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SAOGA Submission to: PARLIAMENT OF AUSTRALIA
Senate Standing Committees on Environment and Communications re Oil and Gas Production in the Great Australian Bight

Oyster aquaculture is a sustainable industry employing hundreds of locals in regional SA. It involves the cultivation of a renewable natural resource and is entirely reliant on the ambient conditions of the wider pelagic ecosystem.

Our Position.

The Oil and Gas Industry will potentially have a substantial benefit for Eyre Peninsula and South Australia – and we do not want to block it. We are supportive of sustainable natural resource utilisation that supports the regional economies of our growing areas across Eyre Peninsula, York Peninsula and Kangaroo Island, provided it is structured to take into account other sustainable industries, the importance of the prevailing ecosystem and mitigates risks to a very low level. If the risks cannot be mitigated by lack of technology, knowledge, or commercial cost – then development (including exploratory stages) should not proceed until the very low risk profile can be achieved. This is a normal risk/consequence process applied to critical public sector decision-making.

Our Concerns.

The development of an oil industry in the GAB does pose a significant risk to the currently pristine unpolluted environment and the image of this. These are the features that the oyster industry's reputation and credentials in the market place are based upon, and have taken decades to establish and promote. The importance of the interrelationship and

interconnectedness between coastal and offshore water masses and movements in the Great Australian Bight cannot be underestimated. A clear example of this is the upwelling system in South-East of SA and the Kangaroo Island Pool and its importance to the entire Great Australian Bight region.

Whilst we welcome NOPSEMA's diligence in assessing the Environmental Plan(s) submitted to date; accidents and previously unforeseen events do occur and the consequences in those situations must fully considered in the assessment and approval process. The two well publicised and well-researched oil disasters in the US clearly show the magnitude of impacts and the long-term nature of the consequences as well as the questionable ability to clean-up and rehabilitate an area to a pre-spill state. This must be fully considered in the Australian assessment process, as does the ability to mount an effective response in what is well known to be an exposed remote rough environment.

Unforseen circumstances and accidental events have contributed to each of the worlds' worst oil spills and oil pollution events (up until that time). So while it is probably feasible to have preventative measures in place to account for risks known about up until the last event (as has been the case throughout history) this does not ensure that all risks are adequately accommodated when operations move into new areas, which is exactly the situation proposed in the ultra-deep waters of the Great Australian Bight. It is well known and acknowledged by proponents to date that the GAB presents a unique set of challenges that do not occur simultaneously at any other drilling site in Australia or indeed across the entire planet.

Human error, violations and lack of adherence to accepted Environmental Plans are clear examples of deficiencies in risk management processes currently operating within Australia. Combine this with extreme ground-swells, sea-states and weather conditions that frequently occur in the ultra-deep waters beyond the continental shelf of the GAB collectively increase the risk of minor incidents rapidly escalating into major events.

For any exploratory or development activity to proceed the ability to mount an effective response including adequate containment equipment, well capping devices, relief well drilling, support resources and infrastructure etc must be immediately available.

Specific Issues.

1. The capacity of government and private interests to mitigate (and remediate) the effects from a loss of well control and oil spill in this area.

   Modelling presented through the NOPSEMA consultation process anticipates an oil spill could impact coastline from Beachport in South Australia's South East to Albany in Western Australia South West, depending on prevailing water currents and wind direction at the time of the event (pretty much the entire coastline of southern Australia). Relying on the mobilisation of a Capping Device and the independently operated ships capable of handling and deploying the Capping Device from centralised depots overseas creates unnecessary steps and potential delays in response times. This is clearly inadequate and unacceptable for drilling in the challenging high-risk, ultra deep-water, exposed location that is the GAB.

2. Whether the NOPSEMA risk-assessment and "ALARP" process take into consideration the ability to rehabilitate the Great Australian Bight to the natural pre-spill state.

3. How commitments to preventing oil spills will be sustained, including after the exploratory and/or production well is 'plugged' and left.

