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Regional Technical Report

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Application of CPUE in estimating MSY: an indicative Reference Point for Blue Swimming Crab in the Visayan Sea

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Abstract:

Visayan Sea located at 11-12°N and 123-124°E, is one of the country's productive fishing ground with wide variety of fishing practices and a home to bountiful marine resources dominated by sardine and blue swimming crab (BSC) (*Portunus pelagicus,* Linnaeus 1758). Like other productive fishing ground, it has been exposed to increasing fishing pressure. Section 8 of Republic Act 10654, the amended fisheries code RA 8550 asserts to establish reference points and harvest control rules (HCR) in a fishery management area or for a fishery. This study aims to establish the reference points of BSC in the Visayan Sea as science basis for HCR.

Data inclusion for this study came from 22 monitored fish landing centers of Region 6 in Capiz, Northern Iloilo and Negros Occidental covering CY 2010 to 2017. Activities include monitoring of total landed catch and effort and reproductive biology sampling. Analysis of results generated use the Adaptive Fisheries Management Approach to come up with indicators for reference points as CPUE(kg/panel), Froese, LBAR, Exploitation (E) values, and Spawning Potential Ratio (SPR).

CPUE from bottomset gillnet showed a continued decrease from 0.62kg/panel in 1991 (Ingles, 1996) to 0.19kg/panel in 2010 and 0.16kg/panel in 2017. Froese threshold is 80% mature-sized catches and megaspawner at 20% of the mature population, while results showed that catches are composed of 60% juvenile, 40% mature. LBAR sets a threshold of fishing mortality (F) equal to natural mortality (M) or F=2M. Results obtained is $F=4.63^{year-1}$ twice the value of $M=2.6^{year-1}$. This resulted to E value at 0.68^{year-1} in CY 2010 and 0.72^{year-1} in CY 2017, higher than the threshold of 0.5^{year-1}. SPR threshold for tropical species is 20% for heavily exploited stocks while results is at 10% in CY 2010 and 8% in CY 2017. These indicators showed apparent growth and recruitment overfishing of BSC.

HCRs recommended based from the results include: increase catch rates by equitable distribution of fishing opportunities, eliminate catches of small sizes, regulate length of net gears, implement appropriate fisheries policy thru reduction of fishing mortality by putting limits to fisheries outputs; and increase retention of spawning population.

Objectives

General:

- Establish Reference Points indicators based on best available information for the appropriate fisheries management of BSC Stocks in the Visayan Sea.
- Help lift the RED status rating of BSC export product in the international market based on Seafood Watch evaluation.

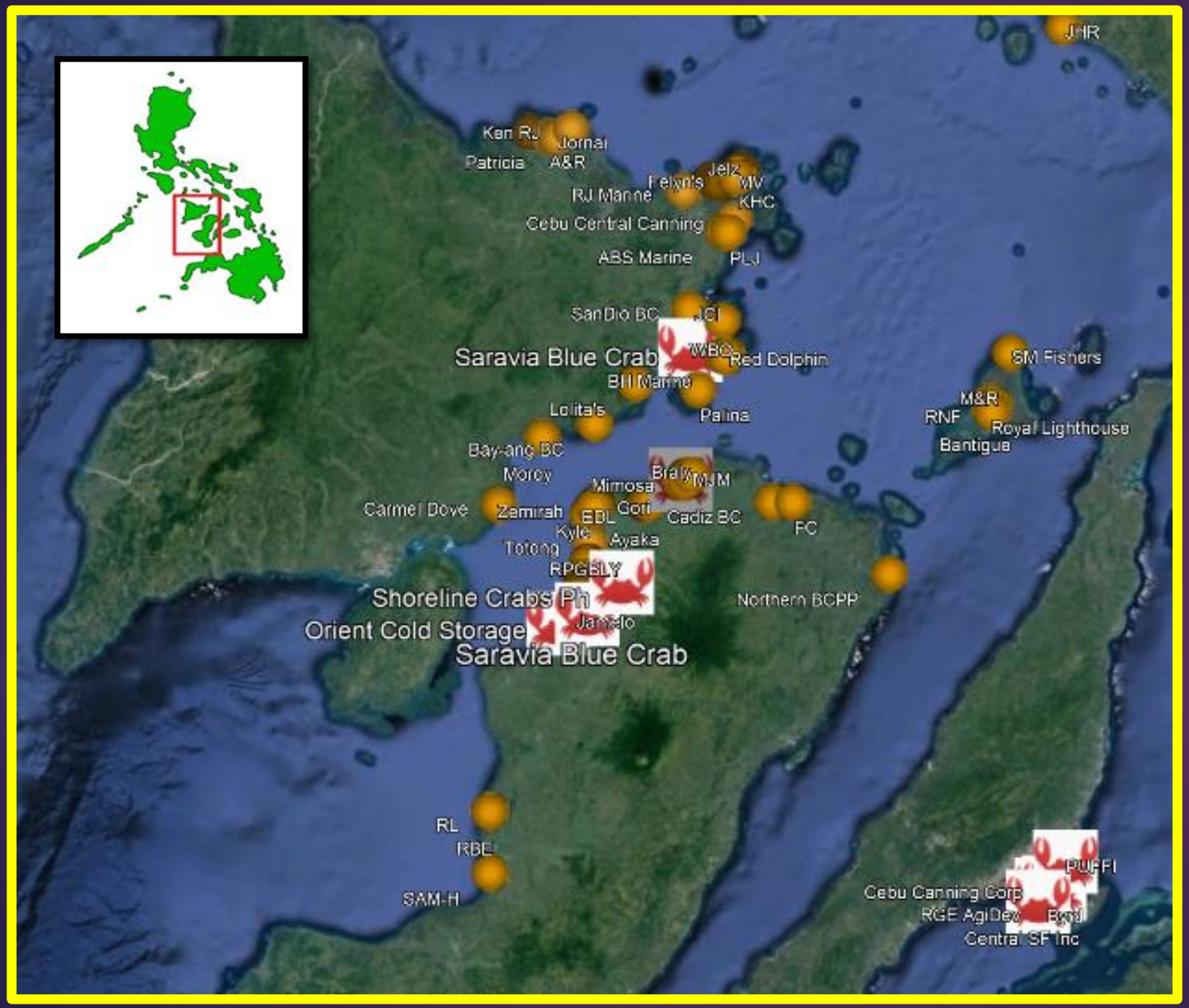
Specific:

