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## SAORC CHAIR REPORT

Congratulations to the Coffin Bay Growers for another excellent conference.

The conference was certainly the best attended in recent years and the final dinner was a feast for the senses with the catering from Marion at the "Oyster Beds" restaurant.

Part of my report at the Coffin Bay AGM was to compare the Oyster Industry Genetics R&D effort with that of the Wool industry. (Not that you can compare of course – but an article about the abandonment of a \$3M wool industry genetics R&D project, because the project "could not provide sustainable economic benefits" caught my attention!!).

Australian Wool Innovations Ltd (AWI) is a not for profit company that invests in marketing, innovation and R&D to increase global demand for wool and secure a sustainable future for the Australian Wool Industry (similar aims to Oysters Australia).

AWI invests along the global supply chain for Australian Wool - from "farm to fashion" and is funded by a 2% woolgrower levy, a contribution from the Australian Govt and revenue from sales of the Woolmark license worldwide.

Further analysis of the article highlighted that AWI had invested \$30m in R&D over the last 10 years and in fact at the same time as concluding the \$3m genetics research, commissioned another \$2.65m on a project into fly strike.

The take home messages for me was:

- Whatever industry you are involved in, - the \$ are obscene!
- Research is not an exact science - you often learn more about what not to do and what doesn't work, than what does,

At about the same time, PIRSA Fisheries and Aquaculture published "***The economic impact of Aquaculture on the South Australian State and Regional Economies - 2010/11***" prepared by Econsearch. This publication updates previous studies undertaken by Econsearch since 1997. The value of output and production estimates were based on PIRSA production returns for 2010/11. In 2010/11 the value of production (farm gate) in south Australia was estimated to be \$35.21M.

Using the same model as AWI, the contribution to R&D for oysters in SA should have been \$700,000. (I am not in any way advocating a 2% R&D levy - it is inappropriate to use another industry levy without understanding the how, what, when, where and why, however it can illustrate the oyster industry generally and SAORC in particular has some way to go.)

In 2010/11 the South Australian Industry paid via levies for R&D around \$190,000.

Based on the AWI model - this does seem woefully short - food for thought!!

...continued on page 2



## SUCESSION PLANNING

The greatest threat to SAORC – is indifference!!

By way of thanking Bruce Zippel for his contribution to the Oyster Industry - I challenged those present at the AGM, by asserting that the biggest enemy to our organisation was not those who thought SAORC and SAOGA were a waste of time - but those within the room at that time - who didnt care - who didnt think that what we were doing or reporting on, had any relevance to what they were doing in their business.

This doesn't mean you have to immediately challenge Bruce for the Chair of Oysters Australia (that would be a pretty daunting prospect at any time), but there are things you can do.

Spend an extra 10 minutes a week educating yourself about the issues that affect you:

- Reading the articles that come out,
- Make that phone call to your Bay Rep,(who are also Directors of SAORC).
- Discuss the issues raised with your fellow growers at the boat ramp or over a beer or two.

In South Australia we are witnessing significant changes to the way we as growers are represented on the “national stage” and the organization of industry groups.

Oysters Australia affords us an opportunity to modernise the structure of oyster industry representation.

As custodians of our industry for future decades - I urge you to get involved.

## ASI BUSINESS PLAN – WHAT DOES THE FUTURE HOLD?

SAORC has made a significant investment over the years into ASI - Australian Seafood Industries, that runs the thoroughbred oyster breeding programme.

ASI is jointly owned by TORC (Tasmanian Oyster Research Council) and ourselves.

Over the years ASI has attracted substantial FRDC and Seafood CRC money particularly for genetics research and is partially funded by a royalty - \$1.00 per '000 charged on ASI stock.

Currently ASI stock is sold by the Hatcheries alongside their own commercial lines at a price differential that funds the existence of ASI .

ASI has required operating support whilst it commercialized its Intellectual Property (IP), and projections over the next 5 years have indicated that a further top up in the order of \$20k per year will be required over the next 5 years from each of the owners.

Whilst SAORC has in 2012 committed to continue to support ASI, SAORC and TORC requested a review of the viability of the the business model.

The reasons for ASI's failure to commercialise are many and varied, but in my opinion relate to the incompatibility of pure R&D and commercialisation and the fact that the organisation has been running on the “smell of an oily rag” and have been living hand to mouth.

I personally have been unable to get ASI stock when I wanted it and having identified family lines that worked for me in my water, were unable to get regular supply.

Representatives of the ASI Board, the owners – TORC and SAORC, the Seafood CRC, the hatcheries and a consultant (funded by the Seafood CRC) met in Hobart to discuss and finalise the Terms of Reference for the review. The review is to be conducted by a world authority on the commercialisation of genetics research – Moreton Rye later in September 2012.

I was delighted that all participants acknowledged the contribution that ASI had made and was making to genetic improvement of edible oysters, and affirmed the role of ASI in the future of our Industry.

I was equally pleased that we now have a way forward to capitalise on SAORC's investment in ASI.

Watch this space for further developments.

## SOUTH AUSTRALIAN MORTALITY SYNDROME (SAMS)

Finally, a word on the SAMS workshops. These are being sponsored by SAORC and are designed as a “forensic investigation” of un-explained mortalities in Bays around SA.