4. The co-incidence between the multiple stranding's of three different species of whales on Kangaroo Island, York Peninsula and Eyre Peninsula while seismic survey vessels were operating in the deep waters adjacent to the continental shelf of the Great Australian Bight through November-December 2014 and January 2015. What other not so obvious ecosystem impacts are occurring with the increased noise and sound pressure waves of these activities? Oysters are entirely reliant on the natural food production of the greater GAB area.
5. Who is responsible and what is the capacity to support industries impacted by oil spill event(s)? Especially if impacts extend for years-decades and are not readily identifiable before they occur?
6. Compensation for impacted businesses must be immediately available (not after lengthy legal proceedings) and must include consumer perceptions in the situation through and following a spill (the experience of seafood producers and harvesters in the Gulf of Mexico was that consumer perceptions were still prevalent years after the product was officially cleared for sale).
7. How Oil and Gas exploratory and extractive companies propose to maintain the image of the pristine, unpolluted GAB environment - these are fundamental to the reputation and credentials of South Australian oysters in the market place.
8. Non-predictable release of hydrocarbons will increase the scope and cost of the South Australian Shellfish Quality Assurance Program (SASQAP).
9. Nothing provided in consultations to date seems to consider the importance and uniqueness of the upwelling system to the entire region. It is the underlying ecology across the broad region that supports the aquaculture and fishing operations. Nutrient recycling from the deep ocean basin adjacent to the shelf-slope drilling area is important for the productivity of the region.

Key Points of the South Australian Oyster Industry.

- Farm-gate value of $35.3 million that is directly contributed to the state's economy.
- Downstream activities directly associated with the oyster industry (i.e. processing, transport, retail) equated to $68.3 million and the flow-on to other sectors a further $145.6 million, contributed to the SA economy from the oyster industry.
- Directly employs 254 FTE in regional areas, and a further 433 FTE in downstream activities. The flow-on business activity generates a further 553 FTE.
- SA is now the ONLY oyster growing state of Australia that if free of the POMS oyster virus. Therefore now the only state that can supply disease free spat (seed stock and on-growers) to the other oyster growing states of Australia and internationally. (POMS results in immediate death of 90-100% of exposed oysters and has recently decimated the oyster industry of Tasmania who previously supplied 95% of the oyster seed-stock required by the entire Australian oyster industry).

Detailed Background.

Oysters are bivalve filter feeders, which means they have 2 solid shells and this naturally limits spatial mobility. They extract their nutrition from the ambient environment by passing large volumes of water across their gills and retaining the phytoplankton and particulate matter carried by the water currents. A study in NSW showed that farmed oysters could remove over 1 million tonnes of suspended material, mostly phytoplankton in their lifetime.

Hydrocarbons and pollutants present in the water column will be accumulated by filter feeding oysters.

Evolution of the Oyster Industry.

The presence of large middens of discarded oyster shells is evidence that aboriginal people had always eaten Australia's native oysters, the Sydney Rock Oyster (*Saccostrea commercialis*) in the warmer waters along eastern Australia and the Flat Oyster (*Ostrea angasi*) in the cooler and temperate areas of southern Australia.

In the early days of European colonial settlement oyster harvesting was a key fishery. The native oyster beds (oyster reefs) were dredged; the shells were burnt and ground to produce lime for building and flesh used as food. The natural beds of NSW were effectively destroyed by the mid 1860's. The South Australian industry continued to operate across 1,500km of coastline up until mid1940's (Alleway and Connell 2015). Oyster dredging was one of the first industries for the settlers of South Australia and underpinned the success of the colonies.

Attempts at commercial oyster farming in Australia began in the Sydney region in 1872 using the locally occurring Sydney Rock Oyster within their native distribution range. However, it was the introduction of a temperate water oyster species that is native to Japan (the Pacific oyster, *Crassostrea gigas*) in the 1960's that enabled oyster farming to occur in other locations. These early ventures were highly successful. The Pacific oyster is the most commonly farmed species in aquaculture in many regions of the world. South Australia is the highest producer of Pacific Oysters in Australia.

The Australian oyster industry includes in excess of 550 individuals and businesses across 3 states, SA, NSW, and Tasmania; and of which 386 licences are held in South Australia. Predominately these are family owned and owner operated. In 2007 Australian production exceeded 16 million dozen with a farm gate value of around $100 million (41% NSW, 37% SA, and 21% Tasmania).

In South Australia the oyster industry is the second most valuable aquaculture sector in terms of farm-gate sales value (PIRSA 2015). The most recent economic assessment (2012-2013) shows the South Australian oyster industry has a farm-gate value of $35.3 million that is directly contributed to the state's economy (ABARES 2014). Downstream activities directly associated with the oyster industry (i.e. processing, transport, retail) equated to $68.3 million and the flow-on to other sectors a further $145.6 million, contributed to the SA economy from the oyster industry (Econsearch 2013).

