Controlling Sydney Rock Oyster Over-catch Using Environmental Data

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NSW GOVERNMENT Local Land Services Hunter

NSW GOVERNMENT Department of Primary Industries

Over-catch

- Biofouling
- Oyster spat → over-catch
- Drying
- This project specifically focuses on impacts of drying on SRO stock and over-catch

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Installation of Sensor Network

- Sensor network **(Hunter LLS)**
- 6 sensors currently installed in Wallis Lake
- Provide real-time data
  - Online platform
  - Water temp.
  - Air temp.
  - Salinity
  - 1 x weather station

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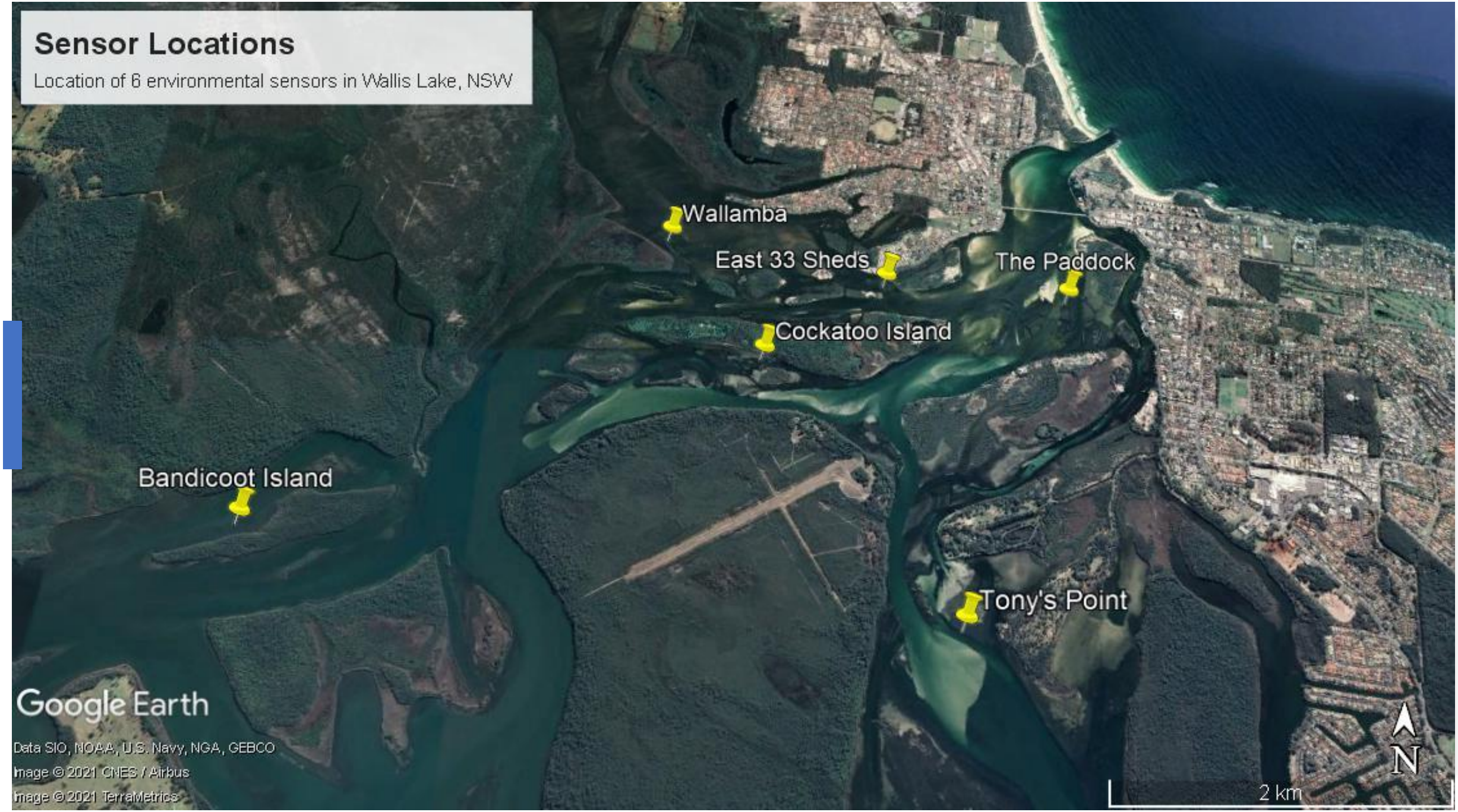
