

Piloting Commercial Scale Supply of Mass Selected Sydney Rock Oysters

[Authors: Select Oyster Company P/L

Project No. [2013/709]



**AUSTRALIAN
SEAFOOD
COOPERATIVE
RESEARCH CENTRE**

19/05/2015

***This project was conducted by
Select Oyster Company Pty Ltd 0402 677 534 selectoysterco@gmail.com***

ISBN?: [insert number?]

Copyright, 2015: The Seafood CRC Company Ltd, the Fisheries Research and Development Corporation and Select Oyster Company Pty Ltd

This work is copyright. Except as permitted under the Copyright Act 1968 (Cth), no part of this publication may be reproduced by any process, electronic or otherwise, without the specific written permission of the copyright owners. Neither may information be stored electronically in any form whatsoever without such permission.

The Australian Seafood CRC is established and supported under the Australian Government's Cooperative Research Centres Program. Other investors in the CRC are the Fisheries Research and Development Corporation, Seafood CRC company members, and supporting participants.

Office Mark Oliphant Building, Laffer Drive, Bedford Park SA 5042
Postal Box 26, Mark Oliphant Building, Laffer Drive, Bedford Park SA 5042
Tollfree 1300 732 213 Phone 08 8201 7650 Facsimile 08 8201 7659
Website www.seafoodcrc.com ABN 51 126 074 048

Important Notice

Although the Australian Seafood CRC has taken all reasonable care in preparing this report, neither the Seafood CRC nor its officers accept any liability from the interpretation or use of the information set out in this document. Information contained in this document is subject to change without notice.



Australian Government
**Fisheries Research and
Development Corporation**



An Australian Government Initiative



Non-Technical Summary

2013/709. Piloting Commercial Scale Supply of Mass Selected Sydney Rock Oysters

PRINCIPAL INVESTIGATOR: Jane Clout

ADDRESS: Level 6, 35 Chandos Street St. Leonards. 2065. PO Box 459 St. Leonards NSW 1590. Australia.

PROJECT OBJECTIVES:

1. Implementation of industry-managed protocols for selected lines of Sydney Rock Oyster broodstock.
2. Develop improved communication with end users with regard to availability, properties and management of available, selected stocks.
3. Coordination of hatchery requirements with broodstock availability to improve supply.
4. Development of human resources with shellfish specific experience.
5. Introduction of selected broodstock into more multiplier hatcheries.
6. Development of a platform to support delivery of outcomes of current research projects including the developing family breeding program.

ABSTRACT

This project has established a system of broodstock management for the Sydney Rock Oyster (SRO) breeding program whereby the ownership and management of broodstock of mass selected lines of SRO have been passed onto industry, and effected by Select Oyster Company P/L (SOCo). This process ensures that selected lines of broodstock are maintained in multiple estuaries, and made available to commercial hatcheries, thus providing industry access to genetically improved lines of stock and contributing to the preservation of genetically improved seed. In addition, SOCo have formed working relationships with three commercial hatcheries by providing broodstock for production runs where requested. In doing so the NSW DPI Fisheries bivalve hatchery has been relieved of pressures to channel state resources into commercial production runs, and enable focus on research and development of the family breeding program (FBP). Transition to a FBP is an acknowledged priority for the SRO industry. With a systematic approach to broodstock management, the foundations are now in place for an efficient transition into a commercial FBP. A major priority now for SOCo is to source and fund the genetic services required to guide our operational breeder, the DPI, in single-pair matings. In the market, production capacity has been less than expected. A combination of suboptimal broodstock conditions and technical issues innate to each hatchery has had negative impacts on the timely delivery of commercial quantities of spat. SOCo is addressing these problems through extension programs including training and research to identify ways to improve broodstock conditioning techniques and reduce technical constraints in hatcheries. The outlook is positive; genetic gains from the family breeding program have been identified and industry demand for selected lines exceeds supply. Furthermore, with the employment of an Operations Manager eighteen months ago, SOCo has been able to action more business operations including broodstock management, and increase collaborative opportunities and communications with industry, oyster consortium groups and our partners the DPI.

OUTCOMES ACHIEVED

Select Oyster Company P/L (SOCo) has established and put into practice an operational model which sets the foundations for the Sydney Rock Oyster (SRO) industry-owned mass selection breeding program, and ultimately a family breeding program, through a broodstock management system and commercial access to improved genetic stock.

Through appointment of an Operations Manger, SOCo channel human resources into the management of mass selected lines of SRO broodstock, and give commercial hatcheries access upon request to the best conditioned stock, for production runs. Sound working relationships with five commercial hatcheries, three which are using selected broodstock for production runs, has ensured that a system for commercial access to selected lines is in place and can be used when the program transitions to family breeding. The diversity of hatchery sources reduces the risks of biosecurity stock lock-down due to diseases, or the risk of undersupply if one hatchery cannot produce.