The South Australian oyster industry directly employs 254 FTE in regional areas, and a further 433 FTE in downstream activities. The flow-on business activity generates a further 553 FTE (Econsearch 2013).

These direct contributions are reduced from $44 million in the previous year's analysis, 2011/12 due to the large number of unexplained oyster mortalities in 2012, co-incidentally, after the first large-scale 3D marine seismic survey that occurred in the Great Australian Bight. Whilst direct

cause and effect is difficult to assess, the timing and impact of these activities on the pelagic food base of the GAB's complex ecosystem is unknown. Dead oysters demonstrated nutritional deficiency with no sign of a pathogen being involved. Unexplained oyster mortality occurred again between February and June of 2014, with no infectious agents being found (PIRSA fish health pers.comm. 2014).

The Oyster industry significantly contributes to South Australia, particularly the economy and employment of regional centres. Pacific oysters are produced from 17 classified growing areas across SA, *ALL* of which are exposed directly or indirectly through ocean currents, to oil exploration and drilling in Great Australian Bight (Figure 1).

POMS was first detected in Australia in 2010 (Jenkins et al. 2013). By June 2014, it was known to occur in Australia in three estuaries: the Georges River–Botany Bay, Port Jackson–Sydney Harbour and Hawkesbury River–Brisbane Water estuaries. In 2016 the disease hit Tasmania and has decimated the industry in that state; with the flow-on impact on other oyster growing regions as Tasmania previously supplied 95% of the seed stock grown in SA and NSW. POMS has a substantial impact on the viability of businesses and regional productivity where it occurs. Maintaining freedom from infection in South Australia and Tasmania is a priority for Australian aquatic animal health authorities and the SA oyster industry. Pacific oysters (and the Portuguese cupped oyster, *C. angulata*) are the only species known to develop clinical disease due to infection with the virus (Department of Agriculture, 2015).

Figure 1: Map showing the proximity and exposure of the oyster growing regions of South Australia to the Great Australian Bight (SAOGA 2015).

The severe disease outbreaks in NSW in recent years and now Tasmania mean that South Australia is now the largest producer of edible oysters in Australia. It is a critical supplier of disease free stock to the hatcheries for breeding purposes. Any impact on this state's oysters will impact on viability and production of oysters elsewhere around Australia.

Production Systems of SA.

South Australian oysters are grown using two methods, either the traditional rack and rail system transferred from NSW, or using a locally developed adjustable long-line technology (the BST system). The BST system developed by growers in Spencer Gulf is now exported around Australia and the world (Figure 2). Both of these growing methods aim to increase the productivity of the oysters by holding them in baskets higher in the water column so they have access to phytoplankton which is more abundant in the well lit and mobile pelagic zone compared to the benthic/sea floor. What is important to note from both of these growing techniques is that growers can adjust (raise or lower) the oysters' position in the water column.

Increasing or decreasing the oysters distance from the sea floor allows growers to manage the time that oysters spend submerged. This accommodates seasonal differences in water and tide heights and enables growers to train oysters to hold their shells closed thereby improving survival throughout transport to market. More time underwater means more time for feeding and faster growth but can lead to weaker shells, weaker muscles (that hold shells shut once removed from water) and incursions of shell damaging mud worms. These can all have implications for decreasing the shelf life once oysters are removed from the water for harvest. Conversely positioning oysters higher on the racks/rails gives them greater exposure to air, encourages thicker shell growth, strengthens the muscle and enables them to hold their shells shut for longer periods of time, kills mud worms and other bio-fouling organisms, but decreases growth rates and can cause stress or death from temperature extremes.

Theoretically growers could respond to a surface oil slick for a limited period of time, by lowering or lifting baskets if the infrastructure for real-time monitoring of water currents is set-up before an accident. However the ability to respond in this manner would be negated if dispersants were used to spread the oil down through the water column. The main reason that dispersants are used is to reduce the size of the oil droplets; this potentially has an unintended consequence of increasing the likelihood of being ingested by the oysters.

