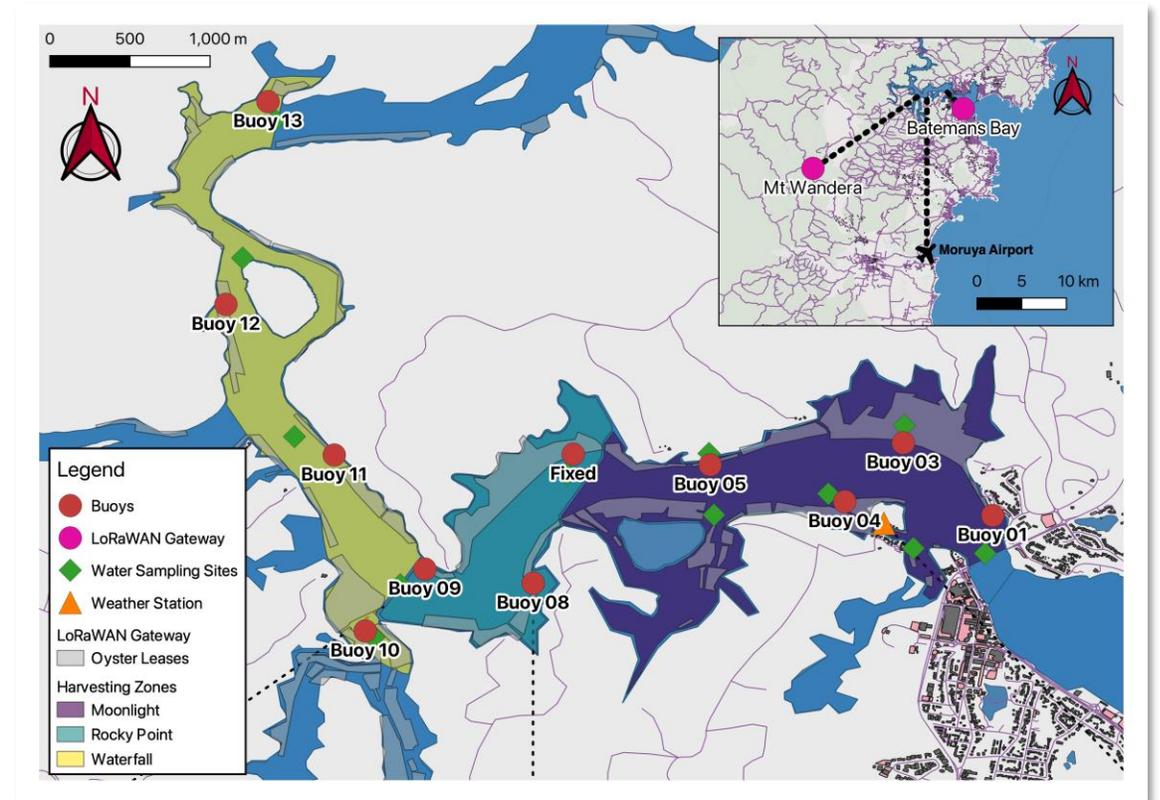
# Clyde River Pilot

- Running since Dec 2019
- Network of *in-situ* sensors (10 buoys and 2 weather stations)
- Provides:
  - Water temperature
  - Salinity
  - Air temperature, wind, rainfall etc.
- Additional temperature sensors are provided to farmers for deployment in areas of particular concern



