



The Australian Seafood CRC's High School Engagement Initiative

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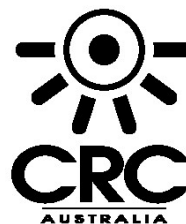
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Front Cover Image – Jamie Crawford from Clean Seas Pty Ltd taking a group of Stuart High School aquaculture students on a tour through the Clean Seas Kingfish Hatchery at Arno Bay, South Australia.

Photo: Mark Oliver

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Non-Technical Summary

2010/739 - The Australian Seafood CRC's High School Engagement Initiative

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OBJECTIVES:

- To develop a two way dialogue between the Seafood CRC and two high schools engaging in aquaculture education in the vicinity of a Seafood CRC commercial partner.
- Through case studies, analyse the current level of aquaculture education and activities within the two high schools that directly relate to the Seafood CRCs programs.
- Outline future possibilities for increased level of engagement between the two high schools and the Seafood CRC programs.
- To raise the level of enthusiasm and awareness towards the diverse career options within the seafood industry by both interactive classroom sessions and visits to commercial facilities.
- By developing frameworks, assist other schools throughout Australia in their pursuit of developing high school based aquaculture training facilities.

OUTCOMES ACHIEVED TO DATE

- The publication of three case studies of high schools that have implemented quality seafood programs.
- Conducted field trips for the above aforementioned schools to a Seafood CRC commercial partner Clean Seas Pty Ltd Kingfish hatchery at Arno Bay, South Australia.
- A contemporary video showcasing the high schools involved in the case studies to be available on various media platforms.
- Designed relevant articles for sector publications.

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Context

As the seafood industry continues to grow in specific regions of Australia, it becomes evermore interwoven into the fabric of these communities. These communities generally are not large state capitals, but small tight knit centres of population, such as Port Lincoln. These towns recognise the importance of their industries, which in turn fosters a collective positive attitude towards them. This positive attitude is shared with even their younger community members. The youth of these communities see fisheries and aquaculture as an attainable career and many grasp this opportunity, however this has not happened by chance. One of the more successful mechanisms in promoting the plethora careers around fisheries and aquaculture is its integration into high school programs.

Future staff, researchers and managers of the seafood industry are currently within the Australian education system. Effectively communicating all of the career possibilities that the seafood industry has to offer to students while they are formulating decisions about their future is vital for the longevity of the industry. There are currently high schools that embed fisheries and aquaculture within their school program. These programs are more often than not, driven by a small number of devoted educators and managers. The level of engagement they have with local commercial producers, research bodies and other schools engaged in similar activities varies greatly between programs and there exists great potential for developing linkages and networks. Having an understanding of how these schools deliver their fisheries and aquaculture programs will allow associated agencies such as the Seafood CRC recognise the potential opportunities for future relationships.

The Case Study Approach

The schools involved in the case studies were Stuart High in Whyalla, Port Lincoln High School and Cowell Area School. In order to ascertain the success or otherwise of the three seafood related high school programs, the researcher utilised a case study methodology. This informal approach relied principally on harvesting quality qualitative data from individuals associated with the programs. Typically the researcher held meetings with the program coordinators/principals, educational delivery staff, seafood infrastructure managers and students engaged in the programs. There was a standard bank of questions which included discussing topics such as:

- The programs history
- Current programs
- Industry involvement
- Student success stories
- Challenges
- Future direction

These meetings were also coupled with a full facility tour, which included observing students participating in learning experiences.



Case Study 1 – Port Lincoln High School

Background

Port Lincoln High School is the largest secondary school in the Eyre Peninsula region. In 2010 it had approximately 753 enrolments (ACARA 2010). The academic profile of school leavers principally leans towards vocational training and employment, particularly in the trades with only a small percentage choosing to pursue university studies. Amongst other industries, the school recognised the vital role the seafood industry plays in the local economy and indeed employment in the region. To acknowledge the importance of the seafood industry and the career possibilities that it holds, Port Lincoln High School developed the Seafood Industry Pathway program. This program is now the foundation for all seafood related education and skills acquisition at Port Lincoln High School.

History

Although different from its current form, seafood related programs have been operating within Port Lincoln High School for over 10 years. As the program has evolved both in terms of infrastructure development and organisational capacity so too has the quality of learning experiences available to the students undertaking areas of the program.

Program Framework and Implementation

Year 10 options- Seafood Industry Pathway Program

The ethos behind the Seafood Industry Pathway program is to allow the student to have quality exposure to various sectors of the seafood industry. This may ultimately inform post schooling career choices. The structure of the program utilises existing frameworks within the Seafood Industry Training Package. Upon completion the student may attain a Certificate I in the Seafood Industry (Fishing Operations). The program is essentially fragmented into specific units of competency (outlined in table1.1) and has been developed through effective engagement and consultation with the local seafood industry.

To successfully implement the program Port Lincoln High School relies on both local registered training organisations and industry. As part of the qualification the student are expected to undertake a minimum of 20 days work placement within a commercial setting. This part of the program has been identified as an essential component in fostering higher levels of workplace maturity and is also critical in enhancing the employability of the student. It is moderately common for students who excel in this part of the program to gain meaningful (part time or full time) employment.

The component of the program that requires hands on training are shared between the school and local registered training organisations. The majority of the training is carried out at the Australian Fisheries Academy (Figure1), which has access to industry standard trainers as well as commercial fishing vessels. Other training is carried out by the local TAFE. The majority of the aquaculture training is carried out within the schools aquaculture training area. All teachers have aquaculture related qualifications and relevant industry experience. One of the challenges associated with implementing a program of this nature is that in order to maintain the level of quality, cost are associated (although they are heavily subsidised by the school). In 2010 the fees for undertaking the Certificate 1 was \$250.00, however if a student was to choose the PADI option as an elective there was an additional fee of \$250.00.

