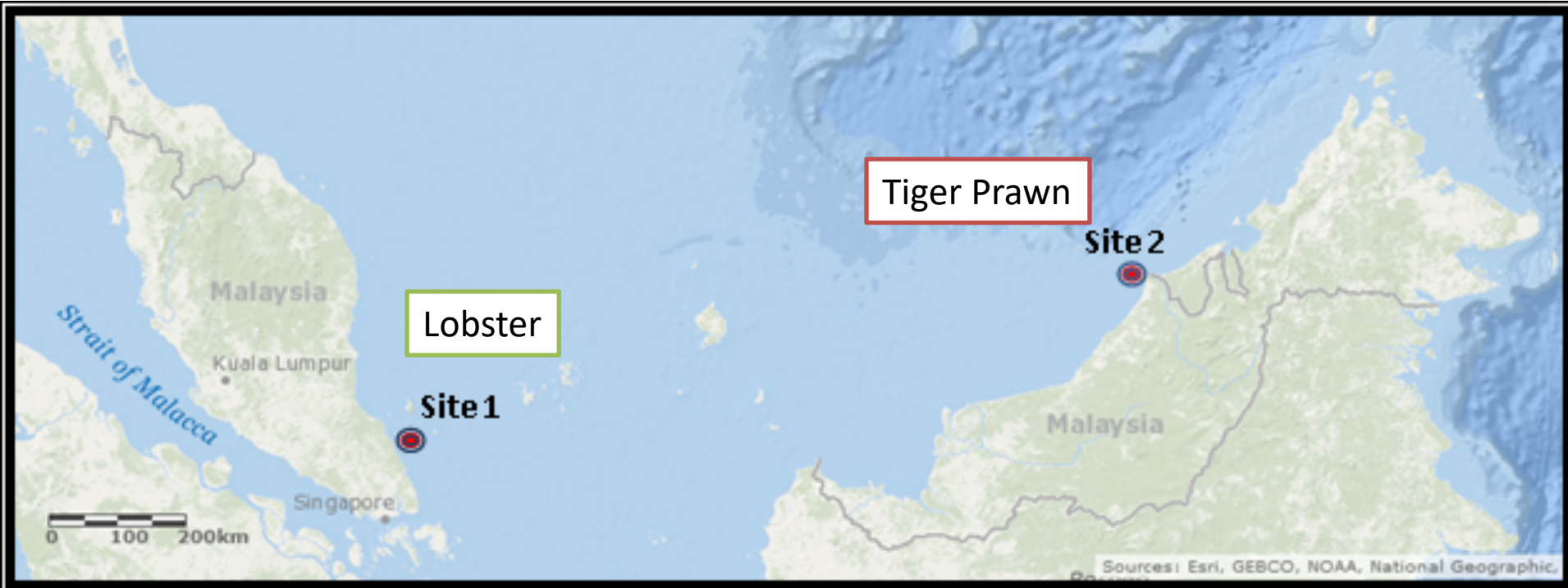




**SEAFDEC/UN ENVIRONMENT/GEF  
Fisheries Refugia Project  
Progress Report  
By  
Department of Fisheries Malaysia**

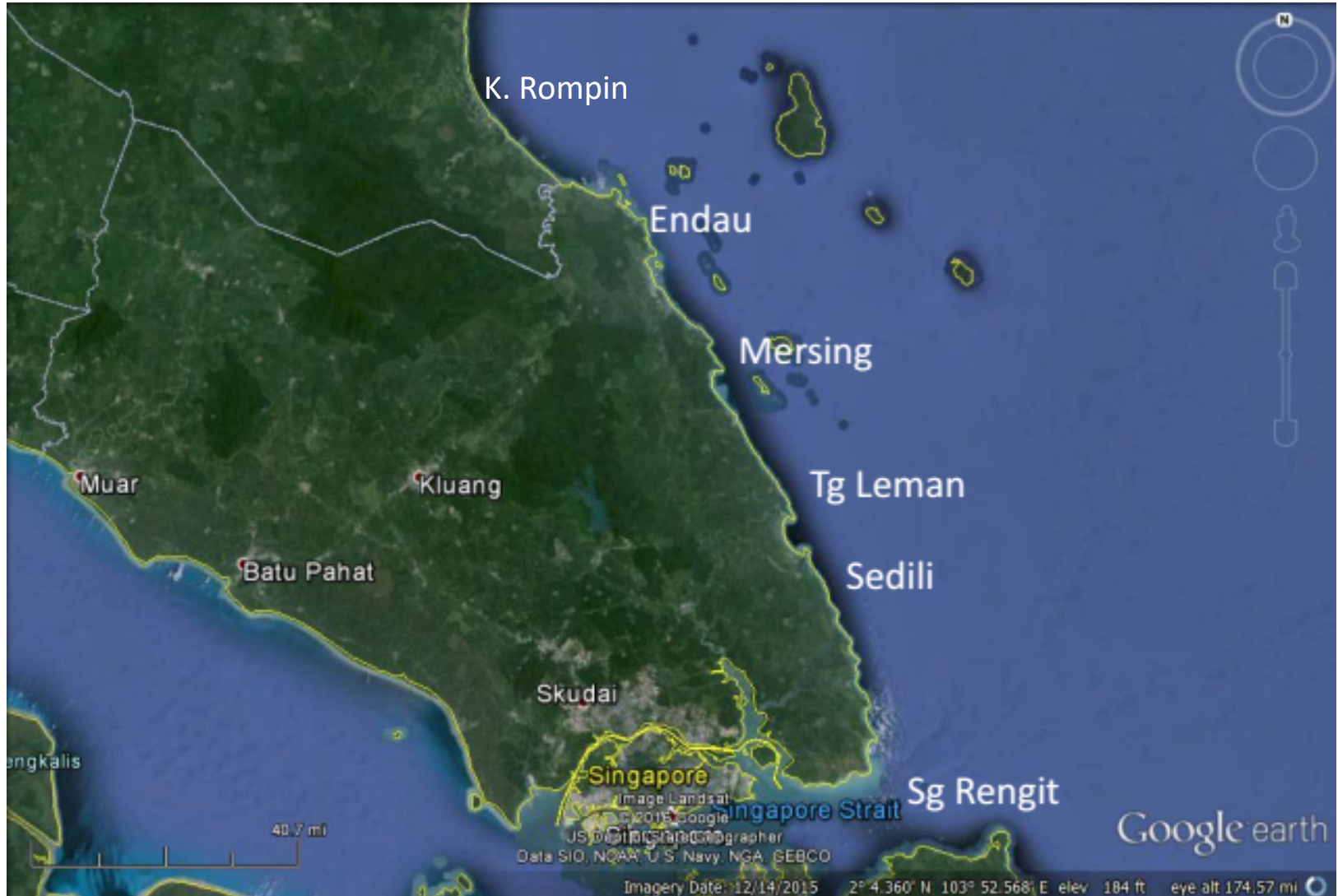
**The 3<sup>rd</sup> Regional Scientific and Technical Committee Meeting for the SEAFDEC/UN Environment/GEF Project on Establishment and Operation of a Regional System of Fisheries Refugia in the South China Sea and Gulf of Thailand, 5 – 7 February 2020, Hai Phong City, Viet Nam**

