## Updated BSC Stock Assessment in the Visayan Sea

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## Credits to the NSAP Team

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Fisheries Management Area 11


BFAR 6
FISHERIES MANAGEMENT AREA 11

## Area

Regional Composition
Designated BFAR Lead
Regional Offices

2,038,600.00 Hectares
5, 6, 7
BFAR Region 6
BFAR Regions 5, 6, 7

## Major Fishing Grounds

1. GUIMARAS STRAIT
2. TAÑON STRAIT
3. VISAYAN SEA

a. Taklong Island Marine Reserve
b. Sagay Marine Reserve
c. Taňon Strait Protected Seascape

et (e) Usalo
${ }^{\circ}-{ }^{20}$

# UISAYAN SEA 

10,000 $\mathrm{km}^{2}$ estimated area
one of the major fishing area in the country
multi-fishery resource with the abundance of small pelagic, marine demersal, cephalopods, \& crustaceans

## Why the Visayan Sea BSC Assessment?

## Monterey Bay Aquarium Seafood Watch

Blue swimming crab


Philippines

Set gillnets, Pots

Decamber 19, 2018
Seufood Whth Consuting feseanche

Final Seafood Recommendations

| SPECIES/FISHERY | CRITERION <br> 1: IMPACTS <br> ON THE <br> SPECIES | CRITERION <br> 2: IMPACTS <br> ON OTHER <br> SPECIES | CRITERION 3: MANAGEMENT EFFECTIVENESS | CRITERION <br> 4: HABITAT <br> AND <br> ECOSYSTEM | OVERALL RECOMMENDATION |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Blue swimming crab Philippines Western Central Pacific, Pots, Philippines, Palawan | Red (1.526) | Red (1.732) | Red (1.000) | Green (3.240) | Avoid (1.710) |
| Blue swimming crab Philippines Western Central Pacific, Pots, Philippines, Visayan Sea | Red (1.526) | Red (1.732) | Red (1.000) | Green $(3.240)$ | Avoid (1.710) |
| Blue swimming crab Philippines Western Central Pacific, Gillnets and entangling nets (unspecified), Philippines, Palawan | Red (1.526) | Red (1.000) | Red (1.000) | Green (3.240) | Avoid (1.491) |
| Blue swimming crab <br> Philippines Western Central <br> Pacific, Gillnets and <br> entangling nets <br> (unspecified), Philippines, <br> Visayan Sea | Red (1.526) | Red (1.000) | Red (1.000) | $\begin{aligned} & \text { Green } \\ & (3.240) \end{aligned}$ | Avoid (1.491) |

## Framework for BSC Stock Conservation



Republic of The Philippines Department of Agriculture Elliptical Road, Diliman, Quezon City

$$
\begin{aligned}
& \text { JOINT DA-DILG ADMINISTRATIVE ) } \\
& \text { ORDER NO. } \frac{01}{\text { SERIES OF } 2014 \ldots \ldots \ldots \ldots \ldots \ldots \text { ) }}
\end{aligned}
$$

Section 3. Regulations. The following are the rules and regulations for the proper utilization and conservation of Blue Swimming Crab:
3.1 Minimum Size of Blue Swimming Crab. The minimum carapace width of blue swimming crab allowed for catching, collecting and trading shall be 10.2 cm , as shown in Diagram 1 which forms an integral part of this Order Provided, that coastal municipalities may adopt a minimum size limit higher than 10.2 cm for catching BSC.

### 3.2 Crab Fishing Gear Limitation

a. Mesh Size/Diameter hole. The minimum mesh size for the following gears shall be implemented:
a.1. Crab Entangling Nets (single layer only) and Crab Liftnets shall have a minimum mesh size of 11 cm and 3 cm stretch mesh, respectively. a.2. Crab Pots/Traps shall have a 5 cm minimum hole diameter.