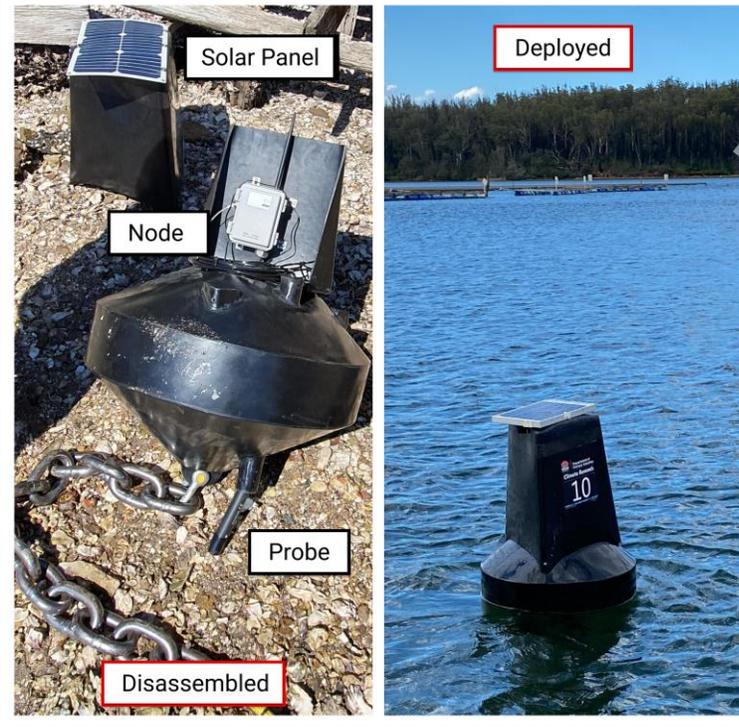
# Clyde River Pilot

- Decisions were made in consultation with oyster farmers
- Identified salinity, temperature, feed availability and rainfall as key metrics
- Deployment is based on harvest areas and NSW Food Authority sampling sites
- Closest available real-time weather over 25km away (Moruya Airport)



# Sensors

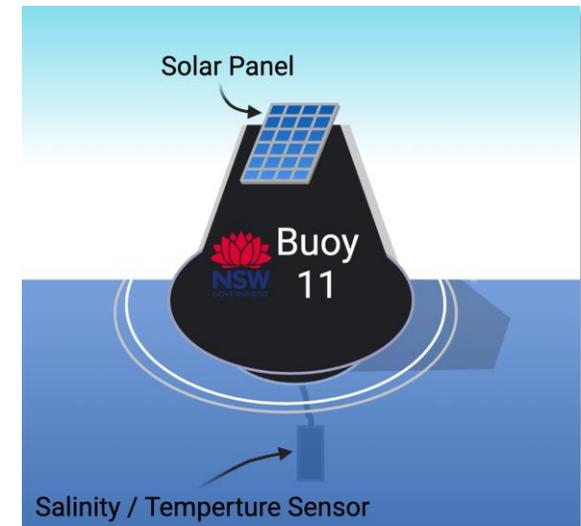
- Probe captures salinity and water temperature data (15 minute intervals)
- Data is transmitted via the node
- Maintained every three months
- Sensors survive around 1 year if wrapped in a stocking (and maintained)
- Sensors can be repaired by manufacturer



AQUALABO  
CONTRÔLE



C4E - Salinity & Temperature



# State of the River Reporting

- Automated report, first version released in the past month
- Extend the value that real-time data can provide
- Provide historical reference
- Combine information from multiple NSW government agencies
- Aims to provide greater transparency on data

<https://dpiclimat.github.io/pilot-reports/>

No login required



## Clyde River Water Quality Report

The screenshot displays the FarmDecisionTECH web interface. At the top, it features the NSW Government logo, the Department of Primary Industries logo, and the FarmDecisionTECH name. Below this is an 'Information' section with a table of activities and notes. The table has three columns: Date, Activity, and Notes. The activities include Buoy Error, Precipitation Error, and Maintenance. Below the table is a 'Report an Issue' button. Underneath the information section is a 'Salinity' section with tabs for 'Chart View', 'In-depth View', 'Fortnightly Trend', and 'Map View'. The 'Fortnightly Salinity Average Trend' chart shows 12-hourly average salinity for three harvest areas: Moonlight, Rocky Point, and Waterfall, from April 14 to 26. The y-axis represents salinity in parts per thousand (ppt), ranging from 0.0 to 24.0. The x-axis shows dates from 14 Apr to 26. The chart shows that Moonlight and Rocky Point have higher salinity levels (around 18-22 ppt) compared to Waterfall (around 4-12 ppt). At the bottom of the chart, there is a small text box with the following text: 'Units represent parts per thousand (ppt). This is equivalent to both g/kg and g/L. Source: FarmDecisionTECH | Get the data | Embed | Download image | Created with Datawrapper'.