# Refugia Sites in Malaysia

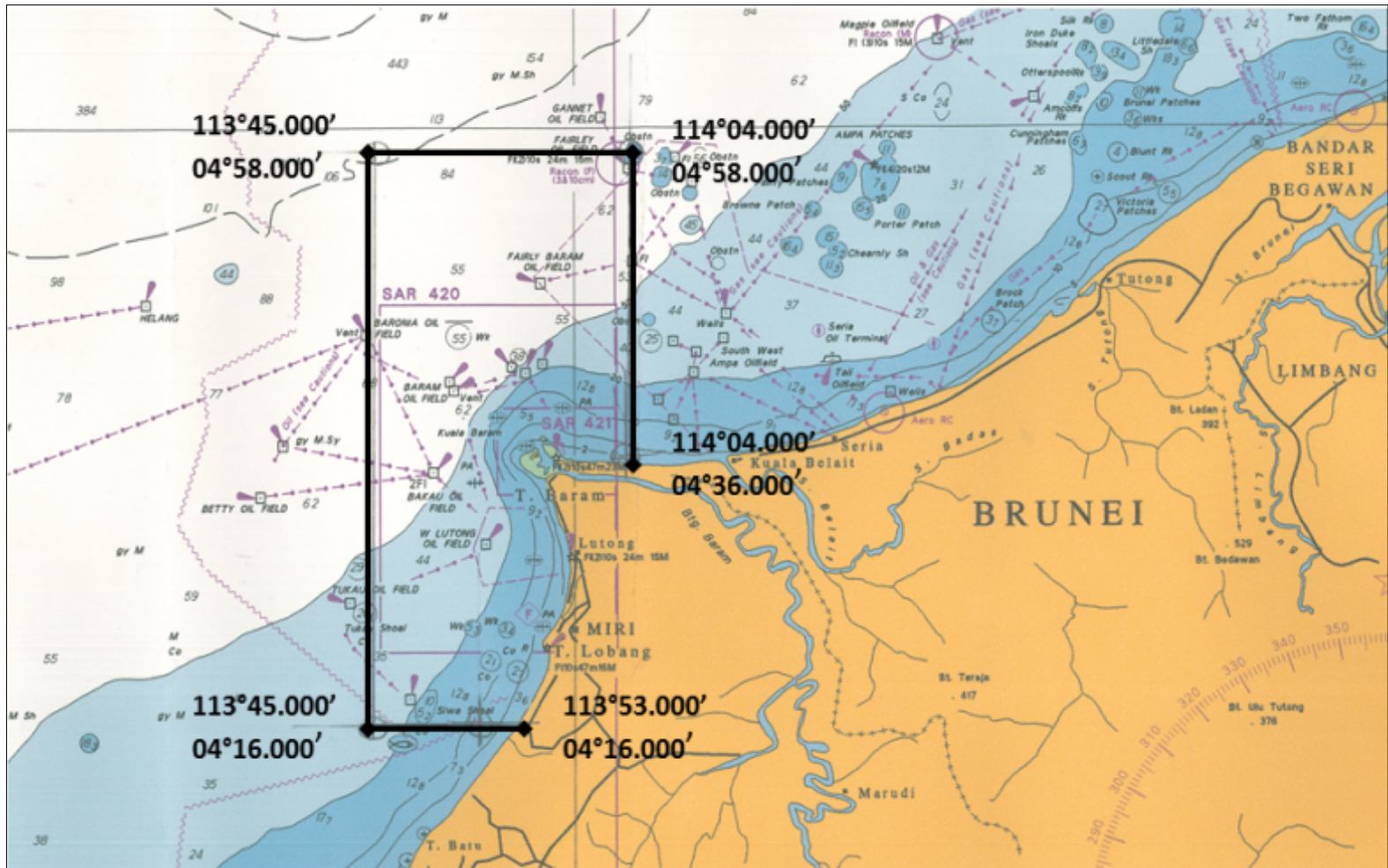


1. Tanjung Leman, Johor – Lobster (*Panulirus* spp.)
2. Kuala Baram, Sarawak – Tiger Prawn (*P. monodon*)

# Lobster Area at South Pahang-East Johor



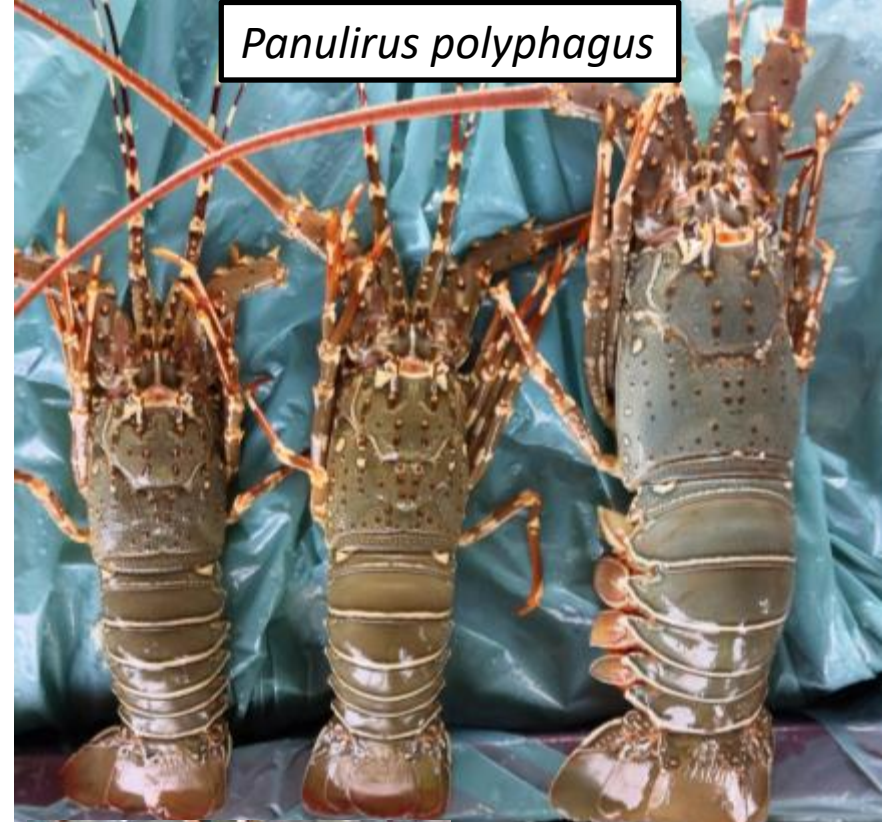
# Proposed Tiger Prawn Refugia at Kuala Baram, Miri, Sarawak