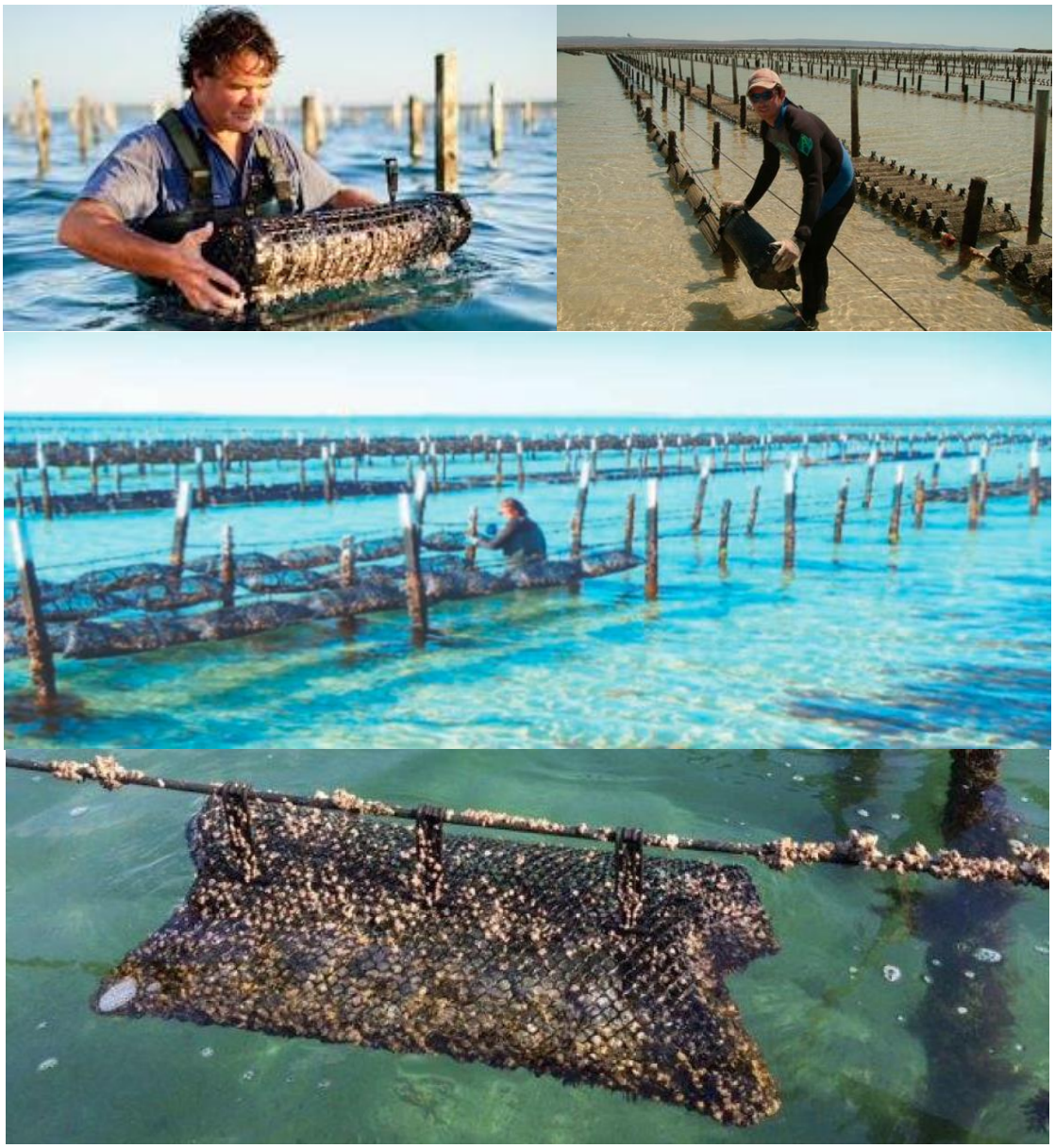

Figure 2: Operating oyster leases showing the diversity of water depths, tidal range and oyster basket suspension configurations on the BST long-line growing system (source Kerry Straight, ABC Landline 2014, SAOGA 2015).

Threats to the Oyster Industry Globally.

Globally oysters are in serious trouble, more than 90% of the world's oyster reefs having been lost in the last century (Alleway, pers.comm. 2015)

In the United States of America, 'Gulf Oysters' had been harvested for generations from the highly productive coastal fringe of Louisiana before the oil spill of 2010 in the Gulf of Mexico (GoM). Prior to the Deep Water Horizon event, Louisiana had accounted for about half of the Gulf Oyster harvest, typically producing between 3-7 million pounds of oyster meat per annum. This was approximately one third of the total production in the United States. Now dredging in this area only yields empty lifeless oyster shells. The gulf oyster harvest volume has declined dramatically in the 6 years since the Deep Horizon oil spill. Thousands of acres of oyster beds where the oil washed ashore are still only producing less than a third of the pre-spill harvest, "but more worrying is the

lack of oyster larvae, these were once abundant on the shell of the older oysters" (oyster fishers GoM pers.comm. 2016).

