Dear Sir/Madam

My comments are limited to the assessments of impacts of the proposed leases, section 8.2. In particular the section dealing with the impact of resource competition from shellfish spat.

The following quote is taken from page 186 of the EIS

*Resource Competition (EIS Page 186)*

> "There is the potential for cultivated spawning shellfish species to influence the distribution of individual shellfish species within Jervis Bay with possible consequences for the balance or makeup of wild assemblages of biota"……." Concerns exist that an increase in the number of mussels introduced to Jervis Bay will increase the size of the spawning population in the bay and increase recruitment pressure on rocky shores and rocky reefs."

This section addresses in part questions that I posed in an earlier submission to Graeme Bowley late December 2012. Graeme responded advising me of the timetable for the EIS and the opportunity to make submissions.

The major question was, will increased spat input into the bay have adverse effects on:-

a. Sessile animals, tunicates, barnacles, limpets, on the intertidal area?

b. Increased fouling of boats?

After careful reading of the EIS I remain unconvinced that the EIS adequately answers these questions.

The EIS implies increased spawning will be of little consequence.

> "The capacity for cultured stocks to contribute to wild recruitment also needs to consider the characteristics of the spawning cycle for shellfish (which take a number of years to reach full spawning potential), the farming methods (which remove the larger and more mature specimens for sale prior to them spawning) and the lack of appropriate spawning triggers in Jervis Bay (in effect a sudden and prolonged cold snap). Collectively these factors generally work together to reduce the likelihood there would be large farming-induced spawning events in Jervis Bay."

Certainly farming methods that involve removal of larger mature specimens will limit spawning. However if shellfish are grown to a reasonable size, it is evident from figure 67 that some gamete production is inevitable. Indeed I understand that without substantial reproductive tissue in muscles shellfish are hardly marketable. The EIS argues (last para page 186)

> "cultured mussels in Jervis Bay were previously harvested between about 10 and 14 months of age. Figure 67 indicates that at this age the mussels have low reproductive capacity and therefore would not be significantly contributing to the wild population of mussels in Jervis Bay."
>
> Note: Figure 67 presents data of growth rates and gamete production from Long Island Sound (USA).

At face value, the conclusion drawn in this paragraph would be a reasonable assumption, however it is misleading as growth rates at the two locations would be markedly different. For example Hammerson (2004) indicates at depths of 6- 7 ft, winter water temperatures in Long Island Sound vary between 0-4$^{O}$C and summer temperatures 20-23$^{o}$C. The summer water temperature at this location might approach that in JB however the winter temperatures are vastly different. Thus to imply similar growth rates and maturity states at the two sites is poor science and misleading.

The lack of appropriate spawning triggers in JB is also suggested to limit spawning of the cultivated shellfish. However this suggestion is clearly countered by the statement (page 186),

> "Certainly, practical experience gathered in Jervis Bay has recorded heavy natural spatfall occurring…".

The triggers might not be reliable for commercial harvesting of spat, but evidently such triggers do occur.

Another quote page 187 implies that spatfall will not be a problem to the ecology of the bay.

> "Mussel farming had occurred previously in Jervis Bay from late 1970s to 2008 with no significant impacts from recruitment being identified."

The key words in the above quote are "being identified". In the absence of supporting evidence in the form of an appropriate survey to measure changes that may have occurred, this argument is unconvincing. If such data existed, I suggest that they would have been presented. Further, the intensity of the proposed shellfish production is likely to far exceed the more limited and less structured cultivation previously undertaken.

Thus I believe the likelihood of markedly increased spat production from the aquaculture leases and the inevitable population of mussels that become established after dislodgement from the ropes has been underestimated in the EIS.

I also believe that the ecological consequences of such increased spat production have not been suitably addressed in the EIS. Increased fouling of moored boats in Callala Bay and in Currambene Creek will cause additional costs to boat owners. Increased fouling of navigation markers, mooring ropes and buoys will require increased maintenance.

However, while the impacts on man would be inconvenient, my major concern is the impact of spatfall on the environment of the marine park itself. Reefs and intertidal regions may be regularly overwhelmed by unprecedented levels of spat settlement to the detriment of existing sessile animals and thus the ecosystem of the bay. More frequent cleaning of moored boats will add to the shedding of toxic antifouling compounds in environmentally sensitive areas, particularly along Currambene Creek.

<u>Comments on proposed monitoring</u>

Proposed monitoring for deleterious impacts in and around the proposed leases is to be applauded. However there appears to be no proposal to assess impacts at more distal locations to detect changes due to enhanced spat establishment. If the leases are established, I believe it is incumbent on the proponents of the scheme (NSW Dept Primary Industries) to perform such surveys, report their findings and use such data to regulate stocking rates.

In my earlier submission, I raised the potential importance of mussel predators (starfish?) present in the vicinity of the lease thriving and thereby increasing their output of offspring that in turn will lead to changes throughout the bay. If the leases are established it would be important to assess changes in predator levels.

Finally, Dr Chris Hardy, CSIRO, Ecosystems Sciences has developed sensitive DNA means to assess differences in faunal assemblages including assemblages in marine sediments. If the leases are to be established, it might be useful to consider if ecogenomic approaches would be a useful addition to monitoring efforts.