SOCo has facilitated sales of selected lines of spat from commercial hatcheries. In 2011/2012, 16 million spat were sold, largely by NSW DPI bivalve hatchery. Our production target was 30 million by 2014 however; just less than 20 million was sold. Shortfalls in sales were due to a combination of factors including: technical issues in hatcheries, suboptimal broodstock condition at times of peak hatchery demand, various unpredictable commercial disruptions to supply of existing seed and the outsourcing of commercial seed production to privately run hatcheries to facilitate NSW DPI investment into the family breeding program. Despite sales shortfalls the demand for selected lines of stock is growing. SOCo have traced sales to at least 42 customers predominantly in NSW and a few in south QLD. We're confident that the original projection of demand for 30 million seed per year is achievable. Disease pressures and an interest in the uptake of selected lines on the basis of positive feedback on stock performance and SOCo customer service are certainly increasing the number of inquiries SOCo receive, and translating to a steady penetration of stock onto more farms. If technical constraints to consistency and volume of seed supply are addressed, it is likely that an additional 10 million spat would have been taken up by the industry this past year, increasing our customer base, and sales quotas per farm, and boosting industry confidence in a reliable supply. SOCo have identified the need for hatchery training and capacity building to secure commercial production and preservation of genetic gains. Improving technical capacity in hatcheries, and broodstock conditioning research and development are ongoing and mutually inclusive challenges.

Family breeding offers a bright future for the SRO breeding program and SOCo have developed a sound working relationship with our operational breeder the NSW DPI PSFI.

LIST OF OUTPUTS PRODUCED

Staff: an Operations Manager (0.75 FTE) employed in October 2013.

Broodstock management: Broodstock deployed in five haven estuaries, and managed by our Operations Manager. Handling protocols were written and distributed to carers. Quarterly on-site inspections, and regular phone and photo assessment maintained.

Strategic Plan: A four year (2014-2017) Strategic Plan approved by the Board outlines the company vision, mission, budget forecasts and SWOT analyses (Strategic Plan, appendix 1). Quarterly review by the Operations Manager and Board meetings.

Commercial hatcheries: SOCo work with five commercial hatcheries. We have provided broodstock spat production to three and maintain regular communication and invoicing system.

Spat supply: During this project (18 months), approximately 28,500,000 spat have been sold to industry. There were orders for at least a few more million, and more sales are expected before the end of the financial year. Industry has access to two lines of fast growing stock: B2 and WMR (selected for QX disease and Winter Mortality disease resistance respectively). Selected spat has been purchased by at least 42 businesses in NSW and QLD.

Communication: quarterly field trips in NSW for farm visits, customer feedback survey and weekly phone calls, bimonthly, if not more frequent, industry communication via emails, newsletters, company Snap Shot, company website, Twitter and FaceBook.

Industry field days: in 2014, two south coast field days, and in 2015 two upcoming (North

and South coast) field days. At each, SOCo presentations educate industry on the breeding program and hatchery supply, while gathering grower feedback.

Networks: establishment of a large network of research and industry bodies interested in SRO breeding projects including NSW DPI, Oysters Australia, OceanWatch Australia, Local Land Services NSW, FRDC, CSIRO, several universities and NSW TAFE.

ACKNOWLEDGEMENTS

We acknowledge the NSW DPI Port Stephens Fisheries Institute for their financial and in-kind support and commitment to the Sydney Rock Oyster breeding program. The DPI have partnered with SOCo to support research and development of mass selected and family lines, operational breeding procedures, and continued guidance on hatchery production and improvement of the program. The DPI have also provided a generous grant to help industry uptake selected lines of spat which has been beneficial to the program and the oyster farmers who purchase the stock. We acknowledge NSW Farmers Association for their secretarial support, lobbying support and guidance. We acknowledge Oysters Australia for the continued support of the Sydney Rock Oyster breeding program and providing direction that is in line with industry priorities. We acknowledge the FRDC and Seafood CRC for financial support of extension programs and the breeding program.

1. Introduction and Background

The Sydney Rock Oyster (SRO) breeding program began in 1990 under the direction of the NSW DPI (DPI). The program adopted a mass selection breeding program (MSBP) technique, and since it began significant progress has been made in providing fast growing and disease resistant SRO to industry.

A key priority for the **breeding program** was identified by the independent '**Morten Rye review** of Australian Breeding Programs for Pacific Oyster, Sydney Rock Oyster, Barramundi and Prawns CRC project 2008/769' stating: "*It is recommended that... [industry]... establishes a management team with the core responsibility to coordinate breeding program activities in close collaboration with PSFI (NSW DPI) and with technical input from a competent provider of quantitative genetic services (e.g. CSIRO)*".

Select Oyster Company P/L (SOCo) is the commercial arm that manages the commercialisation of the breeding program. Established in 2004 by the Oyster Farmers' Association of NSW and NSW Farmers' Associations' Oyster Section with funding from the FRDC, and now owned by NSW Farmers Association. Following the recommendation of Dr. Rye, **an Operations Manager was engaged** to divest routine operations from the Board, and signal **industry's acceptance of and commitment** to the program.

