

COUNTRY REPORT ON PURSE SEINE FISHERIES IN SARAWAK

Present By:

Jamil Musel

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- The demand for fish in Malaysia is on an upward trend, and is expected to increase from 1.3 million metric tonnes in 2010 to 1.9 million metric tonnes in 2020.
- The per capita consumption is predicted to increase from 46 kg to 55 kg over the same period.
- The fishing industry has also contributed close to RM10.22 billion in 2015 and is envisaged to grow annually by 4.9% contributing close to RM 12.96 billion to the Malaysian economy by 2020.
- The industry is an important source of food for the nation, the demand for fish-based protein outstrips the supply generated by the local industry.
- To make up for the shortfall in demand, the country import fish and aquaculture from other countries in the region.

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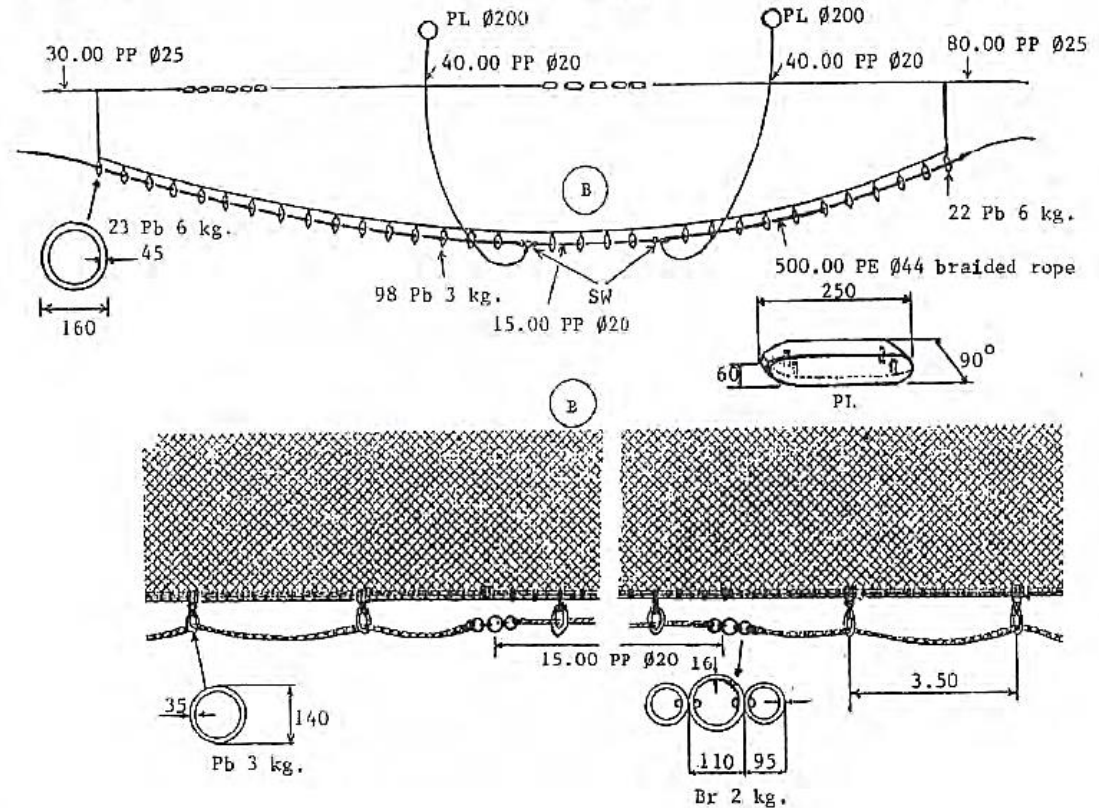
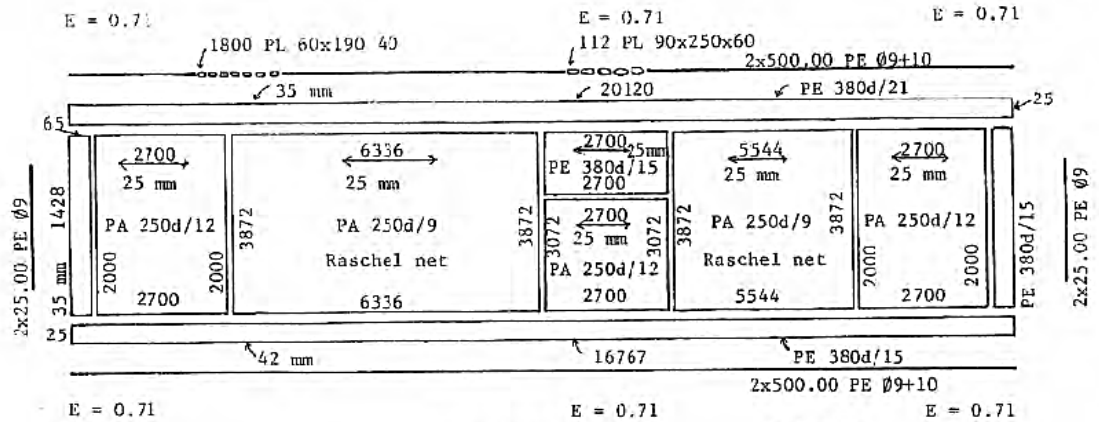
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- Fish purse seine : **Commercial gears** in Sarawak
- **Demersal fish:** Largest part of marine catches
- **Pelagic fish:** Low catch - Low numbers of purse seiners operating in Sarawak (Witter *et al.*, 2015; Gambang *et al.*, 2003)
- **Fishing areas:** Offshore areas and productive fishing grounds (southern bays and in the north)
- **Purse Seine Designed:** Fine mesh & Coarser mesh
Vessel Size: 40 to 70 GRT **Gear Size:** 240 - 450m
- **Management measures for purse seine fishery:** Licensing and Regulations are provided and managed by the Head of Fisheries, located in Kuala Lumpur