SAORC has been very fortunate to secure the services of Charles Caraguel an epidemiologist from the University of Adelaide as project leader, along with senior epidemiologists from AusVet – who were part of the team that identified the Hendra virus affecting horses in Qld.

So the group is very skilled at evidence gathering and assessing all the information available.

To make this investigation worthwhile, we need to gather as much evidence of the mortalities as possible and as such we would like to invite all growers who have been affected to join us for the investigation.

The purpose of the “forensic investigation” is to:

Characterise the problems as clearly as possible and try and determine an outbreak definition,

Document the patterns of diseases based on grower reports – including any links between stock management, environmental factors etc. leading up to an event,

Theorise with producers and others as to what caused these events and determine whether there is any empirical evidence to support these theories.

SAORC is providing everything – venue, travel, food, consulting team, lab coats, disposable coveralls (video reruns of CSI ) – everything; but to make it work we need growers to be open and honest about their experiences.

Get onto Trudy McGowan and get involved.

See you at the ramp.

**Steve Bowley**



# ASI REPORT

Just for those of you that were not at the annual seminars in Coffins Bay a quick update on what we have been up to at ASI.

## POMS TRIALS

As you would all probably know ASI has been conducting trials of its family lines in Georges River, NSW which has been the site of the POMS virus outbreak. 43 ASI families were sent to Georges river in late March 2012 and were present at the time of a disease episode. We saw very large variation in mortality rates after 14 days. The figure below demonstrates the variation that was seen amongst the family lines expressed as estimated breeding values.

Genetic variation was highly significant, and the heritability was  $h^2 = 0.38$ . This suggests there would be a strong response to selection.

Figure 1 demonstrates the genetic variation by highlighting groups of cousin families which have performed at either end of the scale. It also demonstrates the potential gains possible by selecting the best individuals within a family.

We do place some caveats on this trial in that it was terminated after 14 days so what the final level of mortality may have been is unclear. It is undoubtedly an excellent base on which to build with further research.

## SAMS TRIALS

ASI is in a unique position to be able to exploit possible genetic differences in resistance to SAMS. Our trial in Smoky Bay last year gives a high level of hope that this may be a heritable trait. Following on from this we have commenced mortality trials in 2 additional areas this year. As well as the Zippels in Smoky Bay we have sent 43 families to sites in Coffins Bay (Pristine oysters) and Cowell (Tondari Oysters). Put simply these oysters will be given a bit of a hard time to get as close to possible to commercial reality with the hope of seeing mortality events. The opportunity may also exist to add another site with Denial Bay probably the frontrunner at the moment.

I hope it is very obvious that we are placing a huge emphasis on this issue. POMS could potentially be devastating to the national

industry but right now in South Australia SAMS is the issue which is causing the problems. I strongly believe that the approach ASI has and will continue to take will yield results whereas within hatchery breeding efforts have virtually no chance.

## COMMERCIAL AVAILABILITY

For the first time in my time at ASI there is excellent availability of stock coming into the spring sales period.

**Cameron's** have produced an ASI line based on its performance traits and also based on the results of our POMS research. Putting the POMS to one side for a minute, this line is an absolute ripper. Grower feedback in both Tassie and SA has been fantastic with most growers rating this as the best ASI line they have seen. Its shell is dark, deep and most importantly very hard. Ben Cameron has this line on his farm and he is rapt with it. It should be good because it is from our latest generation which is the first with increased number of families meaning more choice for the hatcheries. In regards to POMS we cannot say that it is POMS resistant, we simply have not done enough research. What we can say is that ASI also produced this line and it came out right near the top in our Georges River trial. As per usual contact Ben if you are interested.