Industry ownership and management of a MSBP program is an essential step in the commercialisation and retention of genetic gains for the industry. Commercial viability through industry ownership signifies successful adoption and use of previous investment. It also forms a development platform for the **transition** into a single pair mated family breeding program (FBP). A FBP is essential for the SRO industry as it can select traits such as **growth, diseases resistance, condition and shape, target commercially desirable characteristics identified by** estimated breeding values and effectively control inbreeding over the life of the program. The DPI has supported the establishment of the MSBP and the transition to FBP. **SOCo works in partnership with the DPI** as our operational breeder and research provider for the ultimate industry management and commercialisation of the family lines.

1.1 Need

To commercialise the MSBP and ultimately a FBP, the following recommendations were identified **as key priorities** and have been considered throughout the course of this program. Recommendations and any changes that arose during the project are listed here:

- Development of a **reliable hatchery technique** for a consistent high volume production of SRO spat, and a reliable source of supply which preferably should be a commercial hatchery and undertaken independently of SOCo. Currently one commercial hatchery is producing high volumes of spat, while two others are expanding to increase their production capacity. Each hatchery manages their production independently of SOCo; however SOCo offers broodstock, assistance in marketing, communications with industry and in facilitating training and extension services.
- Facilitate effective **family based multi-trait selection** (incorporating quantitative genetic advice).
- Prepare an **operational breeding plan** based on sound quantitative genetics and selection theory. An operational breeding plan is currently being developed with the support from DPI.
- Establish effective **data recording** (nucleus and performance testing) and database management systems.
- Establish a **management team** with the core responsibility to coordinate breeding program activities in close collaboration with DPI Port Stephens Fisheries Institute (PSFI) and with technical input from a competent provider of quantitative genetic services (e.g. CSIRO).

Furthermore, for industry to progressively adopt management and self fund the current MSBP breeding program, SOCo needed to appoint an **Operations Manager** which would provide a strong incentive for DPI to continue to invest in the family program. SOCo must also invest in program mechanics alongside private commercial investment in hatchery technique to address production barriers.

1.2 Objectives

This project has addressed the following objectives, to varying levels of completion as indicated in italics:

1. Implementation of protocols for broodstock management and perpetuation. *Achieved.*
2. Development of improved communication with end users with regard to availability, properties and management of available, selected stocks. *Achieved.*
3. Coordination of hatchery requirements with broodstock availability to improve supply. *Partially achieved, and ongoing.*
4. Development of human resources with shellfish specific experience. *Achieved and ongoing*
5. Introduce selected broodstock into more multiplier hatcheries. *Achieved and ongoing.*
6. Develop a platform to support delivery of outcomes of current research projects including the developing family breeding program. *Partially achieved.*

2. Methods

In order to address the project objectives listed above, the following core areas of focus were implemented.

2.1 Human Resources and Business Strategy

- **SOCo appointed an Operations Manager** (0.75 FTE) with expertise in oyster reef ecology, oyster aquaculture, disease management and bivalve hatchery production

operations. Under direction from the Board, the Operations Manager was tasked with routine operations, broodstock management, regular liaison with DPI and stakeholders, and communication with industry. She maintained regular communication with the Board including monthly progress reports, teleconferences and quarterly face to face meetings.

- SOCo appointed a new **Board of Directors** with shellfish aquaculture expertise.
- SOCo's four year **Strategic Plan** was written and published on the SOCo website www.selectoysterco.com.au.

2.2 Broodstock Management

- A **broodstock management** and maintenance system was designed and implemented for the mass selected broodstock lines (two lines). Five farmers were nominated as carers from five estuaries encompassing northern and southern NSW estuaries. Each carer is remunerated annually by SOCo.
- **Broodstock handling protocols**, and support for broodstock carers were implemented, including quarterly inspections by SOCo Operation Manger and assistance to the broodstock carers in handling, inspections, maintenance and movements by SOCo where required.
- A **relationship** was established between SOCo and **commercial hatcheries**. **Delivery of broodstock** to commercial hatcheries was coordinated as required by hatchery managers for commercial production. We discovered that delivering **conditioned broodstock on request is challenging** particularly during cooler months and therefore restricted the production of spat at peak demand times and reduction of customers. **Conditioning broodstock in hatcheries** should be a key research priority and methods to incorporate a **more efficient conditioning system** addressed.

2.3 Liaison with stakeholders

- **SOCo facilitated close liaison** with authorities including **DPI Biosecurity and Aquaculture Management** to ensure that the best risk management practices were implemented in the most timely fashion to ensure the perpetuity of the stocks. SOCo facilitated **protocol and permit development** to regulate broodstock and spat movement between NSW and Victorian Shellfish Hatchery, and between estuaries within NSW.
- SOCo maintained regular and working liaison with **DPI Aquaculture Research**, our operational breeders, to **coordinate breeding requirements** to ensure the perpetuation of the genetic gains including disease resistance and fast growth.
- SOCo maintained a regular liaison with **CSIRO** and DPI to identify breeding objectives and formulate a means to secure genetic services in order to deliver a commercial FBP.
- SOCo maintained regular communication with **Oysters Australia** to coordinate research funding priorities for the breeding program and hatchery capacity development.
- **SOCo** maintained regular communications with Seafood CRC (SCRC), and hosted two face to face meetings with our Program Manager Graham Mair, who received SOCo's industry updates. SOCo sought **guidance from SCRC** staff in business decisions including allocation of funds for extension projects in hatchery training.