Climate Smart Pilots  
April 26, 2022  
[www.farmdecisiontech.net.au](http://www.farmdecisiontech.net.au)

PDF Report

Two versions

Web-interface

# Current conditions & trends in Environmental Variables

- Summary of current conditions
- Average fortnightly trend, providing context of trajectory
- Context provided for “bad” data values (an inevitability of IoT)
- Ability to report issues

## Information

Date	Activity	Notes
29th April 2022	Buoy Error	Buoy 11, located opposite to Buckenbowra River has stopped functioning. This has created an artifact in the salinity and temperature data on the 30th of April that should be ignored. The team will fix this buoy when doing maintenance.
4nd - 6th May 2022	Maintenance	The FarmDecsionTECH team will be conducting maintenance on the buoys and weather station. Please get in contact if you have any questions.

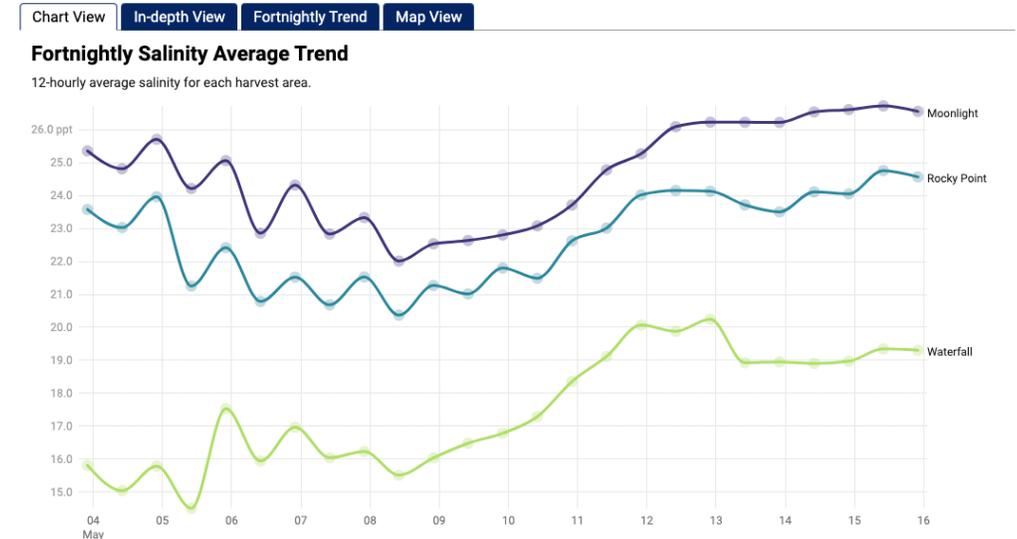
[Report an Issue](#)

## Current Conditions

		Water	Weather			
		Buoy	Salinity	Temperature	Date	
Moonlight	Buoy 01 - Wray Street		27.7 ↓	18.7 ↓	May 16, 9:05 AM	
	Buoy 03 - Moonlight		33.4 ↓	18.8 ↓	May 16, 9:06 AM	
	Buoy 04 - Budd Isl. North		28.8 ↓	18.5 ↓	May 16, 9:01 AM	
Rocky Pt.	Buoy 08 - Angry Man Pt.		20.7 ↓	18.2 ↓	May 16, 9:00 AM	
	Buoy 09 - Chinaman's Point		25.4 ↓	18.4 ↓	May 16, 9:09 AM	
	Buoy 10 - Waterfall Creek		29.5 ↓	18.5 ↓	May 16, 9:03 AM	
Waterfall	Buoy 11 - Opp. Buckenbowra		22.0 ↓	17.9 ↓	May 16, 8:55 AM	
	Buoy 12 - Big Island West		20.3 ↓	18.2 ↑	May 16, 9:07 AM	
	Buoy 13 - Double Bay		19.7 ↓	17.6 ↑	May 16, 9:02 AM	
	Fixed depth - Rocky Pt.		31.3 ↓	18.9 ↓	May 16, 9:01 AM	

↓ decreasing, – stable, ↑ increasing (based on data from the past hour)

## Salinity



Units represent parts per thousand (ppt). This is equivalent to both g/kg and g/L.  
Source: FarmDecisionTECH • [Get the data](#) • [Embed](#) • [Download image](#) • Created with [Datawrapper](#)

# Alternative data views

- Simplify and/or enhance data accessibility
- Min & max identified as key insights growers require

## Weekly Minimum and Maximum Salinity

These values represent the absolute minimum and maximum recorded values from Buoys within each harvest area.