Ocean acidification due to rising atmospheric carbon dioxide driven by anthropogenic emissions and burning of fossil fuels (Sabine et al 2011; Shaw et al 2013) is seriously threatening the viability of natural and hatchery larval production of oysters in the significant growing area of the US Pacific Northwest (NRC 2010; PGSA 2010) and elsewhere (Barton et al 2012; Kroeker et al 2013). Pollution (from freshwater flows and oil spills) are implicated in the deaths of "thousand of acres" of oyster reefs and lack of recruitment in the oyster industry of the Gulf of Mexico (Galtsoff et al., 1935; US Fish and Wildlife Service 1945; NOAA 2013; BP 2014).

Disease is another key threat that has decimated various stocks of oyster growing industries throughout the world. One that is of particular concern for the oyster industry of South Australia is a herpes virus that causes Pacific Oyster Mortality Syndrome (POMS). This disease has decimated the oyster growing industries throughout Europe, Asia and USA with rapid mortality of 80-100% (Friedman et al., 2005; Burge et al., 2006; Garcia et al., 2011; Lynch et al., 2012). Through 2010 the POMS virus was detected from mass mortalities in New Zealand and New South Wales, Australia (Paul-Pont et al., 2014).

From a marketing perspective, agricultural and industrial pollution, encroaching human habitation, and biotoxins are increasingly becoming a concern for growing areas outside of South Australia. Examples include Norovirus and Vibrio's that affect humans in USA; PSP biotoxin in Tasmania and New Zealand; various viruses that affect humans in Wallis lakes NSW (Walsh et al 2011; Farrell 2015; ISSC 2015).

SOUTH AUSTRALIA DOES NOT HAVE ANY OF THESE ISSUES AND THEREFORE CURRENTLY HAS A CLEAR ADVANTAGE IN THE MARKET PLACE ➔ THE RISK OF OIL POLLUTION IN THE GREAT AUSTRALIAN BIGHT COMPROMISES THIS.

SA Shellfish Quality Assurance Program (SASQAP).

Over 97% of oysters bought by Australians consumers are fresh in the half shell - freshness, quality and food safety are paramount.

Australia has a Quality Assurance Program (QAP) that applies to all species of bivalve shellfish (2 shelled molluscs) that are consumed in Australia or exported for consumption. This program is to provide public health protection for consumers of shellfish and underpins sustainable development and consumer confidence in the industry.

It includes a variety of species ranging from clams, cockles/pipi's, mussels, oysters, razorfish and scallops. There are 3 basic forms of production defined in the operations manual (ASQAP 2009).

- harvesting directly from naturally occurring wild stocks (eg cockles, clams, scallops, flat oysters)

- grown in natural conditions with the application of cultural practices to increase catchment area or elevate stock in water column to promote productivity through greater access to natural pelagic food sources (eg mussels, scallops)

- stock produced in a hatchery, introduced to a containment system in the marine environment to grow under natural conditions (eg cupped and flat oysters).

Growing areas where the bivalve molluscs are commercially harvested from natural occurring stocks or are grown by means of aquaculture; are assessed for "pollution conditions". The South

Australian Shellfish Quality Assurance Program (SASQAP) is a regulatory program managing food safety risks that are underpinned by legalisation, standards and guidelines.

The program sits within PIRSA Biosecurity SA and monitors water and shellfish where oysters, mussels, cockles and scallops are harvested to ensure that commercial shellfish product only originates from areas free of any harmful substances.

Whilst oysters grown in areas subjected to higher pollution from human activities have built systems onshore to depurate (purge or clean) oysters; SA is the only state where this is not necessary. SA has pristine oceanic waters, with both little estuarine influence and agricultural run-off from rain events, and growing sites or zones are located in regional areas with low industrial activity and low population bases.

SASQAP is based at the Lincoln Marine Science Centre, Port Lincoln, SA and operates a NATA accredited laboratory for the screening and enumeration of microbiological and harmful micro-algae samples. Biotoxin and chemical (residues) testing is provided by other NATA accredited laboratories on a fee for service basis.

There are currently 17 growing areas and 29 classified harvesting areas spread across South Australia with the majority on the West Coast.

SASQAP is based on a Risk Assessed Approach.

A shoreline and sanitary survey is regularly performed on growing areas to ensure the growing areas are not subject to contamination from human or animal faecal matter, pathogenic organisms, poisonous or deleterious substances or marine biotoxins exceeding the standards as described in the SASQAP and ASQAP Operations Manuals.