2.4 Commercialisation and extension

- SOCo established a **marketing, education and communication** system with industry to raise the profile of the genetic gains of the MBSP and the FBP, and to increase sales of selected lines of seed.
- SOCo demonstrated **commitment to extension activities** with the aim to improve awareness and education of the breeding program and uptake of spat including hosting an aquaculture expert from USA on an FRDC visiting expert bursary.
- SOCo secured Hatchery Hub funds from the SCRC to implement hatchery training and capacity building through external consultant expertise.

3. Results and Discussion

Below the results of the project in relation to each objective are discussed.

1. Implementation of protocols for broodstock management and perpetuation. *Achieved.*

In late 2013, SOCo designed and implemented a **broodstock management system** to facilitate commercial production. The system includes:

- broodstock deployment in **five haven estuaries** in NSW to manage the risk of losses or biosecurity lock ups;
- Implementation of carer **handling protocols**;
- Annual remuneration for carers;
- Quarterly **inspections** by our Operations Manager and more regular and sporadic checkups with carers directly by phone and photographs where necessary.

Carers are diligent in its upkeep and always bring stock off the farm for inspections or photo evidence of condition on request by SOCo. There have been no major mortalities or stock losses due to diseases, theft, or misconduct. SOCo are pleased with the outcome of this broodstock management system from a logistical and systematic point of view, and would be happy to use this system for the care of family lines in the future. Conditioning broodstock (discussed in Objective 3) with this system is however still a challenge requires attention.

2. Development of improved communication with end users with regard to availability, properties and management of available, selected stocks. *Achieved.*

SOCo has built, grown and maintained several forms of communication with industry, including:

- Participation in **two industry workshops** hosted by South East Local Land Services in June 2014. SOCo presented alongside DPI to communicate progress in the MSBP and family breeding program, spat sales via hatcheries and nurseries, and other company initiatives. Similar presentations will be undertaken in 2015 oyster field day events. SOCo is currently involved in the organisation of Oyster Field Days in May 2015 in North and South NSW to launch the NSW Oyster Industry Strategic Plan. SOCo communicate with the organising committees (teleconferences, email, in person) and have secured presentation and a trade show at each to discuss all SOCo initiatives. SOCo is also ensuring that the breeding program is addressed in the Industry Strategic Plan through discussions with the committee chairs and consultant who's writing the plan.
- SOCo are managing a \$50,000 **NSW government subsidy** administered by the NSW DPI and announced in March 2014. This subsidy rebates part of the cost of selected spat to farmers. In November 2014 we announced a second round and increased the rebate from \$600 to \$800 per customer to encourage uptake, however the uptake of this rebate has been slower than expected. 31 applications have been processed but only 20% of the funds have been spent. SOCo are considering increasing the quota again (i.e. \$1000 per customer) or reallocate some of the money to other extension initiatives if approval is obtained.
- SOCo post **updates on our website** regularly including spat availability, hatchery and nurseries details, latest media releases, a testimonials page, updated contact information and useful links (DPI, forms, permits etc...).
- Quarterly **broodstock inspection trips** are undertaken which allows our Operations Manager to visit as many farms as possible en route.
- SOCo's industry contact list is currently **120+ growers** including email and phone numbers.
- In November 2014 SOCo launched a **customer feedback survey**; twenty survey responses have been collected so far. Generally, respondents indicate that reliability of supply is their main priority, followed by disease resistance and condition. A few growers have expressed their interest in diversification of stock including triploid SRO and Flat oysters (angasi). The best way to communication with growers is through the NSW DPI Aquaculture newsletters, and the SOCo website is also used by the majority of respondents. SOCo customer service was rated highly. We find the best way to collect answers is in person with the respondents and we continue to collect this feedback. Other industry feedback is consistent with these responses.

- **Social media:** SOCo launched a Twitter account in January 2015. Although this form of communication is not growers' choice, it has forged communications with processors restaurants, news agencies, government agencies and lobby groups (tweets: 459, following 157, followers 61). SOCo launched a FaceBook page in March 2015.
- Our **Company Snap Shot** was launched in March 2015. This is a one page overview of company news including spat for sale, research, the breeding program. It was distributed via email with hyperlinks for easy reading on smart phone and computer.
- SOCo maintains regular input to the biannual **industry wide DPI Aquaculture newsletter**, and quarterly updates in the **Shellfish Committee** and **Oyster Committee** meetings.
- SOCo participated in the **Australia's Talking Oysters video** Episode 2, which was sent to all OA contacts within Australia, posted on YouTube and our website.