Table 1.1 Seafood Industry Pathways – Certificate I in the Seafood Industry (Fishing Operations)

Unit Group	Unit Name	Description
Common Industry Core	Apply basic food handling and safety practices	The unit covers personal hygiene and conduct, and seafood handling and storage. This unit applies to seafood and aquatic products and is essential to all qualifications in the seafood industry
	Communicate in the seafood industry	This unit of competency specifies the outcomes required to communicate effectively in the workplace. The unit refers to competence in communication rather than English language.
	Work effectively in the seafood industry	This core unit of competency covers the basic knowledge and skills that individuals need, to work in an effective and environmentally sustainable manner in the seafood industry.
	Meet workplace occupational health and safety requirements	This unit of competency requires workers to follow defined occupational health and safety policies and procedures relating to the work being undertaken in order to ensure own safety and that of others in the workplace.
Core	Take emergency action on board a vessel	This unit of competency involves preparing, operating, maintaining, storing and securing small vessels within range of ready assistance and isolated from heavy boating traffic and navigational hazards.
	Apply basic first aid	This unit involves the skills and knowledge required to provide basic first aid on board a vessel, including the performance of immediate life saving first aid until qualified medical assistance is available
Elective	Apply deckhand skills aboard a fishing vessel	This unit of competency involves basic deckhand duties aboard a fishing vessel including rope work, assisting in anchoring, mooring, operating winches and windlasses and preparing a fishing vessel for sea
	Assemble and repair damaged netting	This unit of competency specifies the outcomes for the construction of nets used as fish or prawn trawls, purse seines, beach seines, gill nets and the net component of holding cages and where necessary, customising a net design to suit enterprise specifications
	Operate deck machinery installed on a small vessel	This unit involves the skills and knowledge required to operate and carry out basic user-maintenance on shipboard lifting equipment and deck machinery in accordance with manufacturer's recommendations, regulations and vessel operational procedures
	PADI Dive Ticket	Open water dive ticket (non vet)
	Operate marine communications equipment	This unit of competency involves using radiotelephony equipment, the global maritime distress and safety sub-systems (GMDSS) available for small commercial vessels, specifically digital selective calling (DSC), the emergency position indicating radio beacon (EPIRB) and the marine search and rescue system. This unit incorporates the competencies required for holding the 'Marine radio operators certificate of proficiency (MROCP)'.

Year 10 options – Fishing and Boating

This program is not part of the Seafood Industry Pathway program and unlike the one mentioned above does not lead to a qualification. It does however cover a wide range of learning experiences including:

- Cleaning, preparing and cooking fish;
- Understanding weather maps;
- Understanding navigation and using sea charts;
- Small boat handling;
- Designing & construction of boats;
- The use of safety equipment;
- Recreational Fishing tackle & tips and
- Acquiring a small boat licence.

Year 11 and year 12 options - Seafood Industry Pathway Program

Students may opt to continue with the Seafood Industry Pathway Program by undertaking a certificate II in the seafood industry. This program becomes more tailored toward the student's career choice. They can either focus upon either the commercial fishing or aquaculture sectors. The associations with industry and registered training organisations are the same as the year 10 option and there are also costs associated with this program.

Another major component of this senior level program (particularly in the aquaculture stream) is to assist in the management of the schools aquaculture facility. Much of the assessment is centred around ensuring the facilities operation which includes weekend rostering.



Other Seafood Related Learning Models

Pre year 10

In order to maximise the schools asset, the aquaculture facility is also utilised by year 9 science students when exploring concepts of aquatic chemistry, biology and physiology. This has been earmarked as a successful catalyst for students deciding to undertake the Seafood Industry Pathway Program.

School Based Traineeships

This option is designed for students to gain maximum exposure to the seafood industry. The foundation of the traineeship model is releasing the student for a designated timeframe to undertake (paid) work at a commercial facility, which usually is one day per week as well as extended work commitments during school holidays. This model sometimes transitions to post year 12 standard traineeships and subsequent employment.

Infrastructure and Human Resources

The major seafood related infrastructure item at Port Lincoln High School is their aquaculture facility and adjacent classroom. The aquaculture facility consists of a freshwater recirculation system which houses Murray Cod, Barramundi and Trout, a series of aquariums, work benches, sinks, refrigeration and a backup generator. The teaching staff have gone to great lengths to incorporate key learning points around the facility as well as developing standard operating procedures. The adjacent classroom also has aquaria, computers and a data projector. Figures 2-4 depict some of the infrastructure at Port Lincoln High School's aquaculture facility.



The teaching staff both have vocational aquaculture qualifications and extensive industry experience. One member has also worked in the vocational training field for many years and is well versed at delivering hands on training.



Figure 1 - The Australian Fisheries Academy. An organisation used by the school for maritime training. Figures 2,3 and 4 - Port Lincoln High Schools aquaculture facility.

Current Situation

The Seafood Industry Pathway Program currently has around 90 students opting for the year 10 program with around 120 in total undertaking some part of the above mentioned seafood options. The teaching staff (along with the assistance of students) manage the facility six days per week and also facilitate industry engagement.

Successes

The Seafood Industry Pathway Program is well established with the schools frameworks and has yielded good results. Students have gained employment as a direct result of the program. The facility has actually raised the profile of the school within the community and private industry by the selling of aquaculture seafood products, in particular Barramundi, to local restaurants.