Sensor Locations
Location of 6 environmental sensors in Wallis Lake, NSW
Wallamba
East 33 Sheds
The Paddock
Cockatoo Island
Bandicoot Island
Tony's Point
Google Earth
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
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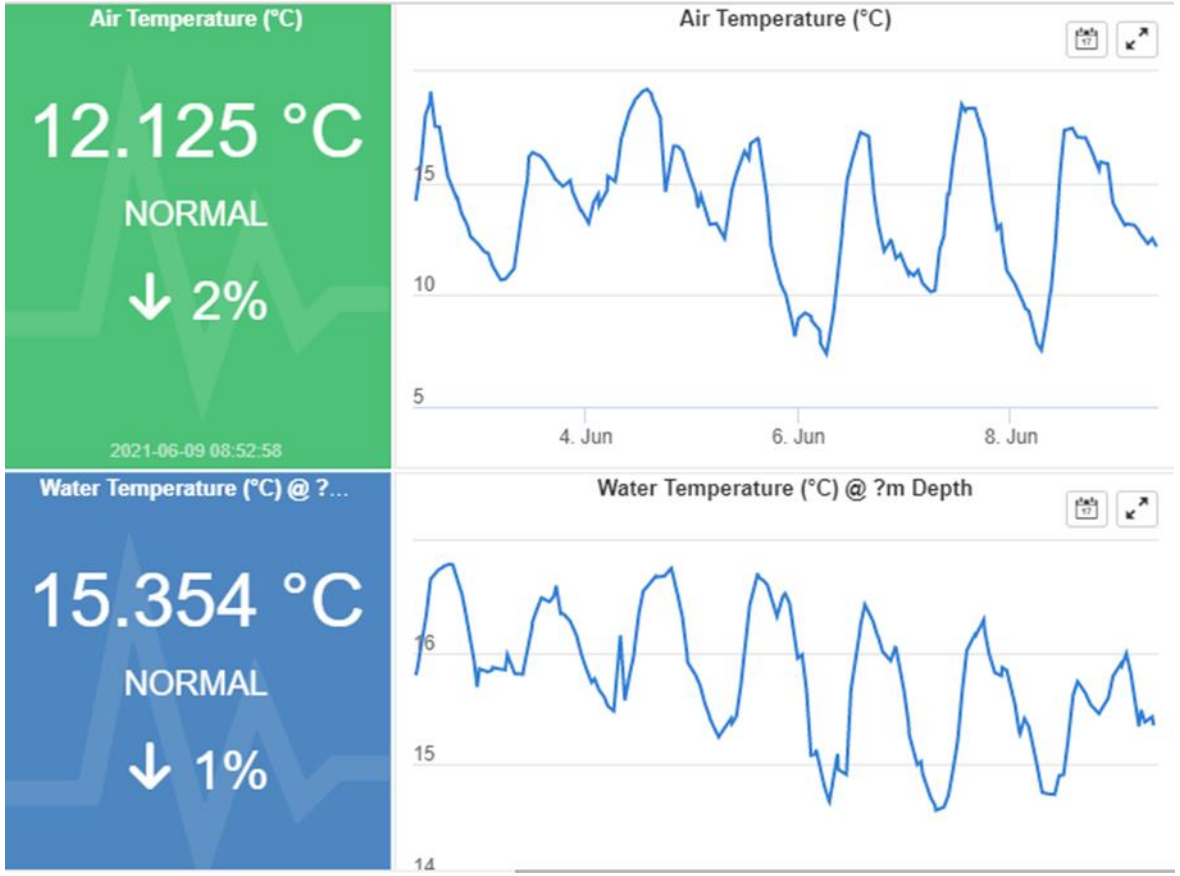
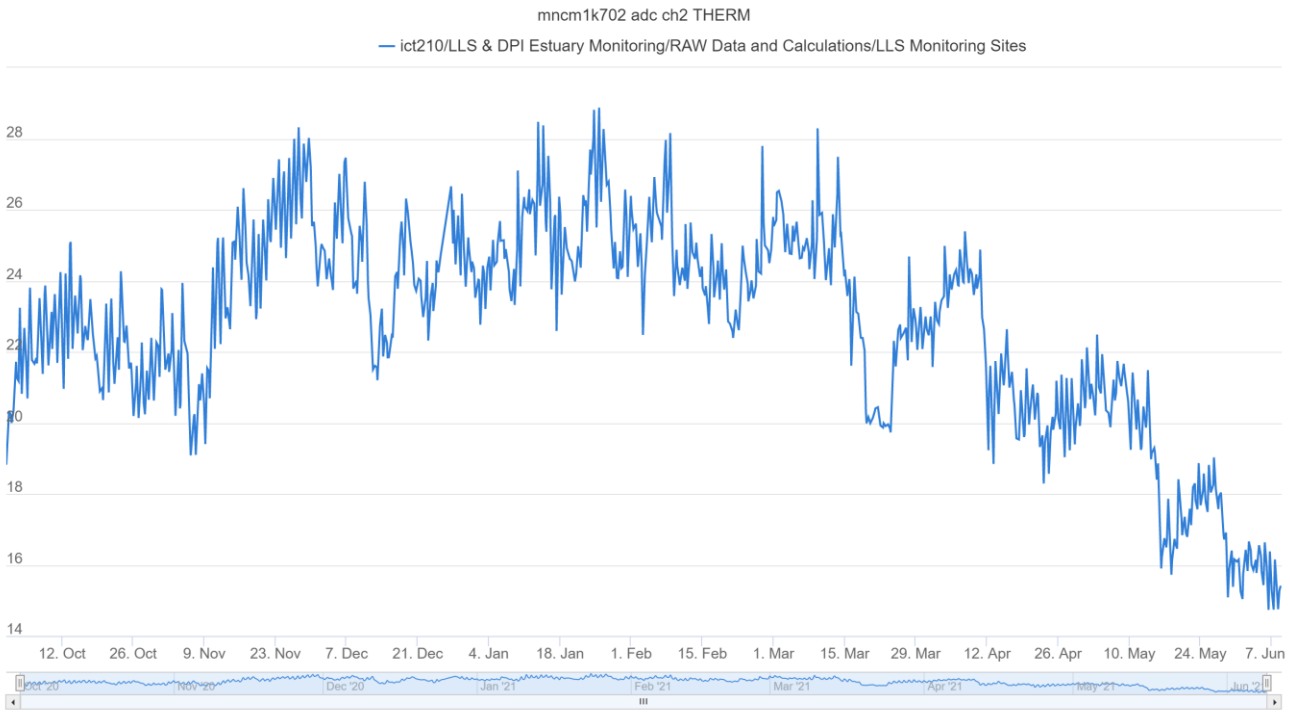
2 km
N

