SEASL

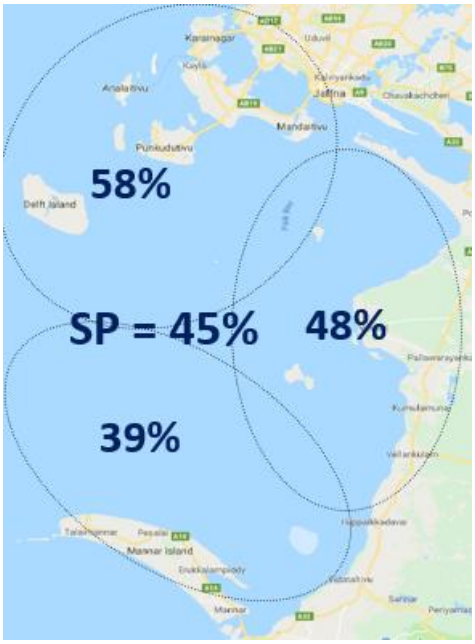
The Blue Swimming Crab Bulletin No. 15

The Sri Lankan blue swimming crab (BSC) fishery improvement project (FIP) was initiated by the National Fisheries Institute Crab Council (NFI CC) and the Seafood Exporters' Association of Sri Lanka (SEASL) in May 2013. The Honourble Minister of Fisheries and Aquatic Resources officially launched the FIP in November. The FIP is a tripartite initiative that brings together small-scale fishermen, seafood manufacturers and government agencies to improve the biological and ecological status and the management of BSC fisheries in the Palk Bay and the Gulf of Mannar. The FIP also works to ensure that supply chains for Sri Lanka's BSC products are economically equitable and socially responsible.

*The two fisheries are the only fisheries in Sri Lanka and the first BSC fisheries in South and South East Asia to achieve a **Good Alternative** rating from the Monterey Bay Aquarium's Seafood Watch Programme (December 2018) and to score > 0.80 against the Marine Stewardship Council's Fisheries Standard (May 2020).*

Improving the biological status of the BSC stocks

The 6th annual assessment of the status of the BSC population in the Palk Bay was conducted between 17th November 2020 and 31st March 2021. The assessment was interrupted several times due to COVID19. Length data was collected by staff from the District Fisheries Offices (DFO) of the Department of Fisheries & Aquatic Resources (DFAR) in Jaffna, Kilinochchi and Mannar. Technical assistance was provided by pelagikos pvt ltd. Fishing communities and seafood manufacturers - notably the staff of Taprobane Seafood Group (TSG) - actively supported the DFAR and pelagikos to collect data for the assessment.

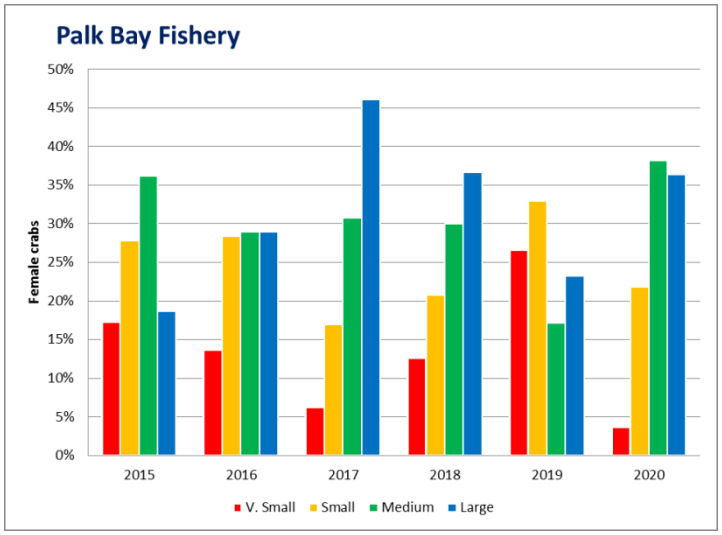


7,704 female crabs were measured at 18 landing centres over a period of 18 days. Crabs were measured from Delft Island in the north (Jaffna District) to Talaimannar in the south (Mannar District) of the Palk Bay. The spawning potential (SP) of the stock was estimated using an application available in the Barefoot Ecologist's Toolbox. The results of the 6th annual stock assessment suggest that the biological status of the BSC stock in the Palk Bay was at a very good level in 2020 (SP = 45%).