Challenges

There are identifiable challenges around the successful implementation of the various seafood programs at Port Lincoln High School, these include:

- The cost of implementation is an ever-growing economic burden to the school and they cannot pass anymore costs onto the students because a price point has been reached.
- The difficulties associated for students wishing to gain an entrance into university as parts of the seafood program can potentially exclude them from gaining university entry.
- Managing the aquaculture facility is a challenge (especially during the weekends and holidays).

Future Directions

Port Lincoln High School has secured federal funding to construct a trade training centre of which a portion will be seafood orientated. From the pool of funds a new aquaculture training facility will be built which will be larger, more automated with a more commercial focus. This will compliment other areas of the proposed trade training centre such as the hospitality/commercial cooking area which will be seafood orientated. It is envisaged that the trade training centre could produce quality commercial grade products that could be sold more regularly to local restaurants.

From a teaching perspective, there is an ever increasing trend to transfer learning material to an online platform where it could be utilised by other students throughout the state. There is a vision that students from other schools interested in a career in the seafood industry will have the opportunity to undertake knowledge based learning through an online platform while also travelling to Port Lincoln for designated block training where practical training will occur.

The Magic Wand Question

When asked what is the single largest need of the school for progressing seafood programs it was unanimous that more effective consultation and involvement with industry was paramount. The school has a strong desire to develop more of a two way dialogue with the local industry both in terms of having the schools learning experiences endorsed as relevant and also having industry recognise that the school has the capacity to provide industry with potential quality staff. It is a challenge for staff to regularly liaise with industry due to multiple constraints on their time, however they see that Australian Fisheries Academy could be an intermediate participant as they have school students attend there and are also constantly communicating with industry.



Conclusions

Port Lincoln High School has well-established seafood programs. On the surface the most successful is the Seafood Industry Pathway Program both in terms of industry exposure and quality training.

There is a deliberate attempt by staff and management to allow maximum exposure to the diversity of the seafood industry that is on their doorstep, although this may be a double edged sword as it is difficult to manage the learning experiences of such diversity and this may detract on the program.

Other school models do focus on one species or sector area which gives them somewhat of a lead agency status.

Port Lincoln High Schools seafood programs are an excellent way for students to understanding that there are a plethora of careers available within the seafood industry and for an enthusiastic learner they are a great platform for life after their schooling years.



Case Study 2- Stuart High, Whyalla

Background

Stuart High School in Whyalla, situated in the northern area of the Eyre Peninsula is a year 8-10 Junior High School with a total of 297 enrolments (ACARA 2010). As a learning environment it embraces the utilisation of practical learning and strongly recognises diversity both in terms of culture and learning styles. The school caters for “*at risk*” youth and has gained strong acknowledgment over the years for its innovative approach to education. Apart from its quality aquaculture program it has a horticulture centre, modern kitchens, a recording studio and excellent IT infrastructure.

History

The precursors to the current aquaculture program were developed in 1993. The school was looking at techniques on how to better engage students in science based learning. This initiative made the program align a lot more with applied science. A series of glass aquarium were constructed and integrated into everyday applied science and mathematics. The program also developed learning experiences around fishing. This program continued for 3 years and was successful in its objective of engaging students in science based learning.

With a change of management, there was a strong push to house the ever expanding program into a purpose built facility. From this initiative Stuart High has been successful in securing various rounds of funding to construct and improve their quality purpose built aquaculture facility.

Program Framework and Implementation

The aquaculture facility is a well utilised resource and is integrated into many teaching areas because of the applied nature of the learning. Many science and maths based activities are undertaken from year 8 in the facility.



Certificate II in Aquaculture

Year 10s have the option to undertake a certificate II in aquaculture in a model similar to Port Lincoln High School. The school engages TAFE and the Australian Fisheries Academy for the training they cannot do within their existing infrastructure and skills base while they also approach local industry for their students to undertake work experience.

Year 8 and 9 exposure

The facility is recognised as a quality whole of school resource and years 8 and 9 use it for a number of disciplines including mathematics, science, home economics, communications and manual arts.

School Based Traineeships

Stuart High have had a number of students undertake a Certificate II in aquaculture school based traineeship with local industry, in particular the kingfish farms, which unfortunately have contracted in recent years.

Infrastructure and Human Resources

The facility at Stuart High School is known as the *Smoked Kingfish and Barramundi Enterprise*. The purpose built facility has a fully functional freshwater recirculation system that houses Barramundi, Murray Cod and Trout. A mezzanine floor has been constructed around the tanks to allow for easier maintenance and monitoring. As with the Port Lincoln High School facility there are numerous key learning points displayed around the facility. Apart from the fully functional freshwater recirculation system the facility has a classroom space, computers, fridges, freezer, aquaria, a commercial fish smoker and a vast array of tourist brochures on stands. Figures 5-8 show selected images from their aquaculture facility.



Figure 5 (Top Left) - Stuart Highs seafood facility.

Figure 6 (Top Right) – Smoked Kingfish ready for sale.

Figure 7 (Bottom Left) – Facility signage.

Figure 8 (Bottom Right) – Large tanks inside the facility.

Stuart High’s facility has a dedicated manager who has a classification as a student support officer. He has commercial aquaculture experienced and a vocational qualification. He provides valuable real world knowledge and skills to both the students and teaching staff.