Establish CPUE based RPs to include

- CPUE for gillnet gear
- CPUE for pot gears
- Yield MSY for BSGNC
- CPUE MSY for BSGNC

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

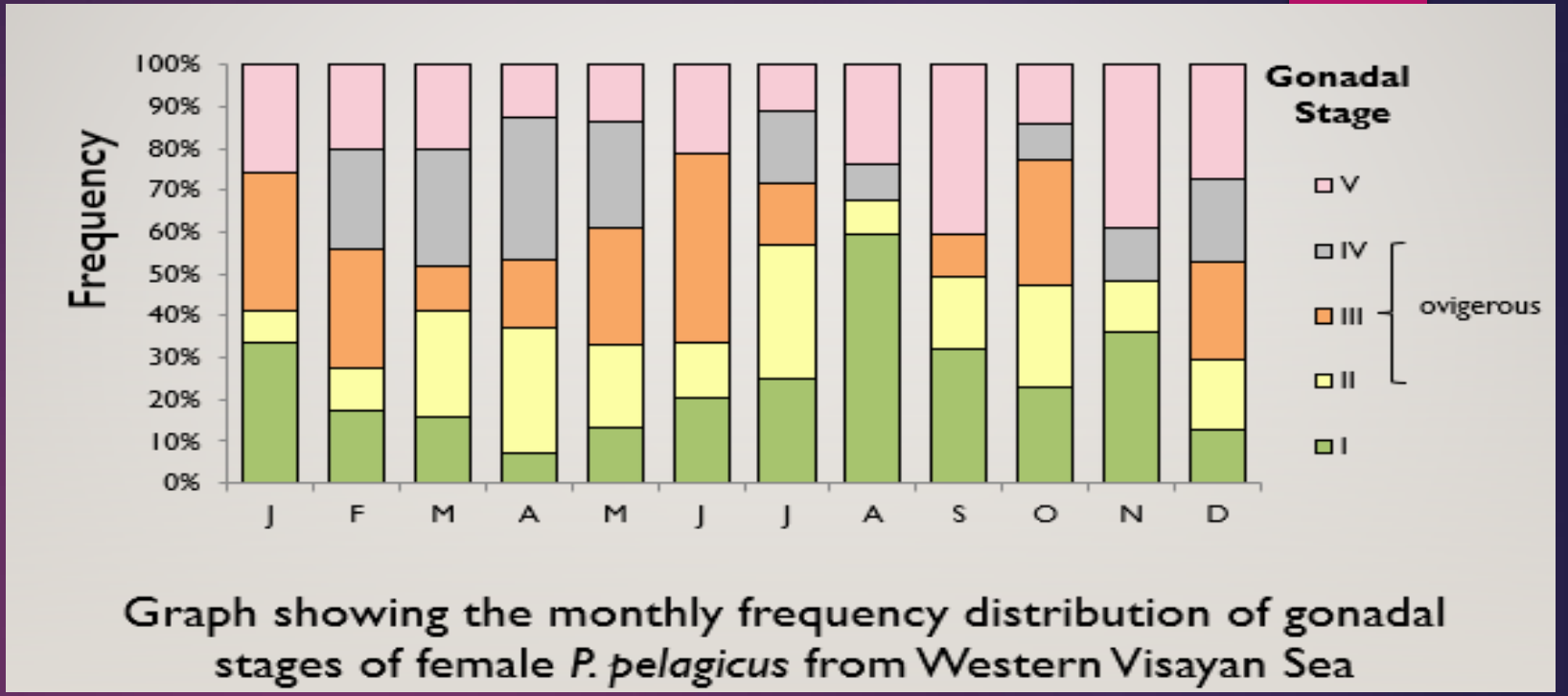