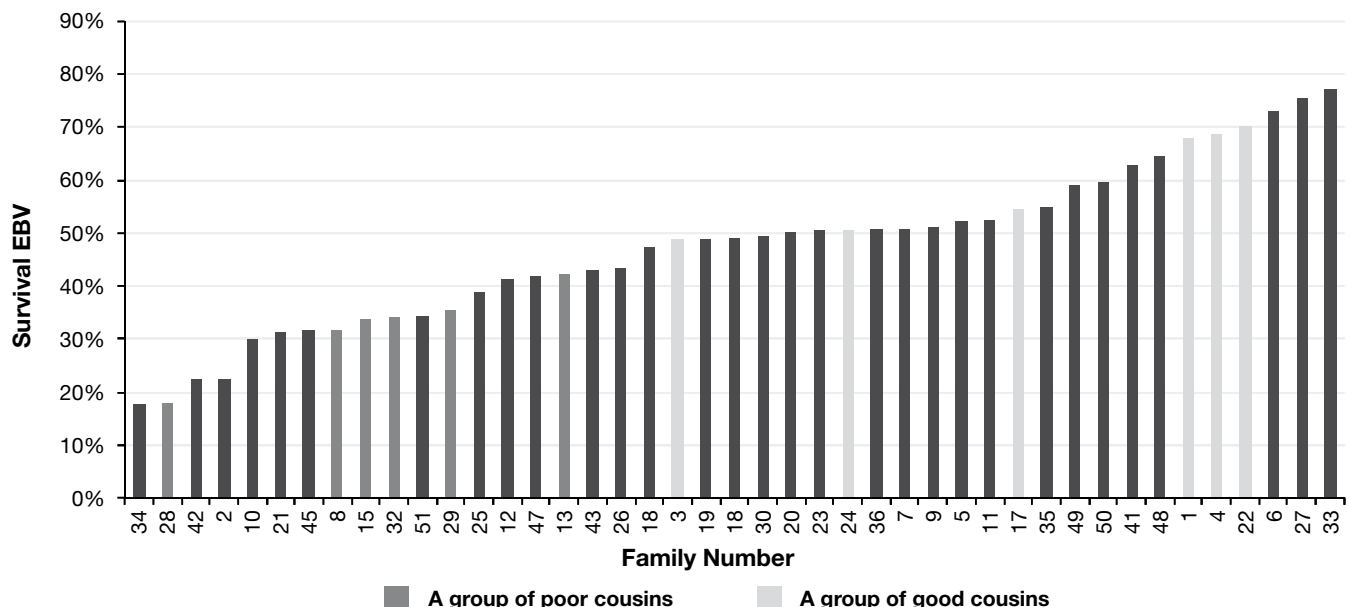
**Shellfish Culture** also has good numbers of ASI stock coming into spring. A small amount of ASI line 8A is still available. This line has been produced for 3 seasons and has performed very well, particularly in SA. They will also be producing a line based on the Smoky Bay SAMS results and this will be available later on in the season. Again the parent lines have very good performance traits and are from the most recent generation. I am very confident that this line will perform very well in South Australian conditions. In addition to this Shellfish Culture are also producing ASI spawnless crosses in which the diploid parent line is an ASI line. The injection of ASI genetics is having positive effects on these lines and the industry feedback has been very good. Kerry is your man if you are interested.

**Matt Cunningham**

General Manager

Australian Seafood Industries

Figure 1: Estimated Breeding Value for Survival: 2011 Year Class Families



# ANOTHER SUCCESSFUL SEMINAR IN COFFIN BAY

The joint SAORC & SAOGA Oyster Seminar , Gala Dinner & tradeshow was held this year in Coffin Bay on the 9th & 10th August with an excellent turnout of over 120 attendees comprising of growers from SA, NSW and Tasmania as well as industry and government representatives. The seminar was held at the Coffin Bay Yacht Club with the local community associations doing a wonderful job catering for the hungry crowd.

The theme for the two days was "Future Proofing Our Industry –Being prepared for any Eventuality" which provided a wealth of information and discussion for those who were present. The informative speakers covered a multitude of topics, including the next round of research results from the industry wide benchmarking project, details on the research being carried out into identifying and understanding the mud worms found in a number of bays and PIRSA also had a strong presence with Peter Lauer providing details on the recent changes to the South Australia Aquaculture regulatory and policy framework and strong participation, especially from bio security & SARDI, in the Pacific Oyster Mortality Syndrome (POMS) incidence response plan workshop.

A key focus of the seminar was industry training with Steve Jones from Business SA presenting on the specific OH&S manual they had developed for members of the Association and the upcoming regional workshops on Maritime & Shed Safety funded by the Safework SA Work Health & Safety Innovative Grants Program. SAOGA joined forces with Business SA to apply for the grant and was successful in winning in excess of \$45,000 in training to be run across the Eyre & Yorke Peninsula over the next year. In addition Lynn Greenwood from the Department of Further Education, Employment, Science & Technology spoke on the Skills in the Workplace Program and potential funding for Maritime and Business Training. We will be working with Lynn & the Cowell Area School to look at funding for Coxswain training.

Presentations were also provided on stock management systems, management of juvenile oysters for the best results, oyster basket recycling opportunities and an insightful presentation on how the Tasmanians market their oysters.

The Seminar wasn't all work with plenty of socialising at the Coffin Bay Sports Complex on the Thursday night as everyone tucked into wonderful pig on the spit wraps and then the infamous Gala Dinner back at the Yacht Club on the Friday night with superb catering by local restaurant Oysterbeds. The local band "Bundy Incident" entertained the guests with a number showing off their dancing moves.

The Annual Oyster Competition was hotly contested with 16 entrants. Congratulations to all the winners.

## **1st Closed Shell**

Southern Cross Marine Culture, Coffin Bay.

## **2nd Closed Shell**

Pacific Estate Oysters, Stansbury & Mooka Oysters, Smoky Bay.

## **3rd Closed Shell**

Pristine Oyster Farm, Coffin Bay & Cowell Oysters, Cowell.

## **1st Half Shell**

Turners Oysters & Seafood, Cowell.

## **2nd Half Shell**

West Coast Oysters, Coffin Bay.

## **3rd Half Shell**

Cowell Oysters, Cowell.

And big congratulations and thank you to all the Coffin Bay growers who put on such a wonderful couple of days especially Jill Coates, David Sims & Jedd Routledge who made sure everything ran so smoothly. Also a special thank you to Phil Channon, the local Port Lincoln Bendigo branch manager, for his wonderful auctioning skills and to all the sponsors who support the event so generously.