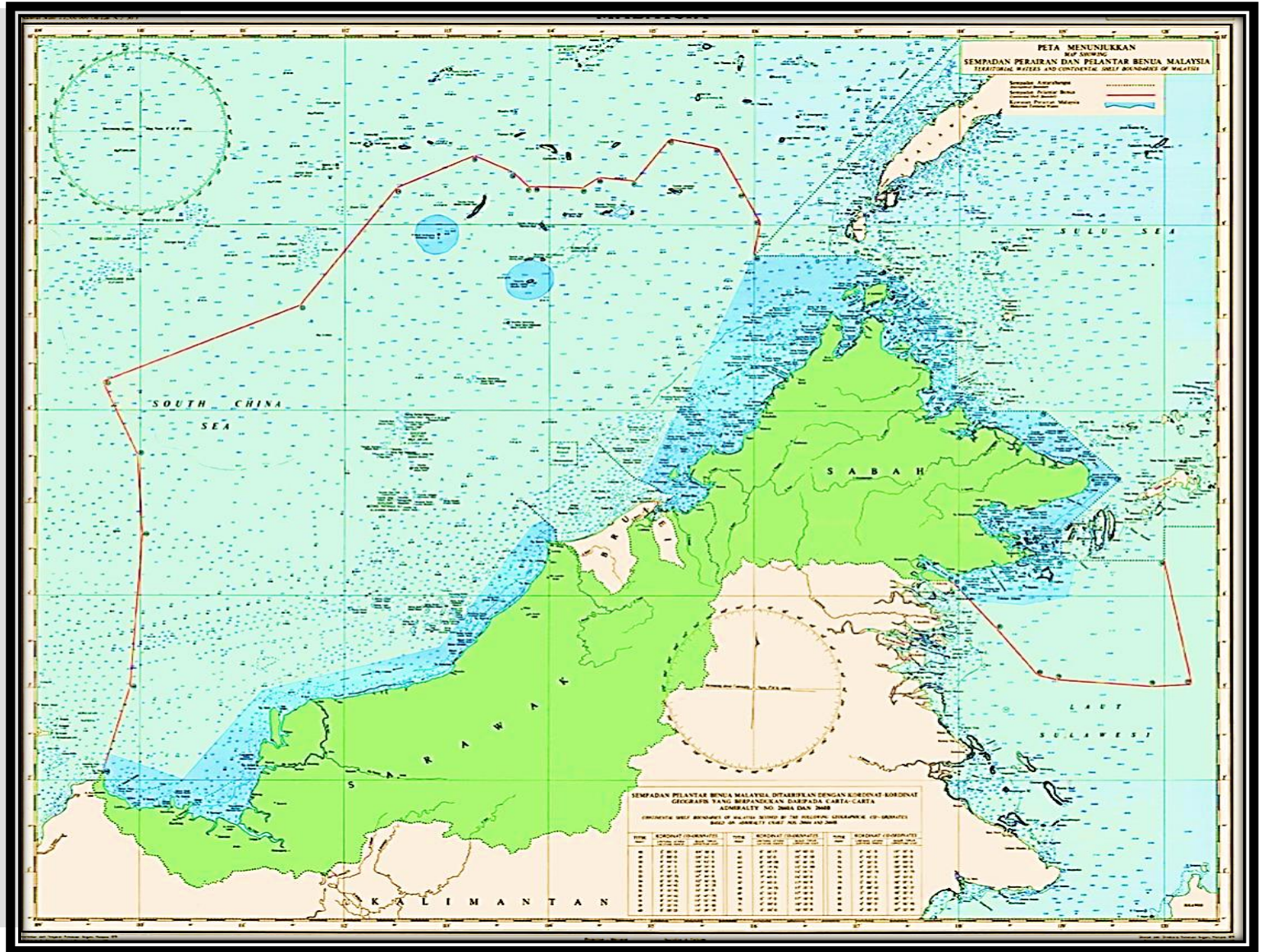
design

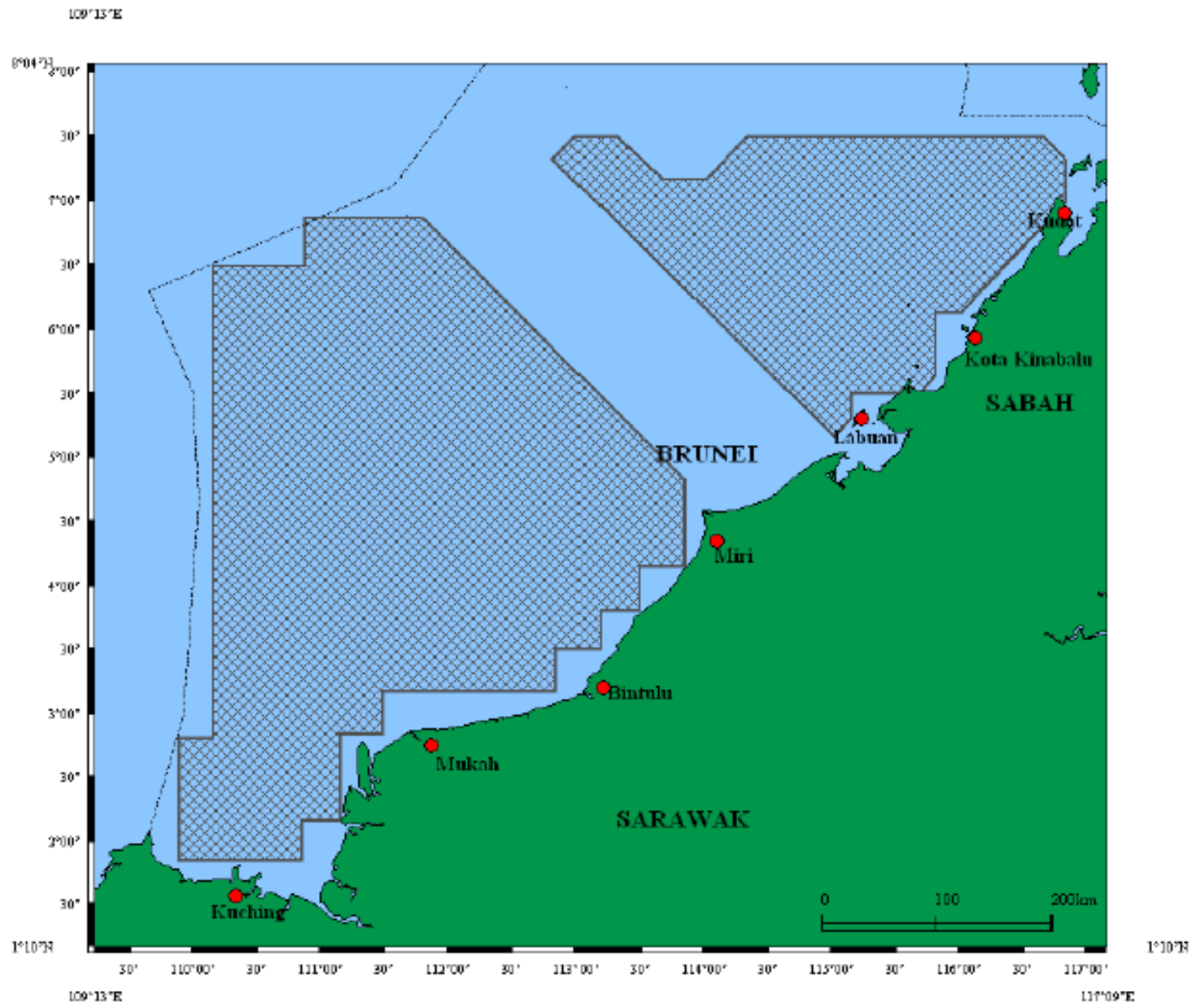
INTRODUCTION



research area

I N T R O D U C T I O N





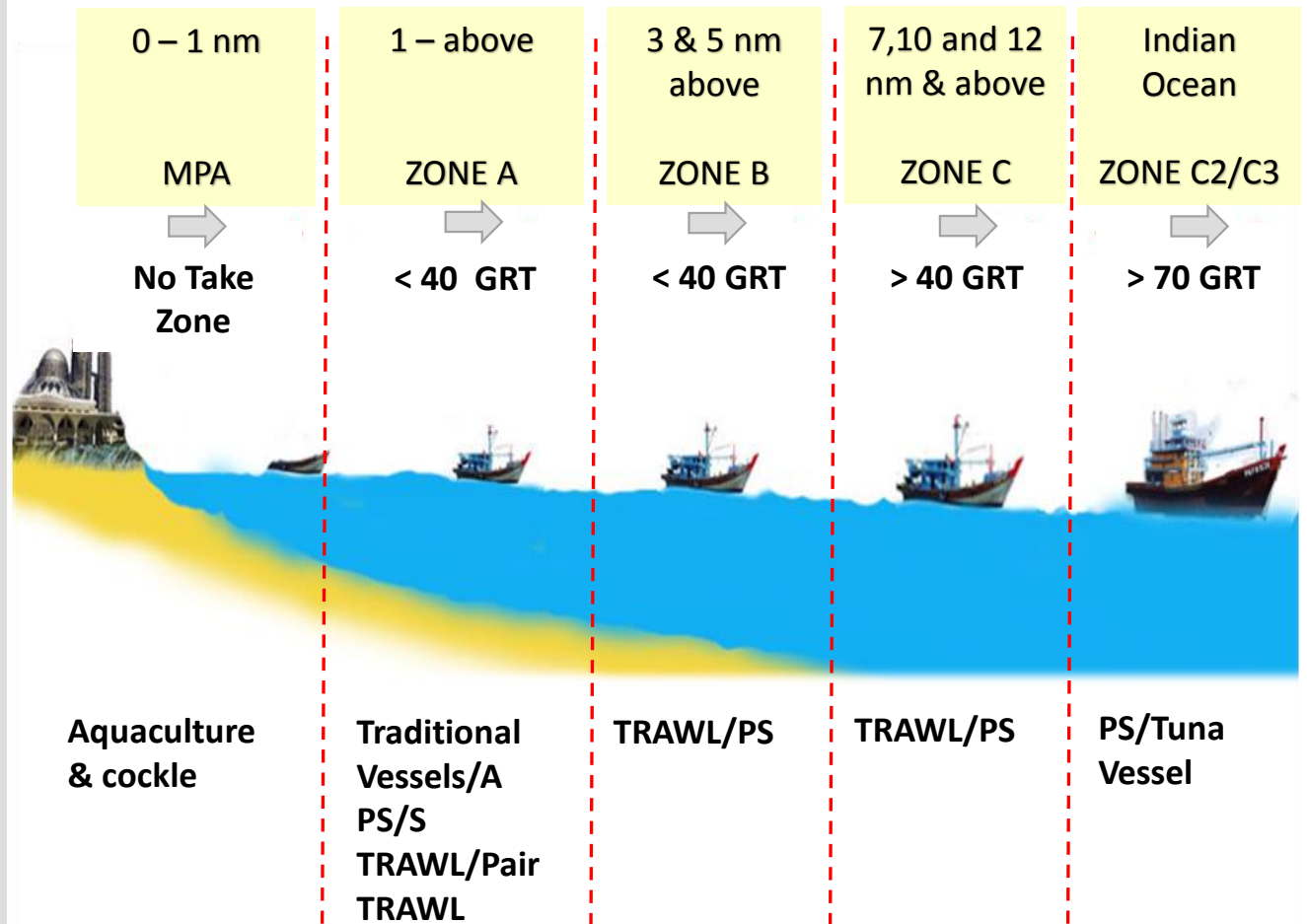
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- These measures were developed within the framework provided by the fisheries law, The Fisheries Act 1985 (Act 317). Among the main measures are →
 - Fishing Zones
 - Closed Fishing Area
 - Fishing Effort Control
 - Fishing Units Control
 - Port & At-Sea Control
 - Fishermen Registration
 - Marine Habitat Conservation
 - The Community-based Fisheries Management

f i s h i n g z o n e

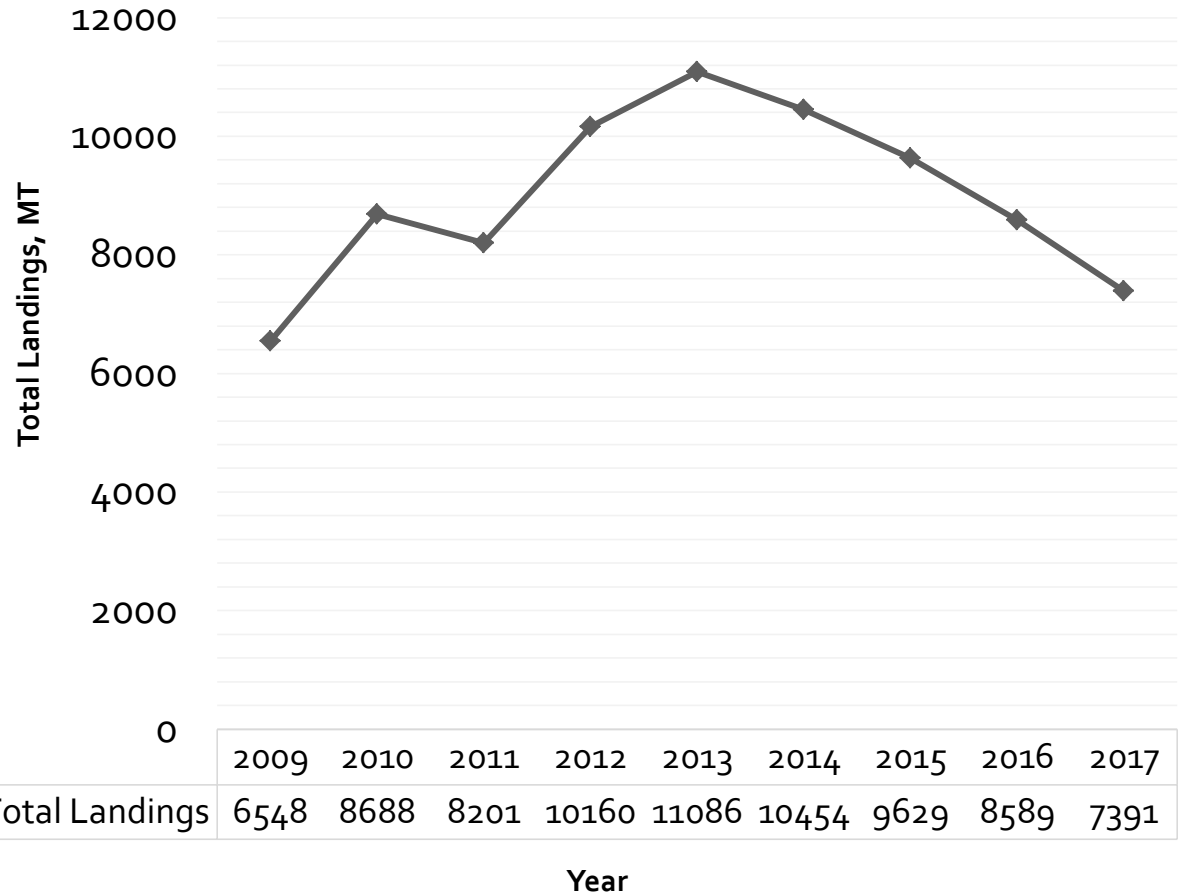
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Landings of Purse Seine Fisheries

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Total Landings in Sarawak (2009-2017)