In addition, SOCo have been actively involved in **several extension projects** during the course of this program, with the objective to increase industry capacity to uptake selected stock and facilitate awareness and improved capabilities within the industry. In June 2014 SOCo was successful in receiving **FRDC Visiting expert award** on behalf of the Australian Government to host Prof. Dale Leavitt from Roger Williams University Rhode Island, to undertake a road show of workshops and presentations in NSW, SA and TAS on floating upweller systems and alternative species cultivation. Dale visited hatcheries in NSW and TAS and several growers and industry bodies in each state. The program was well received and survey results from industry participants indicated a high level of satisfaction and support for such extension projects. Some farmers have taken the information to the next level and built prototypes upweller systems (videos available on SOCo website).

SOCo Board members and Operations Manager attended the **WAS2014** where SOCo co-chaired the oyster day and met with industry bodies from across Australia, including geneticists, ASI, FRDC, CRC and farmers.

Our Operations Manager was recently awarded the **ABARES Science and Innovation Award** to investigate how various husbandry techniques can be used to obtain good shell shape in selected lines of SRO, awarded by Dept. Agriculture for \$22,000. Furthermore, SOCo have recently been granted CRC funding for a **NSW Hatchery Hub** program whereby a skilled consultant will visit hatcheries to offer technical advice, and public seminars will be hosted by universities, DPI and TAFES to attract students and offer open access information to industry bodies. This program is due to start in Winter-Spring 2015.

3. Coordination of hatchery requirements with broodstock availability to improve supply.
Partially achieved and ongoing.

SOCo have established and maintain relationships with **five commercial hatcheries** (detailed below), **three of which are in commercial operation:** Southern Cross Shellfish (SCS), Camden Haven Oyster Supply (CHOS) and Victorian Shellfish Hatchery (VSH). SOCo maintains regular **communications with all hatcheries**, regardless of their production capacity in an effort to try and meet their needs and improve production capacity. Each hatchery that requests to use selected SRO broodstock for commercial production is required to sign a SOCo Customer Account Application (appendix 2). This is a legally binding agreement between SOCo and the guarantor (the hatchery). It places conditions on the use of SOCo product, that being selected lines of broodstock, and the sale of the oyster spat to customers.

In coordination of supply and demand, SOCo play an active role in linking growers with hatcheries, but SOCo do not manage grower orders or payments. **SOCo invoice each hatchery quarterly (0.2c/oyster)**, based on the number of spat (1mm retained) they have produced and sold to industry.

Thus it is so important to improve production from all three commercial hatcheries, and ideally more hatcheries, to increase while diversifying supply. SOCo recognised the importance of improving hatchery production through training and secured Hatchery Hub funding.

SOCo's agreed role is to provide access to broodstock for commercial production when and where required. **SOCo provide broodstock** to hatcheries at their request by sourcing the best naturally conditioned broodstock at the time via communication with carers and informed selected from inspection and/or photos of the stock. SOCo manage shipments, adherence to biosecurity protocols and broodstock movement logs. When the hatchery no longer needs the broodstock, SOCo manages the return of the stock to the carer.

In the 2013-14, 18,800,000 selected spat were sold to industry. For the 2014-15 FY to date (May 2015), 10,214,000 spat have been sold. Production only met half of industry demand due to a combination of **suboptimal broodstock condition and technical problems in the hatcheries**. The impacts of this shortfall on the longer term business plan are discussed in detail in section 6 of this report. Details related to each hatchery are outlined below.

VSH spawned for the first time SRO in Jan 2014 once protocols were sorted with the assistance and direction of SOCo. After a productive first SRO run in January 2014 (3 million spat) the VSH extended their floor space and capacity to produce larger quantities of SRO spat. They have maintained good communication with SOCo and their customers in NSW to facilitate best possible business relations and supply of spat. In January 2015 technical problems at VSH caused an unprecedented decline in production that could not be recuperated. VSH could not undertake a second run due to the **unusable broodstock condition and prior hatchery commitments** to produce other species. VSH is a quarantined system; it must filter and contain all water involved with SRO production, and therefore cannot produce SRO at the same time as other species. VSH have also provided procedural reports on hatchery operations and sought advice from DPI hatchery staff on **technical problems** and although there were production shortfalls, SOCo are confident that VSH are committed to producing SRO for the NSW industry in the future.

CHOS have attempted production runs during 2013, 2014 and 2015. However, due to **suboptimal broodstock condition**, water quality issues and **technical difficulties** the hatchery has not produced commercial quantities of spat. They have expanded the hatchery to increase capacity, and sought guidance from NSW DPI. They have a large customer base, both as a hatchery and a nursery and have expressed interest and support for extension and capacity building programs that could assist their production capacity. SOCo are confident that they are committed to production selected lines of SRO for industry.

SCS has been the biggest supplier of selected seed for industry. They have produced nearly all of the spat sold in 2014-15. SCS is located in Port Stephens and as a result of unfortunate mortalities in Pacific Oyster stock in 2014 due to unknown causes, some of the stock was not sold as industry arranged temporary closures of stock movements from Port Stephens for any oyster species. Furthermore, many customers in southern estuaries who ordered the Winter Mortality resistant line have not taken up available B2 (QX resistant line) spat which has impacted total industry sales this year. In response, SCS have attempted a recent Winter Mortality production run, however due to **suboptimal broodstock condition** in peak times (June – July 2014) and **water quality issues** in early 2015, a commercial WMR run was not achieved.