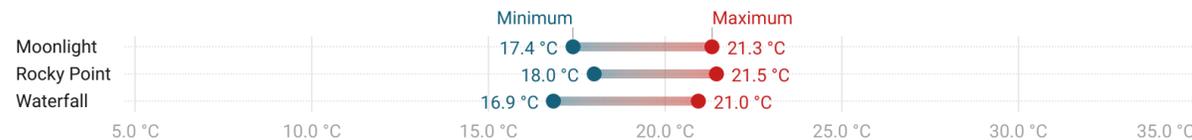


Units represent parts per thousand (ppt). This is equivalent to both g/kg and g/L.

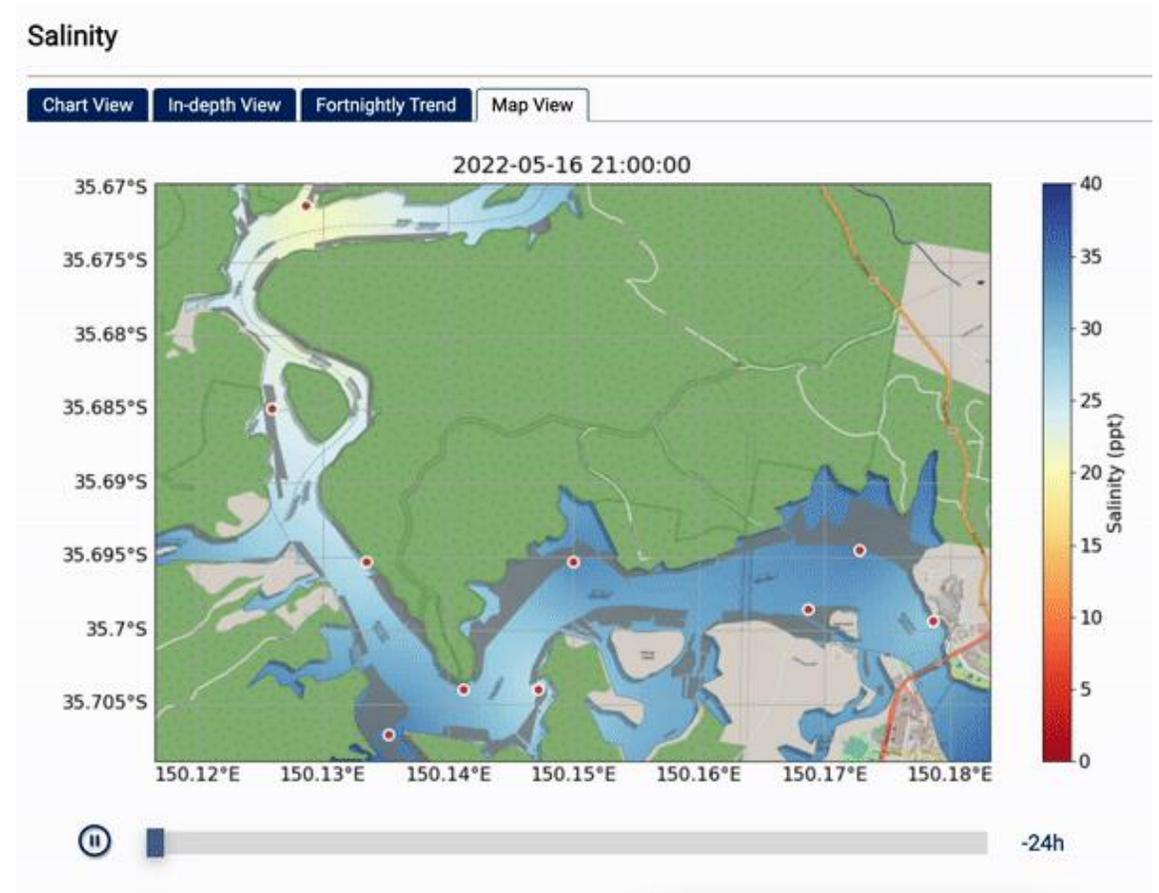
Source: FarmDecisionTECH • Created with Datawrapper