2015	32%
2016	44%
2017	47%
2018	45%
2019	42%
2020	45%

The biological status (*i.e.* spawning potential) of the BSC stock in the Palk Bay increased from 42% in 2019 to 45% in 2020. The results of the 2020 stock assessment suggest that the fishery remains above the Target Reference Points (TRP) SP = 30% to 40%. 30% to 40% spawning potential is indicative of a biologically sustainable BSC fishery, operating at maximum sustainable yield (MSY). The Limit Reference Point (LRP) for the BSC fishery is currently SP = 20%. It is likely that population will have become biologically unsustainable if the estimated spawning potential falls below 20%, for two more consecutive years

The average size of female BSC in the 2020 catch was 141 mm (≈ 191 g). Crabs ranged in size from 97 mm to 196 mm (≈ 55 g – 405 g). 35% of the females crabs measured were Grade 1 (> 200 g). The majority of crabs measured were Grade 2 (41% / 150 g – 199 g). 22% of crabs were Small (Grade 3: 100 g – 149 g). Only 2% of crabs observed in the catch from the Palk Bay fishery in 2020 were Very Small (Grade 4: < 99 g).

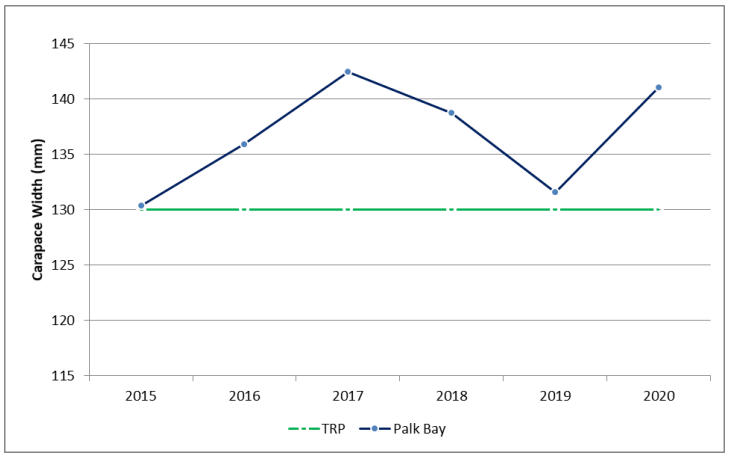


Fishermen and seafood manufacturers first raised concern about large numbers of Very Small (Grade 4: < 99 g) crabs in BSC supply chains in the Palk Bay in 2017. These concerns grew throughout 2018. The results of the 5th annual stock assessment confirmed that purchasing Very Small crabs had become a significant issue in the Palk Bay fishery in 2019 (*see left*).

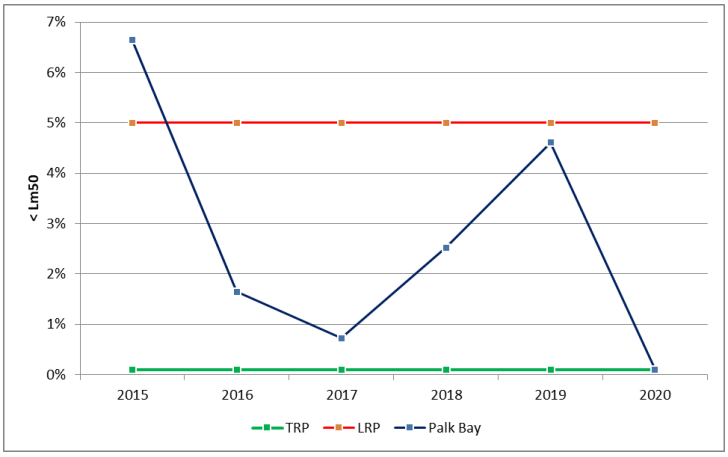
For example, in Kilinochchi District 38% of the BSC measured in 2019 were Grade 4 / Very Small / < 99 g. 20% of these crabs were immature. A return to ***responsible purchasing*** by the seafood manufacturers in 2020 resulted in a sharp reduction in Very Small crabs in the supply chains by the end of the year. Only 2% of the crabs measured in the 6th annual stock assessment in the Palk Bay fishery were Grade 4 (< 99 g). Only 1% of these crabs were immature. The decrease in Very Small / Immature / Grade 4 crab in supply chains is reflected in the recovery of the spawning potential result (45%) for the fishery.