The internationally accepted frequency for phytoplankton monitoring suggests weekly to be the most effective, and to be increased in frequency in the event of a bloom. However, in SA, biotoxin risk assessments which have been undertaken in all growing areas suggest fortnightly monitoring between October and April and monthly at other times to be sufficient.

This reduced level of monitoring due to low assessed risk keeps costs down for the shellfish industries.

Monitoring is increased when triggers are initiated. Oil and gas drilling activity in the GAB would be a trigger for increased monitoring, and increased cost.

Microbiological monitoring for approved areas occurs a minimum of six times per year. Additional monitoring occurs following adverse environment conditions such as rainfall exceeding 20mm in an hour resulting in a deluge of water and contaminants entering the marine environment.

Over the past few years there has been increased financial pressures placed on the shellfish industry. These pressures include the implementation of marine parks, PIRSA cost recovery processes, increased operational costs, new labour awards and unusual growing conditions resulting in unexplained mortalities in 2012, poor growth and condition of oysters.

A further economic challenge has been poor market demand for oysters as a direct result of shellfish contamination from *Alexandrium tamarense* experienced in Tasmania in October 2012.

The Ellis Review of SASQAP suggests proposed increase in shipping to and from South Australian ports requires urgent attention. From a biosecurity perspective, safe guarding marine industries and the environment must be one of the main priorities for the South Australian government.

In recent times we have seen biosecurity failures - Abalone Viral Ganglioneuritis (AVG) sweep across the south west Victoria coastline like a fire front in 2007 resulting in widespread abalone mortalities, the Pacific Oyster Mortality Syndrome wreak havoc on the Eastern Seaboard of Australia since 2010, not to mention isolated shellfish and marine-life mortality events in South Australian waters.

Food safety must be of paramount importance if the South Australian government is to achieve one of its priorities of the State Strategic Plan in producing premium food and wine from our clean environment. Currently South Australia is very fortunate in that it doesn't have large industrial areas close to shellfish growing areas and the industry has been shellfish poisoning event free. SA shellfish industries wish to maintain this positive record and image.

The 2012 Tasmanian shellfish poisoning event had an estimated financial impact of $23.279m. Furthermore, the event had a very significant impact on accessing markets with extra barriers and processes introduced thereby adding further costs, not to mention the ongoing impact on the Tasmanian seafood brand and possible market price.

As there are no natural seeps in the GAB, once drilling commences hydrocarbons or PAH will need to be added to SASQAP list of parameters for which to routinely test. This would add a significant additional cost to industry. Any further cost to SASQAP would be financially unsustainable for industry.

Credentialing – Premium, Food and Wine Strategy.

Alongside of the *Premium Food and Wine* Strategy, the State Government has promoted credentialing for all seafood sectors.

The oyster industry received a State Government matching grant to develop the TQCSI SA Oyster Growers Association QHSE Code which will embrace quality and food safety of oysters, environmental sustainability and workplace safety. The Code will meet all requirements of the current TQCSI QHSE Code:2013 which is a more practical, less bureaucratic version of the ISO Standards but requires the most important issues of each Standard to be addressed. The Code will also include a 'Code of Practice', to be accepted by all SAOGA members, agreeing to comply with industry accepted food safety, quality and environmental requirements and it will complement the South Australian Shellfish Quality Assurance Program (SASQAP).

Some individual businesses have also met the requirements for Friends of the Sea, and/or Organic Certification.

Businesses entering the export markets in China and Asian countries will be able to apply for a State Government *Statement of Recognition* signed by the Minister for Agriculture, Food and Fisheries to highlight to their customers the key regulatory requirements they meet. This could be used to support marketing by a producer in particular markets to demonstrate attributes such as sustainability, biosecurity, food safety to name a few.

Activities in the GAB must not pose any threat to these kinds of credentialing programs and certifications which have been achieved through considerable energy, effort and cost.

Oysters – the accumulators.

In stark contrast to the Gulf of Mexico, the Great Australian Bight has no known documented oil seeps, and therefore it is likely that the GAB does not have natural ability to microbially digest/process oil from a spill. Especially from a well blow out or accidental release situation where large volumes are introduced in very rapidly, any biological response has a time lag the length of which is dependent on prevailing water temperature and other environmental variables.

Oysters being the "kidneys' of the sea are highly likely to accumulate any pollutants which may result from GAB activity.

Judd Evans

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