## Weekly Minimum and Maximum Water Temperature

These values represent the absolute minimum and maximum recorded values from Buoys within each harvest area.



Source: FarmDecisionTECH • Created with Datawrapper



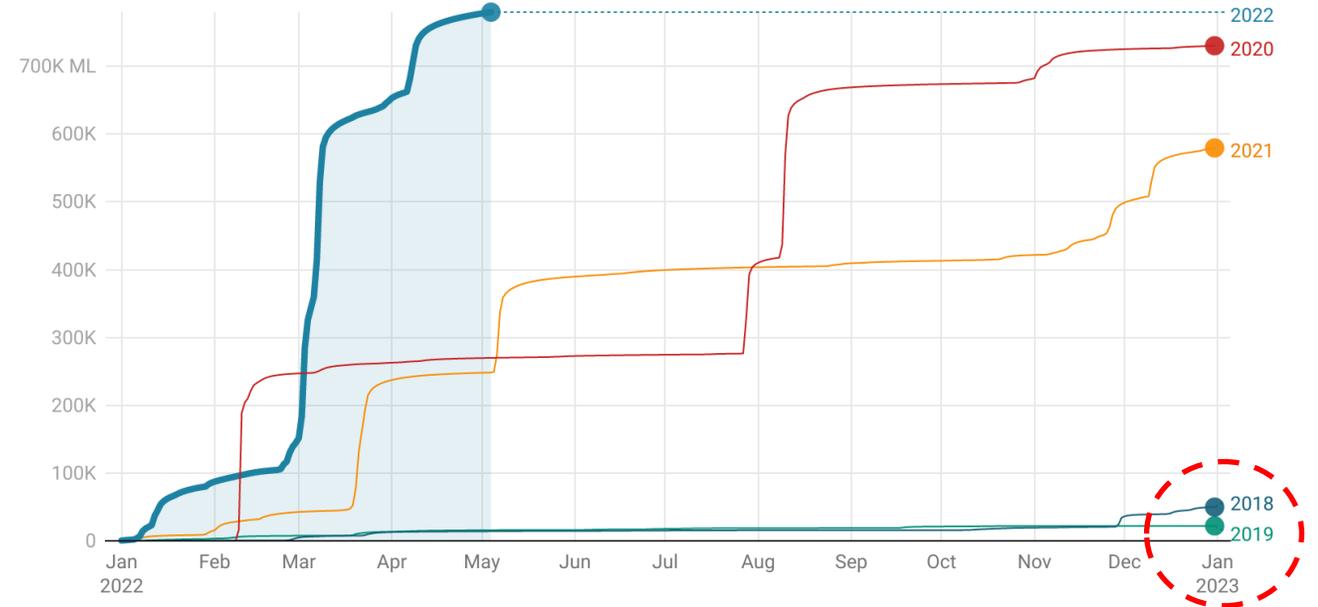
Hourly Salinity Trend

# Upstream Discharge Rates

- Farmers identified upstream flow data of interest in rainfall events
- Rain may not fall on the Clyde but may fall upstream (impacting salinity & water temperature)
- Data is provided by NSW Water
- Farmers have identified the use of historical data to provide context on real-time data

## Cumulative Daily Discharge-Rate Brooman

Cumulative daily water flow for each year from Brooman into the Clyde River. Units represent mega litres (ML). One ML is equal to 1 million litres.