Simple methods to assess the impact of fishing on the Palk Bay stock: In the first half of 2021 the FIP applied four, simple length based methods to the data collected from the Pak Bay fishery since 2015. The aim was to provide FIP members with different perspectives on the likely impact of fishing on the stock.

(1) **Change in average size** of the catch over time indicates whether the size of the fished population is constant or increasing. The TRP for sustainable fishing is a constant or increasing trajectory, indicating a sustainable fishery. A decreasing trajectory indicates the impact of fishing maybe unsustainable (Fairtrade USA, 2014[1]). The average size of BSC caught in the Palk Bay fishery increased in 2015, 2016 and 2017 suggesting that the impact of fishing was sustainable. In 2018 and 2019 the average size of the catch decreased, indicating unsustainable fishing practices. The decrease in average size was reversed in 2020, reflecting the improvements made to the management of the fishery.

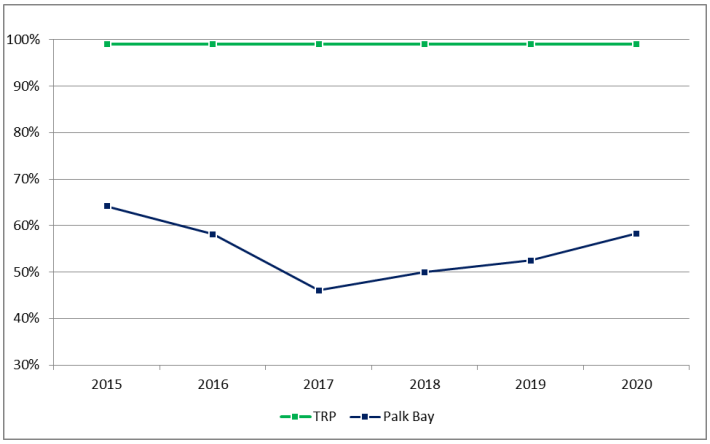


(2) Percentage (%) of immature BSC in the catch is a measure of the percentage of crabs greater than the average size on first maturity (L_{m50}). The TRP for sustainable fishing is zero percent (0%) immature BSC in the catch, whereby all (100%) of female crabs would spawn at least once before they are caught to maintain (or rebuild) a healthy spawning stock (Froese, 2004[2]). The FIP currently advocates 5% as the LRP for immature BSC in the catch. 6.6% of the catch in the Palk Bay fishery was immature crabs 2015; a little above the current LRP. The percentage of immature crabs in the catch was less than the LRP in 2016 and thereafter. In 2020 the percentage of immature crabs in the Palk Bay catch was equivalent to the TRP for sustainable fishing *i.e.* 0.1% of the crabs caught were immature.