## **Trudy McGowan**

Executive Officer

### ***Images clockwise:***

*Serious concentration during the auction.*

*The Oyster Competitors.*

*Winner Closed Shell - Southern Cross Marine Culture Coffin Bay, Stewart Frew.*

*Winner Half Shell - Turners Oyster & Seafood Cowell. Simon Turner.*

*The last official function for our retiring president Bruce Zippel.*





# PIRSA UPDATE

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## UPCOMING AQUACULTURE ZONE POLICIES

Primary Industries and Regions SA (PIRSA) Fisheries and Aquaculture are working on the initial stages of two new aquaculture zone policies for the Franklin Harbour and Ceduna areas. When finalised, these two zone policies will further support the sustainable development of aquaculture in South Australia.

The proposed Franklin Harbour Aquaculture Zone Policy will serve to consolidate 26 current intertidal mollusc sites which utilise 125 ha. The proposed Ceduna Zone Policy will consolidate existing leases in Denial Bay and near St Peters Island in addition to providing further aquaculture farming opportunities on the West Coast.

The creation of aquaculture policies is a complex process and can take 18-24 months to finalise. Initial stages involve the development of a Statement of Intent (SOI) based on technical investigations of the area which analyse available habitat and physical information and identify any information gaps for the region of interest. The SOI also considers issues such as conservation and national parks; existing commercial and recreational fishing; Native Title and navigation and shipping.

The SOI undergoes a governmental inter-agency referral and endorsement by the Aquaculture Advisory Council before the zone policy and a supporting report (which provides the detail of the zone) are drafted and released for public comment. Throughout the process there is extensive consultation with industry, other stakeholders and the public. Following the consultation process, Ministerial approval is sought and if successful, the zone policy is presented to Parliament for a final assessment. The final stage is gazettal of the zone policy.

PIRSA has started working with industry on the proposed Franklin Harbour and Ceduna zone policies. We look forward to your input and collaboration throughout this process.

## GREEN LIGHT FOR NEW ACT

The *Aquaculture (Miscellaneous) Amendment Act 2012* has reached the final stage in the parliamentary process, after it was assented by the Governor on 12 July 2012.

The new Act awaits proclamation before the changes take effect. The amendments will allow for the adoption of contemporary management practices and standards in aquaculture management, compliance and administration in South Australia.

Executive Director for PIRSA Fisheries and Aquaculture, Professor Mehdi Doroudi, said the amendments are critical to keeping South Australian legislation up-to-date with the rapid developments in industry practice and best practice standards.

"While South Australia is home to Australia's most diverse range of aquaculture sectors and enjoys a world class reputation for quality seafood and environmental sustainability, it's important that legislation is reviewed regularly," he said.

"This ensures that government can continue to guide, develop and maintain this vital primary industry, while retaining a best practice approach to aquaculture management."

The *Aquaculture (Miscellaneous) Amendment Act 2012* builds upon the framework established by the Act to streamline

processes and reduce red tape. The Amendment Act will achieve the following:

- Third party registration will promote improved commercial value and security to lenders, which will assist the aquaculture industry to raise funds and develop further into the future.
- Research is a key activity that supports development of the aquaculture industry. As such the establishment of a research lease has been included to enable exclusive aquaculture-related research activities to occur. This will ensure research providers and aquaculture farmers will not be competing for lease area.
- Emergencies will be more readily dealt with by allowing the Minister to grant an emergency lease where it's considered that an emergency situation exists or is imminent. The changes provide for a more immediate response.
- The amalgamation of leases will now be possible in certain circumstances. These will be provided in imminent changes to the *Aquaculture Regulations 2005* soon to be considered by Cabinet.

Following the proclamation of the amended provisions, the *Aquaculture (Miscellaneous) Amendment Act 2012* will be available for viewing on [www.legislation.sa.gov.au](http://www.legislation.sa.gov.au)

## AMALGAMATION OF LEASES AND LICENSES

One of the recent amendments to the Aquaculture Act 2001 is the opportunity for the Minister to create regulations that will allow lease areas or licence areas to amalgamate with adjoining marine aquaculture leases and licenses in certain circumstances.

The ability for individual leaseholders to amalgamate sites, will result in numerous business operating efficiencies, including the submission of a single environmental monitoring report rather than one for each site (up to a certain size of lease site) and reduced navigational marking requirements (up to a certain size of lease site). Some administrative efficiencies for PIRSA may also reduce costs for industry, as a result of fewer leases and licences being issued, invoiced, converted and renewed.

One key aspect contemplated to manage amalgamated lease sites, is a stipulation that the amalgamated lease site must not have more than six corners. This will serve to avoid complex shapes that make the site more difficult to monitor from an environmental and compliance perspective, and can create potential navigational issues.

The regulations required to enable lease amalgamations are currently being developed and PIRSA Fisheries and Aquaculture anticipates that the process will be complete in the coming months. PIRSA extends its thanks to SAOGA for their contribution to the development of these regulations through the consultation process.

Following the proclamation of the amended regulations, they will be available for viewing on [www.legislation.sa.gov.au](http://www.legislation.sa.gov.au)





# OYSTERS AUSTRALIA

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## BENCHMARKING YOUR BUSINESS FINDING OUT WHERE & HOW YOU CAN BE MORE PROFITABLE

Rural Directions Pty Ltd has replaced CDI Pinnacle to run the Oysters Australia benchmarking program. Rural Directions Pty Ltd has been involved in benchmarking for over ten years. Rural Directions has met SA & Tas growers in the lead up to annual conferences to add 2010-11 financials to the benchmarking database. With a new system, reports include new parameters like Return on Equity along with the previous Profitability KPIs. Growers involved will get their results after results from NSW are gathered and finalised in October.