Current Situation

Stuart High is particularly innovative is maximising the potential and marketability of their aquaculture facility. An extremely notable achievement is the way they have integrated informative tourism into its business structure and because of this, the facility is now part of the South Australian government’s Seafood and Aquaculture Trail. This government initiative is promoted as a self-drive seafood experience that spans from Whyalla to Streaky Bay. Facilities that are part of the trail take tourists on organised tours of their facilities for a small fee. Stuart Highs facility frequently gets bus tours, individual travellers, interested locals and other schools undertaking their tour. All of the tours are conducted by the students (Figure 9 below) who are known as seafood promotions officers. This innovative revenue streams adds some much needed funds towards the management of the facility annually.

The other pioneering initiative is the sales of smoked product. Stuart High purchases kingfish portions from a local commercial facility and smokes them in their commercial smoker. The students manage the process which encompasses portion preparation, smoking, cryovacing, labelling and selling to the public to the public. The product has been acknowledged for its quality and value. The school also smokes its own Barramundi when product is available.



Figure 9 – Students conducting public tours of the facility.

From a course perspective, the school continues to run the Certificate II in aquaculture which is similar to Port Lincoln High School both in terms of content and the use of registered training organisations such as the Australian Fisheries Academy.

Challenges

One of the greatest challenges to Stuart High Schools program is the fact that it is only a junior secondary school. Decisions were made in the past to develop a feeder school model in some parts of Whyalla where junior secondary schools feed a much larger senior secondary high school. This model restricts the progression of the aquaculture program past year 10. In the past Stuart High has had former students continue with their aquaculture studies by coming back to the school for their hands on experience while undertaking self-paced learning (supplied by Stuart High) at their new school. This model has proven extremely different from a logistical point of view.

Forming meaningful linkages with industry is another challenge. Unlike Port Lincoln where there is a large concentration of industry, Whyalla's industry is small and with the closure of a kingfish facility in recent times, becoming even smaller. From a product perspective it is sometimes difficult to meet demand for the smoked kingfish.

Successes

Probably the greatest success of the program at Stuart High School it is now recognised as part of the Seafood and Aquaculture Trail. Being part of this initiative raises the profile of the facility as well as bringing a much needed revenue stream. Having students conduct the tours and give demonstration enhances their communication skills in a way that cannot be emulated in a classroom environment.

Future Directions

Stuart High will be seeking funds to expand the seafood processing capacity of the facility. Having an adequate cold room, work benches and associated infrastructure will allow them to buy a more reliable supply of whole kingfish and process them on site ready for smoking. These post harvest skills will greatly enhance the student's skills base. Another planned expansion is to enclose the teaching area of the aquaculture facility into a designated classroom with associated IT infrastructure.

The Magic Wand Question

When asked what is the single largest need of the school for progressing seafood programs it was unanimous that more effective consultation and involvement with industry was paramount. Their focus for more industry involvement, they would like a stronger relationship with Clean Seas Pty Ltd. Students in the past have undertaken work experience and traineeships at their facilities and they would like this to continue and expand into the future. They would also like enhance the relationship to a point where members of the company come to Stuart High to take on a lecturing and guest speakers role.

Conclusions

From its inception as a strategy to greater enhance the students who are *at risk* learning experience to where the program is today, Stuart High has progressed immeasurably. One of the keys to their success is that all programs are extremely student focused. They afford students a level of responsibility that they may not have ever had in the past and more often than not, they rise to the challenge.

They have excellent facility that can deliver a suite of quality learning experiences and empower the students with meaningful hands on skills. The staff and management of the aquaculture facility have looked out of the square to maximise usage of the facility and also its exposure to the community. Their innovative use of tourism and sales of unique products (smoked kingfish) show how

progressive their thinking is. Having a manager devoted to the facility also ensures quality care of the livestock.

Unlike Port Lincoln High, Stuart High is not spoilt for choice with regard to local industry so their drive to develop a special relationship with Clean Seas is perfectly logical. It is hoped that this relationship will be progress in the not too distant future.



Cowell Area School

Background

Cowell Area School is situated in the central area of the Eyre Peninsula and caters for students in Reception to year 12. Cowell Area School's total enrolments for all grades in 2009 were 174 (ACARA 2010). Set in a rural community, the principal industries in the area are aquaculture (specifically oysters), agriculture and mining. These industries, to a certain extent shape some of the learning and skills acquisition models of the school. Cowell Area School has programs with a strong seafood and aquaculture focus. . Amongst other infrastructure, the school owns an oyster lease, boats, an indoor aquaculture facility with aquaponics and processing facility. The school remains one of the centrepieces of the tight knit community of Cowell and is revered as an excellent example of rural schooling success by many.

History

The original mindset behind developing an aquaculture course started in the early 1990s. The local oyster industry approached the school with an idea of having an aquaculture course for years 10-12. This could potentially supply them with quality trained staff of which the learning would have been informed by these commercial facilities. A series of curriculum and learning materials was then developed, however it was undertaken prior to the release of the Seafood Industry Training Package and no vocational outcome or qualification could be attained.



Concurrently to this, Franklin Harbour District Council made available a 2 hectare research and development oyster lease and it was subsequently offered to the school. The lease was moved (with the help of local industry) to a more conducive growing site and Cowell Area High was also successful in changing the sites classification from a research lease to a commercial lease. This allowed the school to gain revenue from product sales.

By 1999 the farm had more infrastructure, a full time manager and a teacher devoted to aquaculture and seafood related activities. The school also was constructing an indoor tanks based facility with both salt and freshwater capacity. For some years the course and program in general had somewhat stagnated and after a review in 2008, the department had intentions of ceasing support for the project. Around the same time a new principal arrived and had a strong desire to keep the resource going and improve upon it. After meeting with the aquaculture committee some options were put forward, which one end of the spectrum was closure and the other being self-sustaining (particularly in financial terms) within two years. The aquaculture committee endorsed the self-sustaining option and a new manager was employed.