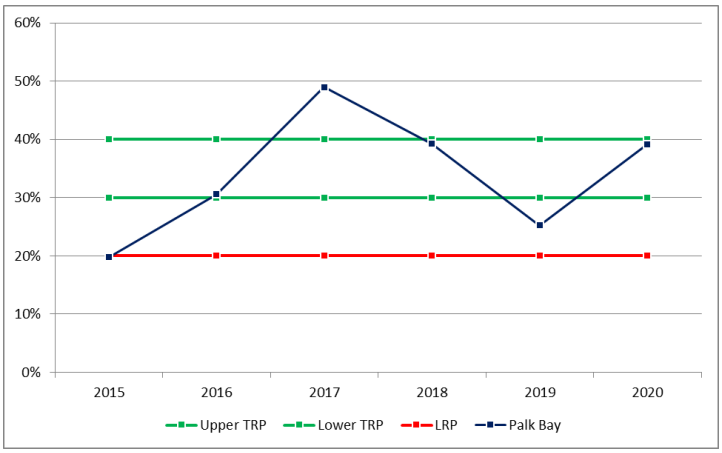


[1] Fairtrade USA, 2014. Capture Fisheries Standard. Version 1.0 Fair Trade USA, December 2014
[2] Froese, 2004. Keep it simple: three indicators to deal with overfishing. Fish & Fisheries 2004, 5, 86–91

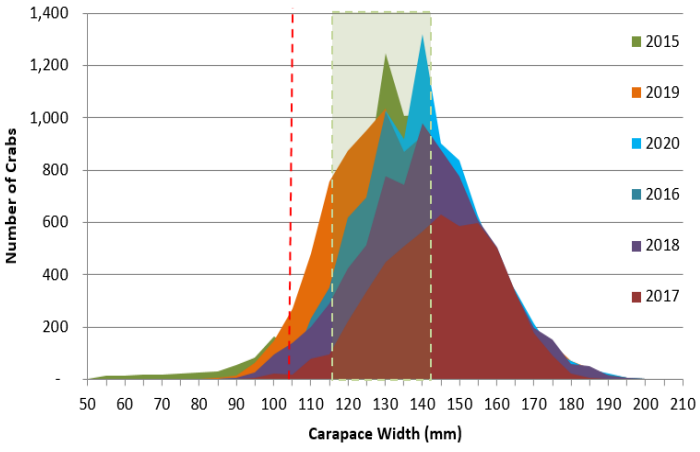
(3) Percentage (%) of BSC caught at optimum length is measured as the percentage of BSC caught at optimum length (L_{opt}), *i.e.* the length where the number of BSC in a given unfished year class multiplied with their mean individual weight is maximum and thus where MSY is obtained (Froese, 2004). The TRP for sustainable fishing is 100% of BSC in the catch to fall within plus or minus (±) 10% of optimum length. The optimum length for BSC in the Palk Bay is estimated to be 130 mm using the formula $L_{opt}=3L_{inf}(3+MK^{-1})^{-1}$ after Beverton (1992[3])[4]. The optimum length ranges from 117 to 143 mm. More than half the catch in the Palk Bay was caught at optimum length between 2015 and 2020, except in 2017 when 46% of female BSC measured 117 to 143 mm.



(4) Percentage (%) of mega-spawners in the catch is measured as the percentage of old, large female BSC in the catch *i.e.* crabs of a size larger than optimum length + 10%. The TRP for sustainable fishing depends on the management regime: the aim is to implement a fishing strategy that results in no (0%) mega-spawners being caught. If no such strategy is in place and thus the catch reflects the age and size structure of the stock, values of 30% to 40% mega-spawners represent a healthy age structure and desirable TRP, whereas less than 20% (LRP) will be a matter of concern (Froese, 2004). The percentage of old, large female BSC in the Palk Bay catch rose steadily from the LRP in 2015 to above the TRP in 2017. The percentage of old, large female crabs in the Palk Bay catch fluctuated around the TRP between 2018 and 2020, indicating a healthy age structure in the population. Currently there are no strategies in place to ensure fishermen do not catch old, large female crabs in the Palk Bay fishery.



Six Year Summary (2015 – 2020): 44,813 female BSC have been measured by members of the FIP from the Palk Bay fishery between 2015 and 2020. The average size of BSC in the catch increased since 2015. Only 2.5% of all crabs measured were less than the size on first maturity (104 mm). 44.7% of crabs were caught at optimum size. Old, large, mega-spawning female BSC made up a further 32.8% of the catch. The application of four simple length based methods to the data from the Palk Bay fishery suggests that the impact of fishing on the stock has been biologically sustainable over the last six years.