Region6	
Processing Plant	5
Picking Station	60

Region7	
Processing Plant	5
Picking Station	7

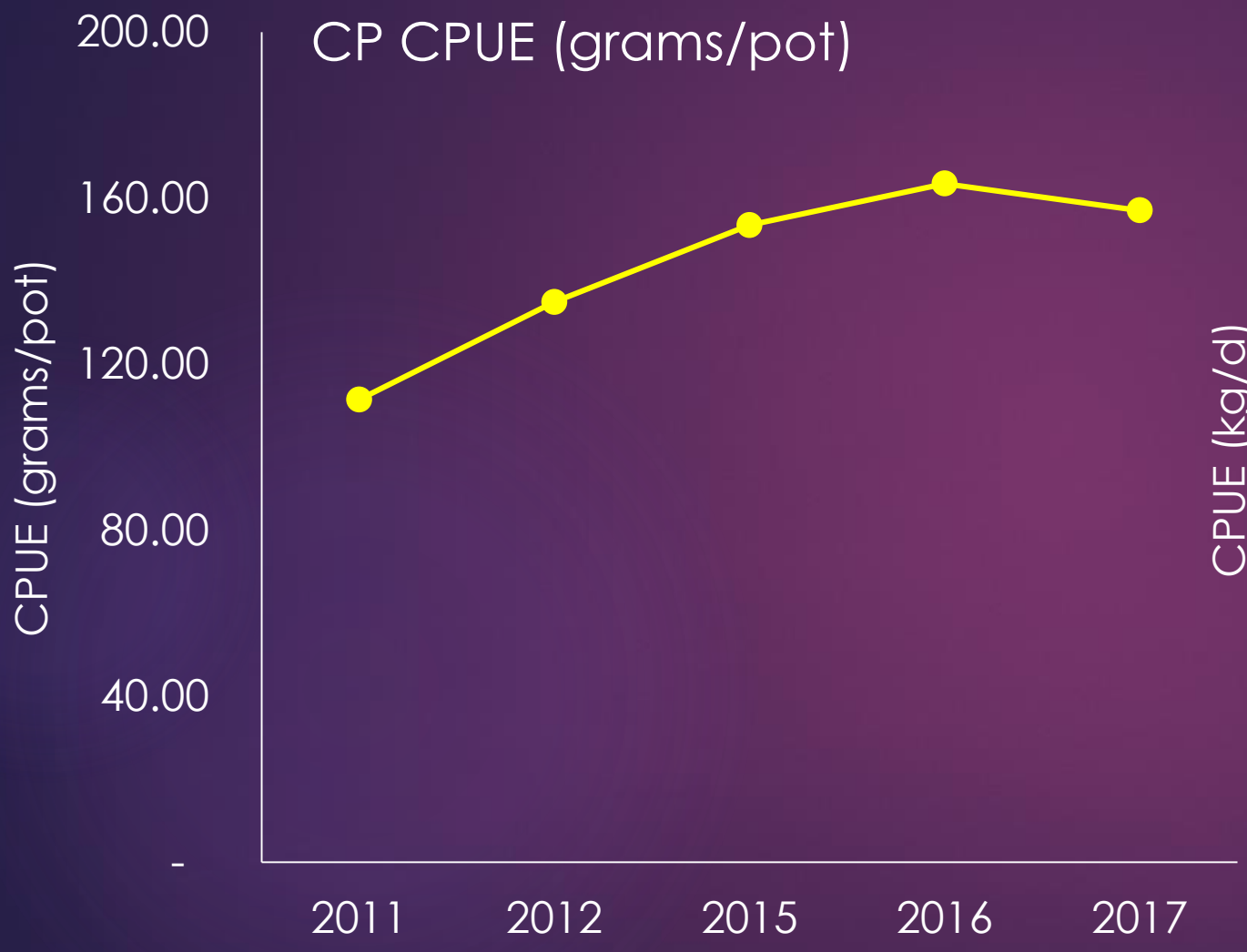
Map of Visayan Sea showing the monitoring stations of the Blue Swimming Crab Project

