

Sydney Rock Oyster Breeding Program

Traits, Trials and Achievements

NSW DPI / CSIRO / SOCo

Introduction

SRO Breeding Program (BP):

1. The Goal
2. The Trials
3. The Logistics
4. The Progress

1. The Goal

- Industry breeding objective:
 - 70% survival through a QX disease outbreak (March 2020)
 - 30% growth advantage compared to wild oysters (March 2021)
 - No difference in condition compared to wild oysters (March 2024)
- Primary traits: QX, growth and condition
- Shell shape: monitoring for adverse changes

Winter mortality resistance

- Genetic characteristics of WM expression are not well understood
- WM disease expression has been low and inconsistent
- Winter mortality resistance:
 - low to moderately heritable
 - responsive to selection
 - is a trait of interest to the SRO BP
 - not currently part of the long term breeding objective of the SRO BP
- No correlations have been found between WM resistance and other traits under selection
- Best estimates of WM resistance were from Quibray Bay using 1 year-old oysters

Future:

- Continue WM field exposure trials of 1 year-old oysters at Quibray if resources permit
 - Can respond if a significant WM outbreak occurs
- Decision on including WM resistance as part of the SOCo breeding objective
- Need to consider how this will influence gains in other traits

2. The Trials

- QX field challenge
- Condition / Growth / Shape
- Winter mortality
- Hawkesbury River semi-commercial trial

Progeny Test Sites: 2019

QX disease resistance:

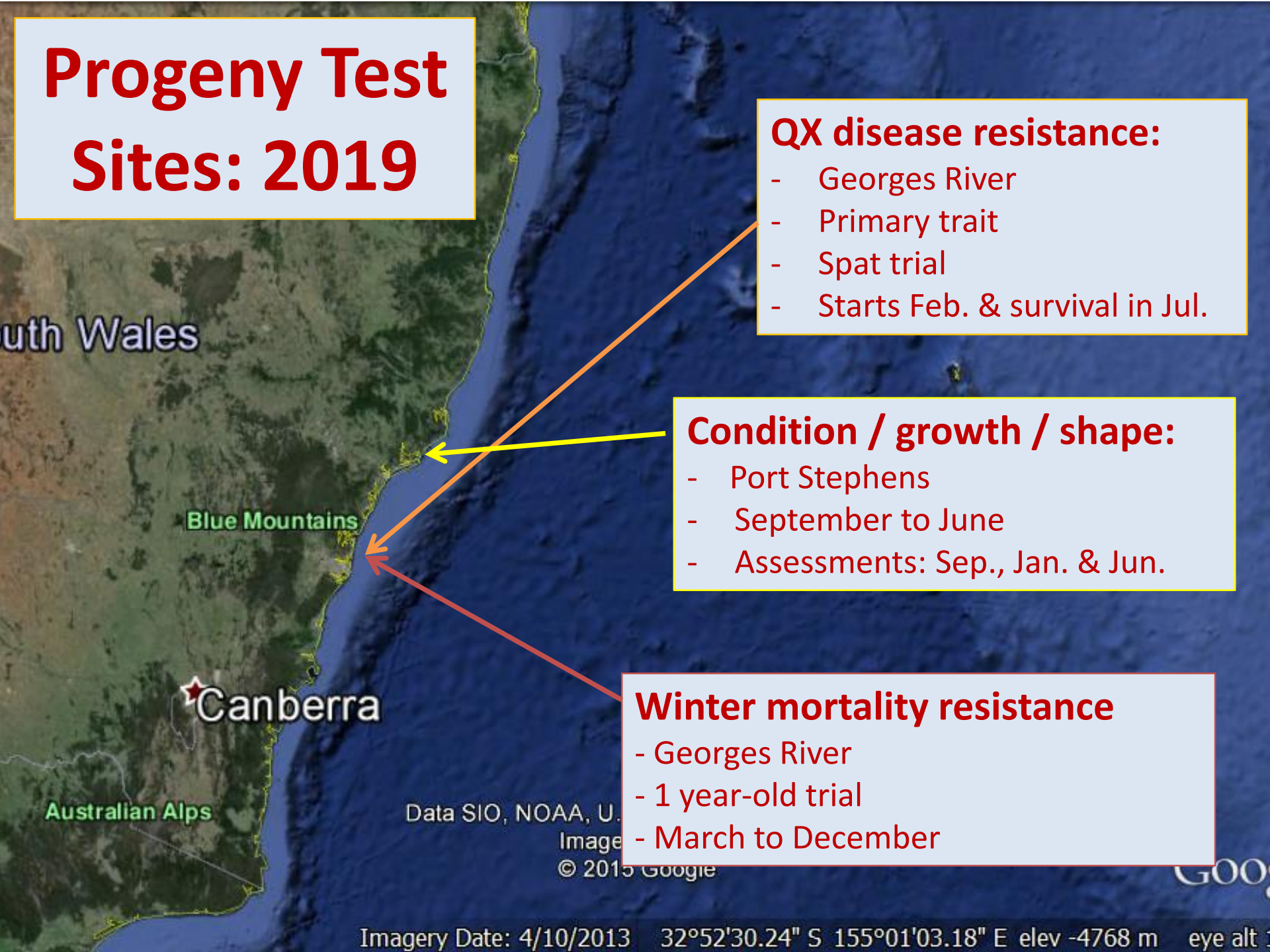
- Georges River
- Primary trait
- Spat trial
- Starts Feb. & survival in Jul.