Program Framework and Implementation

Certificate II in Aquaculture

Cowell Area School offers a Certificate II in Aquaculture for students in year 10 and beyond in both a traineeship and school models. As part of this qualification, students gain units towards a coxswain ticket and senior first aid through the Australian Fisheries Academy. They also attain there PADI dive ticket through a specialist dive school. A great deal of work experience is gained by the students through the local oyster farms, which are on the town's doorstep. Quite often students undertake paid work on these farms and their processing facilities after school, on weekends and holidays. This type of experience proves invaluable for allowing the students to become *job ready* upon completion of their schooling years.



Science through aquaculture

Students down to year 7 get an exposure to Cowells school based aquaculture facility. The majority of middle school and senior school teachers are science and maths teachers and the facility is regularly used as a learning tool. Apart from using the facility for standard maths and science it is also used for ecology, sustainability, horticulture and construction.

Seafood/aquaculture/marine has been developed into an integrated curriculum and although this has happened very recently, anecdotal evidence suggests that it has had a positive impact. By integrating this into existing curriculum it is possible for the more academic students to undertake the program while still attaining university entry.

Other Institutions and Cowell Area High

Other schools and learning institutions travel to Cowell for exposure to their seafood programs, particularly the oyster program. Standard day trips from local schools is common place, however with the schools adjacent dormitories students from both schools and universities have travelled great distances to for extended stay at Cowell Area High.

Infrastructure and Human Resources

Cowell Area school has multiple resources relating to the seafood industry. Firstly, they have a skills centre which is mainly devoted to the seafood industry. This building has designated classrooms with all associated IT equipment. These classrooms are also used by local community groups as meeting places. Within the skills centre is the tanks based aquaculture facility. The tanks house Barramundi, Trout, Yabby, Snapper, freshwater ornamentals and some small local marine species. There are also two separate aquaponic systems growing mainly lettuce, shallots and basil. Other infrastructure includes an office for the farm manager, cold room, processing benches, sorting tables, grader, basket storage and repair area, workshop and commercial vessel and farm vehicle.

The other major portion of infrastructure is their 2 hectare oyster lease, located in the adjacent Franklin Harbour. Figures 10-18 provides selected images of the Cowell Area Schools seafood related infrastructure and student engagement.





Figure 10, 11 (Left Top, Left Bottom) – Student engagement at the oyster farm

Figure 12 (Top Middle) – Facility workshop

Figure 13 (Middle) Cowell Areas School indoor aquaculture and processing facility.

Figure 14 (Bottom Middle Left) – Cowell Area Schools oyster farm

Figure 14 (Bottom Middle Right) – Outdoor Trout tanks

Figure 15 (Right Top) – Processing facility and cold room

Figure 16 (Right Bottom) – Cowell Area Schools boat

Cowell Area High has quality human resources (paid and volunteer) devoted to the program which is strongly attributable to its success. An entity that underpins the program’s success is the aquaculture subcommittee. This committee which is an offshoot of the governing council is made up of the principal, farm manager, a teacher and members of the local industry. They have monthly meetings where standing agendas include a review of the business and strategic plans. The meetings also may discuss teaching/industry trends, work placement, employment and marketing.

The manager is a valuable resource to the program. Originally from the region, he has had international experience and has brought considerable skills and knowledge back to Cowell. He assists in the student’s educational journey and often has them under his tutelage, while ensuring the product is grown and sold. The teachers drive the program and are integral to it’s success. They have a good working knowledge of aquaculture and are always willing to assist on the lease. The principal is also a key driver for the revamping of the program. Her energy and enthusiasm are vital facets to its long term success.

Investment has also been made into the professional development of staff in the aquaculture area. Recently three staff travelled to Tasmania to see first-hand the hatchery they purchase their spat from. This experience enhanced their knowledge and skills of the science behind breeding oysters and it also enhanced the working relationship between the two businesses.

Current Situation

The Certificate II students are progressing well and have a lot of experience in recent times as the farm has had a very successful year in terms of product sales. The oyster lease to date has sold around \$80,000 worth of product this year and will pay for the managers wage, which was a key performance indicator for the business and strategic plans. Their products sales strategy is diverse with large consignments sold to other farms for on grown product and smaller orders coming from the local community, while other product is sold during special days such as local festivals and field days. Currently the farm has had its greatest financial success this year and they are all looking forward to emulating this feat next year. The school is also winning accolades such as regional business awards and a category in the South Australian Oyster Growers Association Awards.

Challenges

The greatest challenge that Cowell Area High faces is the pressure to keep producing a quality product to pay for their farm manager. Like all farming, oyster growing has good years and bad years and the department needs to recognise that some years production will not be as successful as others.

Successes

The key to the recent successes at Cowell Area High is due to the recruitment of a quality manager, a devoted team of teaching staff and management within the school and the good will of local industry, in particular members of the aquaculture subcommittee. If these groups did not show a high degree of devotion, the successes around product sales, student learning experiences and outcomes could not eventuate.

Future Directions

There are plans to expand the programs infrastructure, participation and breadth of learning experiences. The school has secured around \$800,000 federal Trade Training Centre Funding to be directed towards metal fabrication and marine/seafood. This will include a new, larger vessel to service the oyster lease and also to be used as for training to a larger number of students.

The dormitories are being refurbished and will be fully functional in the new year and partnerships are already established with organisations such as Flinders University and the Australian Maths and Science School to use these facilities.