◆ Total Landings

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Decapterus macrosoma
Shortfin scad
Selayang TL 20.7 cm



Decapterus russelli
Indian scad
Selayang TL 21.4 cm



Amblygaster leiogaster
Smoothbelly sardinella
Tamban beluru TL 21.2 cm



Dussumieria acuta
Rainbow herring
Tamban bulat TL 16.1 cm



Sardinella gibbosa
Goldstripe sardinella
Tamban pipih TL 16.5 cm



Megalaspis cordyla
Torpedo scad
Cincaru TL 25.8 cm



Selar boops
Bigeye scad
Selar kuning jantan TL 21.5 cm



Selar crumenophthalmus
Bigeye scad
Selar pucat TL 24.5 cm



Selaroides leptolepis
Yellowstripe scad
Jamah TL 12.5 cm



Katsuwonus pelamis
Skipjack tuna
Tongkol jepun TL 51.5 cm



Euthynnus affinis
Kawakawa
Tongkol kurik TL 29.2 cm



Rastrelliger kanagurta
Indian mackerel
Kembong hitam TL 23.0 cm



Rastrelliger brachysoma
Short-bodied mackerel
Kembong putih TL 20.2 cm



Scomberomorus commerson
Narrowbarred Spanish mackerel
Tenggiri batang TL 82.9 cm



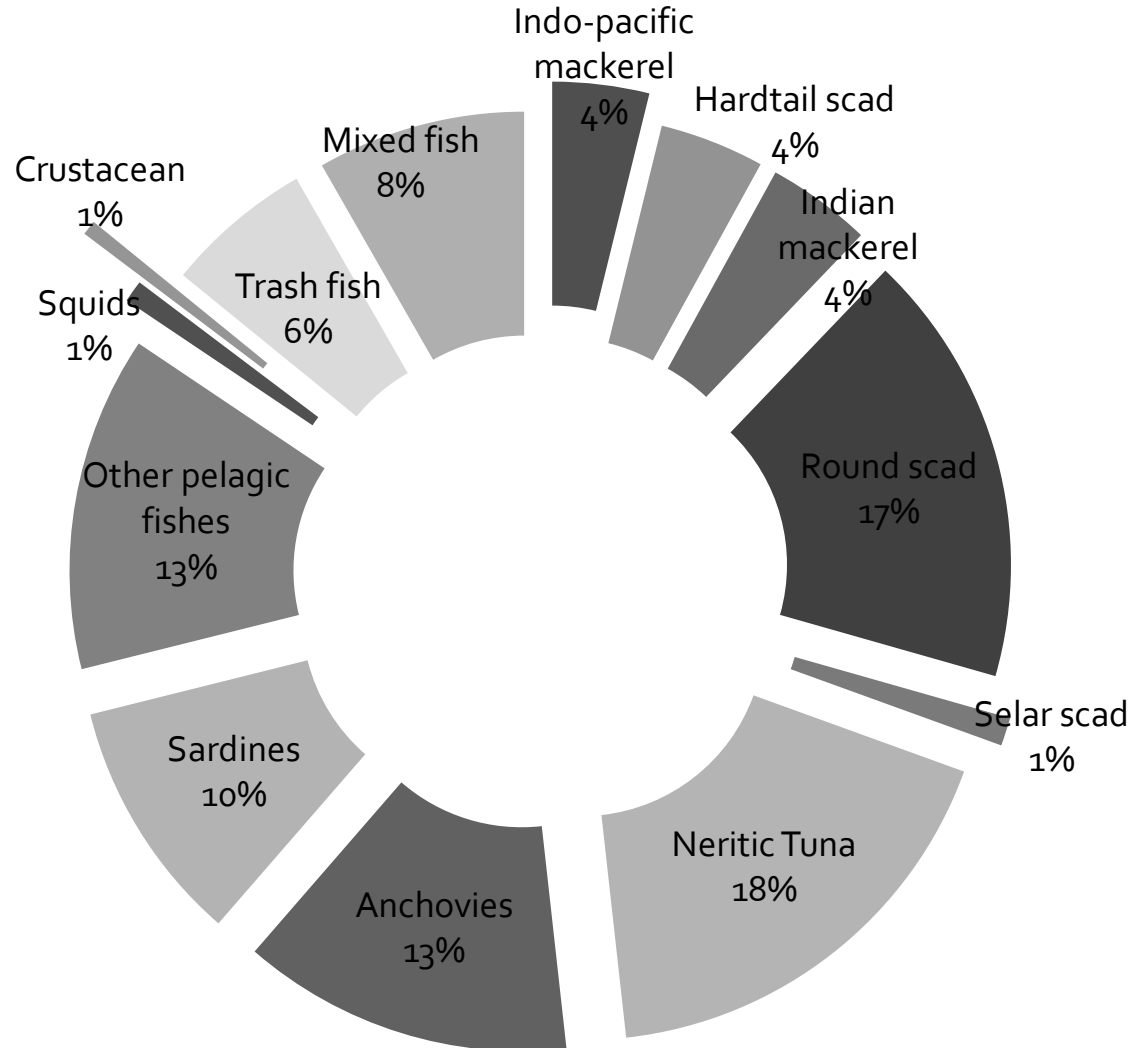
Scomberomorus guttatus
Indo-Pacific king mackerel
Tenggiri papan TL 37.5 cm



Parastromateus niger
Black pomfret
Bawal hitam TL 23.5 cm

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Catch Composition in Sarawak (2009 - 2017)



Length at 1st maturity

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SPECIES	SEX	LENGTH [cm]
<i>Decapterus maruadsi</i>	Male	21.72
	Female	22.67
<i>Decapterus macrosoma</i>	Male	12.81
	Female	19.5
<i>Decapterus ruselli</i>	Male	12.98
	Female	11.44
<i>Rastrelliger brachysoma</i>	Male	22.46
	Female	22.46
<i>Rastrelliger kanagurta</i>	Male	21.2
	Female	18.5

*Note: Research by Mr Jamil Musel (2013) & Mr Hadil Rajali (2006)

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SPECIES	PERIOD
<i>Decapterus maruadsi</i>	May – June
<i>Decapterus macrosoma</i>	Sep – Oct
<i>Rastrelliger kanagurta</i>	July - Sep

*Note: Year 2003 - 2005

Estimation of growth & mortality

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		TARGETED SPECIES								
Species	Site	L_{∞}	K (yr^{-1})	M	F	M/K	Z	ϕ	E (F/Z)	Rn
<i>R. kanagurta</i>	2003	272	0.8	0.96	2.57	1.20	3.53	4.772	0.73	0.993
	2004	272.5	0.94	0.86	16.54	0.91	17.4	4.844	0.73	0.99
	2005	270.3	0.8	1.06	3.25	1.33	4.31	4.767	0.95	0.993
<i>R. brachysoma</i>	2003	259	0.9	0.95	3.13	1.06	4.07	4.774	0.77	0.978
	2004	261	0.7	0.8	6.41	1.14	7.2	4.678	0.89	0.999
	2005	260	0.9	0.94	4.21	1.04	5.15	4.784	0.82	0.999
<i>D. maruadsi</i>	2003	257	0.7	0.8	2.72	1.14	3.52	4.665	0.77	0.996
	2004	258	0.4	0.56	2.7	1.40	3.25	4.425	0.83	0.999
	2005	254	0.5	0.65	1.46	1.30	2.11	4.509	0.69	0.995