What are growers saying about the benchmarking program:

“Our investors are looking for this type of info.”

“Well worth the investment.”

“This is an increased focus on reviewing your business first, then look to what others are doing second.”

There are some raving fans and we can put you in contact with them if you want to know what's involved! And if you want to join the program, contact Carlyn Sherriff on 08 8842 1103 or email me at [csherriff@ruraldirections.com](mailto:csherriff@ruraldirections.com).

## INVESTING IN POMS RESISTANCE

A proposal has been approved by Oysters Australia and submitted to the Seafood CRC for funding. The project is valued at \$440,000 and will evaluate breeding strategy options for inclusion of POMS resistance within the ASI breeding program. How this relates to existing trait selection and measurement of POMS resistance levels within the ASI program will be determined.

The project also aims to add to the results of Seafood CRC funded field trials over the last 2 seasons and incorporate a lab based challenge (to be developed as part of an FRDC Aquatic animal health project) to assess the genetic influence in POMS resistance. The establishment of a broodstock repository with animals that have survived a viral challenge will also be investigated.

## LIFTING THE GAME IN SEAFOOD RETAIL: OYSTER RETAIL PROJECT

Branded merchandising units housing oysters from different regions are planned as part of a trial to improve presentation of oysters at fish mongers. A seafood retail chain will trial the use of the unit supported with accompaniments, consumer / store staff education materials, and a demonstration shucker. The project has been designed in response to Seafood CRC consumer research results which demanded origin transparency and freshness. After looking at consumer, retailer & grower feedback with the in store sales results we'll decide whether the idea can be commercialised. Project planned for October/ November start.

## SHED TALKS: PRACTICALITY OF RESEARCH RESULTS

Grower groups will be established and run in each state in a shed in autumn 2013 as part of a CRC funded project. We recognise that there's often too much information and not enough time to think through the practicalities at annual field days & conferences. So, with results like profitability figures from the benchmarking project we'll look at examples – anything from mortality, labour & handling, storage, etc. Other topics flagged are cool storage costs & handling. One bay in SA has already claimed ownership of a grower group location! We'll be in contact closer to autumn.

Coming soon

**Nutritional data for Sydney Rock, Pacific and Angasi Oysters with health claims you can use for marketing:** Oysters taken from 5 locations each for Pacific and Sydney Rock and 2 locations for Angasi were analysed for a range of vitamins, minerals and fatty acids. The raw results are available (please contact Rachel King [rkoyster@yahoo.com.au](mailto:rkoyster@yahoo.com.au) if you want them). A Seafood CRC funded nutritionist/dietician will interpret the numbers to pull out the top 3-4 health claim messages for oysters. We'll distribute all results when finished.

*Taken from [oystersaustraliablog.org.au](http://oystersaustraliablog.org.au) - an online space to receive & discuss recent news.*



# SOUTH AUSTRALIAN MUDWORM PROJECT

## REPORT ON SAOGA/SAORC MUDWORM RESEARCH PROJECT 2012

Lexie Walker

The South Australian Mudworm project was initiated at the end of 2011 and the first samples of blistered infested shells arrived at the Australian Museum in Sydney for processing in February 2012. The research project aims to identify which mudworm species are present in SA Pacific Oysters and their breeding patterns. Shells with intact blisters and mudworms are collected at 6-weekly intervals, reflecting the 42-47 day egg to adult cycle of the mudworm. Eight sampling periods are to be completed over a 12 month period. To date, 5 sampling periods have been successfully completed and processed (Table 1).

The research uses morphological, statistical and molecular methods. Using different methods allows more confidence in the species identifications which are the basis of the breeding pattern study. Morphological methods used are: light microscopy imaging, Scanning Electron Microscopy (SEM) imaging, examination of methyl green staining patterns and examination of erosion channels and blisters for eggs and larvae. The statistical method uses morphological characters and taxa clustering techniques. The molecular method uses PCR techniques and genes suitable for identification of individual species. Samples for the different methods need to be preserved differently. Mudworms that have been extracted and identified are either:

- frozen fresh and stored at -80°C for molecular work;
- preserved in 8% formalin for use in morphological work and SEM imaging; or
- preserved in 80% ethanol for later unforeseen molecular work.

Whole shells with intact blisters are examined live and then preserved in either 8% formalin or 80% ethanol for breeding pattern studies. All material preserved in formalin is rinsed in water and then transferred to 80% ethanol for storage. (see Table 1)

## MORPHOLOGICAL METHODS PROGRESS

More than 470 specimens have been extracted (mostly adults but including juveniles, larvae, eggs) and of these approximately 150 are whole animals, the most valuable for identification. The worms are difficult to extract in good condition as they readily drop palps and have fragile flaccid mid-body segments when reproductive. The need to associate adults/eggs/larvae with an intact blister or erosion channel also makes the process quite painstaking.

Eight species have been identified so far (Table 2).

