THE ECONOMIC FEASIBILITY OF INCREASING ROCK LOBSTER YIELD BY TRANSLOCATION IN TASMANIA, AUSTRALIA

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The Tasmanian rock lobster resource is characterised by large variation in growth between regions with faster growth in the north than the south. For example, 110 mm carapace length (CL; the legal minimum length) males from the south average an annual increase in weight of less than 10%, while males of the same size from the north average over 50%. This naturally has a substantial effect on yield per recruit with much higher productivity from northern regions. Egg production is also affected by spatial differences in biology; for example, L50% of size at onset of maturity is 65 mm CL at some southern sites and 120 mm CL at some northern sites.

A single size limit is applied across the jurisdiction, which leads to vastly different outcomes in different regions. In the south, the total female biomass approaches that of a virgin stock as most lobsters fail to reach legal size. In contrast, northern areas are growth overfished with low levels of egg production.

Although there are traditional management solutions to these spatial problems, such as regional size limits or quotas or both, there has been resistance to their adoption due to economic concerns. In particular, the split pricing system that involves discounting of larger (>1.5 kg) and smaller (<0.8 kg) lobsters is expected to interact with the quota management system so that fishers will be disinclined to target small or large lobsters even if they became more available as a result of regional size limits.

Translocation of lobsters from high-density, slow-growth and low-value regions to more productive sites has been proposed to address these biological and pricing issues. This management system is novel for rock lobsters and numerous research needs have been identified. One of the fundamental issues for translocation is reported here – would shifting lobsters from one region to another to increase yield be economically viable?

An economic analysis was conducted that used outputs from biological modelling of stocks at four sites of origin and four release sites, coupled with economic data obtained from interviews of industry participants. The model process involved the capture and translocation of a cohort of lobsters between the origin and release sites. The dynamics of this cohort were then modelled and contrasted against estimated harvest and economic yield if the lobsters had been left at their original site. Costs were scaled against the expected yield with consideration of mortality associated with translocation and fishery dynamics. Harvest rates and gear selectivity at each site was based on recent estimates from the fishery and assumed to remain constant with altered density.

Two different operational systems were considered for translocating lobsters. In the first, charter-fishing operations shifted lobsters. In the second, fishers retained their undersize catch and releasing at a different site on their return journey. The charter option provided increased flexibility in sites of origin and release with estimated costs of $2.84 per kg recaptured for the largest distance translocations considered. Under a worst-case scenario for

all biological parameters the cost remained less than $10/kg and well below the current lease price of over $15/kg. Thus translocation appears to provide an economically feasible option for increasing catch and profitability of fishers.

Community benefit from translocation was maximised where translocations were charter operations between slowest and fastest growth areas. Net community benefit for operations involving the transport of 5 tonnes was $160,000 for these scenarios. The internal rate of return for these operations was around 200%, which constitutes an extremely attractive investment. Translocations by fishers had lower cost than charter operations but also lower State benefits, because longer distance translocations were less feasible.

Economic gains through translocation were largely associated with the potential increase in volume of product rather than market grade and thus price of product. As a result, translocations from deep-water sites to shallow-water sites in the one region do not appear economically feasible. Gains in marketability mainly act to provide additional support for larger distance translocation.

Operational systems for increasing yield through translocation were discussed at industry port meetings and included the lease of additional quota unit from a government business unit with revenue used to fund charter and monitoring operations. There is support for increasing quota at some fraction of the gain in exploitable biomass, say 50%. The remaining fraction would create gain in egg production, opportunity for recreational catch, and environmental values. Under a scenario of allocation of only 50% of the potential increase in yield, the cost for commercial fishers would be less than $10/kg of additional quota – considerably less than current lease cost.

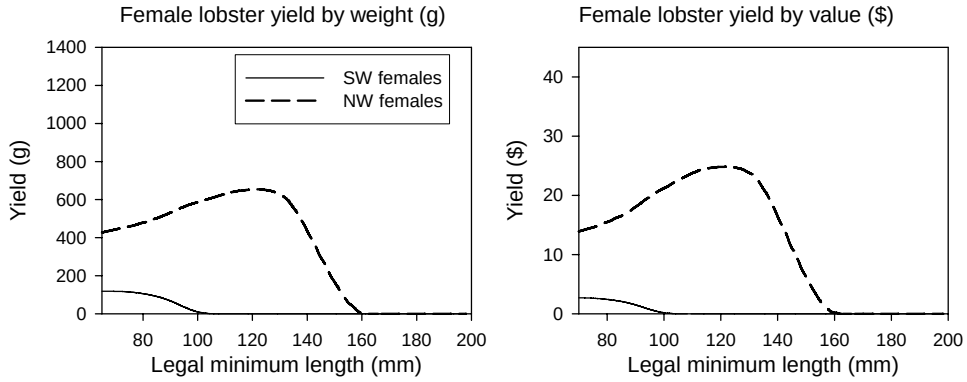

Figure 1. Yield per recruit curves for female lobsters from the NW and SW of Tasmania in response to alternative size limits (harvest rate = 0.4). A lobster recruiting to the NW can contribute around 6 times the revenue of a lobster in the SW. Regional size limits would better manage yield than a single limit – but only translocation can convert a low value recruit to a high value recruit.