Sensor Network Data





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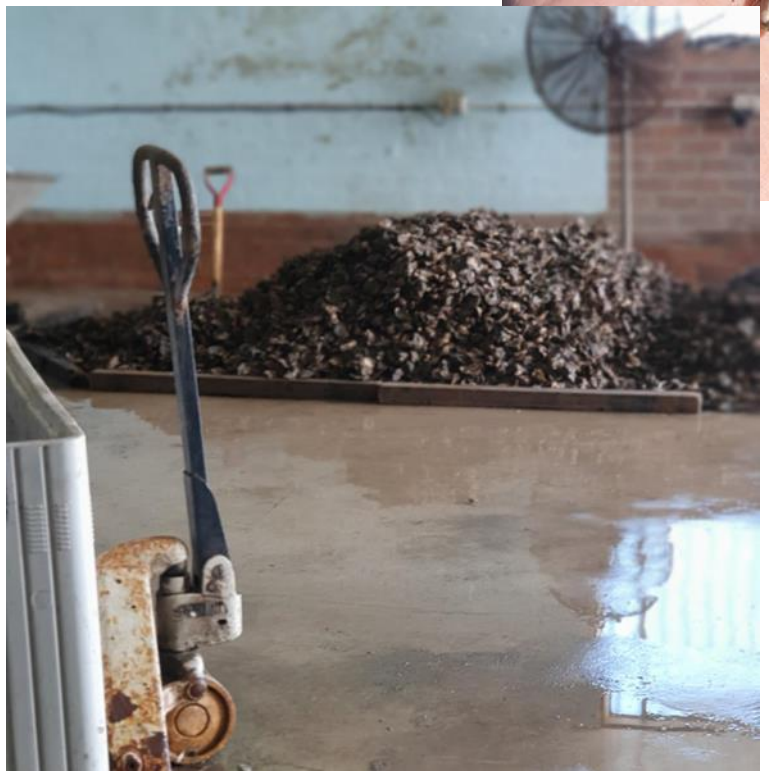
Data Application

- How can we use this to predict Sydney Rock Oyster responses?
  → Application in farming
  →Improve management of over-catch
- Identify SRO patterns in the environment
  - Spawning
  - Settlement
    →When/where?
- SRO response to drying regimes
  - Stock
  - Over-catch



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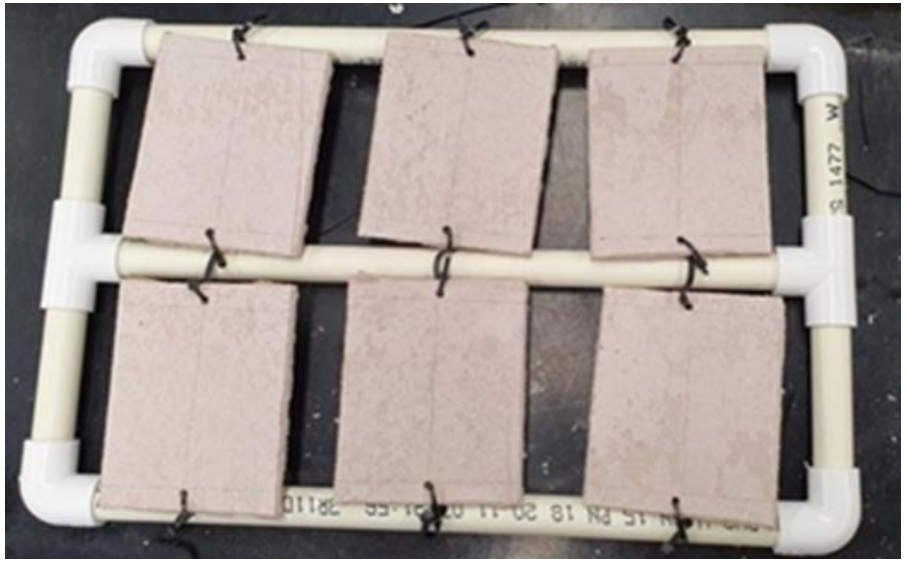
Over-catch Settlement

- Spawning dependent
  →Time in water column
- Settlement vs recruitment
- Difficult to detect mollusk settlement patterns
  →Physical, environmental and biological factors



Settlement plates

- Temporary
- Permanent

- Adjacent to sensors
- Post-spawning event
- Compare SRO settlement between locations