AquaFarms QLD is a commercial hatchery in Hervey Bay, QLD. They maintain regular contact with SOCo.

Smithies Hatchery is a commercial hatchery on south coast NSW which has produced commercial quantities of selected spat in the past; however they have not expressed any intention of producing in the last few years.

4. Development of human resources with shellfish specific experience. *Achieved and ongoing.*

An **Operations Manager** (0.75 FTE) was appointed in October 2013 for a two year term. The Operations Manager is based at DPI PSFI and regularly travels across NSW to undertake broodstock inspections, meet with farmers and conduct meetings. The Operations Manager is tasked with **regular communications and directions from the Board**, broodstock

management, communications with industry and authorities, and business development. In addition, a new Board was appointed consisting of oyster farmers, shellfish experts and a NSW Farmers Association representative. **A four year Strategic Plan** was written and implemented, including a SWOT analysis, budget, and production forecasts for 2014 - 2017. The Strategic Plan (without financials) was published on the SOCo website and available on request. A confidential copy (with financials) was delivered to DPI.

SOCo also explore **other business opportunities**. In 2014, SOCo managed the sale of flat oyster *Ostrea angasi spat* from the NSW DPI hatchery to a commercial nursery. This service generated a small income for SOCo via a levy. SOCo are considering options to expand our business model to include hatchery production of other species such as flat oysters, and this concept will be discussed at upcoming field days in May 2015. Breeding programs have not been discussed, but SOCo could facilitate hatchery-grower business relations and assist with protocol implementation to generate income from this service.

Triploidy: there is market demand for a disease resistant triploid SRO. SOCo have had discussions with SCS hatchery who wish to embark on R&D into triploidy induction using selected lines of SRO. SCS in consultation with NSW DPI and CRC have sought approval from SOCo to use selected lines of broodstock for commercial triploid production. A SOCo levy would be collected on spat sales. However, as no research has been done on the performance of triploid SRO, SOCo and the hatchery would implement a 'buyer beware' market strategy.

5. Introduce selected broodstock into more multiplier hatcheries. *Achieved, and ongoing.*

Before the program started, selected broodstock was being used by **two commercial hatcheries**; SCS and CHOS. Of these two, commercial scale runs were achieved only by SCS. Broodstock was also being spawned for commercial production in DPI PSFI hatchery, however, it has been the objective of this program and DPI to move production out of this hatchery and into **commercial hatcheries** to free up state resources to research and development of the FBP.

Since this program started eighteen months ago, a **third commercial hatchery** (VSH) has undertaken commercial production runs with selected lines of stock, and the working relationship between SOCo and other commercial hatcheries is improving.

6. Develop a platform to support delivery of outcomes of current research projects including the developing family breeding program. *Partially achieved.*

SOCo has been **liaising closely with the DPI** research team and with geneticists from the CSIRO to develop the family lines. SOCo facilitated and hosted a Family Breeding workshop in September 2014 in Sydney whereby CSIRO, DPI, CRC, ASI and Oyster Australia were invited to discuss progress in the family breeding program, and plan for the future commercialisation. At that workshop, and in communications since **estimated breeding values for disease resistance, growth and meat condition** has been determined and it's been identified that SOCo can achieve 7% gains concurrently in condition and growth in each generation.

SOCo has maintained communications with analogous **Pacific Oyster breeding provider ASI**, and our Operations Manager and Chair travelled to the ASI Business Development meeting in Hobart (March 2014). Our Operations Manager travelled to CSIRO Hobart (October 2014) to meet with geneticist and ASI to discuss the development of the family breeding program.

SOCo's Operations Manager **assists DPI** in the **experimental broodstock maintenance** in three rivers: Georges River where performance during QX and Winter mortality disease is assessed; Clarence River and Merimbula where broodstock families and MSPB lines are exposed to QX disease and Winter Mortality disease respectively, for selection of survivors for breeding the 6th generation of mass selected lines and founder families for the family breeding program which are expected to be available for commercial production in 2016.

SOCo's Operations Manager also assisted in the hatchery spawning of single pair crosses of families in January 2016, which has produced 46 families that are currently held in Port Stephens. In October 2014 our Operations Manager attended a two-day Breeding Focus, Breeding For Resilience workshop hosted by CSIRO, AGBU and UNE at Armidale UNE Campus. There she met several geneticists working in the livestock and aquaculture industries and forged relationships that she maintains on behalf of SOCo today.

Currently SOCo is in the process of **sourcing funding** that's needed for the **genetic services** that will inform breeding family selection, guide the next round of single pair matings in January 2016 and develop a data management system for the family breeding program, and resultant EBVs.