## 2. Work Progress 2019



# Lobster Research in South Pahang- East Johor



*Panulirus polyphagus*



*Thenus orientalis*

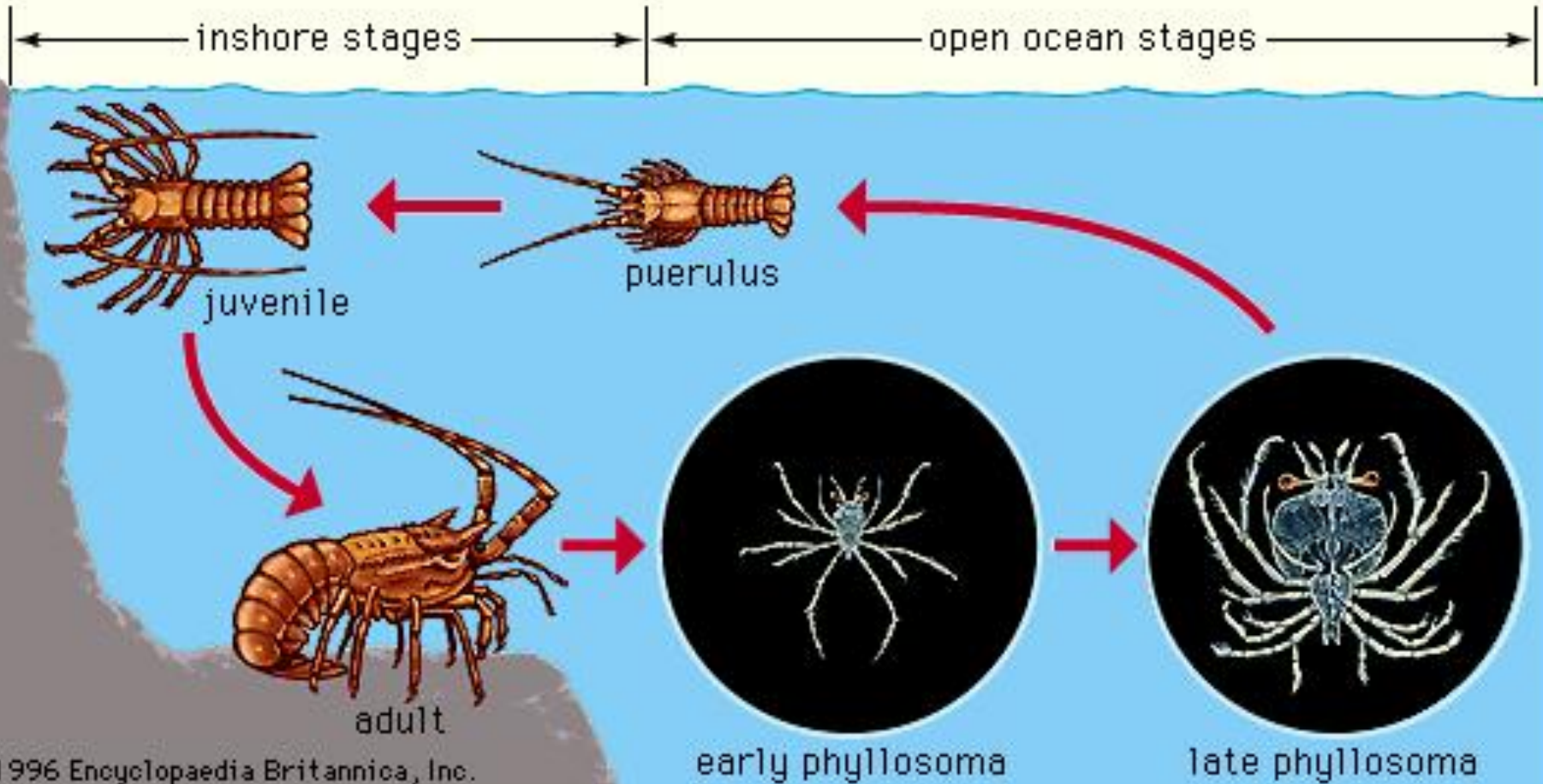


*P. ornatus*



*P. homarus*

# Spiny Lobster Life Cycle



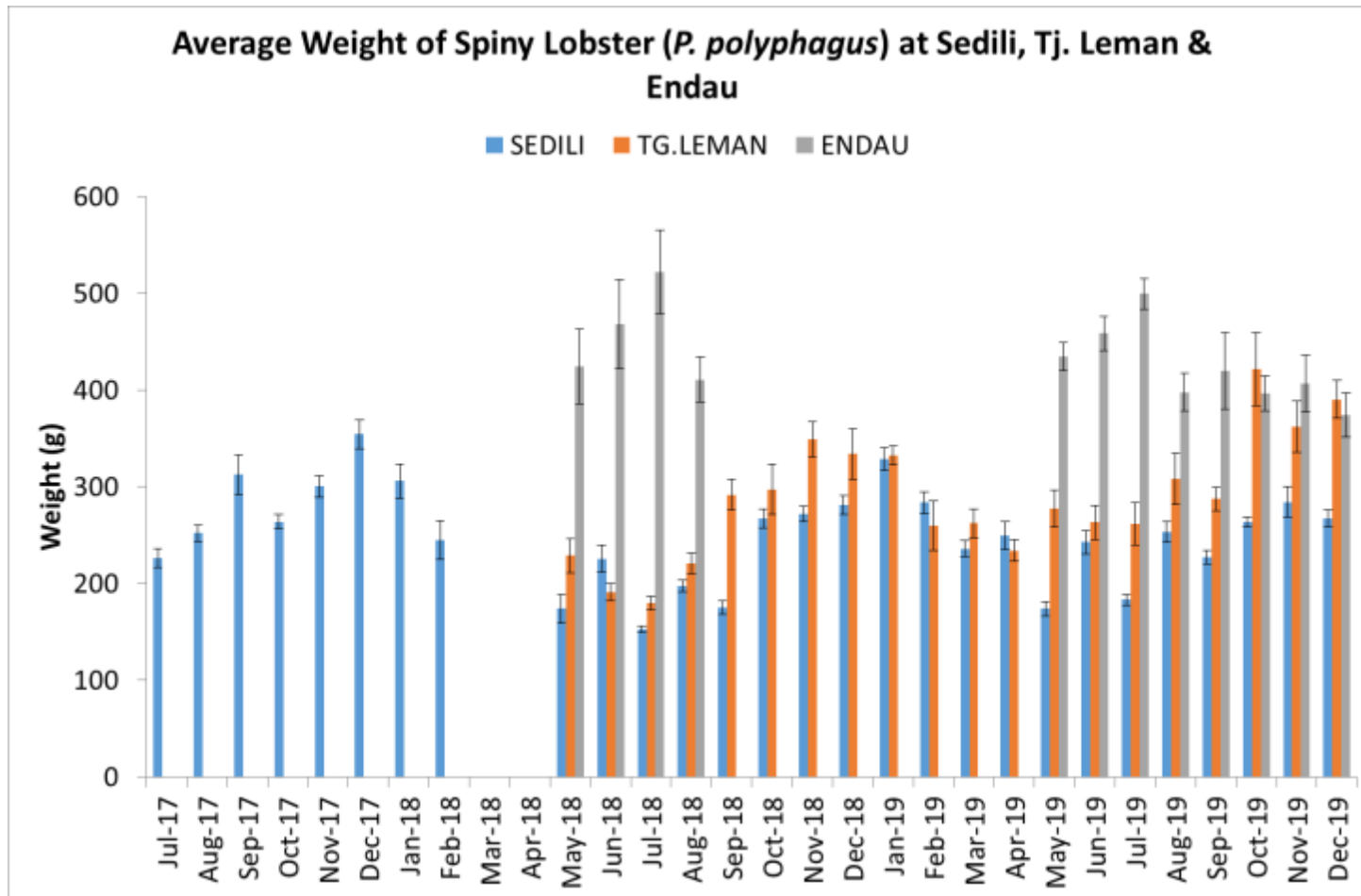
# Lobster Refugia Activities (2019)

1. Collection of lobster landing data from fisherman jetties
2. Lobster surveys (OBB) at sea
3. Socio-economic surveys of fishermen
4. EAFM workshop (11-13 Nov 19)





# Lobster Landing Study At East Johor (2017 – 2019)



**Average weight at Sedili: 250g, Tj. Leman: 287g, Endau 434g**

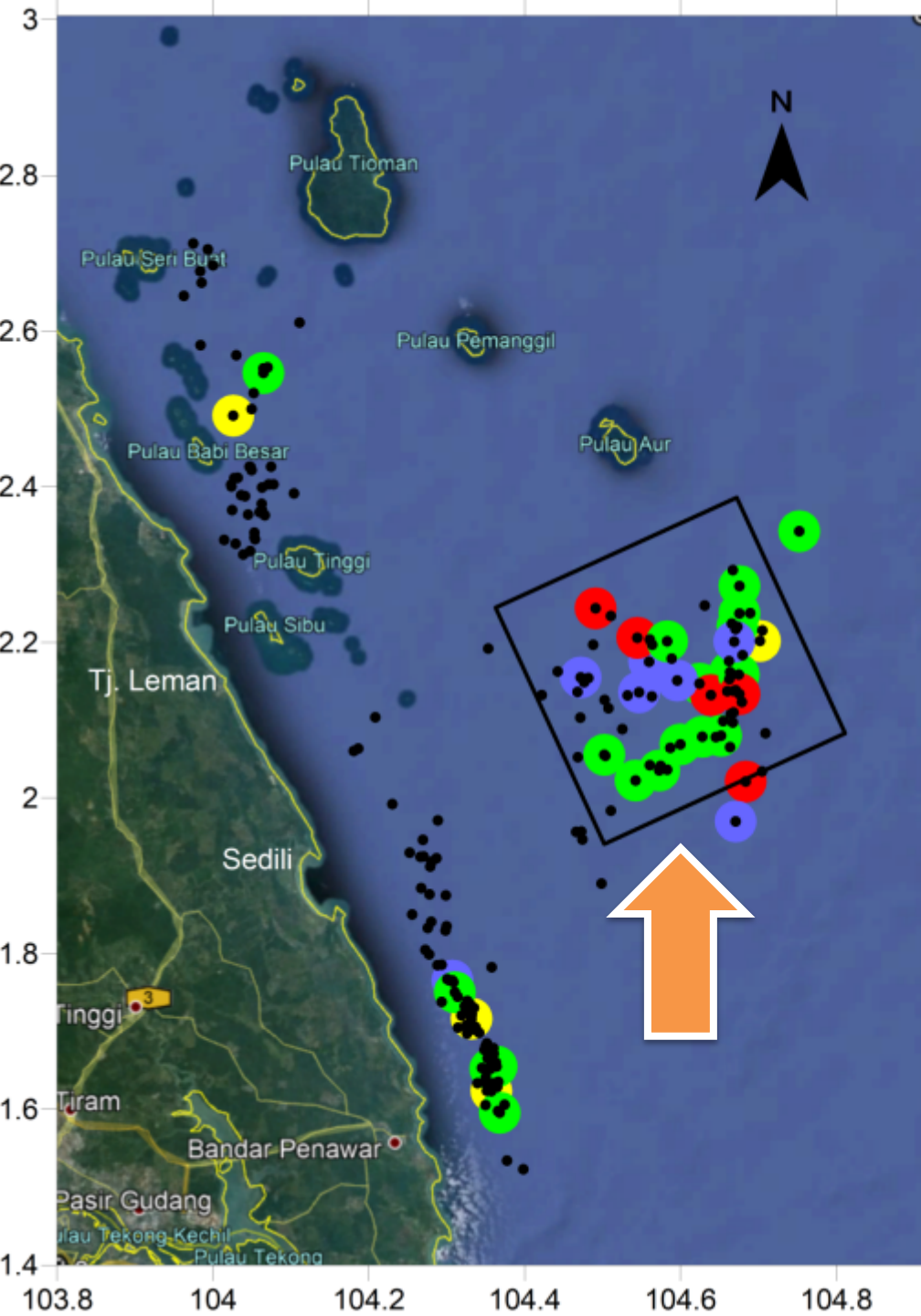
# Lobster surveys (Observer-On-Board) at sea ( Sept – Nov 2019)

No.	Date	Bot Reg.	Results
1.	2-15 Sept	JHF 5222T	35 hauls, 3 lobsters
2.	8-16 Oct	PAF 4623	20 hauls, 2 lobsters
3.	9-19 Oct	JHF 3388T	34 hauls, 12 lobsters
4.	16-30 Oct	JHF 5222T	38 hauls, 4 lobsters
5.	21-30 Oct	JHF 3388T	41 hauls, 27 lobsters
6.	22 Oct-2 Nov	JHF 1255T	27 hauls, 1 lobster
		<b>Total</b>	<b>195 hauls, 49 lobsters</b>

# Lobster resource surveys at sea

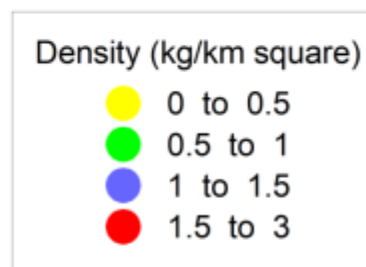


Ave wgt= 598 g (190-1300g)  
Ave carapace (CL) = 9.3 cm (3.1-13.2cm)