The principle has a vision that the school can utilise its marine resources into the teaching areas of ecological sustainability and marine ecology in the future. She also has indicated that the schools oyster lease could be used by scientists and post graduate students for their research projects. All of these initiatives have an underlying theme of trying to build more working relationships with relevant individuals, departments and organisations.

The Magic Wand Question

When asked what is the single largest need of the school for progressing their seafood programs, the response was quite different to the other two schools. Cowell Area Schools greatest need was to increase the amount of exposure the program gets through effective marketing strategies. One specific example was that it would be advantageous to create an information pack (preferably in the form of a DVD) about the schools aquaculture/seafood program. This could be used by groups for preplanning field trips and also as a helpful tool for other schools wishing to undertake a program of this nature.

Conclusions

Cowell Area School is unique many ways. Its chosen primary culture species (oysters) lends itself to school based programs because there is not as much reliance on electricity, pumps, oxygen etc. Having a primary culture species also allows the schools to take a lead agency role around oyster farming and although students do get exposure to other species with their tank based systems, if they chose to gain meaningful local employment in the aquaculture industry it is almost certain they will be working with oysters. This type of unambiguous pathway does suite some learners.

The school is inextricably mixed with the community and they seem very proud for it to be that way and they have very strong values when it comes to the way they would like their school to function.

The business model the school has adopted seems to working very well and it certainly gives the students an appreciation of commercial aquaculture. The current program model at Cowell Area High would definitely be a preferred model for regional schools, however there has to be a critical mass of extremely devoted individuals for something as special as the Cowell program to occur and if they are not there it would be almost impossible to implement.

Conclusions and Recommendations

All three schools have quality programs that offer tangible skills development for entrance into the seafood industry. Previous school graduates are now part of the local seafood industry workforce, which may ultimately be the single most important factor in gauging the success or otherwise of these programs. It is interesting to note that upon discussing the success of these programs in terms of direct employment with members of the local oyster industry, there was an acknowledgement or acceptance that school leavers may opt to work for a local commercial oyster farm upon leaving school, however may only stay employed in the sector for two to three years before moving on to other employment in the trades or mining. This situation was not seen as negative as the oyster industry in the past has engaged the ex school leaver who now has specific skills, such as an electrician, for specialist farm work.

Stuart Highs seafood program is an excellent example of student engagement. Traditionally developed as a way to engage 'at risk' youth, they have surpassed all expectations. They go well beyond engaging students to actively enticing members of the public into the facility to show them the wonders of aquaculture. Their *out of the box* thinking which allows them to embrace tourism and other value added ideas such as selling commercial smoked product sets it apart in terms of innovation. Stuart Highs greatest challenge is industry engagement. This is mainly due to geography more than the willingness to engage. Most of the commercial seafood industry is well south of Whyalla and daily visits on a regular basis would be a challenge. The staff and management are actively trying to tackle this issue and are also seeking the assistance of Cowell Area School in this area. Stuart High is acutely aware of the crucial role industry plays in programs of this nature and because of this they continue to reach out to the local seafood industry. They have a particular desire to create strong ties with Cleanseas Pty Ltd a number their students have undertaken work experience there previously.

The high level of quality associated with the Port Lincoln High Schools seafood program can be strongly attributed to the teaching staff. They have had significant commercial experience as well as a demonstrated ability in delivering vocational based seafood training. Some staff have worked in registered training organisations delivering material from the Seafood Industry Training Package. The delivery staff has confidence in both their ability to train as well as manage the schools aquaculture facility. Port Lincoln High is a large school and many students opt to undertake some

form of seafood related program and just the sheer numbers of students undertaking a program coupled with the diversity of programs themselves may be quite challenging. It is ironic that because Port Lincoln High has such a diverse array of commercial seafood facilities at its doorstep it may be difficult to develop *special* relationships with specific sectors. This is not a problem experienced in Cowell.

Port Lincoln High has an exceptional program for students wishing to *experience* the range of careers the seafood industry has to offer. It is also perfectly suited for students who have enough initiative to use these skills to pursue a position in the local seafood industry as there are meaningful employment opportunities for graduates of Port Lincoln High School.

Cowell Area School has been noted by many as a quality model of a progressive rural school. The principal, teaching staff, administration and farm manager are totally devoted to progressing the seafood program. Their seafood program has many special features that make it unique. Firstly in terms of organisation the school stood out. The way it approached the governance of the seafood program was unique and is a model that requires special acknowledgement. They are inextricably linked with the local oyster industry which greatly enhances the program. Although their methodologies of engagement and inclusion are exceptional, one must acknowledge that Cowell Area School is in a unique situation in so far as the only seafood sector within proximity of the school is the oyster industry and this does give them an advantage in forming a *special* relationship. The school is also a central pillar of the Cowell community and many commercial oyster farmers' children attend the school. Although there is this advantage, an enormous amount of effort and organisation has been undertaken to galvanise this relationship to ensure its future success.

Having a functional oyster farm is another unique attribute of the school. Oysters as a species have a distinct advantage over growing finfish within an educational setting. One of the greatest challenges for the three schools is to ensure the livestock is well cared for and in good health and relying on pumps and power is not conducive to the traditional five day work cycle of schools, which is why it is common for seafood teachers and some devoted students to spend their Saturdays checking on livestock. Cowell Area School circumvents this problem with their oyster farm.