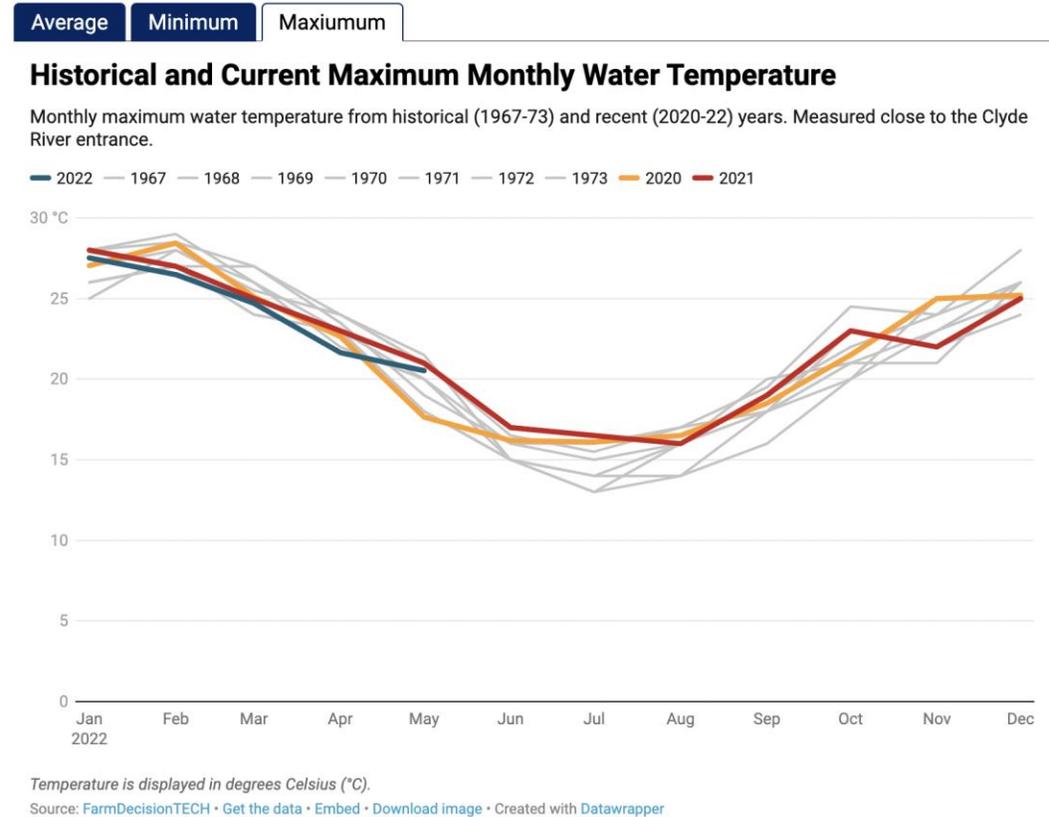


Data: © State of New South Wales through WaterNSW  
Chart: FarmDecisionTECH · Created with Datawrapper

Drought Years

# Historical context

- Data observed from 1967 to 1973 (50 years ago)
- Contains average, min, max monthly water temperature
- Enables a comparison with recent history
- Provides context on what to expect in the next month
- Along with discharge rate, provides some historical reference data



# Project status

- Improve upon these reports (analysis and data curation)
- Identify other data sources of interest
- Get input from other oyster farming regions around the usefulness of real-time reporting
- If you are interested in signing up to our email list to get State of the River Reports
- Have any comments about the reports

Climate Smart Pilots



## State of the River Report Clyde River

[View online](#)

[Download as pdf](#)

### Buoy Maintenance 4th - 6th May

The Climate Smart Pilots team will be down at the Clyde River from **this Wednesday (4th May) to Friday (6th May)** to conduct maintenance on the buoys and weather station. During this time, an additional backup weather station will be installed to ensure accurate weather information is always available. Say hello to the team if you see them.

# Thank you

## Team involved:

- Dr Allen Benter
- Matt Pierce
- David Taylor
- Ben Sefton
- Thomas Karbowiak
- Mal Kul
- Michael Middleton
- Gwen Garrad

-  Project management
-  Software development
-  Technician
-  Communications

Clyde River growers

