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Dear Sir/Madam,

Submission: Initial Position Paper on Introduction of *Macrocystis pyrifera* (KBB) into the Quota Management System

The New Zealand Marine Sciences Society (NZMSS) is a scientific society affiliated to the Royal Society of New Zealand. It comprises over 260 scientists, managers, policy makers, and students working in all aspects of marine science in New Zealand and overseas. Society members work for universities, Crown Research Institutes, and other research providers, as well as for various central and local government departments, agencies and non-governmental organizations. Our members, therefore, have a wide range of views and experiences on most issues confronting the management of New Zealand's marine environment. Our elected Council has the task of providing comments on marine science issues in the public realm, including government policy and marine conservation. This submission represents a consensus view of the NZMSS Council concerning the scientific issues relating to the proposed introduction of the giant kelp *Macrocystis pyrifera* into the quota management system (QMS). We understand that if *M. pyrifera* is introduced to the QMS, a separate consultation process will occur prior to the setting of a Total Allowable Catch (TAC). However, we would like to raise our concerns at this early stage regarding the management of any future fishery of attached kelp.

As summarized in the Initial Position Paper (IPP), *Macrocystis pyrifera* provides habitat for a large diversity of organisms (e.g. fish, invertebrates, birds), and is a keystone species within these highly productive ecosystems. This provision of habitat is a key difference between *M. pyrifera* and other species managed under the QMS. In addition to providing a habitat, giant kelp is also an important source of food for a large range of marine animals (Graham 2004). It is stated in the IPP that if the Ministry of Fisheries (MFish) decides against introducing *M. pyrifera* to the QMS, it will become an open-access fishery. The NZMSS council are particularly concerned with ecological implications that could occur due to harvesting of attached *M. pyrifera* under either of these options. Any economic benefits gained from harvesting giant kelp must be carefully weighed against the risks of harvesting affecting the keystone role of this species in New Zealand's coastal seas.

Based on the details provided in the IPP, it is difficult to assess the potential sustainability of *Macrocystis pyrifera* harvest should the species be introduced to the QMS, or alternatively treated as an open-access fishery. There is a lack of specific information in the document regarding the proposed management of the fishery, such as regulations on harvesting methods, scale of management, possible rotational harvesting of kelp forests and permitted number of harvests per year. The NZMSS Council has two main concerns about the management of future harvesting activity. Firstly, the proposed management areas are very large in extent, with KBB3 extending much of the length of the South Island. Research carried out in New Zealand has shown that *M. pyrifera* growth rates vary significantly over very short distances (tens of meters), due to differences in water motion, light and nutrient levels, and other environmental

factors (Hepburn et al. 2007). These differences are likely to make some kelp forests more vulnerable to negative effects of harvesting. The only study to date focusing specifically on harvesting *M. pyrifera* in New Zealand was conducted in Akaroa Harbour (Pirker et al. 2000), where the environment is typically sheltered from ocean swell. It is expected that the response to harvesting of these kelp forests will be very different from offshore kelp forests on open wave exposed coastlines. In our opinion it is unwise to extrapolate findings from the Pirker et al. (2000) study to an area of such large extent. Secondly, the proposed harvesting season is from 1st October to 31st September (i.e. year-round). Given the strong seasonality of *M. pyrifera* growth in New Zealand (Hepburn et al. 2005, 2007), and the recommendation of Pirker et al. (2000) that sustainable harvesting of *M. pyrifera* is only possible during late spring and during autumn, we believe that a year-round season would be unsustainable.