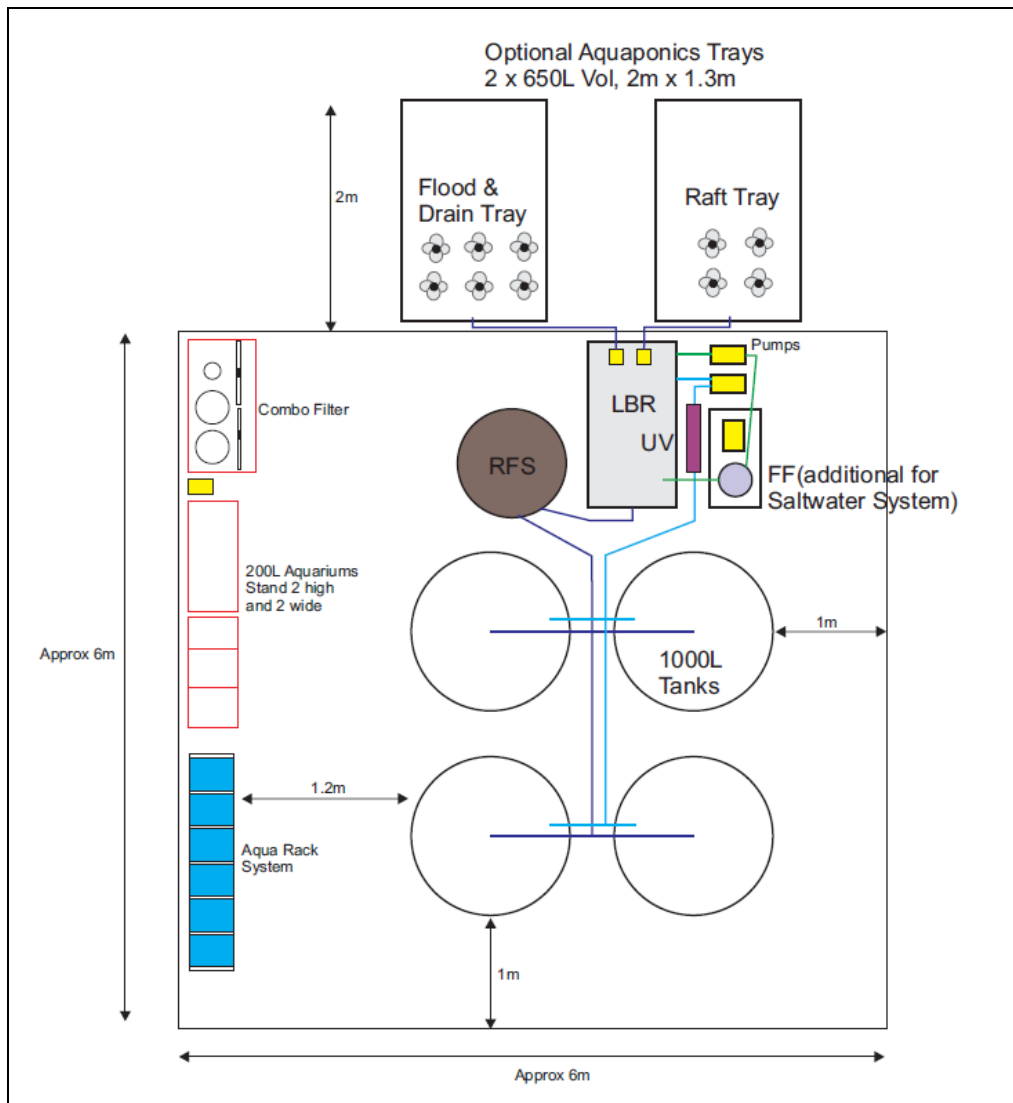
There was one common factor that stood out over any others during these case studies, this was the staff themselves. They were all highly motivated, visionary individuals and were devoted to their courses, facilities and wellbeing of their students. Everyone involved went over and above what would be considered their core duties. They all acknowledged the challenges associated with

running a program of this nature but all conceded it was well worth it. It seems as long as there are individuals with this level of passion and commitment within these schools the future of these seafood programs look promising.

High School Aquaculture Facility Cost Estimates and Schematics

The information provided below is a useful guide for any high schools wishing to develop a program that encompasses a functional aquaculture facility. All quoted prices are deemed correct as of 05/04/11.

The Diagram below illustrates an aquaculture system which could be effectively utilised as part of a high school program. The system is housed within a 6X6 M shed or room with the optional aquaponics system sitting outside of the structure in a hot house style tunnel. All other ancillary products needed for a program of this nature are also embedded within the quotes below the schematic.



The costing below is an example of a combination of aquaculture recirculation systems that could be incorporated into a high school and used as an educational tool for the delivery of an aquaculture education program. Included in this costing is a combination of 3 separate recirculation systems of different sizes, where one or all of them can be applied in your application. For these systems there are many different size variations, tank choices and filtration components that can be incorporated, so use this as a guide only. The below costing encompass:

- 1 x Aqua Rack System, multiple tank system. Incorporates 18 x 13L tanks and central filtration system.
- 1 x Multiple Aquarium Tank System (4 x 200L Aquariums, 2 of them divided into three segments to create 6 x 50L tanks)
- 1 x 4000L Fish Growing System (consists of 4 x 1000L Poly Aquaculture Tanks and associated filtration components). This system has the option to add 2 x Aquaponic's Trays.

Any of the above systems can be utilised in either fresh or salt water, however some components such as foam fractionators must need to be added for a salt water system.