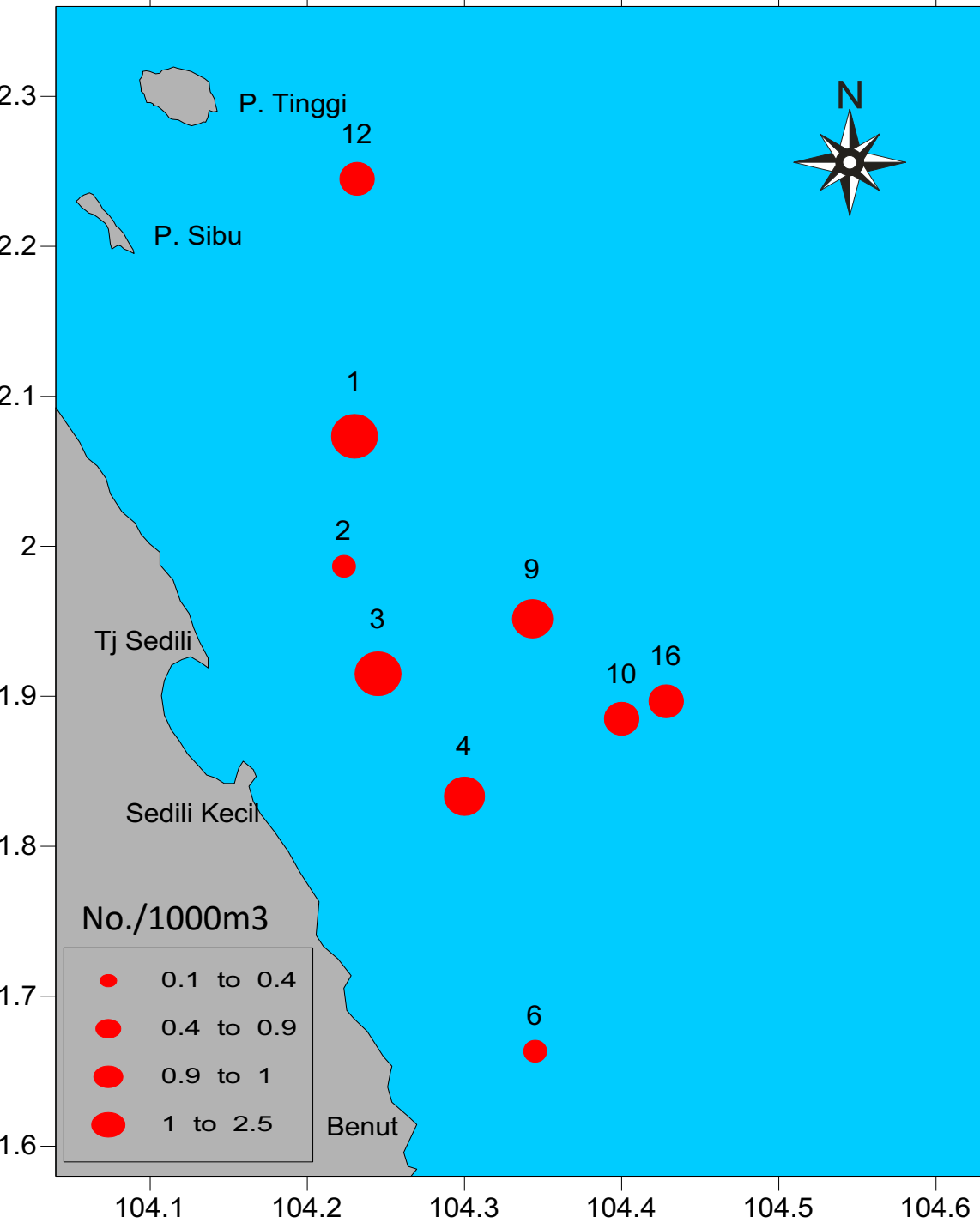


# Proposed Lobster Refugia Site

- Area size : 140,023 Ha / 1400 km<sup>2</sup>
- 20 nautical miles from Tj. Leman
- 20 nm from Sedili
- 5 nm from Aur Island
- Dimension: 20x20 nm
- Cover zone C
- **Need further discussions with stakeholders**



# Distribution and Density of Phyllosoma (larvae) in East Johor (Aug 2017)



Density (ind./1000m<sup>3</sup>) of *Panulirus* spp. dan in 2017 survey.

# Socio-economic surveys of fishermen

- 17 – 19 Sept 2019
- Tioman Island
- Survey team from FRI Batu Maung (Lead Ms. Norhanida Daud)
- Survey location targeting fishermen villages in Tioman Island



# Socio-economic surveys of fishermen

- A baseline socio-economic survey of fishers covering eight fishing areas in Pahang-Johor was undertaken during 2018-2019 period.



165 respondents

State	District	Fishing base	Freq.	%
Pahang	Rompin	Kuala Rompin	14	8.5
		Rompin Lama	5	3.0
		Endau	5	3.0
		Pulau Tioman	27	16.4
Johore	Kota	Tanjung Sedili	16	9.7
	Tinggi	Sedili Besar	19	11.5
		Sedili Kecil	21	12.7
		Sungai Musoh	38	23.0
	Mersing	Tanjung Leman	20	12.1
<b>Total</b>			<b>165</b>	<b>100.0</b>

# Socio-economic surveys of fishermen

- 88.2% of respondents agreed with the establishment of refugia as proposed by DoF.
- 66.7% of respondents agreed not to conduct fishing operation of lobster during its breeding season after the establishment of refugia.
- 95.8% of respondents agreed that the Department of Fisheries should discuss with the fishers and fishers 'community regarding the proposal of the establishment of lobster refugia in the beginning.



# Socio-economic surveys of fishermen

Respondents understood the concept of refugia 72% (Yes) 27% (No)

Level of Awareness (Unit : %) # of Respondents : 165	Strongly Agreed	Agreed	Neutral	Disagreed	Strongly Disagreed
Respondent agrees with the proposal to establish the lobster refugia	29.4	58.8	0.0	7.91	3.9
Tanjung Leman is a suitable site for lobster refugia	60.6	21.8	2.4	10.3	4.8
Lobsters catching operations should be stopped during their breeding season	39.4	27.3	4.8	11.5	17.0
Respondent agrees to jointly-maintain the refugia once after it was established	28.5	27.9	9.7	15.2	18.7
Refugia site should be gazetted as prohibited areas for all fishing operations	29.7	32.1	5.5	9.7	23.0
DoF should consult with the fishers before proposing the establishment of refugia for lobster	66.7	29.1	2.4	1.8	0.0

# Socio-Economic Survey - Lobster



# EAFM Refugia workshop

- Target about 36 fishermen
- Participants from Pahang and East Johor
- Air Papan Resort, Mersing, Johor
- 11 -13 Nov 2019



# Planned Activities 2020

- Phyllosoma (larvae) study at suggested refugia site (August & Oct 2020)
- Lobster landing data collection (Jan – June 2020)



**TIGER  
PRAWN  
RESEARCH AT  
KUALA  
BARAM,  
MIRI,  
SARAWAK**

**Tiger Prawn**  
**(*Penaeus monodon*)**  
**Refugia in Kuala**  
**Baram, Sarawak**



**Juvenile**



**Adult**

# Tiger Prawn Refugia Activities (2019)

1. Collection of adult tiger prawn in Batu 1 (landing site) and market (Krokop market, Miri)
2. Juvenile tiger prawn survey at three main rivers (nursery area)
3. Tiger prawn survey (adult) at sea
4. Refugia gallery at Fisheries District Office, Miri, Sarawak.