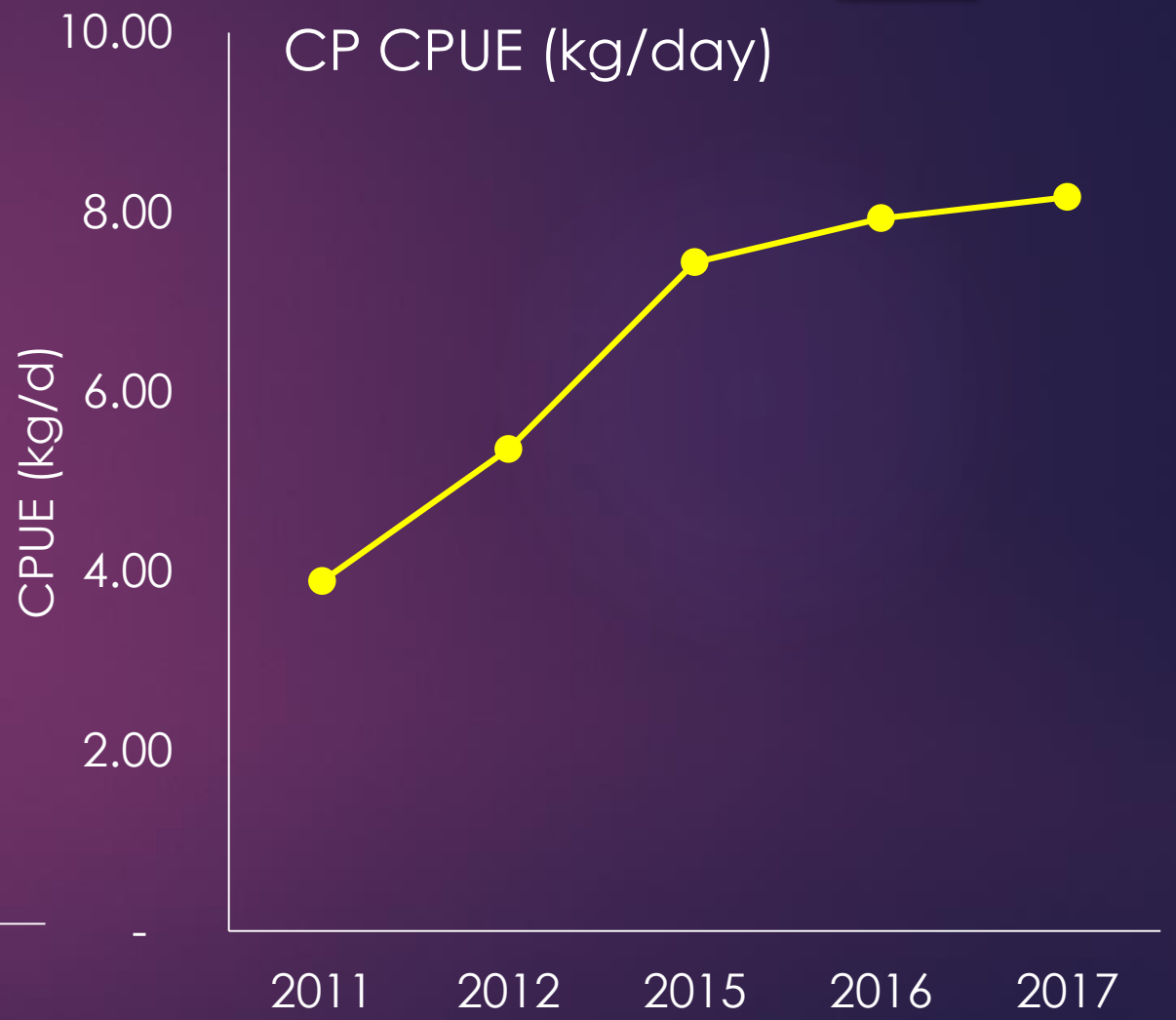
Seasonality



Graph showing the monthly frequency distribution of gonadal stages of female *P. pelagicus* from Western Visayan Sea