Improving the ecological status of the BSC fisheries

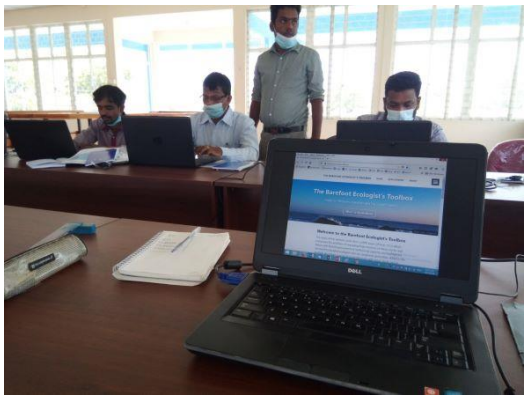
Ecological impacts on non-target species: No new information or data was collected or analysed to improve the two fisheries' impact on non-target species in the first half of 2021.

Ecological impacts on marine habitats: No new information or data was collected or analysed to improve the two fisheries' impact on marine habitats in the first half of 2021.

[3] Beverton, R. J. H. (1992). Patterns of reproductive strategy parameters in some marine teleost fishes. *J. of Fish Biology* 41, 137–160
[4] Adrian Hordyck, pers. comm.

Improving the management of the fisheries

Fishery Specific Management Systems: The draft regulation for BSC fishing was approved by the Minister of Fisheries and Aquatic Resources in March 2021. The regulation was submitted to the Attorney General's (AG) Department by the Director General, DFAR in April. The new regulation proposes a minimum mesh size (4½' / 114.5 mm) and a maximum ply (6 ply) for BSC fishing and a minimum purchasing weight (100 g) for seafood exporters and their agents. The DFAR is awaiting comments from the AG's Department prior to submission of the new regulation to the Cabinet of Ministers for approval by the Minister.



The first of six technical training programmes on ***fishery management and stock assessment methods for data poor fisheries*** was held in Kilinochchi DFO in May, in compliance with the government's COVID19 protocols. Six officers from the Kilinochchi DFO participated in the two day programme (*see right*). The programmes are co-financed by the Market Development Facility (MDF), a regional economic initiative by the Australian government's Department of Foreign Affairs and Trade (DFAT). The programme introduces different objectives for fishery management; the biology and ecology of BSC; the four simple length based assessment methods described above and LB-SPR, including a 'hands-on' practical session running BSC data through the application available in the Barefoot Ecologist's Toolbox. The programme also introduces a simple template for fishery management plans including harvest strategies, reference points and harvest control rules and management tools. The 2021 Compliance Survey of Code of Conduct for Responsible Fishing was also discussed.

Improving economic equity and social responsibility in supply chains

Economic Equity: A lack of consumer demand for Seafood Watch ***eco-recommended*** BSC products in North America means that US importers, Sri Lankan manufactures and BSC fishermen in the Palk Bay and the Gulf of Mannar were unable to generate an ***eco-price premium*** for South and South East Asia's only ***eco-recommended*** BSC products in the first half of 2021.

Social Responsibility: No actions were implemented by the FIP to improve social responsibility in supply chains for Sri Lankan BSC products during the reporting period.

COVID19: COVID19 caused the average beach price to fall sharply (- 60%) between January and April 2020, according to price data collected by 18 cooperatives in the Palk Bay fishery. This was due to low consumer demand for Sri Lankan BSC products in North America and Europe. The average price began to recover in June 2020 (- 46%) and by June 2021 was only - 1% compared to the highest average beach price in March 2019.

Taprobane Seafood Group Pvt Ltd - the lone Corporate Member of SLBSC FIP – together with the Seafood Exporters' Association of Sri Lanka, the Department of Fisheries and Aquatic Resources and BSC fishing communities are grateful to the **National Fisheries Institute Crab Council** for its generous support of the FIP since 2013. FIP members are also grateful to **Market Development Facility** for co-financing one of the actions described in this edition of the ***Sri Lankan Blue Swimming Crab Bulletin***.

*Soft copies of all **fifteen** edtions of the Blue Swimming Crab Bulletin are available in English, Sinhala and Tamil at www.pelagikos.lk.*
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