# Tiger prawn (adult) surveys (24 – 26 August 2019)

Station	Coordinate	Results ( <i>P.monodon</i> )	Others
1.	N 04 41.099 E 113 55.131 (K.Lutong)	13 tails, 5 F, 8 M	Waters depth : 10.2 metres Water temperature :30.5° C Salinity : 34.3 ppt Dissolved oxygen : 3.5 ppm pH : 7.9
2.	N 04 38.340 E 113 53.764(K.Lutong)	29 tails, 13 F, 16 M	Waters depth : 10.2 metres Water temperature :30.4° C Salinity : 34.8 ppt Dissolved oxygen : 4.6 ppm pH : 7.5
3.	N 04 36.115 E 113 53.575(K.Lutong)	53 tails, 26 F, 27 M	Waters depth : 10.5 metres Water temperature :29.9 °C Salinity : 34.7 ppt Dissolved oxygen : 4.9 ppm pH : 7.5



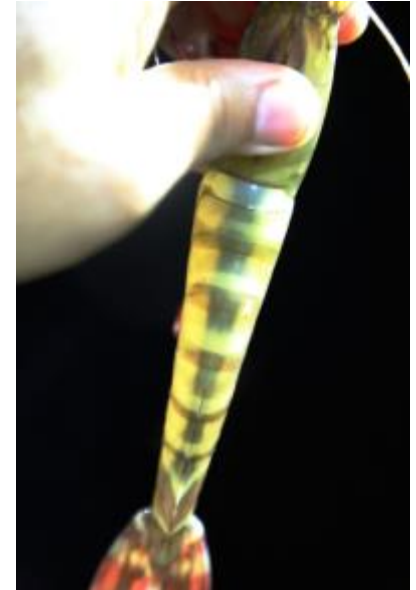
## Tiger prawn (adult) surveys (24 – 26 August 2019)

Station	Coordinates	Results ( <i>P.monodon</i> )	Others
4.	N 04 36.926 E 114 02.159 (K.Baram)	5 tails, 2 male, 3 female	Waters depth : 10.6 metres Water temperature :30.2° C Salinity : 32.4 ppt Dissolved oxygen : 5.2 ppm pH : 7.9
5.	N 04 43.721 E 113 59.171(K.Bararam)	4 tails, 3 male, 1 female	Waters depth : 10.4 metres Water temperature :30.4° C Salinity : 32.8 ppt Dissolved oxygen : 3.9 ppm pH : 7.6

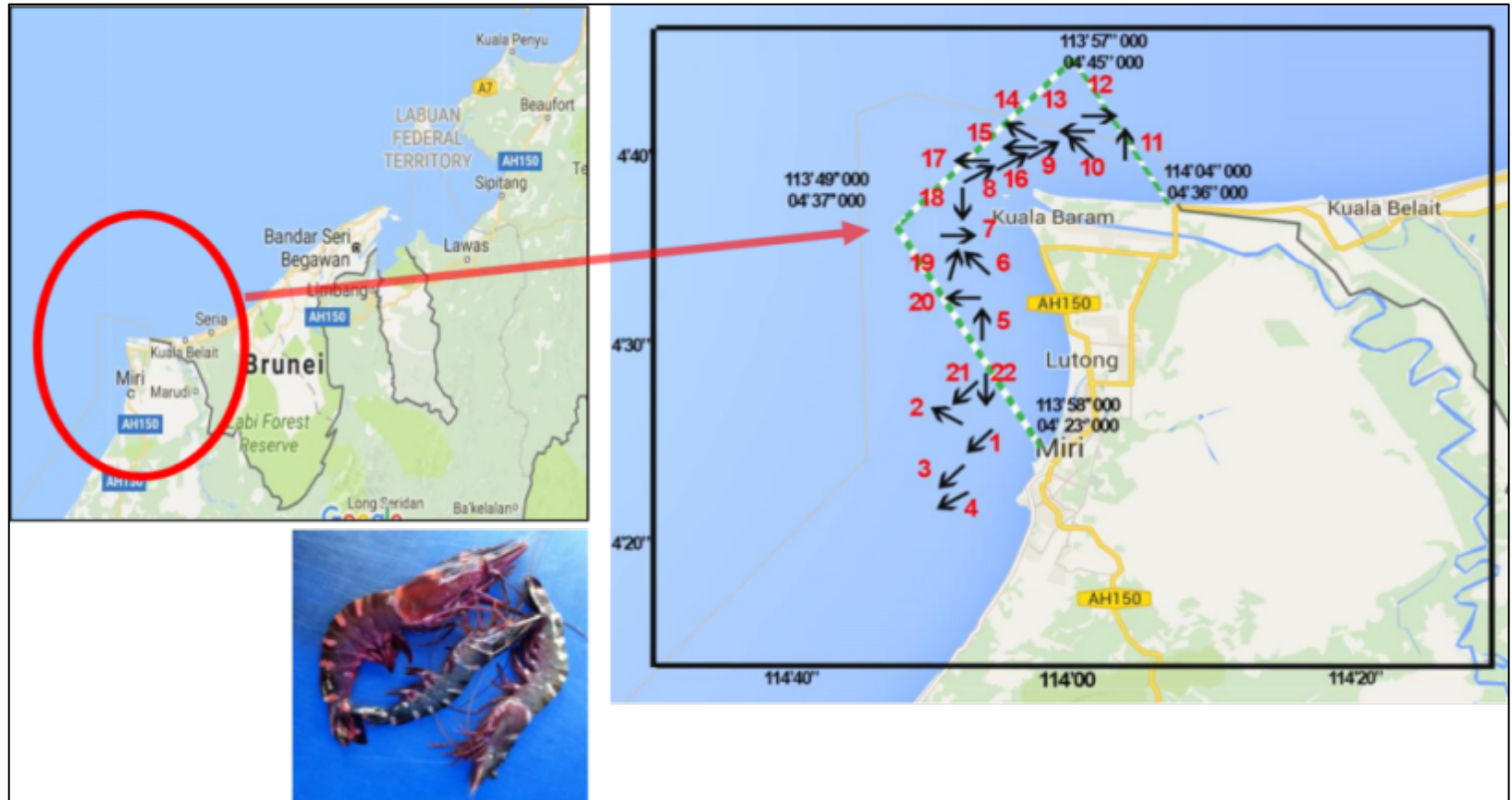
# Tiger prawn (adult) resource surveys at sea (Kuala Baram)