*Note: Year 2003 - 2005

Fishing Effort for Purse Seine Fisheries

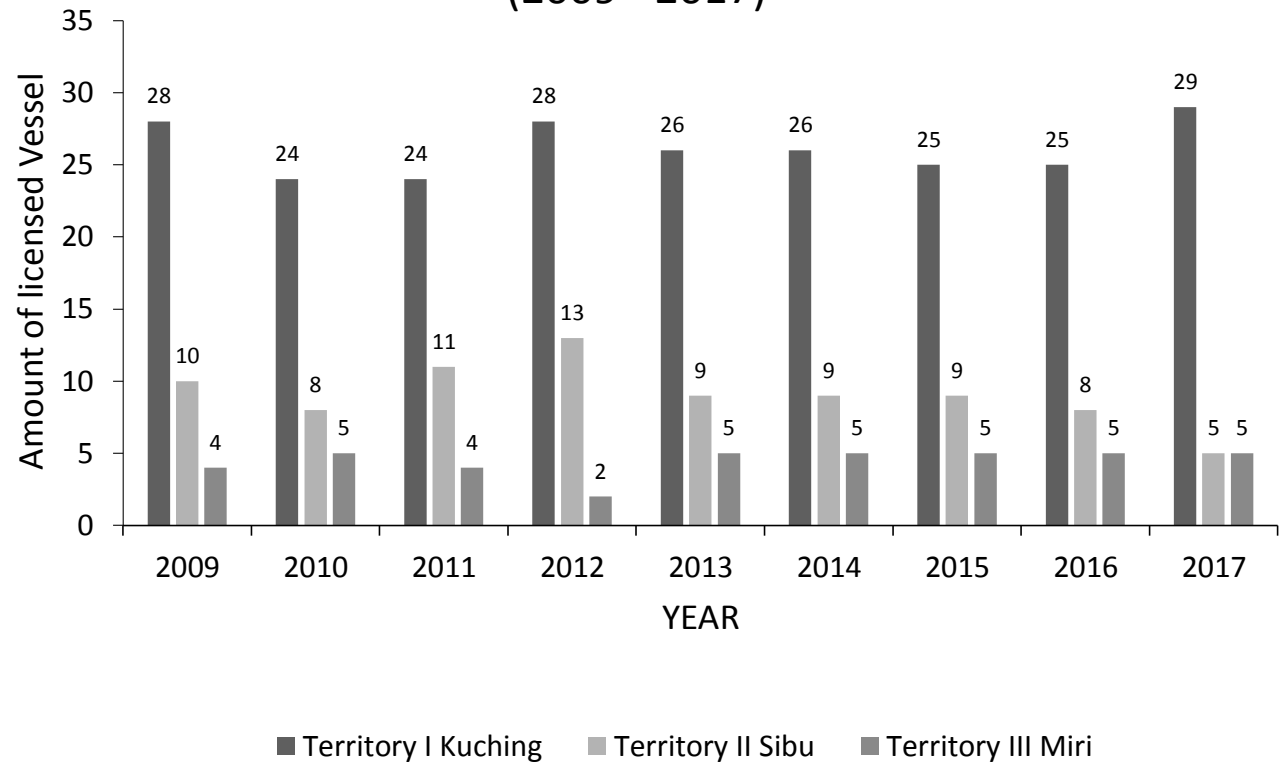
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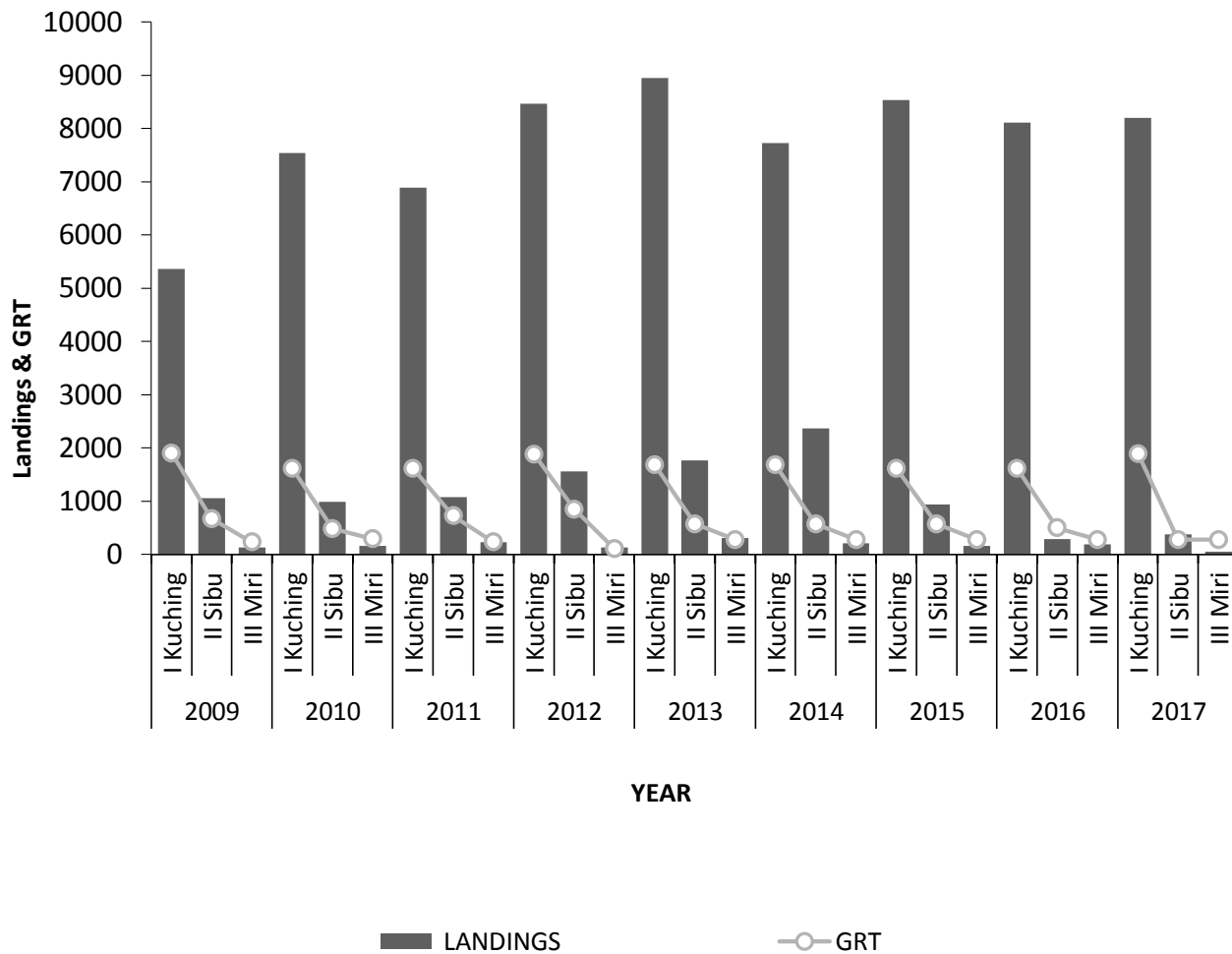
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No. of Licensed Vessel in Sarawak by Territory
(2009 - 2017)



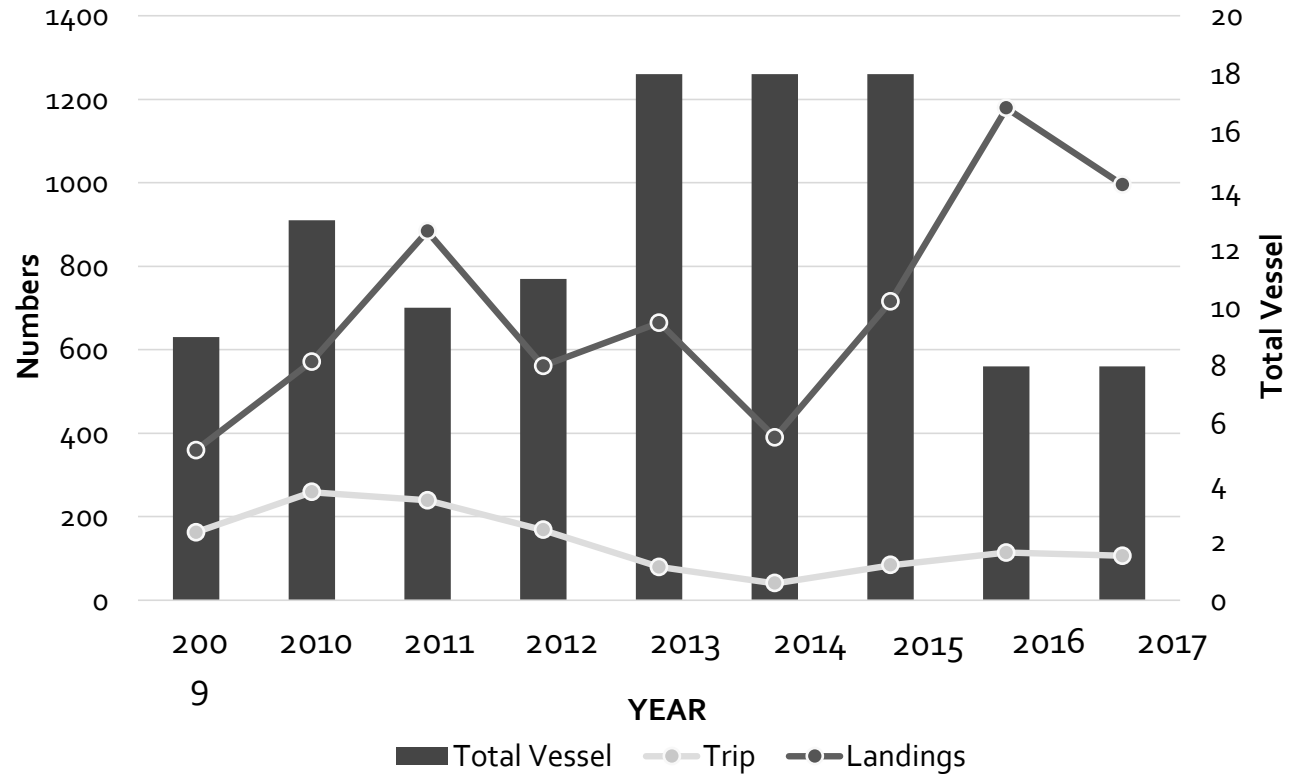
Fishing Effort by Territory

Fishing Effort in Sarawak By Territory (2009 - 2017)



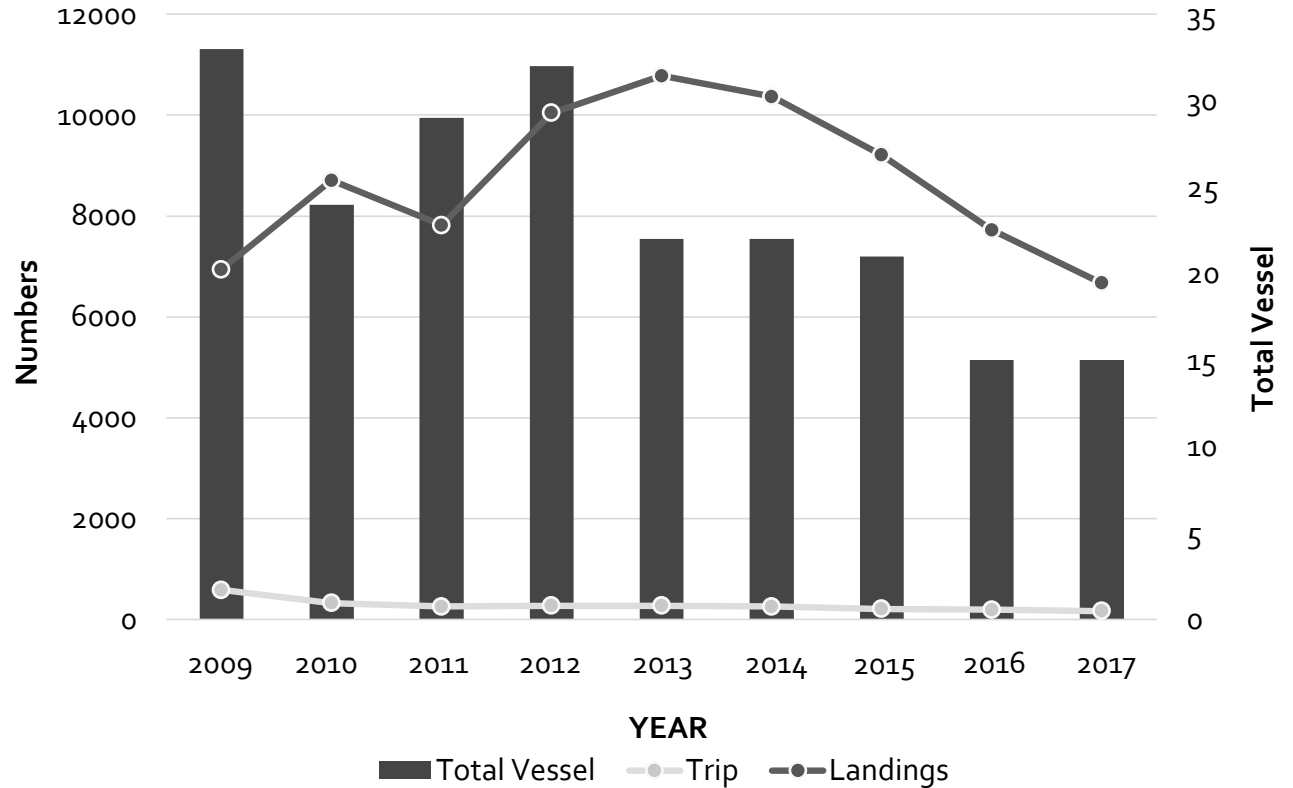
Cumulative Effort (40-69.99 GRT)

CUMULATIVE EFFORT OF PURSE SEINE IN SARAWAK 40-69.99 GRT (2009-2017)