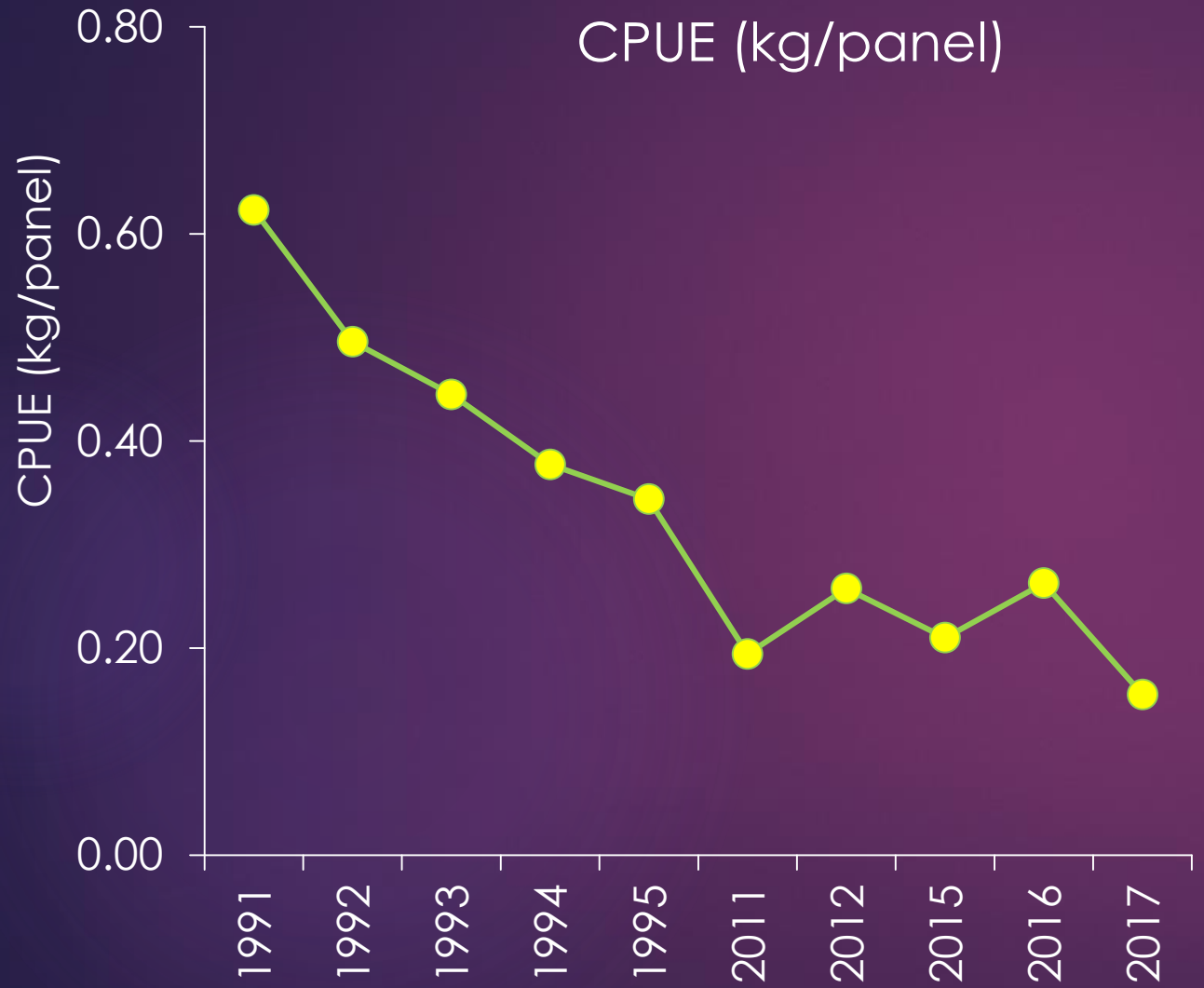
CPUE using CRAB POT

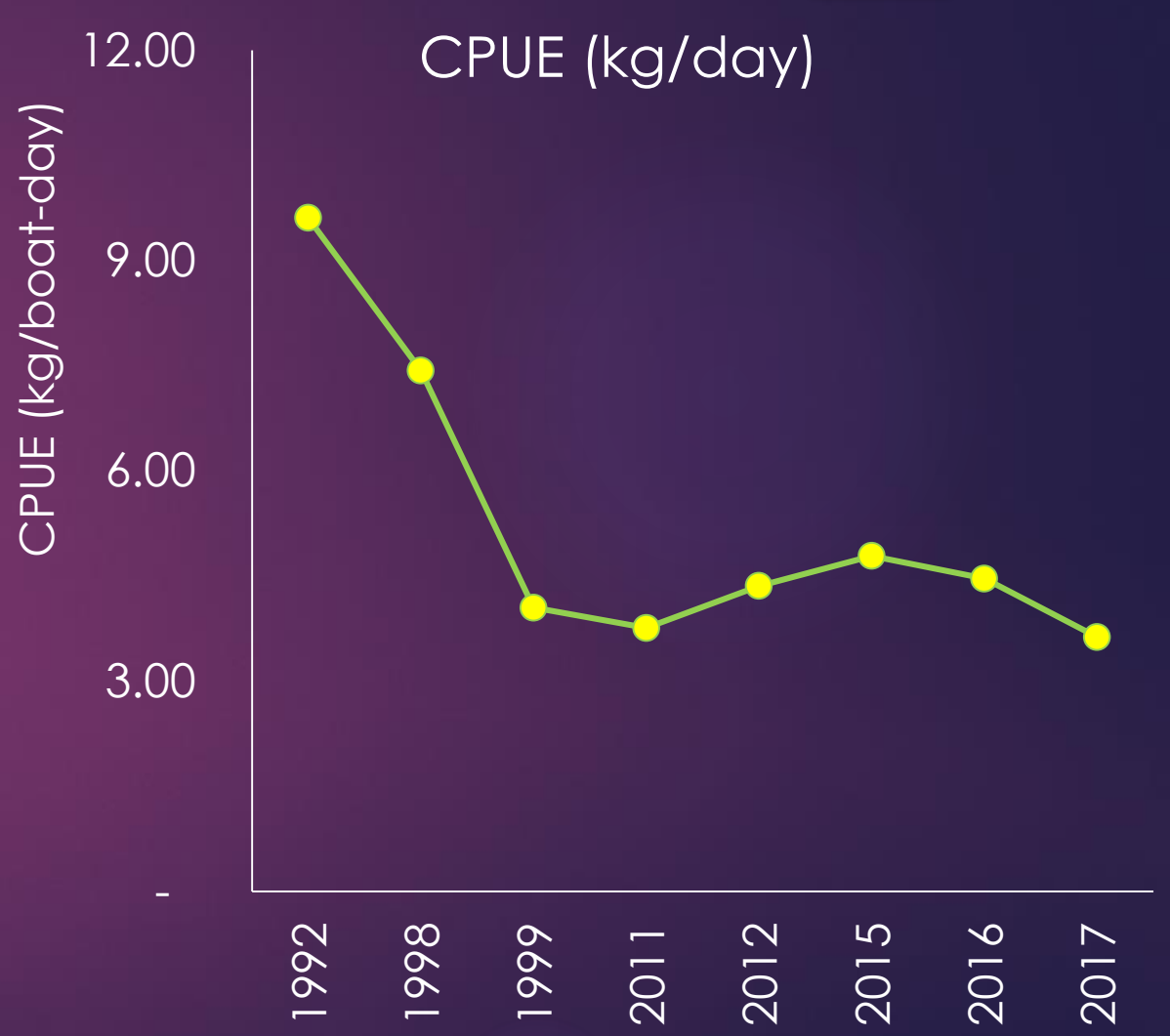




Target: Increasing or Stable annual trend