Ongoing Settlement Plate

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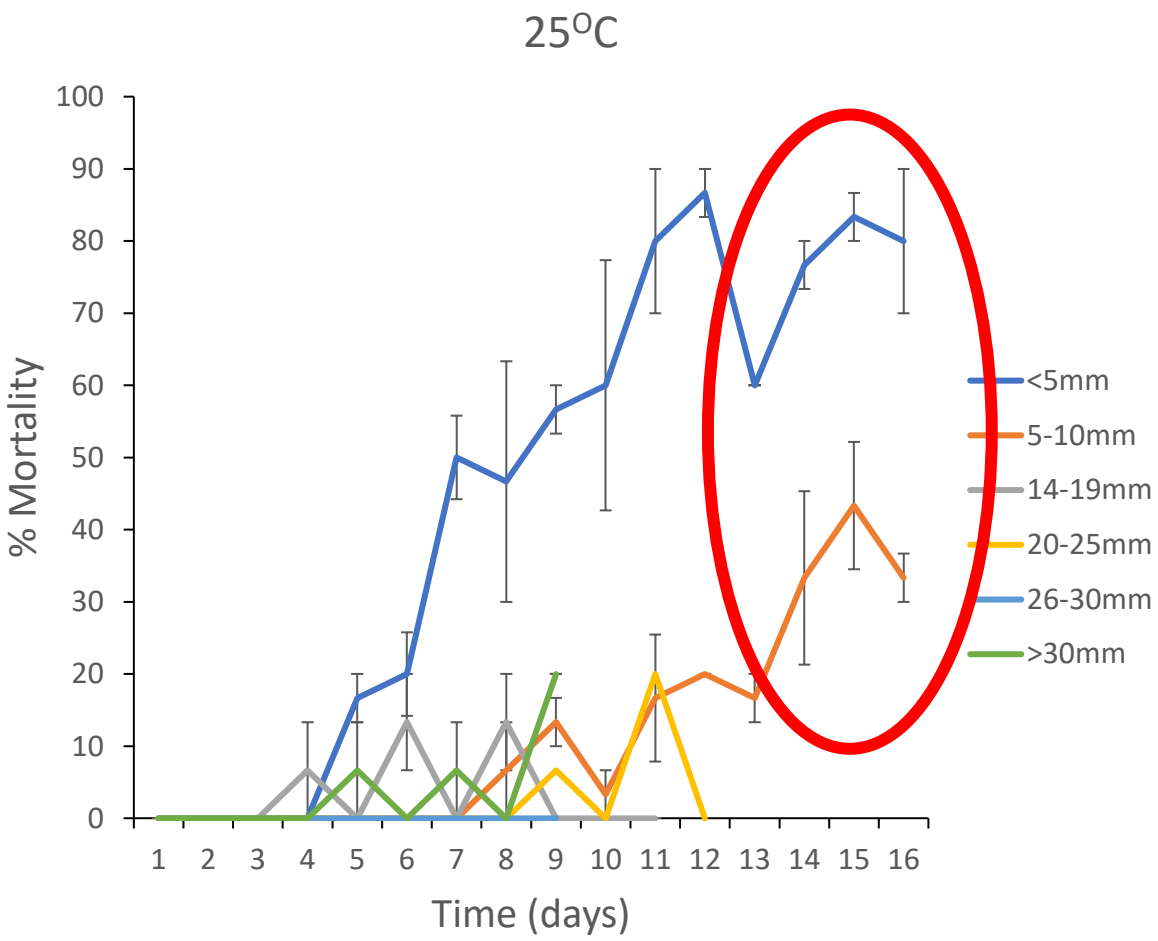
Temperature Stress During Drying