SUBJECT: Regulation for the Conservation of Blue Swimming Crab (Portunus pelagicus).
3.3 Closed Season/Area. To prevent overexploitation/overfishing, a closed season shall be imposed by the LGUs, in consultation with the FARMC based on scientific data gathered. The NFRDI and BFAR Regional Field Offices through its NSAP, other research institutions/agencies and academe shall provide such data
3.4 Other Subjects for Regulations. If public interest so requires, based on sound scientific evidence and/or the precautionary approach in fisheries management based on the recommendation of the LGUs and BFAR, in consultation with FARMC and other stakeholders, the Secretaries of DA and DILG may issue regulations on any or all of the following: 1) the number of registered crab fishers to be allowed to operate for the catching of blue swimming crab in any areas in Philippine waters; 2) limit the number of crab pots/traps allowed per boat/banca; 3) limit the length/depth and number of nets a fisher could own and operate; and 4) specific closed fishing season for BSC by municipality.

## Blue Swimming Crab Stock Profile

- Major commodity for Visayan Sea
- Region 6 as the major source of crab raw material for export
- Fisheries management supported by National Policy (JAO 01s.2014) \& local ordinances (Provincial Ordinances of Iloilo and Negros Occidental
- Commodity of concern in the international market with the RED list status at the
 Seafood Watch in US \& New England Aquarium


| Region7 |  |
| :--- | :--- |
| Processing Plant | 5 |
| Picking Station | 7 |

## BSC Stock Assessment from 2019 to present in partnership with BFAR Regions 5, 6, and 7



Total Landing Centers Monitored - 36 Region 5-4
Region 6-28
Region 7-4

Standard Monthly Sampling Schedule


Landing Site 1 - Major or Commercial Landing Site

## Monitoring process:

Catch \& effort thru BSC boat landings


Length and weight monitoring


Five point scale of female gonadal maturity used for P. pelagicus (Sumpton et.al., 1994)


Premature


FIII Stage/Ripening


FI Stage/Immature FII Stage/Developing


FIV Stage/Spawning


FV Stage/Spent

Internal macro identification of stages


FIII


## BSC, 90.05

## Catch Composition of Crab gears

Recorded BSC gears incidental catch information for Visayan Sea for the CY 2015 to 2020


| Group | \% |
| :--- | :---: |
| BSC | 91.8 |
| Others | 8.2 |
| Finfish | 3.7 |
| Cephalopods | 0.09 |
| Other Crustacean | 3.1 |
| Gastropod | 0.6 |
| Bivalves | 0.01 |
| Sharks | 0.3 |
| Rays | 0.4 |

## Bottomset gillnet/Crab entangling net



| Group | $\%$ |
| :--- | :---: |
| BSC | 83.8 |
| Others | 16.2 |
| Finfish | 1.0 |
| Cephalopods | 0.04 |
| Other Crustacean | 15.14 |
| Gastropod | 0.03 |
| Bivalves | - |
| Sharks | - |
| Rays | - |

## Crab Pot/Panggal or timing

## Recorded Incidental Catch as of CY 2022

| Primary species | Gillnets (\%) | Traps (\%) | Pots (\%) |
| :--- | :---: | :---: | :---: |
| Aetobatus narinari | 0.001 |  |  |
| Carcharhinus sorrah | 0.002 |  |  |
| Chiloscyllium plagiosum |  | 0.013 |  |
| Chiloscyllium punctatum | 0.151 |  |  |


| Secondary species | Gillnets (\%) | Traps (\%) | Pots (\%) |
| :--- | :---: | :---: | :---: |
| Charybdis feriata | 0.525 | 1.096 | 6.763 |
| Portunus sanguinolentus | 0.019 | 0.004 | 9.474 |
| Scolopsis taenioptera | 0.070 | 5.245 | 0.132 |
| Podophthalmus vigil | 1.881 | 0.586 | 0.419 |
| Charybdis natator | 0.931 | 0.007 | 0.682 |
| Thalamita crenata | 0.084 | 0.097 | 0.395 |
| Melo broderipii | 0.536 |  |  |
| Onigocia spinosa | 0.894 |  |  |
| Pseudorhombus arsius | 0.667 | 0.001 |  |
| Neotrygon orientalis | 0.464 |  |  |
| 6 |  |  |  |

## Annual CPUE of Major BSC Gears

 monitored in the Visayan Sea for CY 2015 to 2022

## BSGNC - CPUE (kg/panel)



## Crab Pot - CPUE (kg/pot)




Monthly frequency distribution of gonadal stages of female $P$. pelagicus from Western Visayan Sea for CY 2012


Monthly frequency distribution of gonadal stages of female P. pelagicus using consolidated Visayan Sea data for the period of CY 2020