- *Boccardia proboscidea*, is recognised as an introduced species found in silty environments worldwide;
- *Boccardia chilensis* has been recommended as an introduced species and is frequently associated with cultured oysters;
- *Polydora websteri*, and *Polydora hoplura* are also found worldwide associated with cultured oysters. *Polydora hoplura* has been recorded from SA waters in the early 1970's, but this may be a case of different species being given the same name.
- *Polydora haswelli* and *Polydora woodwicki* were first described from southern Australian waters so may be considered endemic species. *Polydora haswelli* is being increasingly recorded from cultured oyster areas worldwide, although most of these records remain to be confirmed. *Polydora woodwicki* was first described from abalone in Victoria. (see Table 2)

Methyl green staining to identify species seems to have good potential but this requires further work to confirm.

SEM imaging has been very useful to confirm characters that are not clear using light microscopy and to observe characters only able to be seen under very high magnification and resolution.

The database for use in the statistical method is well progressed. Further material will be added prior to conducting the analysis.

**Table 1:** Completed sampling periods; preservation methods and use

|     | Collected  | Preservation/material available        | Use*  |
|-----|------------|--|---|
| SA1 | 20/02/2012 | 8% formalin                            | Preliminary identification of species present |
| SA2 | 02/04/2012 | Frozen fresh; 80% ethanol; 8% formalin | DNA pilot; SEM                                |
| SA3 | 14/05/2012 | 8% formalin                            | Live video worms in shell                     |
| SA4 | 25/06/2012 | Frozen fresh; 80% ethanol; 8% formalin | DNA stored tissue; SEM                        |
| SA5 | 21/08/2012 | 80% ethanol; 8% formalin               |   |

\*NB material from all sampling periods are used for morphology and breeding pattern studies





**Table 2:** Mudworm species recorded in this project to date from SA Pacific Oysters; notes for live identification; their % occurrence over specimens so far examined; and the numbers used for research purposes.

| species   | occurrence % | DNA | SEM | registrations |
|---|--------------|-----|-----|---------------|
| Boccardia proboscidea Hartman 1940<br>“dark green; black face”                          | 24%          | 12  | 3   | 15            |
| Boccardia cf. chilensis Blake and Woodwick 1971<br>“zebra stripes rear end”             | 2%           | 1   | 2   | 3             |
| Polydora websteri as in Read, 2010<br>“fine black line palps”                           | 27%          | 17  | 5   | 22            |
| Polydora woodwicki Blake and Kudenov 1978<br>“tidy; few gills; squashed nose”           | 21%          | 6   | 1   | 7             |
| ? Polydora haswelli as Read, 2010<br>“black bars on palps; light stripes face; pale”    | 2%           | 0   | 1   | 1             |
| ? Polydora haswelli Blake and Kudenov 1978 “black bars on palps; dusky; black pygidium” | 16%          | 2   | 3   | 5             |
| ? Polydora hoplura as in Read, 1975<br>“black bars on palps; pale; spiny posterior”     | 4%           | 2   | 1   | 3             |
| ? Polydora hoplura coll.: Rapid Bay, Hutchings 1979                                     | <1%          | 0   | 0   | 1             |

## MOLECULAR METHODS PROGRESS TO DATE

The following extracts are from the pilot study report prepared by Andrew King, Technical Officer, Wildlife and Genetics Unit, Australian Museum, Sydney. The full report of the results of the pilot study is available from SAOGA/SAORC.

### “Aims of pilot study:

1. To carry out an initial literature and database search of sequence data and related resources that may be of use in identifying or developing primers to use in this study.
2. Screen any identified primers and determine if any can be used to reliably generate good quality sequence data across all the target species

3. Determine if the sequence data generated can be used as a reliable method for discriminating between species defined by morphological methods.”

### “Results:

- Aim 1 - We have identified a small number of potentially useful primers.
- Aim 2 - 115 PCR reactions were performed. Sequence data for Polydora websteri was successful but no primers set reliably amplified genes across all the target species.
- Aim 3 - Unable to determine due to lack of data.

