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Response to "Comment on 'Seagrass Viviparous Propagules as a Potential Long-Distance Dispersal Mechanism' by A. C. G. Thomson et al."

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Our original article (Thomson et al. 2014) presented data exploring *Zostera nigricaulis* asexually-produced vegetative propagules as a potential long-distance dispersal mechanism for seagrasses. We found that the vegetative propagules of *Z. nigricaulis* were able to maintain buoyancy and photosynthetic health for more than 85 days, which suggested capacity for long-distance dispersal. While long-term establishment of propagules *in situ* was not successful due to poor seasonal conditions, highly-successful establishment and growth in mesocosm-based experiments gave support for positive establishment opportunities. Resilience of seagrass meadows relies on the ability of seagrass to successfully recolonise denuded areas or disperse to new areas (Macreadie et al. 2014), and this research demonstrated that although successful establishment may be rare, vegetative propagules show re-establishment potential for declining seagrass populations. These results are consistent with results found by Stafford-Bell et al. (2015), where prolonged dispersal of *Zostera muelleri* vegetative fragments was predicted.

Sinclair et al. (2015) argue that, in the case of Thomson et al. (2014), seagrass vivipary has been confused with vegetative (clonal) growth. We agree that the term vivipary was not the appropriate term to use when referring to an asexually derived propagule. We originally used the term to try and distinguish the specialised asexually-produced *Z. nigricaulis* vegetative propagules from adult plants becoming dislodged from the sediment and split into smaller fractions due to disturbance. We agree that these structures should be referred to as (asexual) vegetative propagules, and welcome the opportunity to correct this error.

Further to this, Sinclair et al. (2015) contend that the genetic distinctiveness of propagules was not appropriately demonstrated, and suggest testing the genetic distinctiveness of the propagules as a way to determine if they were in fact viviparous. We disagree, as each propagule was individually picked from the parent plant, as stated in the methods. We have already conceded that the propagules are vegetative, and therefore this comment loses its relevance.

Sinclair et al. (2015) also assert that potential vegetative propagule dispersal over long distances was not supported by appropriate data. We disagree and believe this was suitably addressed

by showing that propagules maintained health and buoyancy over an extended (> 3 months) period. While we did not experimentally demonstrate dispersal, we did show evidence of long-term survival, both on the water surface and while planted in mesocosm experiments. Although the *in situ* experiments failed to establish, the number of vegetative propagules trialled were extremely small, given the number of propagules that are produced in natural seagrass meadows annually.

Contrary to the evidence presented in Thomson et al. (2014), Sinclair et al. (2015) maintain that vegetative propagules would not be capable of establishment or survival *in situ.* Whilst we agree that establishment *in situ* was unsuccessful in this occasion, it was largely due to propagule dislodgement caused by poor weather conditions and sediment scouring, rather than mortality. We do not believe this demonstrates that propagules are incapable of establishment and survival. Rather, the evidence suggests that in this case the original point of propagule settlement did not provide adequate conditions for establishment. Our research successfully showed that given the right conditions, propagules can survive within a new environment, as displayed by the 100% survival rate in the mesocosm transplantation. While Sinclair et al. (2015) acknowledge this, the significance of our result is completely undermined by the overall conclusion reached by Sinclair et al. (2015), where they state that propagules are not capable of establishment and survival.

Lastly, we disagree with Sinclair et al. (2015) that the spreading of existing clones would not introduce genetic variability into existing meadows. If given the chance to successfully disperse long-distances, an asexual-produced vegetative propagule has the potential to bring new genetic material to a genetically distinct meadow, which would only require a low establishment rate to be biologically and genetically significant (Rousset 1997; Slatkin 1987). As a result, the movement of asexual propagules between locations can facilitate enhanced genetic diversity if those propagules are able to successfully recruit and sexually reproduce within the new population. Additionally, if those propagules carry novel alleles, they will contribute new gene variants to the population and contribute to increasing both genetic and genotypic diversity.

We agree with Sinclair et al. (2015) that utilising correct biological definitions is essential for understanding the biology and variation in seagrass meadows; however, we reassert our findings that *Z. nigricaulis* asexually-produced vegetative propagules show potential as a long-distance dispersal mechanism.

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