# Tiger prawn (adult) resource surveys at sea (Kuala Lutong)



# Proposed Tiger Prawn Refugia Site (Adult)-295 NM<sup>2</sup>



# Proposed Tiger Prawn Refugia Site (Juvenile)-3 rivers identified, Pasu, Lutong and Sibuti river)



# Site 1 : Pasu river

Salinity : 4 to 15 ppt

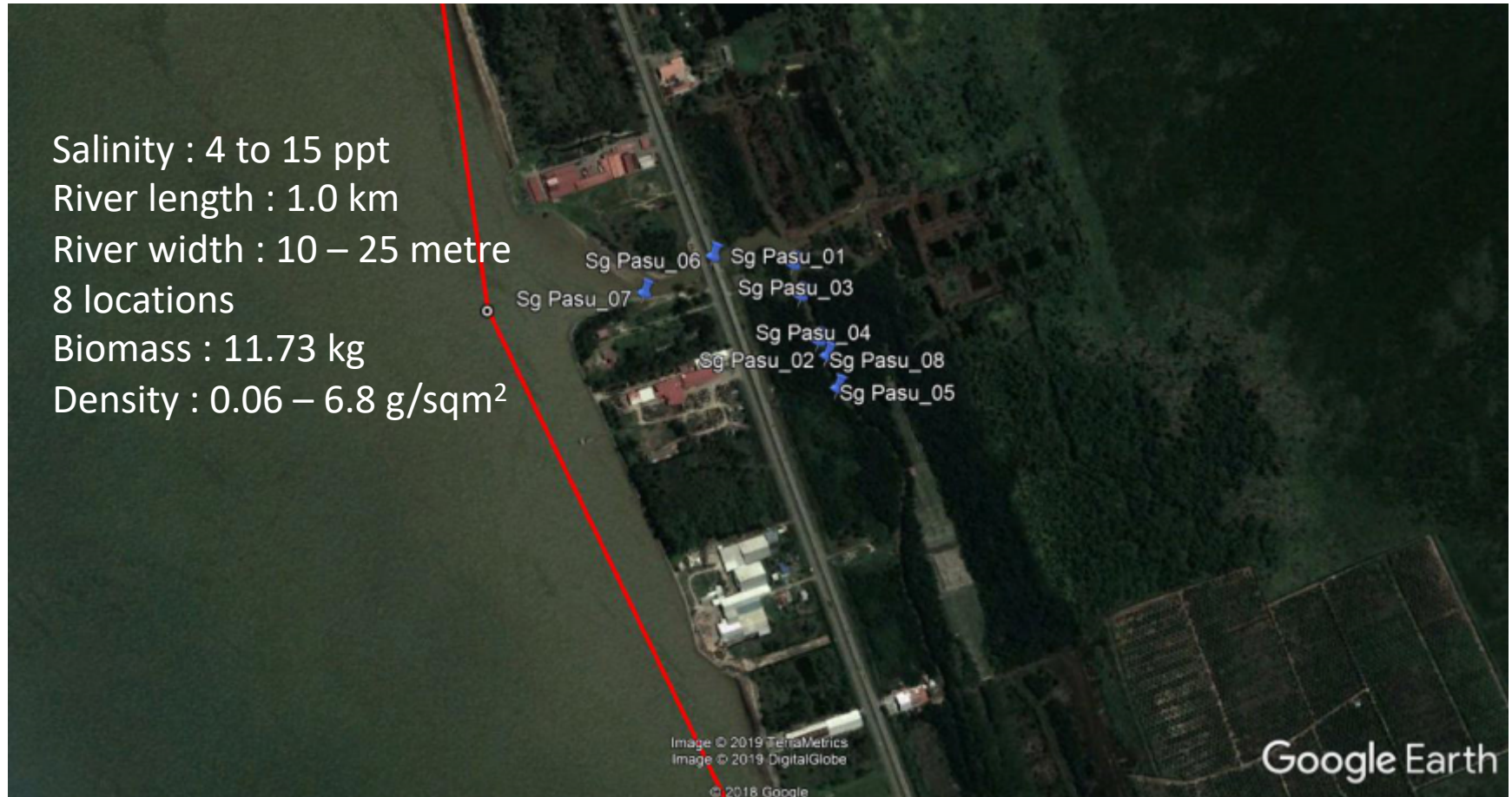
River length : 1.0 km

River width : 10 – 25 metre

8 locations

Biomass : 11.73 kg

Density : 0.06 – 6.8 g/sqm<sup>2</sup>



# Site 2 : Lutong river

Salinity : 15 to 28 ppt

River length: 1.5 km

River width : 30-40 metre

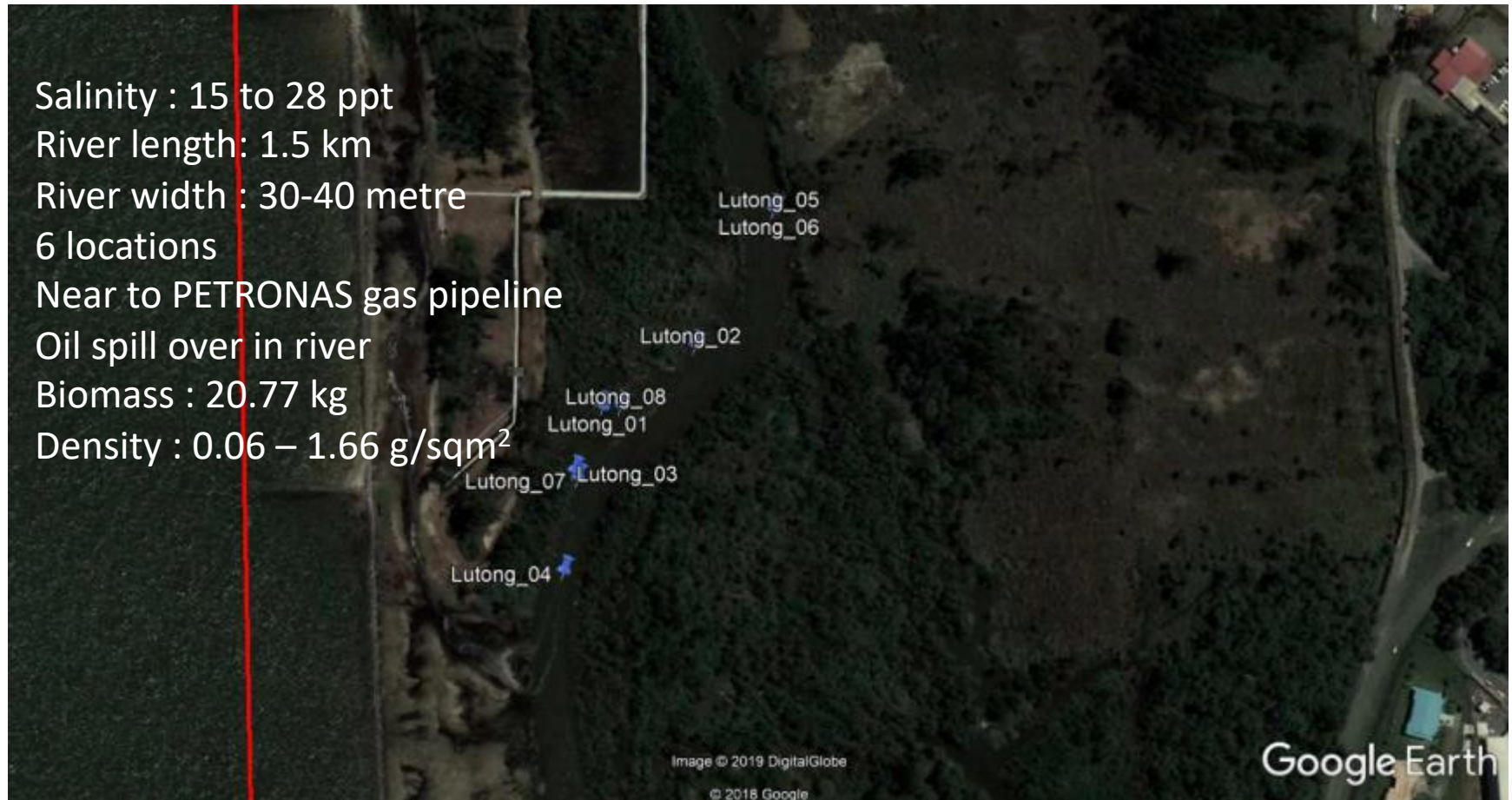
6 locations

Near to PETRONAS gas pipeline

Oil spill over in river

Biomass : 20.77 kg

Density : 0.06 – 1.66 g/sqm<sup>2</sup>



# Site 3 : Sibuti river

Salinity : 15 to 20 ppt

River length : 3 km

River width : 80 – 120 metre

6 locations

Biomass : 15.22 kg

Density : 0.025 – 0.82 g/sqm<sup>2</sup>



Image © 2019 TerraMetrics  
Image © 2019 CNES / Airbus  
© 2018 Google

Google Earth



# Posters on refugia displayed at Refugia gallery

**PROJEK REFUGIA PERIKANAN  
DOF MALAYSIA/SEAFDEC/UNEP/GEF**

**PENGENALAN**



Laut China Selatan dan Teluk Siam merupakan suatu kawasan marin yang cetek yang mempunyai kepelbagaian biologi dan menyokong kegiatan perikanan yang signifikan dan penting kepada jaminan keselamatan makanan, serta menyumbang kepada sumber pendapatan eksport bagi negara-negara Asia Tenggara. Pendaratan ikan dari kawasan ini menyumbang kepada kira-kira 10% daripada keseluruhan pengeluaran perikanan tahunan global dan memberi sumbangan yang signifikan kepada ekonomi negara-negara yang berada dalam kawasan Teluk Siam dan Laut China Selatan.

Stok ikan di Laut China Selatan dan Teluk Siam mengalami tekanan yang tinggi daripada aktiviti perikanan, sehinggakan kebanyakan spesies-spesies ikan yang mempunyai kepentingan ekonomi telah dieksploitasi secara berlebihan. Permintaan global yang semakin meningkat bagi produk perikanan dan kebergantungan komuniti pantai terhadap ikan sebagai sumber makanan dan sumber pendapatan, menyebabkan daya usaha penangkapan ikan semakin meningkat.

Komponen perikanan dan habitat dalam Projek UNEP/GEF Laut China Selatan menumpukan kepada peranan penting yang dimainkan oleh habitat-habitat seperti paya bakau, terumbu karang, rumput laut dan tanah lembab dalam mengekalkan pengeluaran sumber perikanan di kawasan Laut China Selatan dan Teluk Siam.

Projek ini telah disertai oleh 6 buah negara serantau iaitu Vietnam, Kambodja, Thailand, Indonesia, Malaysia dan Filipina. 2 kawasan telah dicadangkan sebagai tapak refugia di Malaysia iaitu :

- Tanjung Leman, Johor bagi spesies **udang karang** dan
- Kuala Baram, Sarawak bagi spesies **udang harimau**.




**REFUGIA PERIKANAN DALAM KONTEKS  
PROJEK UNEP/GEF LAUT CHINA SELATAN**

**DEFINISI REFUGIA PERIKANAN**

*"Kawasan marin atau persiran pantai yang telah dikenai(pasti secara ruang dan geografinya, yang mana langkah-langkah pengurusan yang spesifik dijalankan untuk melindungi spesies penting (sumber perikanan) semasa peringkat kritikal dalam kitar hidup organisma tersebut, bagi mencapai penggunaan sumber secara mampan"*

**CIRI-CIRI REFUGIA PERIKANAN**

- BUKAN "Zon larangan penangkapan ikan".
- Mempunyai objektif penggunaan sumber secara mampan demi kebaikan generasi sekarang dan masa hadapan.
- Mewujudkan suatu kawasan tertutup di dalam refugia bagi melindungi spesies (atau kumpulan spesies) semasa peringkat kritikal (penyumbang penting) dalam kitar hidup spesies tersebut.
- Fokus kepada peringkat kritikal dan penting dalam kitar hidup sesuatu spesies perikanan, termasuklah peringkat bertelur dan kawasan nurseni, atau kawasan habitat yang menjadi tempat perlindungan induk spesies tersebut.
- Mempunyai petan pengurusan yang berkaitan.




**Induk Udang harimau**



**Juvenil udang harimau**

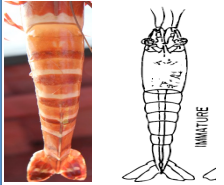
# Posters on display at Tiger Prawn Refugia gallery, Miri Fisheries Office

## Ovarian Maturation Stages

Jabatan Perikanan Malaysia

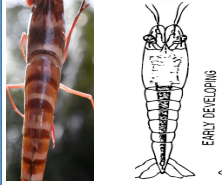
This maturation stage is based on the external appearance of *Penaeus monodon* ovaries at different stages of maturity as seen through the dorsal exoskeleton (modified from Primavera, 1983)

**Stage 1**



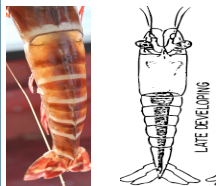
*Stage I and V (undeveloped and spent stages).* Ovaries are thin, transparent, and not visible through the dorsal exoskeleton.