Condition / growth / shape:

- Port Stephens
- September to June
- Assessments: Sep., Jan. & Jun.

Winter mortality resistance

- Georges River
- 1 year-old trial
- March to December



Prior to 2019

South Wales

Blue Mountains

Canberra

Australian Alps

Data SIO, NOAA, U.S. Navy, U.S. Air Force
Image Landsat
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QX disease resistance

- Georges R.
- Clarence R.

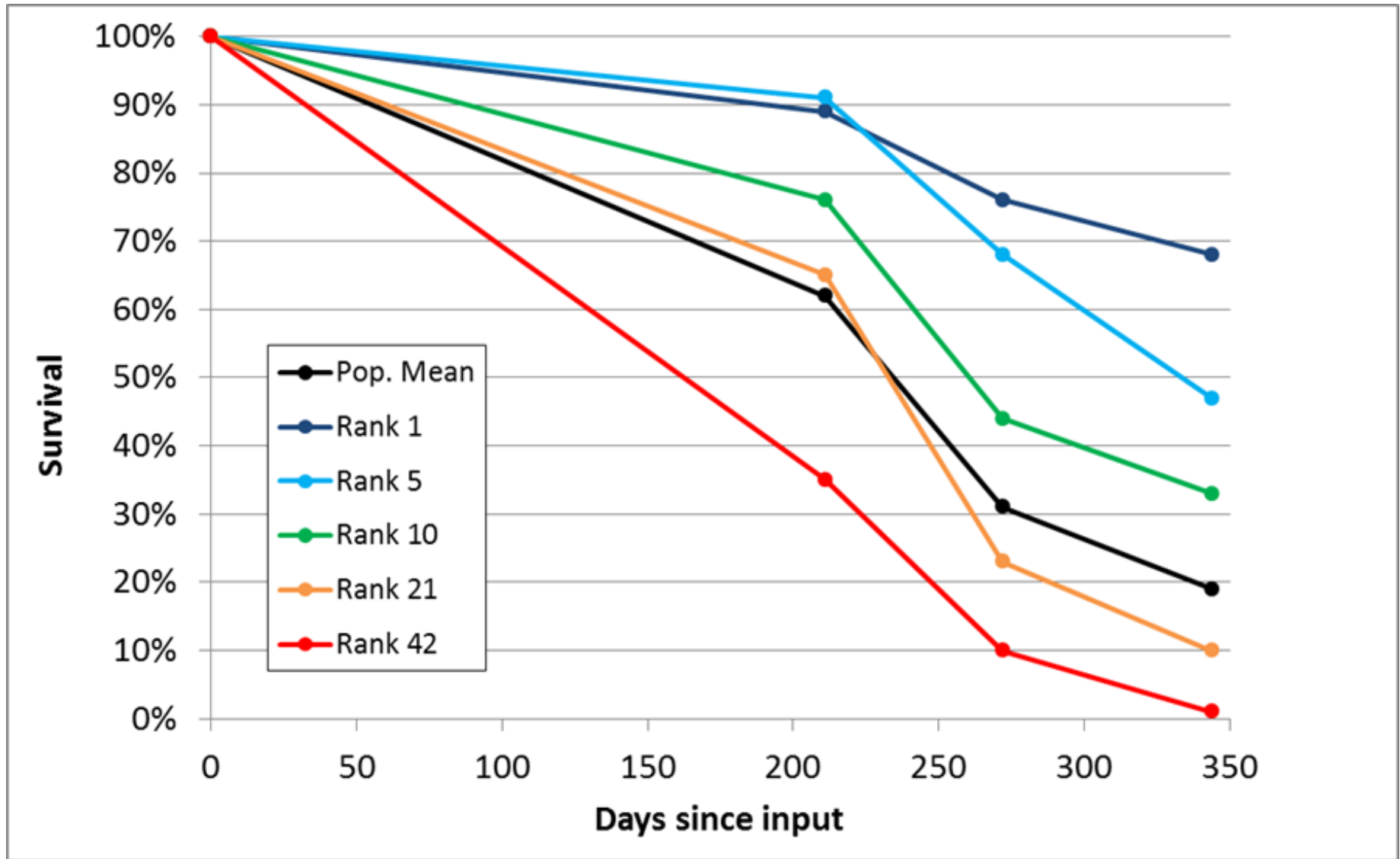
Condition / growth /shape:

- Wallis Lake
- Port Stephens
- Clyde River


Winter mortality resistance

- Georges R.
- Crookhaven R.

QX survival at Lime Kiln Bar (2015 year class)









CSIRO Data Management System

← →  https://www.marine.csiro.au/apex/f?p=123:2:4751357517587:::P2_CFT:Define_Fertilisations

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File Edit View Favorites Tools Help

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SOCO Selective Breeding Database

Input

Output

System

Tables

Load Files

View Loaded Files

Input File Format

Load File

Filename

Browse... Submit

Choose File Type

☐ Define Unit

☐ Define Site

☒ Define Fertilisations

☐ Define Progeny Test

☐ Input Individual Measurement

☐ Input Unit Measurement

☐ Input Trait Descriptor

☐ Input Job

☐ Input Alias

☐ Update Individual Outliers

☐ Update Unit Outliers

☐ Input EBV

☐ Input EBV Coefficients

☐ Input EBV Descriptor

☐ Input Founder Genetic Groups

☐ Define Genetic Groups

Recently Loaded Files

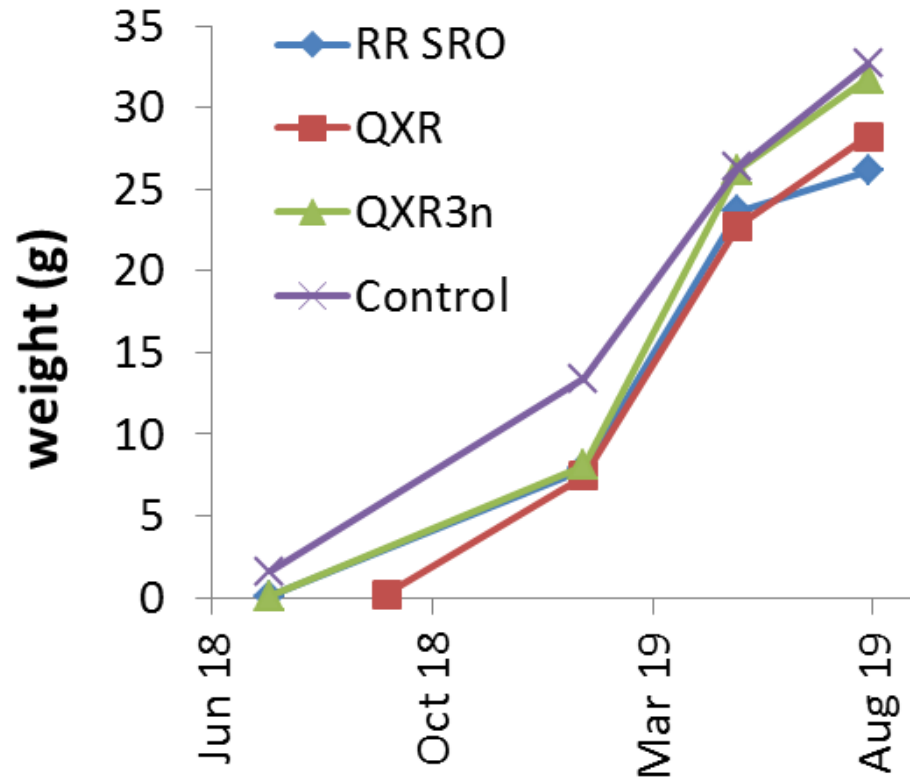
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2015_Fertilisation_2015-10-22.csv	75	Define_Fertilisations	MIKE	03/JUL/16	Download
2014_Fertilisation_2015-01-08.csv	74	Define_Fertilisations	MIKE	03/JUL/16	Download
2010_Fertilisation_2011-03-01.csv	73	Define_Fertilisations	HAM257	06/JUL/16	Download
2009_Fertilisation_2010-01-21.csv	6	Define_Fertilisations	MIKE	28/JUN/16	Download
2007_Fertilisation_2008-01-22.csv	5	Define_Fertilisations	EMMA	28/JUN/16	Download
2006_Fertilisation_2007-01-19.csv	2	Define_Fertilisations	EMMA	28/JUN/16	Download