| SAOGA/SAORC mudworm project 2012 - Molecular identification |                |  |                              |                            |                              |                                 |                                 |               |                         |         |                           |                  |  |
|---|----------------|--|------------------------------|----------------------------|------------------------------|---------------------------------|---------------------------------|---------------|-------------------------|---------|---------------------------|------------------|--|
| DNA Pilot study:  |                | Australian Museum DNA lab  |                              |                            |                              |                                 |                                 |               |                         |         |                           |                  |  |
| DNA tissue:   |                | mid-body region section taken, removed fresh, live into sample tube and frozen (-20°C) |                              |                            |                              |                                 |                                 |               |                         |         |                           |                  |  |
|   |                |  | PCR CO1<br>Polydora<br>F1/R1 | PCR CO1<br>1490F/<br>2198R | PCR 16S<br>16Sarl/<br>16SbrH | PCR CytB<br>CytB424/<br>CoBr876 | PCR CO1<br>Polydora<br>F1/2198R | Sequence Data | tentative ID            | AM rego | treatment                 | number specimens |  |
| DNA la Received   | Extraction DNA |  |                              |                            |                              |                                 |                                 |               |                         |         |                           |                  |  |
| L-01  | 3/04/2012      | 25/04/2012   | 7                            | 2                          | 1                            | 7                               | 1                               |               | Polydora ?woodwicki?    | W40657  | fresh, live, frozen -20°C | 1                |  |
| L-02  | 3/04/2012      | 25/04/2012   | 7                            | 2                          | 1                            | 7                               | 1                               |               | Polydora ?woodwicki?    | W40658  | fresh, live, frozen -20°C | 1                |  |
| L-03  | 3/04/2012      | 25/04/2012   | 7                            | 2                          | 1                            | 7                               | 1                               |               | Boccardia proboscidea   | W40659  | fresh, live, frozen -20°C | 1                |  |
| L-04  | 3/04/2012      | 25/04/2012   | 7                            | 2                          | 1                            | 7                               | 1                               |               | Boccardia ?proboscidea? | W40660  | fresh, live, frozen -20°C | 1                |  |
| L-05  | 4/04/2012      | 25/04/2012   | 1                            | 2                          | 1                            | 7                               | 1                               | 1232 bases    | Polydora websteri       | W40661  | fresh, live, frozen -20°C | 1                |  |
| L-06  | 4/04/2012      | 25/04/2012   | 1                            | 2                          | 1                            | 7                               | 1                               | 1226 bases    | Polydora websteri       | W40662  | fresh, live, frozen -20°C | 1                |  |
| L-07  | 4/04/2012      | 25/04/2012   | 1                            | 2                          | 1                            | 7                               | 1                               | 1219 bases    | Polydora websteri       | W40663  | fresh, live, frozen -20°C | 1                |  |
| L-14  | 14/06/2012     | 18/06/2012   | 1                            | 1                          |                              |                                 |                                 |               | Boccardia proboscidea   | W41441  | extracted live, preserved | 8                |  |
| L-15  | 14/06/2012     | 18/06/2012   | 1                            | 1                          |                              |                                 |                                 |               | Polydora ?woodwicki?    | W41442  | extracted live, preserved | 3                |  |

The shaded areas indicate the numbers of PCR reactions performed on each sample with each primer set.

■ Indicates successful amplification of the target gene.

■ Indicates failed amplification



## DISCUSSION

Molecular research into this group of organisms is limited. This is evident by a general lack of available sequence data and primer development. PCR inhibition by factors co-purifying with the DNA has been rumored for this group of organisms but does not appear to have been confirmed by any study.

Our pilot experiment indicates that DNA extraction can be successful on very small samples. (2 segments of a single worm)

Optimal PCR conditions for the CO1 gene of *Polydora websteri* have been determined and have given good sequence of ~ 1220 bases. We would expect that these conditions would also work for *Polydora woodwicksi*. The status of the primer binding sites and potential factors affecting the PCR reaction for this species requires further investigation.

Primer set *PolydoraF1/PolydoraR1* for the CO1 gene appear to offer the best opportunity for sequence based sample identification (good length fragment, clean sequence data)

Primer sets for the CytB gene (CytB424/CoBr876) and their PCR conditions used for *Boccardia* sp have been published by Simon et al (2009). These failed to work against the *Boccardia* samples in our study. We have been since been advised that the published primers were incorrect."

## FUTURE WORK

Further investigation needs to be done to identify or develop PCR primer sets that reliably amplify genes across all suspected mudworm species in this study. CytB could be further investigated as a potential gene of interest using corrected primers. Re-design of the *polydora* F1/R1 primers may improve their performance.

If cross-species amplification can be done, this it opens the possibility of a rapid/cheap PCR based species identification assay.

Some investigation into possible inhibitors of PCR in this group of organisms may be necessary."

## BREEDING PATTERNS RESULTS TO DATE

It is obvious from examination of the intact shells and blisters that it will be possible to see the breeding patterns through the year for each of the species found. More data is currently being collected.

## YOU CAN'T HANDLE GROWTH

Interesting headline, what it's referring to is that collectively we as an industry do not have adequate handling practices to handle increased growth rates in oysters.

At a recent oyster seminar, Scott Parkinson from Shellfish Culture floated the idea that oyster units should be no more than half full before they are handled.

It is my opinion that overcrowding, oysters especially when they are young, makes them vulnerable to South Australian Mortality Syndrome (SAMS). The problem is that it is not when they are overcrowded that they die but later on when mortalities are around and they are stocked at more reasonable densities.

## OCCURRENCE OF SPECIES ACROSS DIFFERENT GROWING AREAS

At this stage it appears that all areas have the same suite of species.

## SUMMARY DISCUSSION

The mudworm project is progressing as planned.

A suite of 8 species has been identified from the material sent thus far. The species involved are commonly associated with oyster aquaculture. One introduced pest species has been found. At least two species are endemic, one of which was first described from abalone, the other is currently being reported from widespread oyster growing areas around the world.

There are some taxonomic naming issues to be resolved, but the additional methods being used should successfully resolve these.

The molecular pilot study has shown that the CO1 primers may be used for identification of at least *Polydora websteri*. They may be able to be used successfully for other *Polydora* species in this project that weren't included in the pilot study. The published *Boccardia proboscidea* primers used for the pilot were unfortunately in error. I was advised of the error verbally by the author and she has provided apologies and the correct information. The new primers should be tested and should be successful in sequencing *Boccardia proboscidea* and possibly *Boccardia chilensis*. Further discussions are being held with molecular biologists working on polychaetes to find improved methods for this group.