CPUE using BSGNC



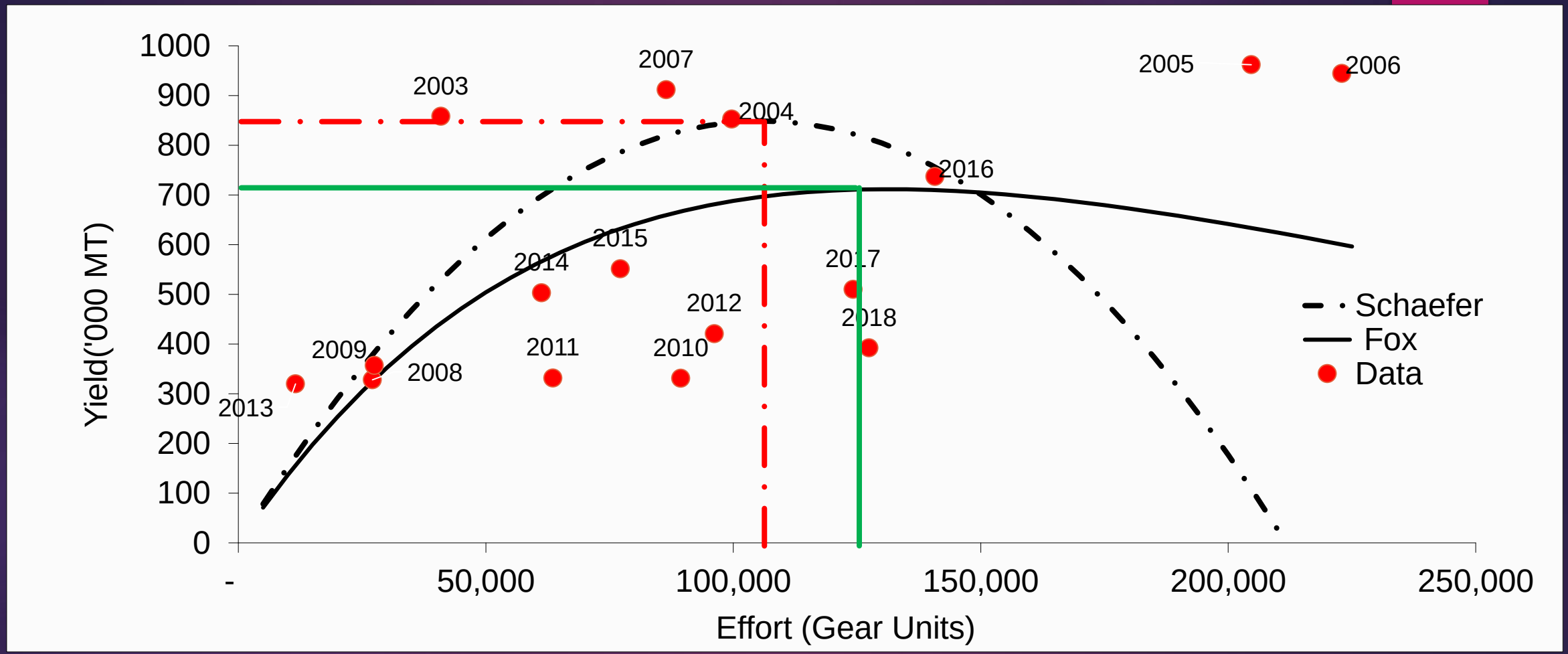


Target: Increasing or Stable annual trend

Reference Indicator:

Performance Indicators	Target Reference Point	Limit Reference Point	Results 2016	Results 2017	Results 2018	Inter-pretation
FROESE	80% mature	50% mature	73%	36%	40%	**x**
Fishing Mortality (F)	F/M < 1	F = 1.5M	1.73	2.87	2.52	**x**
Exploitation Value (E)	0.5	0.6	0.67	0.72	0.69	**x**
CPUE @ MSY (Schaefer) $\underline{CPUE_{current}}/CPUE_{MSY}$						
	>1	<1	0.72			**x**

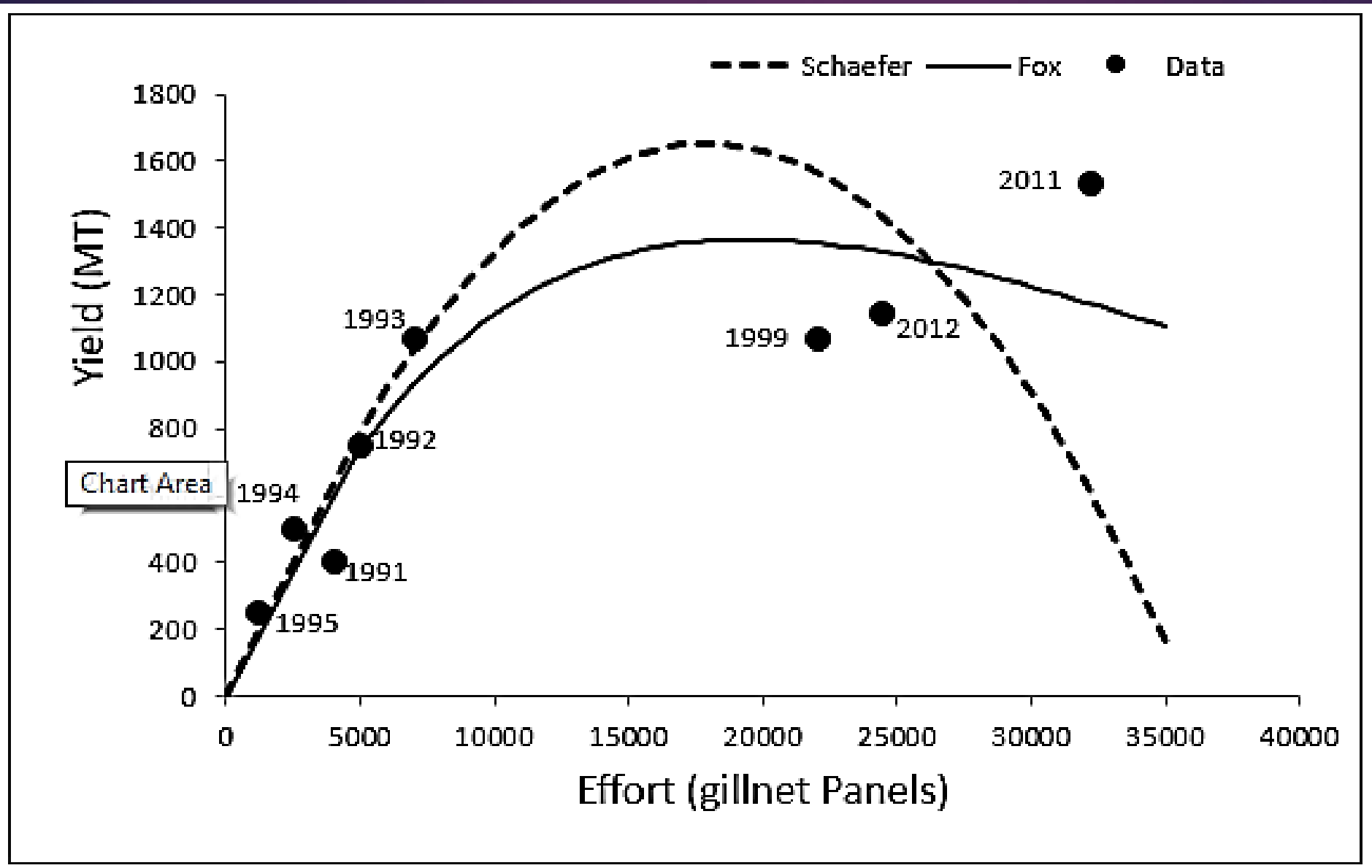
Potential Yield for Visayan Sea Multi-Fishery



Indicator	Schaefer	Fox
MSY ('000 MT)	848.75	711.57
f_{MSY} (# of Fb Units)	105,833	131,034