1 - 7

MIKE

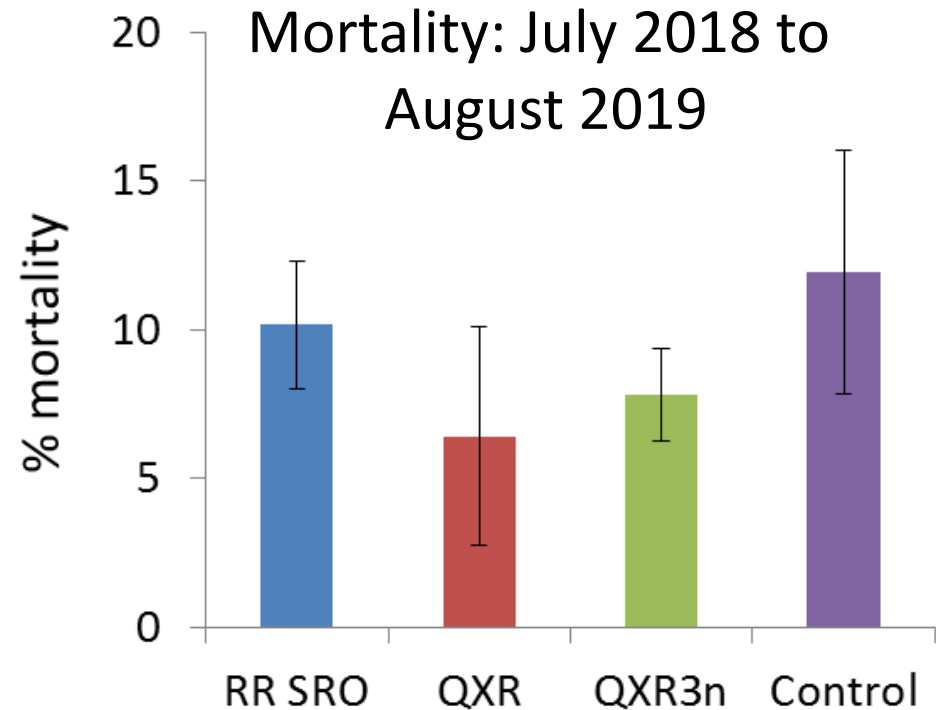
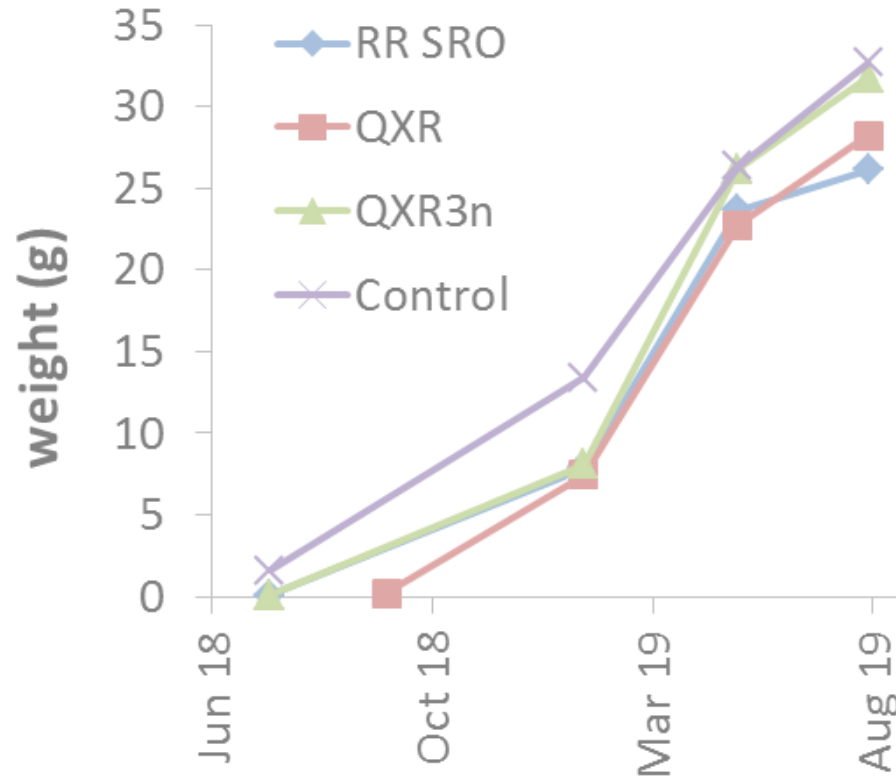
Hawkesbury River Semi-Commercial Trial

DPI / SOCo / Hawkesbury R. Farmers



Hawkesbury River Semi-commercial Trial

DPI / SOCo / Hawkesbury R. Farmers



3. The Logistics

- SRO Breeding Program **requirements**
 - What is required to run the SRO Breeding Program?
- What is the SRO Breeding Program **Schedule**?
 - Important to maximise genetic gains

SRO Breeding Program Requirements

- 1. Hatchery capable of producing 60 to 80 families per year:**
 - skill set and facilities are not those available in a commercial hatchery
- 2. Broodstock holding facilities, including broodstock back-ups**
- 3. Ability to run field testing trials, including:**
 - oyster growing sites,
 - crews to provide the animal husbandry, and
 - crews capable of undertaking:
 - technical measurements, and
 - collecting large amounts of data
- 4. Data management system:**
 - For management of large amounts of data
 - Not an off-the-shelf product (only available from a specialist)
- 5. Quantitative genetics analyses to provide:**
 - metrics for selection decisions,
 - inbreeding management, and
 - strategy formulation.