In addition to the questions asked by the project research a new question has appeared regarding the leaf blisters seen in some oysters. What is the cause of these blisters? Are they a result of water quality variations or are they due to worm attack?

Thanks to SAORC/SOAGA and all the growers participating in the study. There has been considerable interest in the project at the local, state, national and international level and I look forward to seeing the final results applied in industry and used in further research.

Cause and effect are removed from one another and the oyster grower does not make the connection between overcrowding when young and mortalities now.

Rule 1 Never let spat trays fill up.

Another problem is that when we were learning how to grow oysters it was explained to us that you start spat off low continuing to lift it's growing height as it gets older. This worked fine before SAMS turned up. However with the advent of SAMS this concept no longer works. Oysters grown low as juveniles are more susceptible to SAMS later in life.



Rule 2 Never be tempted to grow juvenile oysters at low heights.

With these 2 rules in mind let's go back to the headline. The Pacific Oyster breeding program started off many years ago with growth rates as a major trait. This was a disaster. Growers never adjusted their practices to allow for the differences.

The result was that much of the spat was grossly overcrowded before handling.

This made any susceptibility to SAMS much worse.

Australian Seafood Industries (ASI) who took over and currently run the breeding program realised a long time ago that growth was not as important as other traits to growers. Selecting for growth had affected shape and shape was very important to growers.

So ASI changed it's selection pressure and made shape it's main trait while also paying attention to other traits.

It also became evident to ASI that there was some genetic influence in an oysters resistance to SAMS.

Coinciding with the appointment of Matthew Cunningham as general manager of ASI was an increased selection pressure for SAMS resistance.

Matthew realised the importance of this trait to industry and continued to put pressure on it. The result is continuous improvement of selectively bred lines to resistance to SAMS.

Other traits have also been considered and selected for. However growth remains very low on the list.

The breeding program is very important for providing resistance to SAMS in the future.

I personally believe that the latest releases have better resistance to SAMS than the commercial releases do.

This year is the first year for a number of years where there are selectively bred oysters available in spring from both of the major hatcheries.

The breeding program is the most realistic avenue within industry to develop SAMS resistance oysters.

It can and will trial different family lines within South Australia for their resistance to SAMS and reject the most susceptible.

It is an interesting aside that survival has been a selection trait in the breeding program for a number of years and when tested against POMS there was a level of resistance found.

If the breeding program did not have survival as a trait then I personally believe that resistance to POMS would have been much less.

I also believe that any modern oyster breeding program that does not have survival as a selection trait is headed for trouble.

The breeding program will continue to be sensitive to growers needs and adjust selection pressure to suit.

Selectively bred oysters purchased 5 years ago will not be the same as selectively bred oysters purchased today because of continuous improvement.

## SASQAP REPORT

I have compiled phytoplankton data that has been performed at the SASQAP laboratory. As you can see from the values each year is different and there is not consistency from year to year. From what I can see there requires a lot more data analysis, as the seasonal upwelling event that occurs along the west coast plays an important role in providing food to the oysters.

The 2012 average counts look quite good so far, however growers have struggled this year across the state, from what I can understand from looking at the data, there was an upwelling event however it wasn't very strong. The oysters after spawning

didn't receive the required amount of food they need to lead them into the winter season. There is a period as the water temperature drops between June to September when seasonally there are very low phytoplankton counts across the state, this happens every year from the data I have analysed.

My Masters project will hopefully be able to fill in the gaps and tell us when the best food is present and at what time of year.

**Clinton Wilkinson**  
Program Leader, SASQAP

### South Australian Oyster Harvesting Areas Total Phytoplankton Averages

|      | Denial Bay | St Peters | Smoky Bay | Streaky Bay | Port Douglas | Franklin | Stansbury | Port Vincent |
|------|------------|-----------|-----------|-------------|--------------|----------|-----------|--------------|
| 2002 | 487765     | 762868    | 162852    | 84106       | 324504       | 74160    | 54821     | 37628        |
| 2003 | 298527     | 184836    | 936205    | 622185      | 1185485      | 183973   | 158296    | 97346        |
| 2004 | 1163325    | 268441    | 628611    | 609650      | 668846       | 146985   | 50310     | 35460        |
| 2005 | 1269735    | 598789    | 1492678   | 749623      | 1250175      | 97211    | 68164     | 36748        |
| 2006 | 1046558    | 439484    | 1072407   | 205772      | 570391       | 94281    | 32928     | 39539        |
| 2007 | 1762235    | 1743445   | 1755419   | 475552      | 590339       | 311202   | 28460     | 167753       |
| 2008 | 573790     | 653178    | 1110842   | 944675      | 908819       | 127942   | 22560     | 30019        |
| 2009 | 1299825    | 1005185   | 1074329   | 1419874     | 279312       | 257747   | 127848    | 100479       |
| 2010 | 523114     | 274736    | 500519    | 1447300     | 865986       | 226571   | 109541    | 47466        |
| 2011 | 1240760    | 960306    | 737084    | 749941      | 1172267      | 592083   | 32820     | 32019        |



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