The IPP cites harvesting of *M. pyrifera* off the Californian Coast, and there is a suggestion that the Californian fishery will be used as a model for any future fishery in New Zealand. This suggestion is of concern to the NZMSS council, as there are key differences between giant kelp forests in these environments as summarized in Table 1. Although there has been scientific study of the potential implications of this harvest on kelp forest ecosystems, it has proven very difficult to tease apart changes in the ecosystem that are due to harvesting, from changes that have occurred due to climate, ocean currents, fishing of kelp grazers and their predators, sedimentation and pollution (Dayton et al. 1998, Airoidi et al. 2008). We argue that it is more appropriate to compare New Zealand *M. pyrifera* with that growing at similar latitudes in South East Australia and Tasmania. In these locations, there has been a 70% decline in the extent of kelp forests over the last 90 years, linked to the decline of abalone and finfish species. There are now plans to make *Macrocystis* kelp forests an endangered habitat type and kelps forests are listed alongside the Great Barrier Reef as a Special Marine Area by the Department of Environment, Water and Heritage of Australia (<http://www.environment.gov.au>). There are no long term studies that have monitored *M. pyrifera* abundance over large scales within the proposed management areas in New Zealand. We argue that given this lack of long term data, and the status of *M. pyrifera* habitat in other locations, any fishery should proceed with extreme caution.

Californian kelp forests	South Island kelp forests
Very large in extent – individual patches up to 10 km ² (Dayton et al. 1998)	Small and discrete – individual patches typically <100 m ² . Large beds are only found along the North Otago coast and are <1km ² (Fyfe et al. 1999)
Latitude 33°N – high light, kelp growth not limited by light (Zimmerman and Kremer 1986, Kain 1989)	Latitude 41-47°S – relatively low light, kelp growth limited by light (Kain 1989, Hepburn et al. 2005 and 2007).
Relatively consistent growth year round and growth only slows in summer due to low seawater nitrogen (e.g. Zimmerman and Kremer 1986)	High variability in growth rates among sites due to light, nutrients and water motion. Respond to seasonal fluctuations in light with maximal growth during spring (Brown et al. 1997, Hepburn et al. 2005 and 2007)

Table 1. Summary of key differences between *Macrocystis pyrifera* populations in California and the South Island of New Zealand.

In conclusion, given the lack of other options, we reluctantly recommend that *Macrocystis pyrifera* be introduced to the QMS with qualifications. Due to the role of this species in key physical and biological processes in coastal seas and as a facilitator of other fisheries

(e.g. crayfish, paua, coastal finfish) a more appropriate action would be to protect this species and the kelp forest habitat type.

These qualifications are that upon introduction to the QMS, the Total Allowable Catch (TAC) for *M. pyrifera* be set at zero until:

1. Risk assessment analyses are conducted by an independent expert to determine if ecological risks associated with a *M. pyrifera* fishery outweigh the possible benefits.
2. Independent research is conducted to determine the likely impacts of harvest on *M. pyrifera* and its' associated values in a range of areas in Quota Management Areas 3 and 4.
3. A management plan is developed that aims to minimize adverse affects of kelp harvesting on *M. pyrifera* and its' associated values (e.g. Vasques 1995).
4. Identification and protection of kelp forest areas of outstanding value (e.g. the offshore kelp forests north of Otago Peninsula).

If a fishery is deemed to be unsustainable or too risky we suggest that the *M. pyrifera* fishery be closed and that provision be made for the protection of attached *M. pyrifera* from future fishing activities.

If a sustainable fishery is found to be possible we would suggest that limited harvesting should begin using an adaptive management approach.

- This should only occur where good evidence already exists that harvesting is likely to be sustainable for the kelp being harvested and for associated ecosystems and fisheries.
- Quota Management Areas 3 and 4 (QMA) are too large to effectively manage a *M. pyrifera* fishery as growth and the ecological role of this species vary significantly over much smaller scales. QMAs from Kaikoura to the northern extent of Banks Peninsula, Banks Peninsula, Waitaki River Mouth to Nugget Point and Nugget Point to Slope Point would be most appropriate. TAC should be set at zero in each area until sustainability concerns listed above are addressed.
- Areas identified of particular ecological and economic value (e.g. the kelp forests of North Otago) are protected by regulation.

References

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