Schedule

Oct

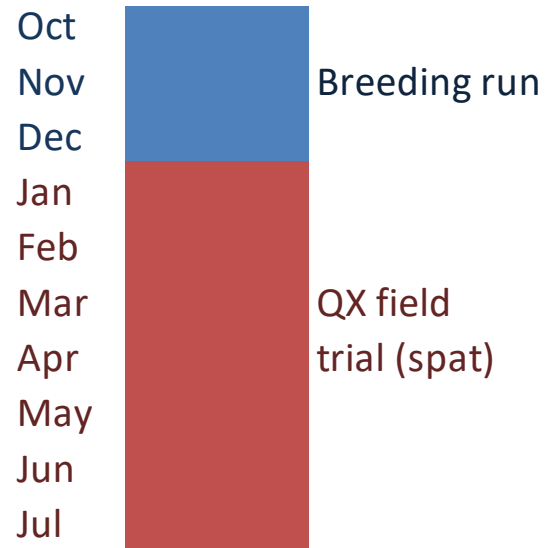
Nov

Dec

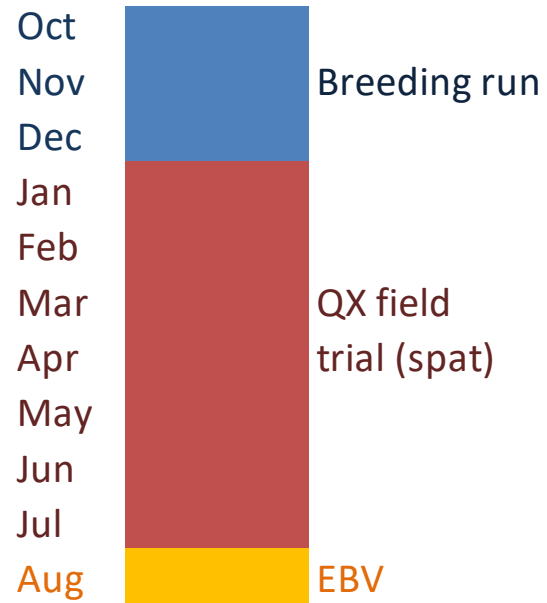


Breeding run

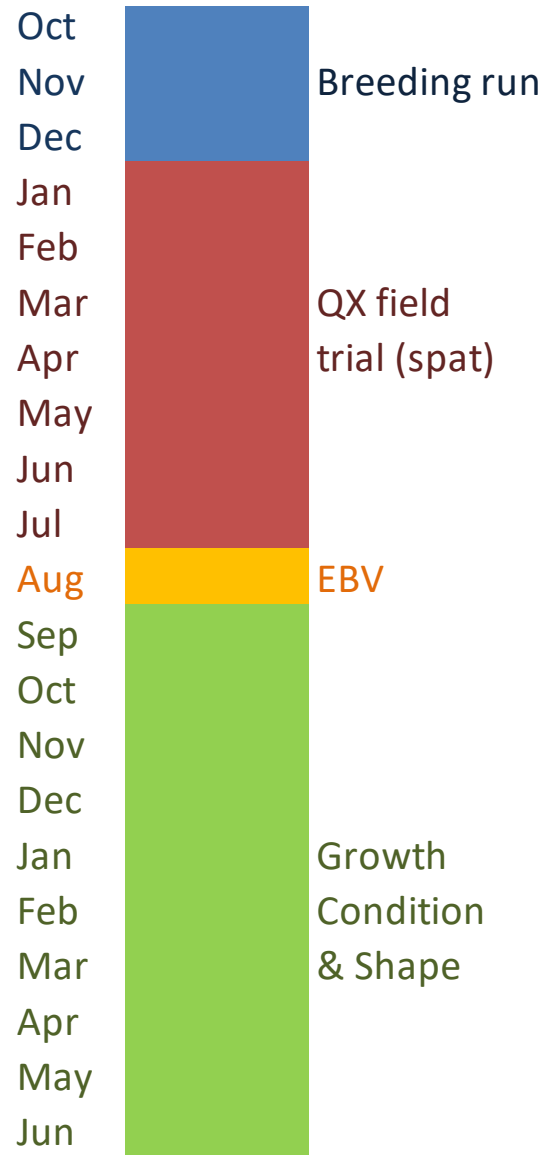
Schedule



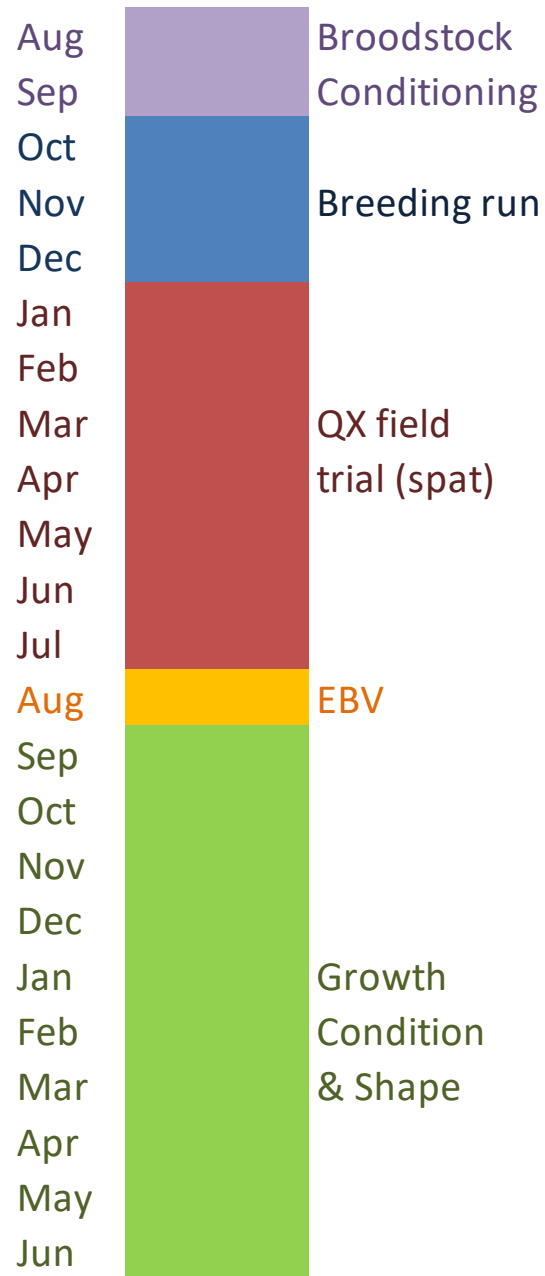
Schedule



Schedule



Schedule



4. The Progress

Year Class	QX Surv. Families	Weight Families	Condition Families
2014	27%	33%	-12%
2015	19%	15%	-1%
2016	41%	26%	-7%
2017	48%	18%	-3%
2018	63%	-	-2%

4. Progress

Year Class	QX Surv. Families	QX Surv. Top 8	Weight Families	Weight Top 8	Condition Families	Condition Top 8
2014	27%	55%	33%	23%	-12%	-4%
2015	19%	62%	15%	24%	-1%	-2%
2016	41%	62%	26%	26%	-7%	-6%
2017	48%	64%	18%	31%	-3%	-4%
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Business
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International Agricultural Research



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Fisheries Research and
Development Corporation



AUSTRALIAN
SEAFOOD
COOPERATIVE
RESEARCH CENTRE



MACQUARIE
University
SYDNEY · AUSTRALIA

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- **Port Stephens Fisheries Institute Hatchery Staff:**

Stephan O'Connor, Kyle Johnston, Brandt Archer, Lynne Foulkes and Walter Scifleet



Talk Outline

1. Goal
 - Breeding objective
 - Traits under selection: QX, growth and condition
 - Shell shape
 - Incorporating winter mortality
2. Field trials
 - QX field challenge
 - Condition / Growth / Shape
 - Winter mortality
 - Hawkesbury River semi-commercial trial
3. Logistics
 - Requirements
 - Schedule
4. Progress
 - What we are doing