CODE	DESCRIPTION/COMPONENT	QTY	EACH PRICE	TOTAL PRICE
AQUA RACK SYSTEM (Bottom left in above schematic diagram)				
AQRA250	18 x 13L Aqua Rack System	1	\$4,995.00	\$4,995.00
AQH600	Aquatic Heat System 600 watt	1	\$313.25	\$313.25
			SUB TOTAL	\$5,308.25
MULTIPLE AQUARIUM TANK SYSTEM (Middle left in above schematic diagram)				
MISC	3' Glass Aquarium Tanks (2 with dividers)	4	\$350.00	\$1,400.00
MISC	Pipe Timber Stand to hold above Aquarium Tanks	1	\$450.00	\$450.00
BCOMBOFW	Budget Combo Filtration System	1	\$2,995.00	\$2,995.00
AQH1200	Aquatic Heat System 1200watt	1	\$448.85	\$448.85
HCM100	Uno Mag Drive Pump	1	\$305.00	\$305.00
O2040	40 watt Emperor Aquatic's UV Steriliser	1	\$395.00	\$395.00
DB15A	15LPM Air Pump	1	\$98.75	\$98.75
GV05M	5 Way Gang Valve	2	\$8.25	\$16.50
AS1	Sweetwater Air Diffuser	6	\$2.55	\$15.30
AS3	Sweetwater Air Diffuser	2	\$3.60	\$7.20
MISC	Plumbing (Water & Air)	1	\$450.00	\$450.00
			SUB TOTAL	\$6,581.60

4000L FISH GROWING SYSTEM (Centre in above schematic diagram)				
AP1000	1000L Polyethylene Aquaculture Tank	4	\$995.00	\$3,980.00
RFS65	Radial Flow Separator	1	\$1,750.00	\$1,750.00
LBR1000	Low Space Bioreactor includes 100um Bags & Media	1	\$2,150.00	\$2,150.00
PPP18C	1/8HP Performance Pro Pump	1	\$595.00	\$595.00
O25080	80 Watt Emperor Aquatics Ultraviolet Steriliser	1	\$795.00	\$795.00
AL40	40mm Airlifts (hang on the side of tank) inc diffuser	4	45.00	\$180.00
DB40A	Kamair 55LPM Air Pump (air for biofilter & tanks)	1	\$156.50	\$156.50
VM1	1 Way Air Flow Manifold	1	\$28.75	\$28.75
VMADD	Additional Valves for VM1	4	\$11.00	\$44.00
AP119PM	6mm Vinyl Tubing	10	\$1.50	\$15.00
MISC	Plumbing Air & Water	1	\$850.00	\$850.00
			SUB TOTAL	\$10,544.25
CODE	DESCRIPTION/COMPONENT	QTY	EACH PRICE	TOTAL PRICE
	OPTIONAL EQUIPMENT			
	Aquaponic Trays & Stands (Top centre of schematic)			
GB600	Aquaponic Trays 2m x 1.3m x 0.3mH Duraplas	2	\$450.00	\$900.00
AQPST	Stand 800mm High	2	\$490.00	\$980.00
PSY25	Polysteyrene for each Raft Tray, 25mm with holes	2	\$60.10	\$120.20
MED00400	Clay Balls to fill 1 tray requiring 650L per tray	13	\$38.20	\$496.60
R440224	Quiet One 3000 Pump	2	\$68.00	\$136.00
MS6110	Digital Timer up to on/off 8 times per day	1	\$26.70	\$26.70
MISC	Plumbing (Air & Water)	1	\$350.00	\$350.00
			SUB TOTAL	\$3,009.50
Saltwater Conversions For:				
Aqua Rack System				
AP021	Aquarium Foam Fractionator	1	\$234.75	\$234.75
R440224	Quiet One 3000 Pump	1	\$68.00	\$68.00
			SUB TOTAL	\$302.75

Aquarium Tanks System				
PPS02	Model 3 Aquarium Foam Fractionator	1	\$785.00	\$785.00
			SUB TOTAL	\$785.00
4000L Fish Growing System				
PPS2	Aquasonic Foam Fractionator	1	\$1,550.00	\$1,550.00
HCM100	Uno Magnetic Drive Pump	1	\$305.00	\$305.00
			SUB TOTAL	\$1,855.00
OPTIONAL MANAGEMENT EQUIPMENT				
ECOTESTRPH2	Eutech pH Pen	1	\$115.00	\$115.00
TK550	Carbonate Hardness kit	1	\$11.63	\$11.63
TK544	Ammonia Kit	1	\$13.75	\$13.75
TK560	Nitrite Kit	1	\$12.33	\$12.33
TK570	Nitrate Kit	1	\$16.46	\$16.46
TK520	Hardness Kit	1	\$13.30	\$13.30
FW061	Extra Power Water Purifier 1L	1	\$15.59	\$15.59
BCC100	Bio-Culture 100ml Concentrate	2	\$51.38	\$102.76
270912	11cm x 16cm Glass Aquarium Algae Pad	2	\$11.60	\$23.20
SYPHON	Multipurpose Syphon	1	\$38.25	\$38.25
FN-113	Aquarium Net 6"	4	\$0.90	\$3.60
FN-115	Aquarium Net 10"	4	\$1.85	\$7.40
DN31A	Monorail Net 40cm x 40cm, 3mm mesh, 46cm Handle	1	\$58.45	\$58.45
DN32D	Monorail Net 40cm x 40cm, 6mm mesh, 91cm Handle	1	\$79.15	\$79.15
DO200	YSI DO200 Dissolved Oxygen Monitor	1	\$297.00	\$297.00
605352	DO200 Cable Assay 4m	1	\$308.00	\$308.00
ES401	250ml pH7 Calibration Solution	1	\$10.27	\$10.27
ES404	250ml pH4 Calibration Solution	1	\$10.27	\$10.27
RAC3	Recirculating Aquaculture Systems 3rd Edition	1	\$198.00	\$198.00
			SUB TOTAL	\$1,334.41

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