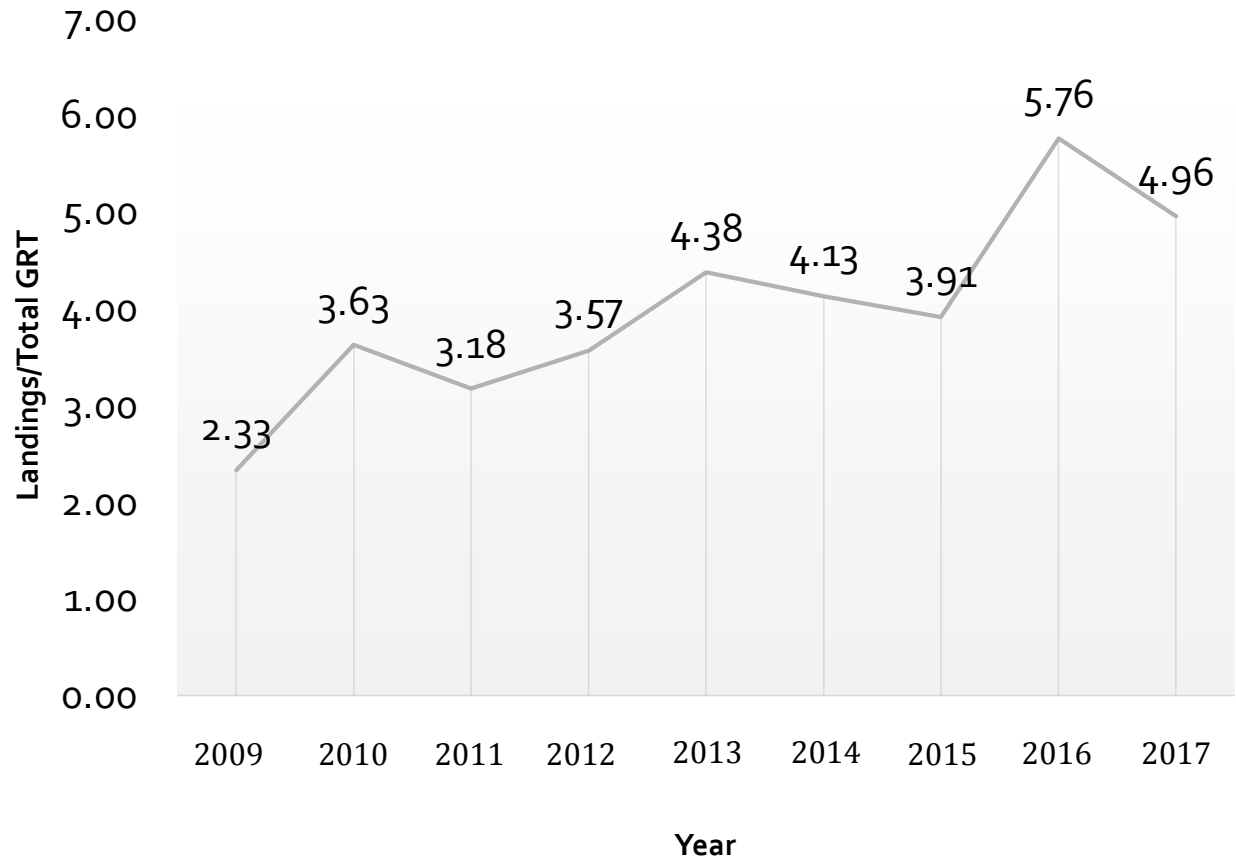
Cumulative Effort (≥ 7 GRT)

CUMULATIVE EFFORT OF PURSE SEINE IN SARAWAK ≥70 GRT (2009-2017)



C P U E

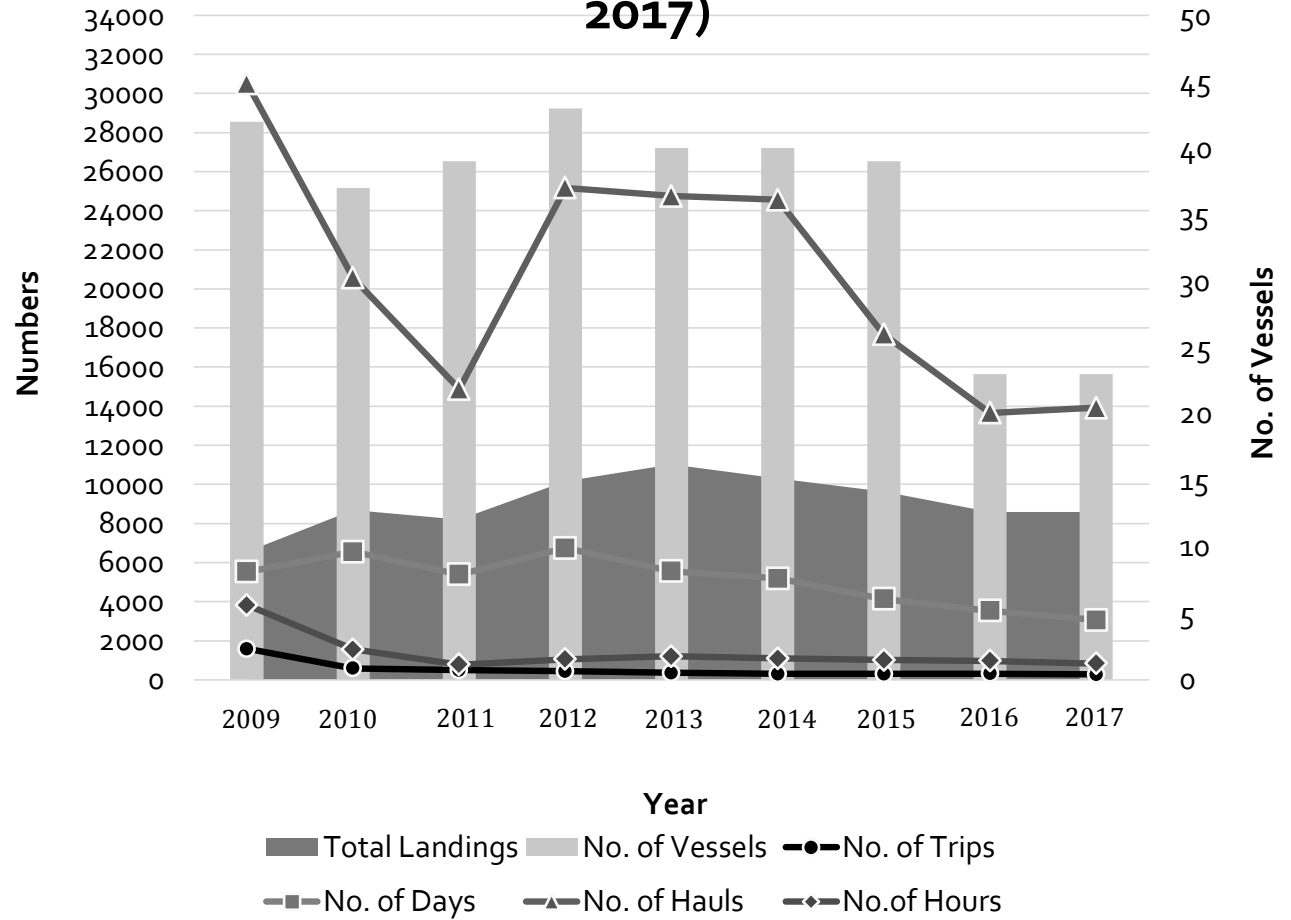
CPUE in Sarawak (2009 - 2017)



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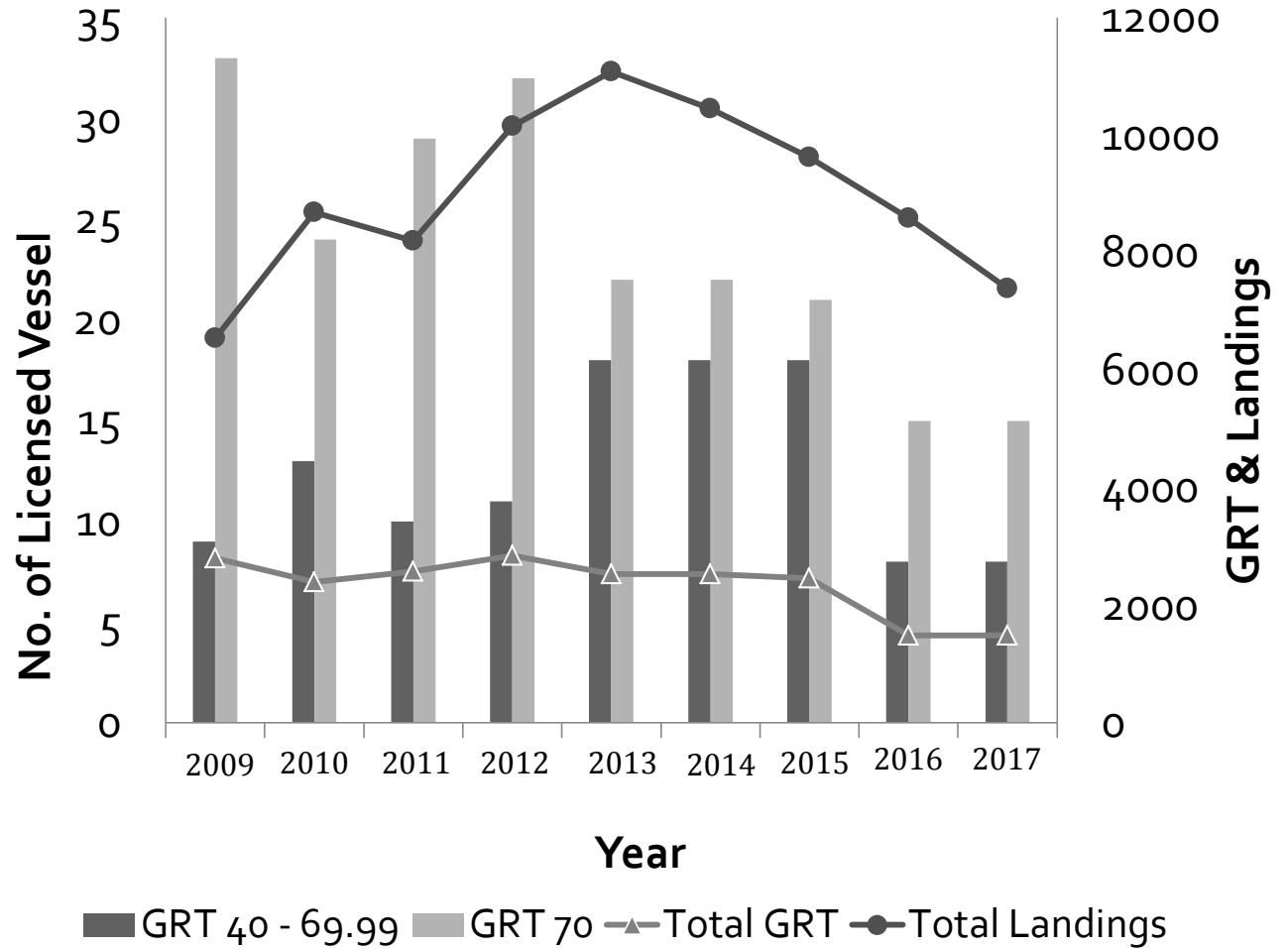
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Cumulative Effort in Sarawak (2009 - 2017)