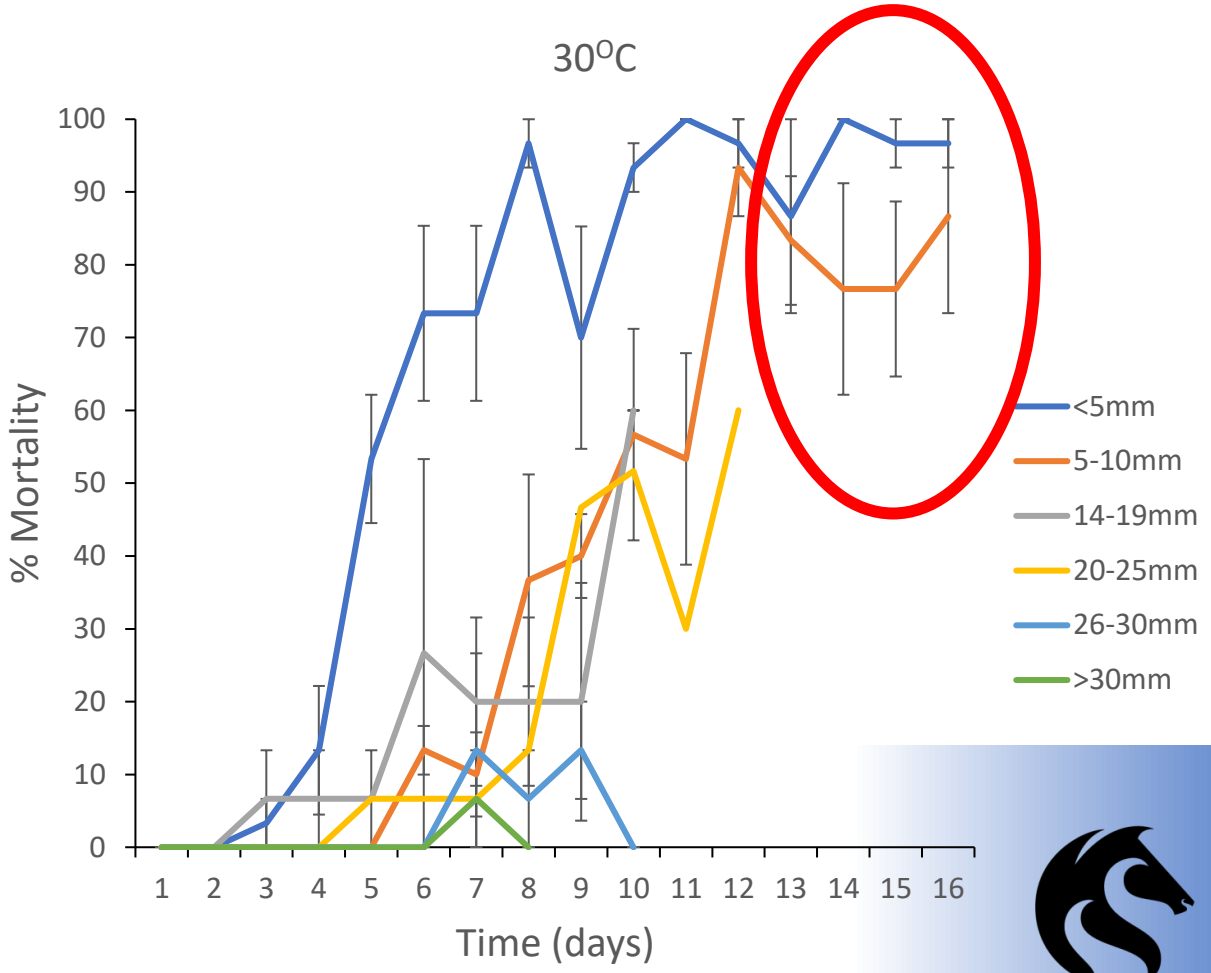
- Ensure survival of SRO stock
  - →Reduce risk of compounding stress events
  - →Reduce risk of mortality
- Reduction of over-catch
  - → Ideal conditions to maximise over-catch mortality
  - → Impact of consecutive drying events

Laboratory Experiments

- Collect baseline data → when should we expect mortality
- 6 size classes
- 12 replicate chambers
  - 25°C
  - 30°C
  - 35°C
  - 40°C
- 10 + days
- Sub-sample each size class
- Measure % mortality over time