4. Benefits and Adoption

This investment has been of **huge benefit to SOCo, the SRO industry and industry bodies**. It has preserved and built on the legacy of the SRO breeding program that has been developing since 1990, and has since made significantly headway in providing a commercially available, fast growing and disease resistant animal for the SRO industry. Through the appointment of an Operations Manager, SOCo have been able to channel resources and energy into responding to industry and DPI needs; that is, commercializing an industry owned breeding program. During the past eighteen months since our Operations Manager started and since the appointment of new Board members, SOCo have received strong, **positive feedback from the industry**, reporting that SOCo's communications and responses to industry requests has **improved dramatically**. DPI have also indicated that the benefits to the breeding program are evident as the management of broodstock and relationship with the industry is improving, while commercial hatcheries are responding to industry needs so that the DPI can now channel their resources into developing FBP.

Encouraging progress has been made in terms of production and hatchery capacity. SOCo have built strong relationships with five commercial hatcheries, three of which are each pursuing selected lines for production to meet customer demands. SOCo have been able to trace the sales of selected lines of stock via government rebates and the customer feedback survey. Selected lines of spat have been taken up by at least 42 businesses mainly in NSW, and a few in QLD. SOCo are privy to the fact there were orders for approximately an additional 10 million spat this year, and therefore we expected sales of around 20 million spat however due to **suboptimal broodstock condition and hatchery technical issues** mentioned previously, this quantity of spat could not be produced. The NSW oyster industry employs 313 oyster farmers yet the supply of SRO is in deficit of demand by approximately 50%. Diseases have had a serious impact on production, and some farmers rely entirely on selected seed. The potential for growth in uptake of selected lines of spat is evident

This project has facilitated substantial non-market benefits particularly in the context of industry training and extension. In response to technical issues that have reduced hatchery production, **SOCo designed a hatchery training project, the Hatchery Hub** which aims to address specific hatchery needs and identify areas for operational improvement. This project has been developed in consultation with hatchery Operations Managers who have expressed their interest and support for extension opportunities to improve operations at each step of the way (conditioning broodstock through to nursery stages). SOCo has also discussed options with universities, the DPI and TAFE in order to extend the benefits of this project to the wider community and particularly youth who are interested in careers in aquaculture. The Hatchery Hub will **set standards** for hatchery procedures for the SRO industry and serve as a benchmark for future training schemes, including training of tertiary students. It is intended to also benefit hatchery profitability through spat sales in the shorter term.

The development and maintenance of an industry-owned and managed broodstock program implemented by SOCo during this project will serve the SRO industry in the future when it transitions into a FBP. While the market gains of the FBP are not immediately quantifiable, the non-market benefits through the gradual adoption of the FBP are already evident. The transition brings the SRO industry in line with other leading global seafood industries such as

Pacific Oysters, and salmon which use family breeding technologies for the most effective and targeted genetic gains. The FBP also addresses industry needs for an animal with commercially desirable traits which can be consistently produced on demand.

5. Further Development

The main areas of focus that require further development to secure the continuation of a commercial SRO breeding program for the industry are discussed here.

The first is **securing the production capacity** of commercial hatcheries. Currently, of the five commercial hatcheries which are permitted to produce SRO seed for the NSW industry, only one (SCS) has a production record that is indicative of its capacity to produce commercial quantities. It is important that **hatchery personnel** have the **technical skills** to enable production to be timely, reliably consistent and at full capacity. It is also very important that there are **several viable hatcheries** that can supply oyster spat to mitigate the impact of unprecedented biosecurity closures. As mentioned previously, SOCo have been granted CRC funding for a Hatchery Hub training program which should be implemented in 2015. This project will be a good starting point to develop standards for hatchery protocol and serve as a benchmark in hatchery capacity and industry uptake. **SOCo would encourage more training** initiatives of this nature as a priority for the SRO industry in order to uptake new technologies and forge collaborations within the industry to set common goals and standards.

As to be expected, **broodstock condition varies through time**, and between estuaries. At times the **timely condition required for successful spawning** has not been achieved and as a result, some production runs could not start, or produce the required quantities of spat. This is a problem particularly during winter when broodstock is needed most by hatcheries to supply industry in spring time. **Research in broodstock conditioning** techniques within hatcheries is of a priority. SOCo have raised this with DPI, Oyster Australia and been in contact with universities to collaborate on potential research projects. We have built relationships and maintain discussion with Southern Cross University Nation Marine Science Centre and the newly established Charles Sturt University Port Macquarie Campus. Further work is essential and a priority for SOCo, commercial hatcheries, nurseries and industry.

The development of the FBP is underway and a key priority for SOCo, the DPI and industry. Previous CRC R&D projects show that **pair-mated family breeding** for SRO can target known commercially desirable and heritable traits which include fast growth, disease resistance, meat condition and shell shape. To retain the genetic gains and continue the legacy for a commercial breeding program, **genetic services are essential**. Until now, DPI and external funding bodies have supported the establishment of this family breeding program, but in order for the program to become commercially viable it must be **industry managed and owned**. SOCo are pursuing ways to source, fund and manage the genetic services required and provide ongoing management of the program. To develop an industry-owned FBP for commercial use, genetic services are estimated to cost between **\$30K - \$50K per year**, over a period of three years. **Levies** generated from sales of spat from the MSBP lines are **insufficient**; at current production (~15-20 million spat per year) levies do not cover the costs of a geneticist, or SOCo Management staff. Therefore, **an injection of funds to secure genetic gains** would facilitate the transition into the FBP in order to provide improved lines of seed to industry in the short term. In the longer term, **reliable commercial production** necessary to generate sustainable levies is far more likely to be achieved if **hatchery training programs** that address technical shortfalls, **combined with access to conditioned genetically superior broodstock** are realistically attainable. SOCo is focused on addressing these reasons for production deficit in order to sustain a **commercially viable breeding program and pioneer a sound business model**.