Monthly frequency distribution of gonadal stages of female P. pelagicus using consolidated Visayan Sea data for the period of CY 2022





SPR for BSC

## SPR

- Below Limit 20\% Below Target 40\% - Above Target

SPR
slow Limit RP ( $20 \%$ )
oove Limit RP oove Target RP (40\%) J0\% SPR

CY 2012
50\%


## CY 2020

50\%

## CY 2022

50\%

Graph showing the SPR result of Portunus pelagicus caught in the Visayan Sea for CY 2012, 2020, and 2022

## Reference Indicator:

| Performance <br> Indicators | Target Reference <br> Point | Limit Reference <br> Point | $\mathbf{2 0 1 2}$ | $\mathbf{2 0 2 0}$ | $\mathbf{2 0 2 2}$ |
| :--- | :--- | :--- | :---: | :---: | :---: |
| FROESE | $80 \%$ mature | $50 \%$ mature | $40 \%$ | $63 \%$ | $\mathbf{6 0 \%}$ |
| Fishing Mortality <br> (F)/LBAR | F/M <1 | F = 1.5M | 2.00 | 1.73 | $\mathbf{2 . 1}$ |
| Exploitation <br> Value (E) | 0.5 | 0.6 | 0.68 | 0.67 | $\mathbf{0 . 6 3}$ |
| Length at first Maturity | Increasing | Stable | 11.5 | 11.7 | $\mathbf{1 2 . 0}$ |
| SPR | $30 \%$ | $20 \%$ | 10 | 23 | $\mathbf{2 7}$ |

CPUE @ MSY (Schaefer) CPUE $_{\text {current }} /$ CPUE $_{\text {MSY }}$

| $>1$ | $<1$ |  | 0.48 |
| :--- | :--- | :--- | :--- |

## SPR Original Result

Controls


## Biological Parameters

## Life history ratios

## Asymptotic Length

- Absolute Relative


Length-at-Maturity


## Steepness



## Exploitation Parameters

## SPR or F/M? <br> SPR

- SPR F/M


## Selectivity-at-Length




Maturity Selectivity




## SPR

## Simulation

## Exploitation Parameters



Biological Parameters

## Life history ratios

Asymptotic Length

- Absolute Relative



## Length-at-Maturity



Catch
Fished
Unfished


Maturity Selectivity



## Growth performance:

TRP - Increasing values LRP- Stable values

| Year | Loo | Lm | $\mathbf{L}_{50}$ <br> (Probabbilty of <br> Capture) | $\overline{\mathbf{L}}$ | Mode |
| :--- | :---: | :---: | :---: | :---: | :---: |
| 2012 | 19.1 | 11.5 | 11.0 | 11.3 | 10.8 |
| 2020 | 20.5 | 11.7 | 11.9 | 12.0 | 12.8 |
| 2022 | 21.8 | 12.0 | 11.6 | 12.4 | 12.6 |


| Findings/ <br> Analysis | Harvest Control Rules | Management <br> Action | Specific Actions |
| :---: | :---: | :---: | :---: |
| Low \% catches <br> of mature sized <br> crab (Froese) | Increase survival of <br> juvenile \& spawner | Improve HCRs to <br> protect the spawning <br> population | 1. Implementation of closed season <br> 2. Review and improve BSCNMP and JAO 01 <br> series of 2014 <br> 3. Identification of area with spawning <br> aggregates and declaration of MPA or <br> permanent closure |
| Decreasing <br> catch rates of <br> BSGNC <br> (CPUE Trend) | Increase catch rates | Equitable <br> distribution of <br> fishing opportunities <br> to resource user | 1. Attrition/Reduce number of fishing boats <br> operating by 34\%* (staggered reduction) |
| 2. Or Reduce the number of effort (no. of <br> panels (Gillnet); no. of pots (Crab pot) per <br> boat-operation |  |  |  |
| High <br> exploitation <br> ratio | Reduction of Fishing <br> Mortality | Reduce fishing effort <br> and/or put limits on <br> fisheries output | 1. Staggered reduction of number of fishing <br> boats operating by 22\% in five years |
| 2. Or Reduce the number of fishing days |  |  |  |
| operation per boat |  |  |  |