**Stage 2**



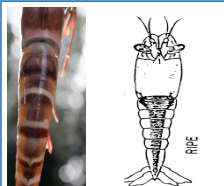
*Stage II (developing stage).* Referred to as an early maturing stage, ovaries are flaccid and white to olive green in color, and discernible as a linear band through the Exoskeleton.

**Stage 3**



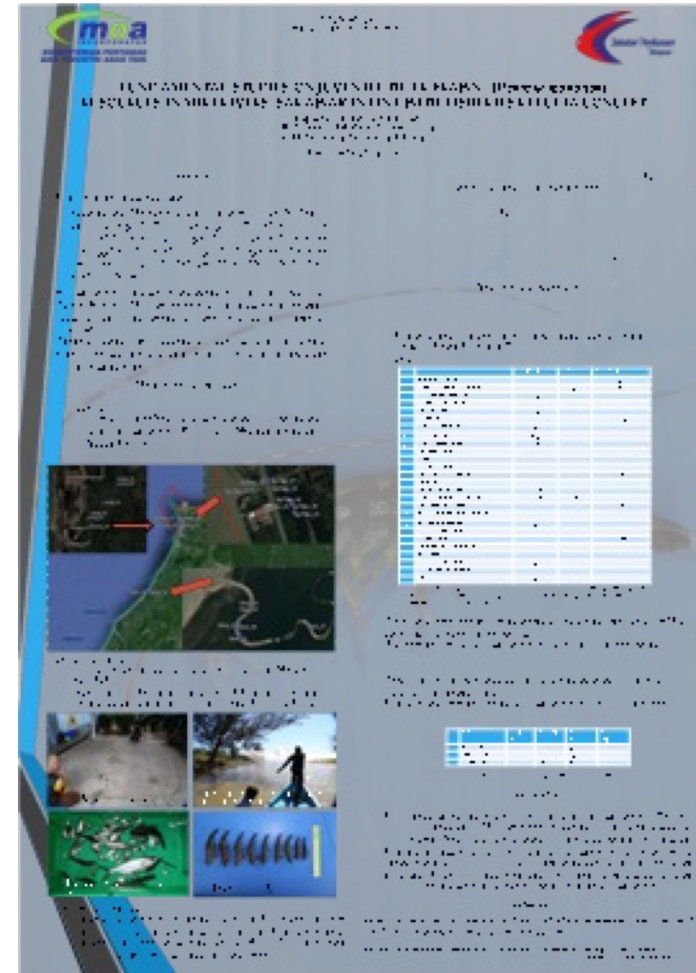
*Stage III (nearly ripe stage).* Ovaries have glaucous color with the anterior portion thick and expanded. They are very visible through the exoskeleton, particularly at the first abdominal segment, when viewed against the light.

**Stage 4**



*Stage IV (ripe stage).* The ovary classified as ripe (mature) stage is diamond-shaped, expanding through the exoskeleton of the first abdominal segment. The isolated ovary appears dark olive green, filling up all the available space in the body cavity.

Prepared by: Nurisda binti Abdul Han, Awg. Mohd. Shahryzan binti Awang Omar, Fisheries Research Institute, Bintawa, Photographed by: Hady Asok

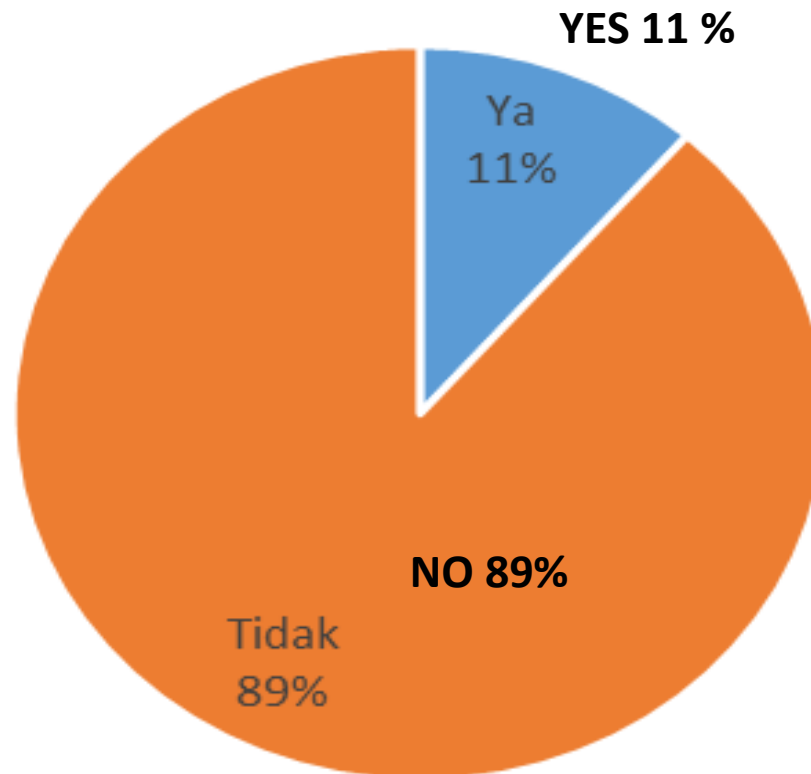


SISTEM PENGALIHAN PERIKANAN BUKIT MELAK (SARAWAK) KE MUDA (SARAWAK) DAN KUALA LUMPUR (SELANGOR)

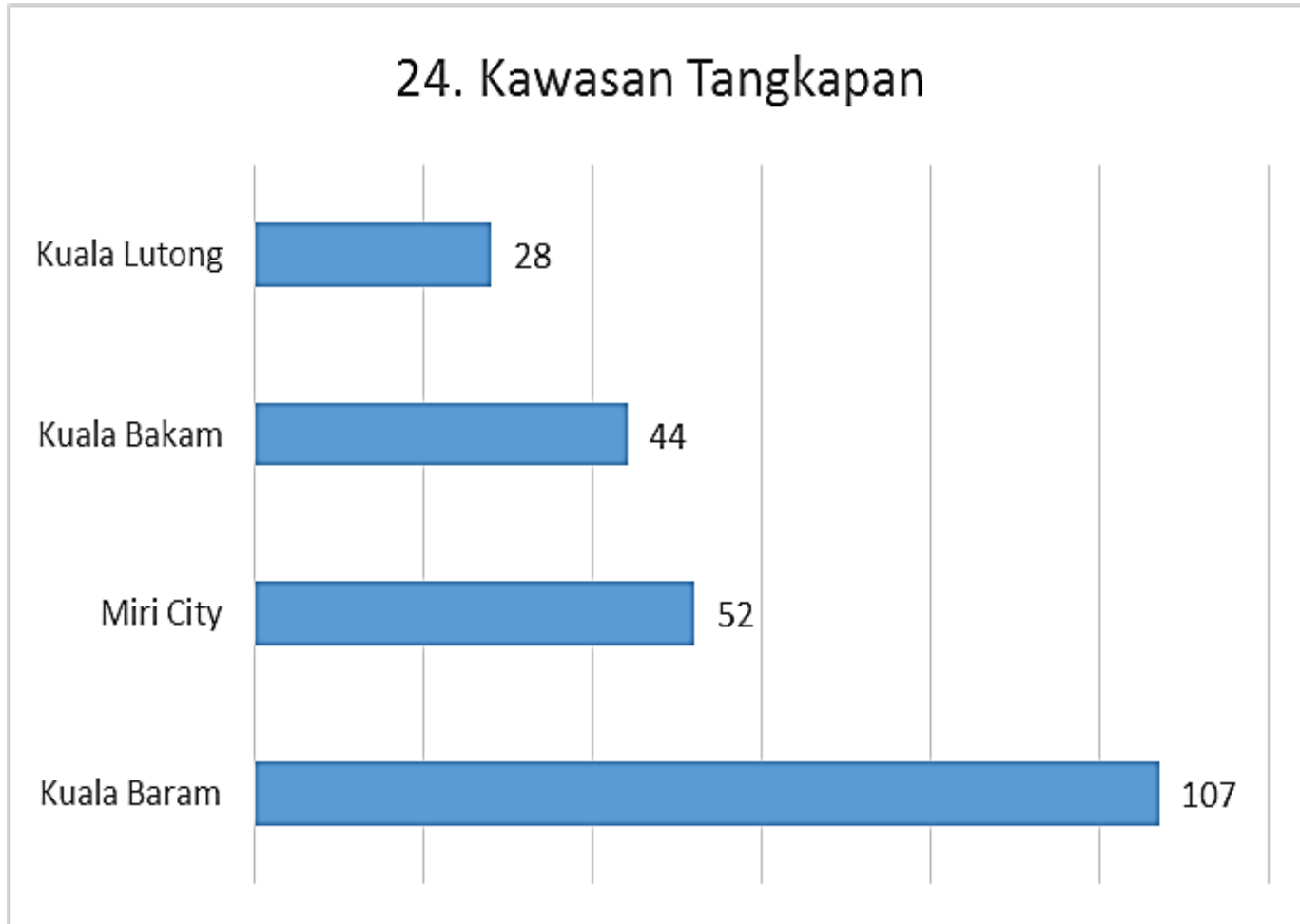
NO	LOKASI	NO	LOKASI
1	...	...	...
2	...	...	...
3	...	...	...
4	...	...	...
5	...	...	...
6	...	...	...
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19	...	...	...
20	...	...	...