Fishing Effort

Fishing Effort in Sarawak (2009 - 2017)



Status of Pelagic Fish Stock

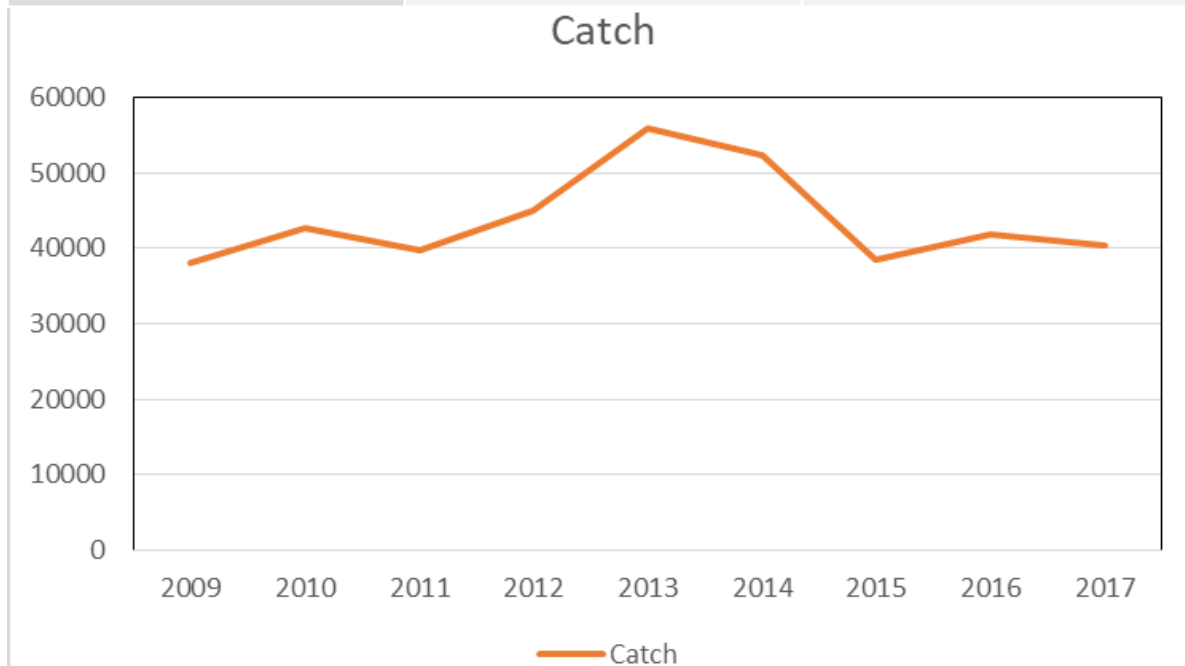
ITEMS	UNIT	2015
Area	km ²	150,627
Average Density (D)	tonnes/km ²	3.46
Total Biomass (Q)	MT	521,169
Current Yield (Y)	MT	46,777
Potential Yield (MSY)	MT	79,192
Surplus	MT	32,415

Status Analysis of Pelagic Fish Stock via Kobe Plot (2009-2017)

The table showed the landings and CPUE standardisation of pelagic fish from 3 types of gears (purse seine, trawl net and drift net) for the period of 2009-2017

CPUE & Landings
Standardisation

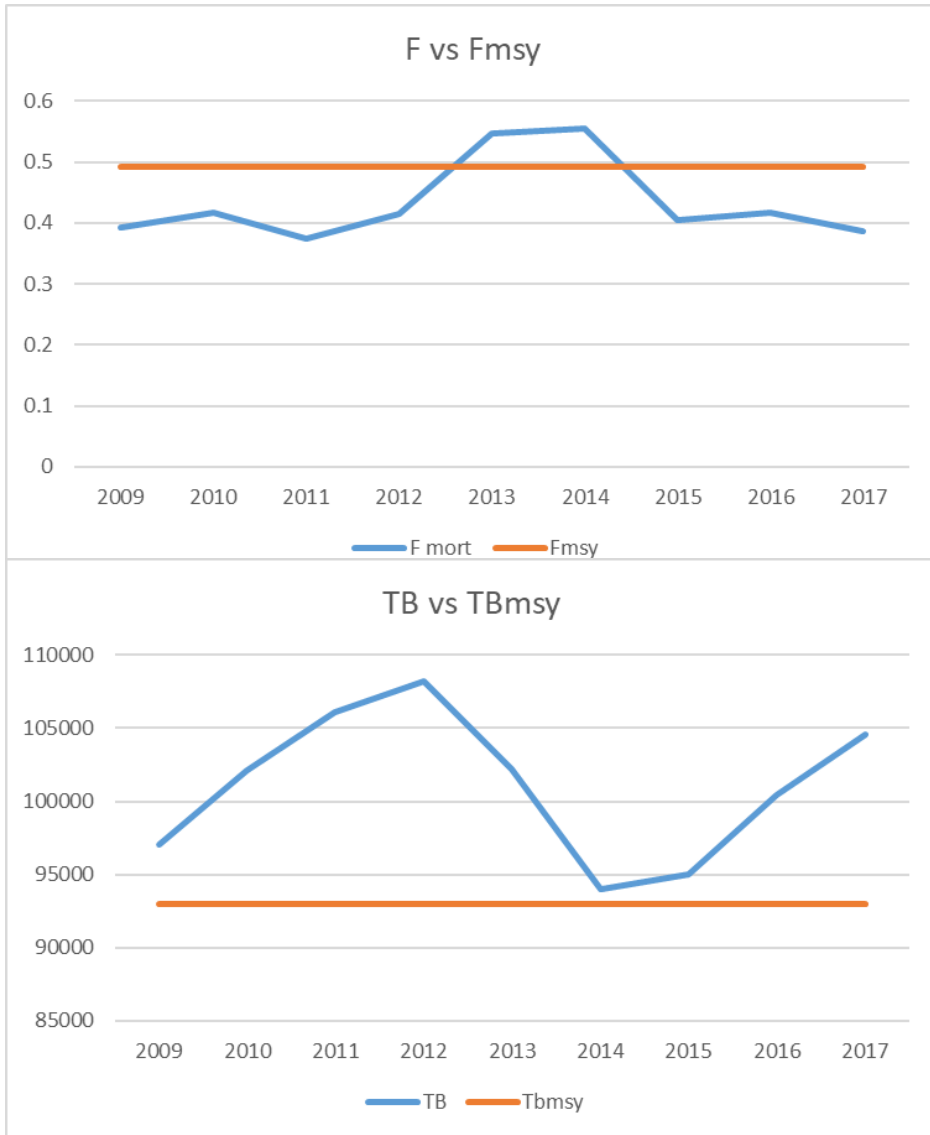
Year	CPUE STD	Catch
2009	2.81	38112
2010	2.87	42634
2011	2.95	39839
2012	2.85	45025
2013	3.54	55915
2014	3.72	52254
2015	3.20	38444
2016	3.06	41908
2017	2.97	40436



The graph showed the landings of pelagic fish in Sarawak waters for the period of 2009-2017

The value of F showed quite a distant from F_{msy} , therefore the amount of F could be increased for pelagic fishery

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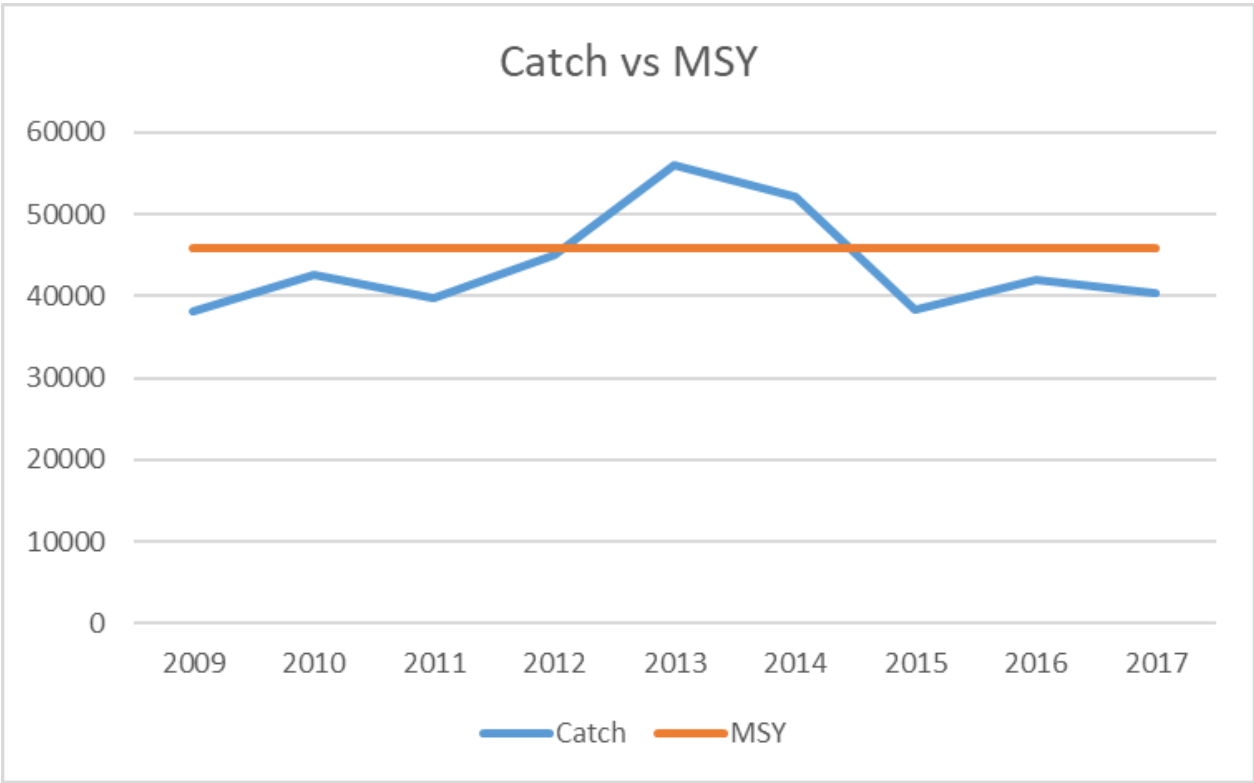