Preliminary Results





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Investigated Variables

Temperature stress

Size

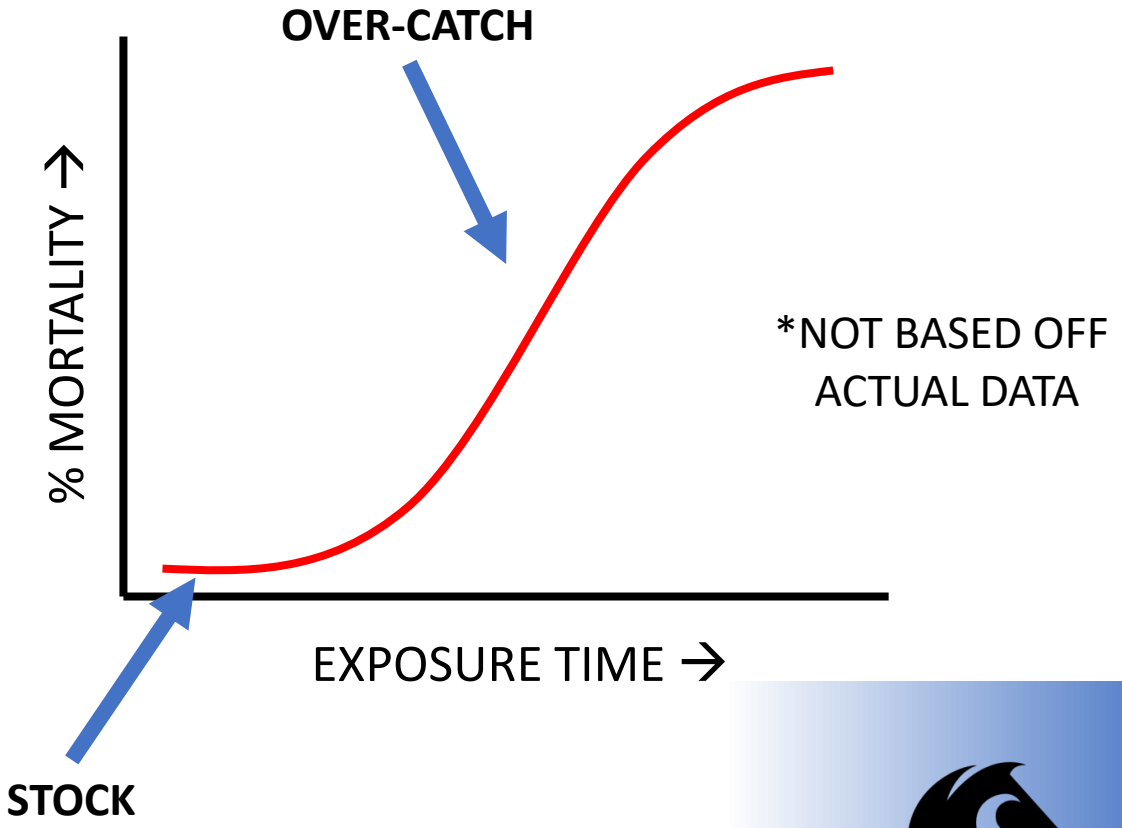
Genetics

Condition pre-drying (salinity)

Influence of over-catch

Measuring Temperature Stress

- Maximise over-catch mortality
- Minimise risk of stock mortality
- Mortality is not a practical measure
- **Metabolomic analysis**
  - Detects changes to metabolome due to stress
  - Used in previous SRO studies
- Evaluate impact of each variable over time
  - → Replicated drying events



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Application for drying regimes

- **Over-catch settlement**
  - spawning event **+** location in the estuary **+** environmental conditions (water temp./salinity) **= remove stock from water to minimise settlement**

- **Over-catch mortality during drying**
  - over-catch size **+** stock size **+** environmental conditions (high air temp.)

  = expected % over-catch mortality after X number of days

- **Stock stress during drying**
  - oyster size **+** prior stress (low salinity) **+** environmental conditions (high air temp.) **+** number of days

  = return to water

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Environmental conditions

Likelihood of settlement

Oyster response to stressor

Understanding of current drying regimes

Practical over-catch management suggestions

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