# Socio-Economic Survey – Tiger Prawn

Do you know about the Tiger Prawn Refugia?



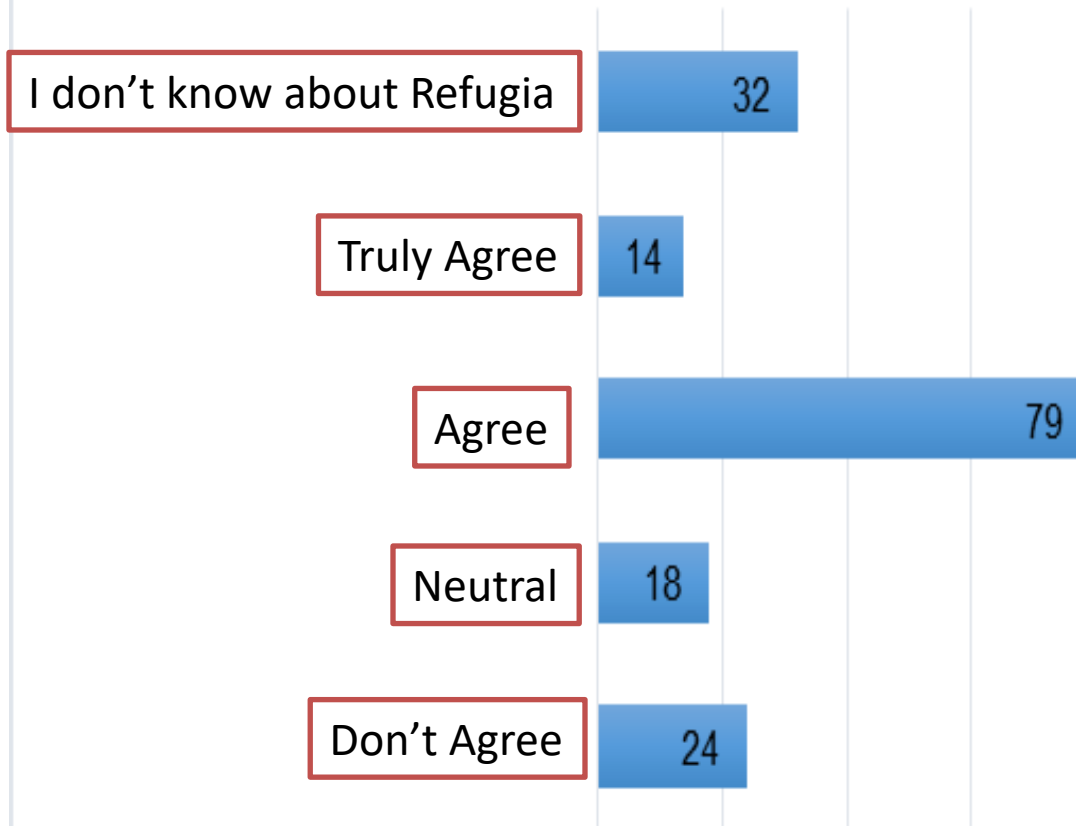
# Socio-economic Study (by UiTM-JPLS, 2016)



Number of respondents: 231

# Prohibition of Tiger Prawn Fisheries during Breeding Season

39. Larangan menangkap udang harimau perlu dibuat sewaktu musim pembiakan



(by UiTM-JPLS, 2016)

# Refugia Related Papers 2019

- Ryon Siow, Nurridan Abdul Han, Hadil Rajali and Richard Rumpet. 2019. The Establishment of Fisheries Refugia as a New Approach to Sustainable Management of Fisheries in Malaysian Waters. Paper presented at the World Seafood Congress (WSC), 9 – 11 September 2019, Penang, Malaysia.
- Ryon Siow and Abd Haris Hilmi bin Ahmad Arshad. 2019. The Composition and Density of Fish Resources in the Surrounding Waters Off Tioman Island and Tinggi Island, Malaysia. Paper presented at the International Conference on Oceanography and Sustainable Marine Production (ICOSMaP 2019), 29 – 31 October 2019, Kuantan, Pahang, Malaysia.

# Refugia Related Papers 2019

- Nurridan Abdul Han, Hadil Rajali and Richard Rumpet. 2019. Fundamental studies on juvenile tiger prawn (*Penaeus monodon*) resources in Miri rivers, Sarawak in line with fisheries refugia concept. Paper presented at the International Conference on Oceanography and Sustainable Marine Production (ICOSMaP 2019), 29 – 31 October 2019, Kuantan, Pahang, Malaysia.
- Nurridan Abdul Han. 2019. Fish refugia as a new tool for fisheries management in Malaysian waters. Paper presented at the Fisheries Research Institute Seminar, 25 – 27 November 2019, Glami Lemi, Negeri Sembilan, Malaysia.

# Conferences

WSC Penang





# 3. Financial Report (Until December 2019)



# Financial Performance (until 31 December 2019)

CODE	ALLOCATION (USD)	EXPENSES (USD)	EXPENSE S PERCENT AGE (%)	BALANCE (USD)	BALANCE PERCENTAG E (%)
1000	55,121.00	45,310.00	73.36	7,663.00	26.64
2000	20,000.00	0.00	0.00	20,000.00	100.00
3000	44,936.00	6,457.00	56.50	3,484.00	43.50
4000	4,800.00	12,872.00	236.00	-6,550.00	0.00
5000	783.00	0.00	0.00	783.00	100.00
<b>TOTAL</b>	<b>125,640.00</b>	<b>64,639.00</b>	<b>51.45</b>	<b>61,001.00</b>	<b>48.55</b>

# Financial Performance Details (Code 1000) (until 31 December 2019)

CODE	ALLOCATION (USD)	EXPENSES (USD)	EXPENSES PERCENTAGE (%)	BALANCE (USD)	BALANCE PERCENTAGE (%)
1100 (Project Personal)	10,181.00	9,756.00	95.83	425.00	4.17
1200 (Consultants)	1,943.00	1,309.00	67.37	634.00	32.63
1600 (Travel)	42,997.00	34,245.00	79.65	8,752.00	20.35
<b>TOTAL</b>	<b>55,121.00</b>	<b>45,310.00</b>	<b>82.20</b>	<b>9,811.00</b>	<b>17.80</b>

# Financial Performance Details (Code 2000) (until 31 December 2019)

CODE	ALLOCATION (USD)	EXPENSES (USD)	EXPENSES PERCENTAGE (%)	BALANCE (USD)	BALANCE PERCENTAGE (%)
2200 (Sub Contracts) (MoU)	20,000.00	0.00	0.00	20,000.00	100.00
<b>TOTAL</b>	<b>20,000.00</b>	<b>0.00</b>	<b>0.00</b>	<b>20,000.00</b>	<b>100.00</b>

# Financial Performance Details (Code 3000) (until 31 December 2019)

CODE	ALLOCATION (USD)	EXPENSES (USD)	EXPENSES PERCENTAGE (%)	BALANCE (USD)	BALANCE PERCENTAGE (%)
3200 (Group Training)	28,436.00	4,696.00	16.51	23,740.00	83.48
3300 (Meetings /Conferences)	16,500.00	1,761.00	10.67	14,739.00	89.33
<b>TOTAL</b>	<b>44,936.00</b>	<b>6,457.00</b>	<b>56.50</b>	<b>38,479.00</b>	<b>85.63</b>

# Financial Performance Details (Code 4000) (until 31 December 2019)

CODE	ALLOCATION (USD)	EXPENSES (USD)	EXPENSES PERCENTA GE (%)	BALANCE (USD)	BALANCE PERCENTA GE (%)
4300 (Premises)	4,800.00	12,872.00	268.16	-8,072.00	0.00
<b>TOTAL</b>	<b>4,800.00</b>	<b>12,872.00</b>	<b>268.16</b>	<b>-8,072.00</b>	<b>0.00</b>

# Financial Performance Details (Code 5000) (until 31 December 2019)

CODE	ALLOCATION (USD)	EXPENSES (USD)	PERCENTAGE EXPENSES (%)	BALANCE (USD)	PERCENTAGE BALANCE (%)
5200 (Reporting Cost)	783.00	0.00	0.00	783.00	100.00
<b>TOTAL</b>	<b>783.00</b>	<b>0.00</b>	<b>0.00</b>	<b>783.00</b>	<b>100.00</b>