The TB line is higher than the TB_{msy} line which indicated that the biomass of pelagic fish in Sarawak is still high

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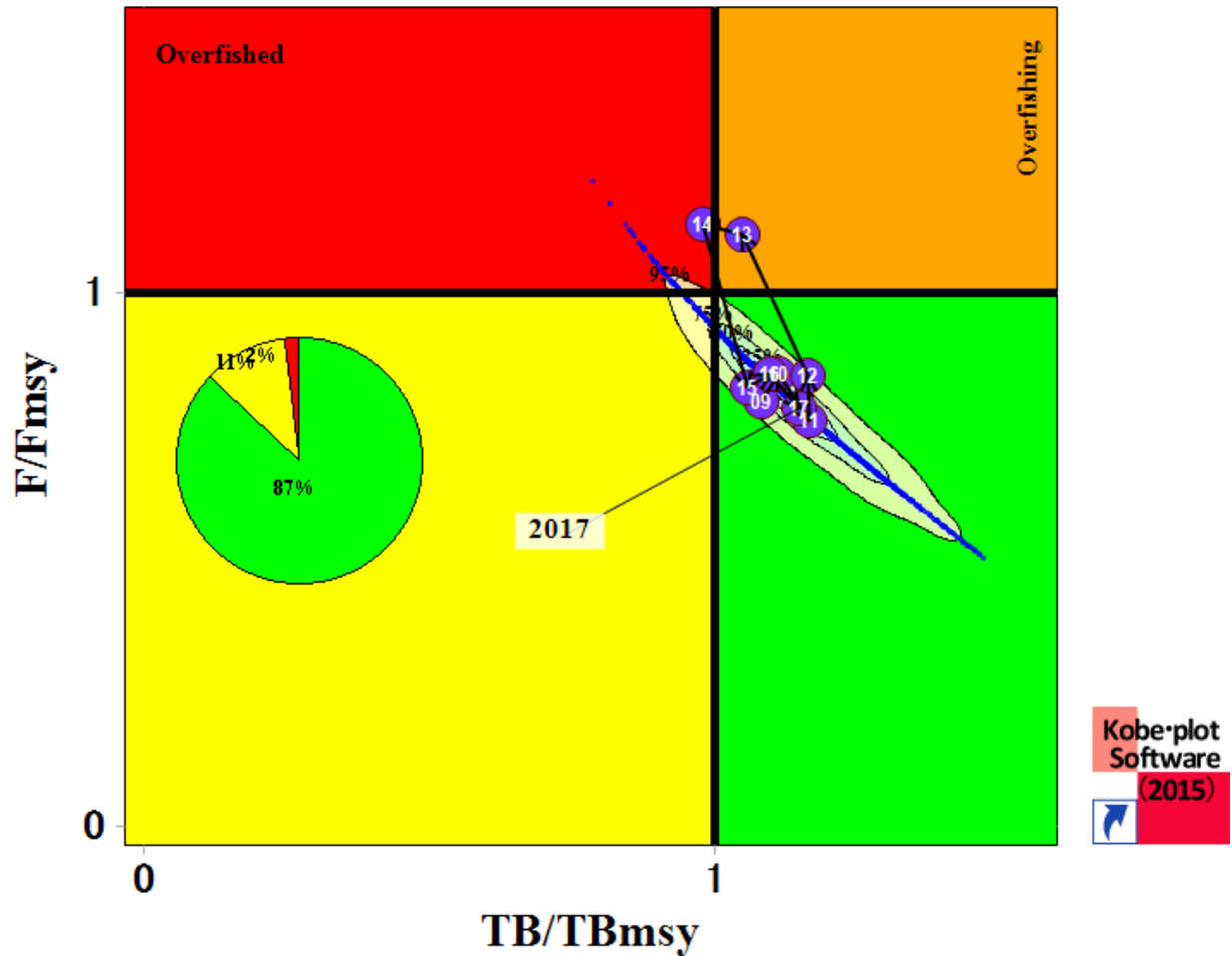
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The graph showed the landings and the MSY line. The landings of pelagic fish was exceeding MSY in 2012-2014 and later started to decreased in 2015-2017.

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The Kobe Plot revealed the status of pelagic fish in Sarawak for 2009-2017. The latest status of pelagic fishery is within the **GREEN** area

Based on risk assessment, the current catch level (40,263 tonnes, 3 years average in 2015-2017) can be increased by 14% to the MSY level (45,850 tonnes). Even when the catch is increased to MSY level, the probabilities violating MSY (TB & F) are less than 35% in 10 years (2027).

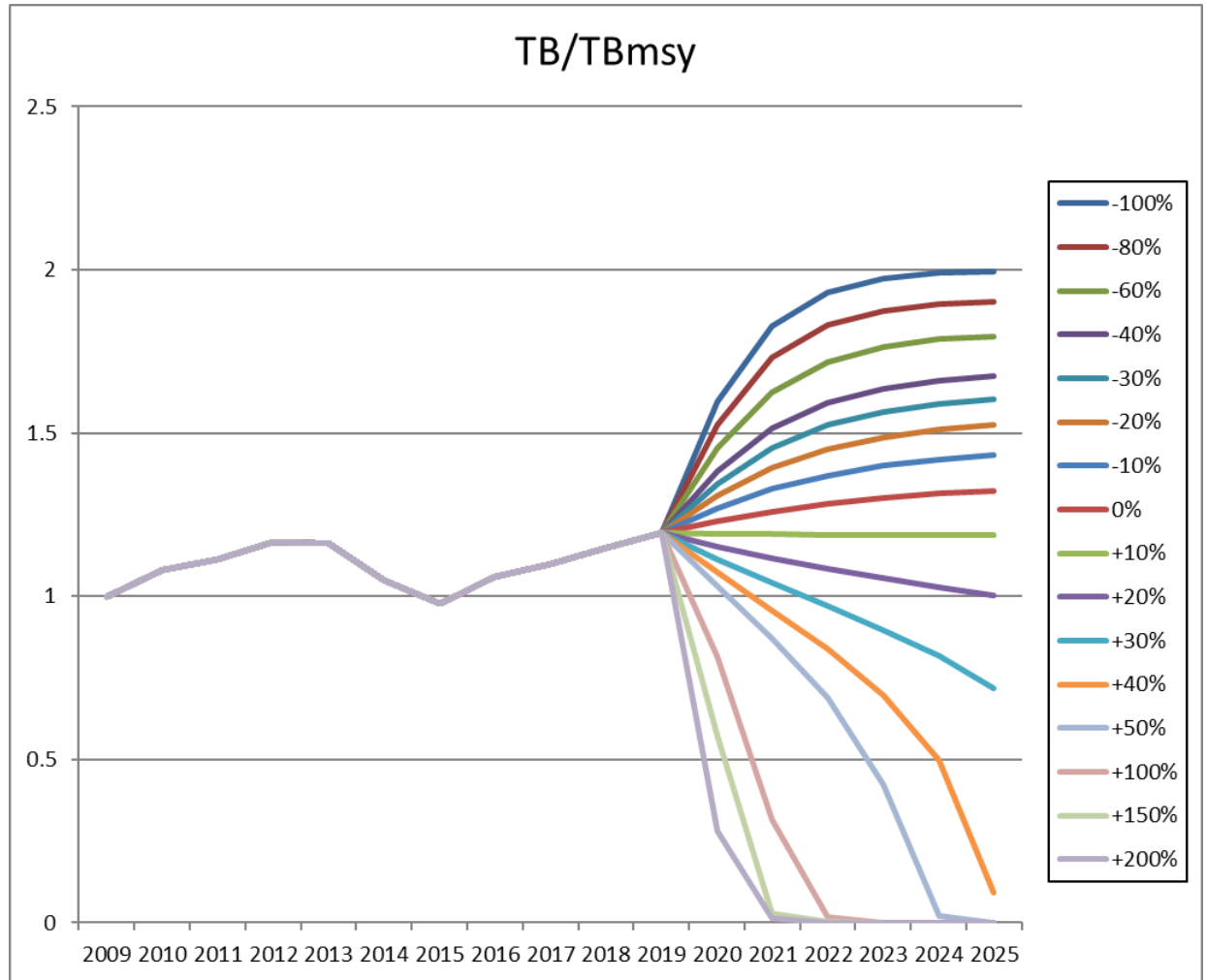
Color Legend										
Risk levels	Low risk		Medium low risk		Medium high risk		High risk			
Probably	0 - 20%		20 - 50%		50 - 80%		80 - 100			
	60%	70%	80%	90%	100%	110%	114%	120%	130%	140%
					Current catch (*)		MSY level			
10 catch scenarios (tons)	24,158	28,184	32,210	36,237	40,263	44,289	45,850	48,316	52,342	56,368
TB2020 < TBmsy	0	0	1	2	5	7	10	14	23	33
F2020 > F MSY	0	0	0	0	0	5	15	30	71	94
TB2027 < TBmsy	0	0	0	0	0	11	31	62	91	98
F2027 > F MSY	0	0	0	0	0	8	34	72	97	100

Note: (*)The current catch levels the average catch in 3 recent years (2015-2017)