6. Planned Outcomes

Below is a list of the project's original outcomes that were identified as key performance indicators, along with how the project outputs have addressed each of the outcomes.

- Successful production schedule for 2013/2014 breeding season, with confirmed supply of breeding stocks deployed to haven sites and improved seed available to growers from one or more hatcheries.
 - This project deployed **broodstock in five haven estuaries**, and delivered to **three commercial hatcheries** during 2013/14 and 2015 production seasons. Over the course of the project (since Oct 2013) approximately 28,500,000 spat have been sold to industry.
- A commercially viable strategy presented to and approved by the SOCo Board.
 - SOCo **employed an Operations Manager** in October 2013. A **four year Strategic Plan** (2014-17) was written and approved by the Board which outlines the business strategy. SOCo Operations Manager reviews the strategy and its targets to provide quarterly reports based on SWOT analyses and a 'traffic light system'. The Strategy is available on our website and open for review. SOCo are investigating ways to improve the business model. Currently, income is reliant on sales levies of selected spat. As supply has not met demand, levy revenue is not sustainable. Therefore ways of improving production capacity and implementing alternative business strategies such as the provision of a commercial hatchery supply chain of other species and triploid SROs are being considered by SOCo.
- Successful and consistent production of selected lines of SRO for supply to NSW Industry, by more than one hatchery.
 - SOCo work with **three commercial hatcheries** to provide broodstock for production of spat for industry and kept in touch with two other hatcheries that have produced SRO in the past.
- Sales increased from 16 million spat in 2011/12 to 30 million by 2014/15.

In **2013/14 financial year 18,800,000 spat** were sold. To date, for the 2014/15 financial year 10,214,000 spat have been sold and it's expected that a few more million will sell before the end of the financial year based on the level of inquiries from potential customers. One of the main reasons that target was not met, and reduced production compared to 2013/14 financial year is the fact that **DPI PSFI hatchery did a commercial run** in October of 2013 which produced over **half of the sales** for that year. By contrast, in 2014/15 sales were **entirely dependent on commercial hatcheries**, only one of which produced commercial volumes of spat. Each hatchery made several attempts at runs; however a combination of **suboptimal broodstock condition and technical issues** in the hatcheries hindered production. What SOCo have done in response is secure **Hatchery Hub funding** to try and address technical capacity issues in broodstock conditioning and hatchery operations through independent consultant assessments to being mid 2015. SOCo's business model addresses building hatchery capacity as a key factor in improving production and supply to industry, and identifies the need to focus resources into hatchery growth and diversification.

7. Conclusion

This project has implemented **key operational business procedures**, and with the appointment of an Operations Manager and direction from the Board has established the foundations for an achievable **industry-owned and managed SRO breeding program**. The project has identified strengths and weaknesses with the current business model. Strengths include a **logistically sound and manageable broodstock holding** operation whereby stock is **traceable and accessible** for commercial hatchery purposes, while also alleviating the DPI of commercial production pressures.. This in turn enables the channelling of state resources into the development of the FBP. SOCo have maintained **strong relationships**

with the DPI as our partner body and operational breeders to secure industry priorities in the SRO breeding program. Expansion of production to now include three working commercial hatcheries, and two non-working but equipped hatcheries has resulted from SOCo's commitment to work **alongside hatcheries**, to ensure we consider their business priorities when acting on our own. SOCo have built an expansive **network of oyster farmers and industry bodies** which is receiving positive feedback and an increasing level of inquiries; indicative of the industry's growing **acceptance of SOCo's position and services**.

This project has also identified **areas for expansion and key priorities** for the future. **Training** in hatchery techniques and capacity building are essential if the hatchery operations are to become viable. Furthermore, **broodstock conditioning** techniques in hatcheries and on leases requires research and development to improve broodstock availability on demand for peak production times. The transition into the FBP is already underway. This program will underpin the future of SRO breeding. However, **levies generated from current sales are not sufficient** to cover the costs of required genetic services or management staff and therefore SOCo are looking to external funding and alternative revenue-generating services the company could offer industry in order to secure the commercial viability and the future of the breeding program.

8. References

'Morten Rye 2014. Review of Australian breeding programs for Pacific Oysters, Sydney Rock Oyster, Barramundi and prawns' Seafood CRC 2008/769.

10. Appendices

Documents

1. **Select Oyster Company Strategic Plan 2014-2017**
2. **Select Oyster Company Customer Account Application form**

Staff List

Emma Wilkie Operations Manager Select Oyster Company

Jane Clout Chair, Select Oyster Company

Rachel King Oysters Australia