20 % Effort Reduction based on the CY 2018 Data

Yield @ MSY for *P. Pelagicus*

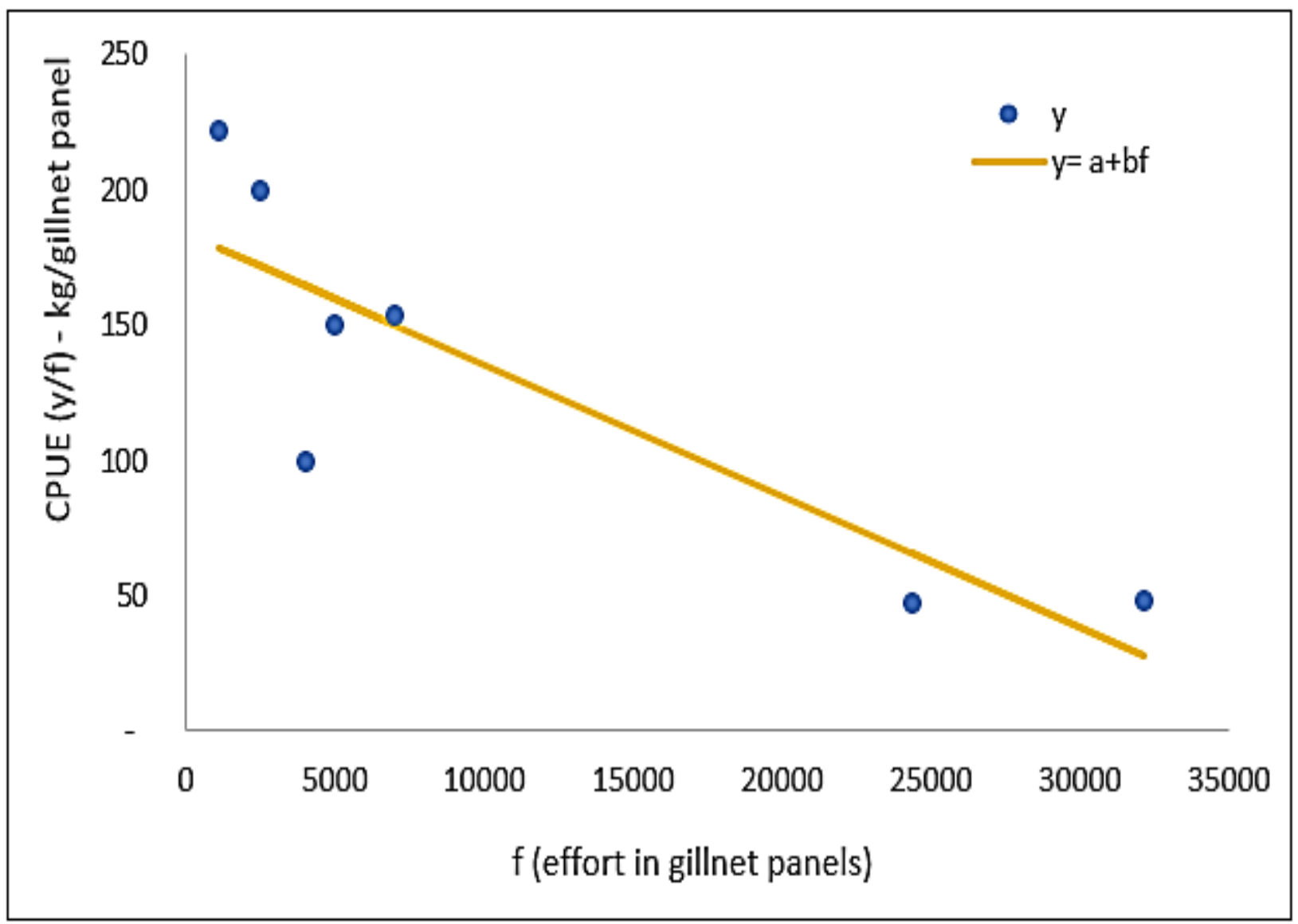


MSY - 1,365MT

f_{MSY} – 19,473

20% Effort Reduction

CPUE @ MSY for *P. Pelagicus*



Formula	Argument
Y/f (predicted)	< 1 : reduce effort
Y/f MSY	> 1: increase effort

CPUE at MSY	92.18
Predicted MSY	0.72
f_{MSY}	19,010
Current effort	24,372
Effort Ratio	-22.1
	21% Effort Reduction
Reduction of number of	5,386
20Panels/boat	269

Harvest Control Rules	Management Action	Specific Actions
Increase survival of spawner	Improve HCRs to protect the spawning population	1. Implementation of closed season 2. Review and improve BSCNMP and JAO 01 series of 2014 3.Identification of area with spawning aggregates and declaration of MPA or permanent closure
Increase catch rates	Equitable distribution of fishing opportunities to resource user	1. Attrition/Reduce number of fishing boats operating by 22% 2. Or Reduce the number of effort (no. of panels (Gillnet); no. of pots (Crab pot) per boat-operation
Reduction of Fishing Mortality	Reduce fishing effort and/or put limits on fisheries output	1. Staggered reduction of number of fishing boats operating by 22% in five years 2. Or Reduce the number of fishing days operation per boat 3. Gear swapping to ecofriendly fishing gears