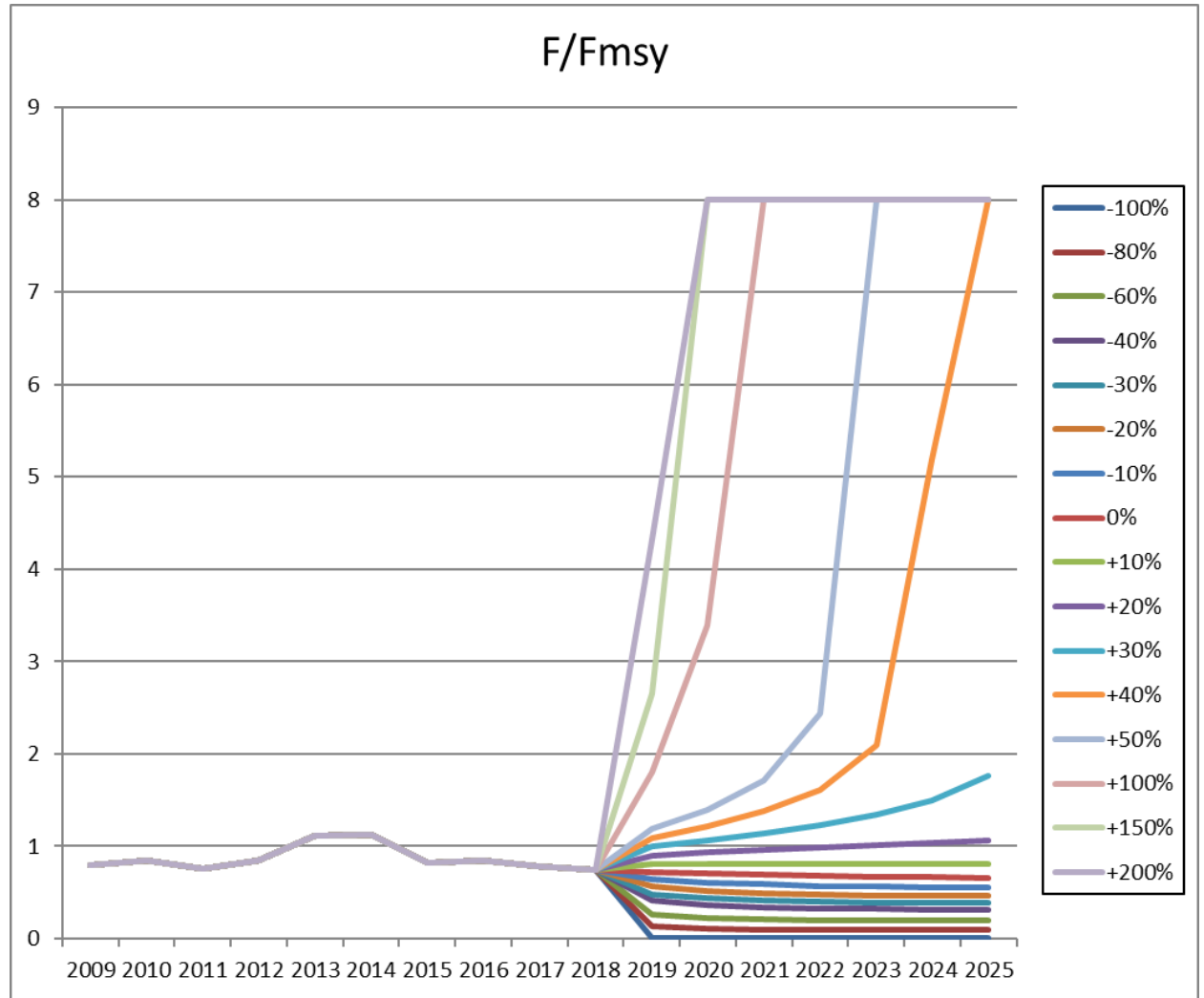
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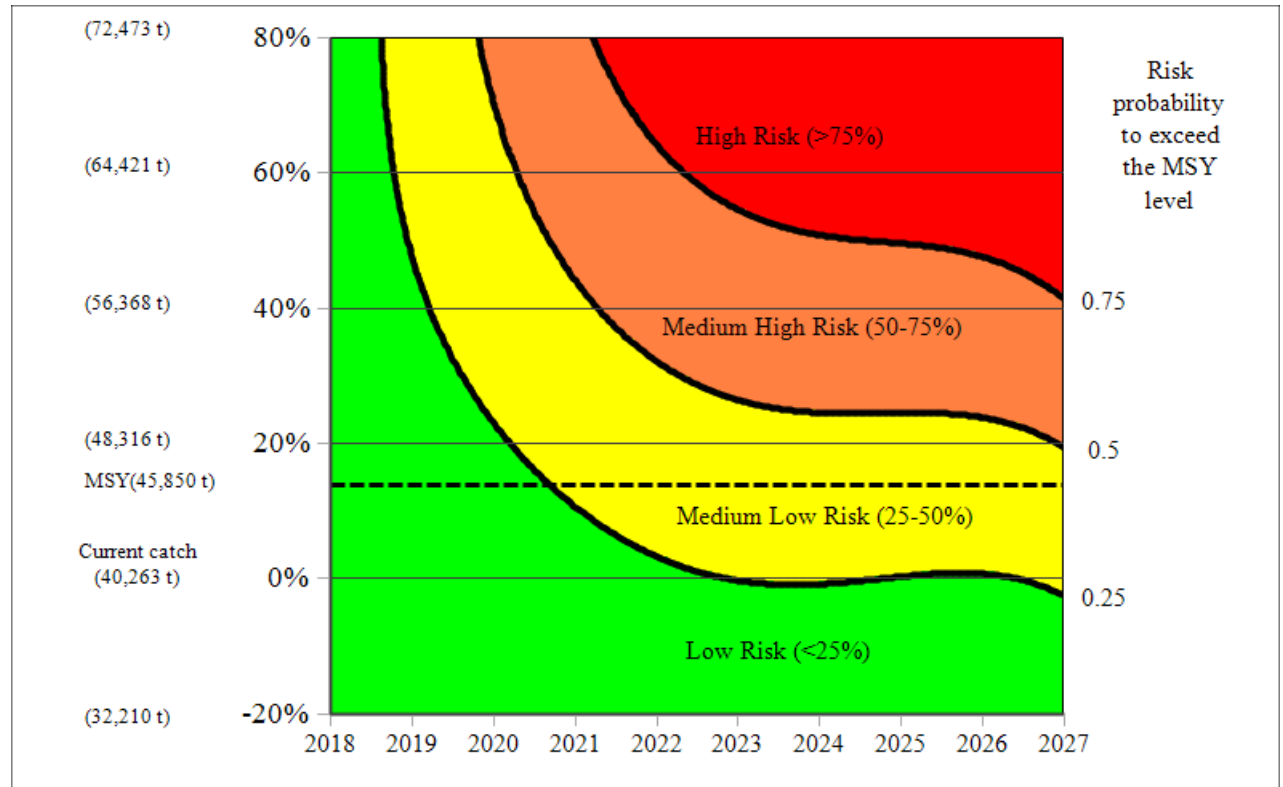


Projection
Fmsy
(Next 10 Years)



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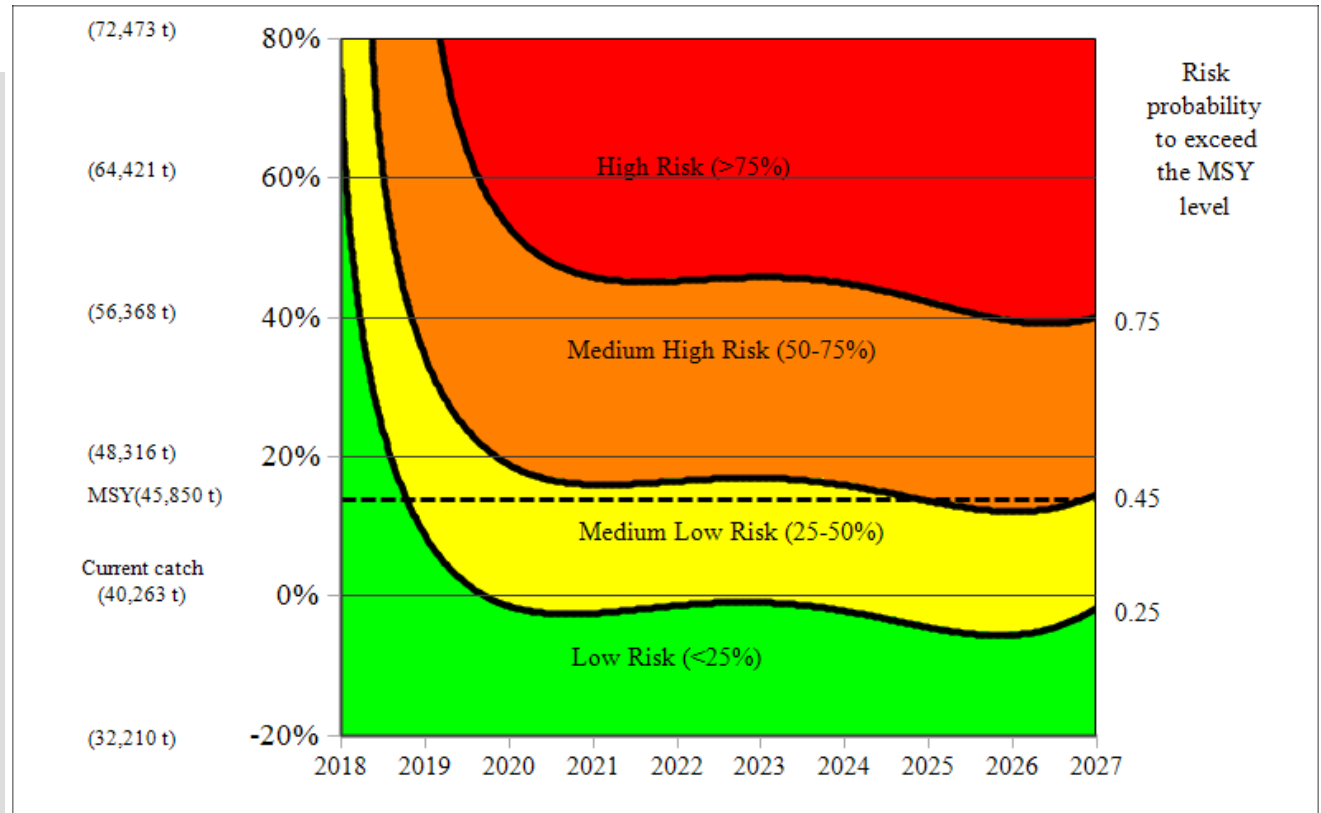
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The figure showed the status of landings and MSY for pelagic fish in Sarawak (in terms of total biomass)

1. Green Area (next 10 years) – if no increase in landings from 2017
2. Yellow Area (year 2021) – if 40% increase in landings from 2017
3. Overfishing (next 10 years) – if continuously increase in landings more than about 20%

Fishing Risk
 Killing
 our
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 generations
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The figure showed the status of landings and MSY for pelagic fish in Sarawak (in terms of fishing mortality)

1. Green Area (next 10 years) – if no increase in F (same as 2017)
2. Yellow Area (year 2020) – if increase about 10% of landings from 2017

Existing Management Strategies

- Joint venture program, close season management is not yet applied due to Sarawak have more than enough available resource
- According to our latest survey in 2015 (Fisheries Resource Survey in Malaysian Waters 2013-2016), the surplus of production is 32,415 MT.
- Kobe plot analysis could be utilized to facilitate the pelagic fisheries management.
- According to the research in 2015 and the analysis via kobe plot until 2017, it is showed that the resources in Sarawak waters is underexploited. Therefore, the management could introduce a plan to increase the fishing effort with precautionary approach (eg: increase fishing vessels).

Thank

You