



FISHERIES REFUGIA PROFILE

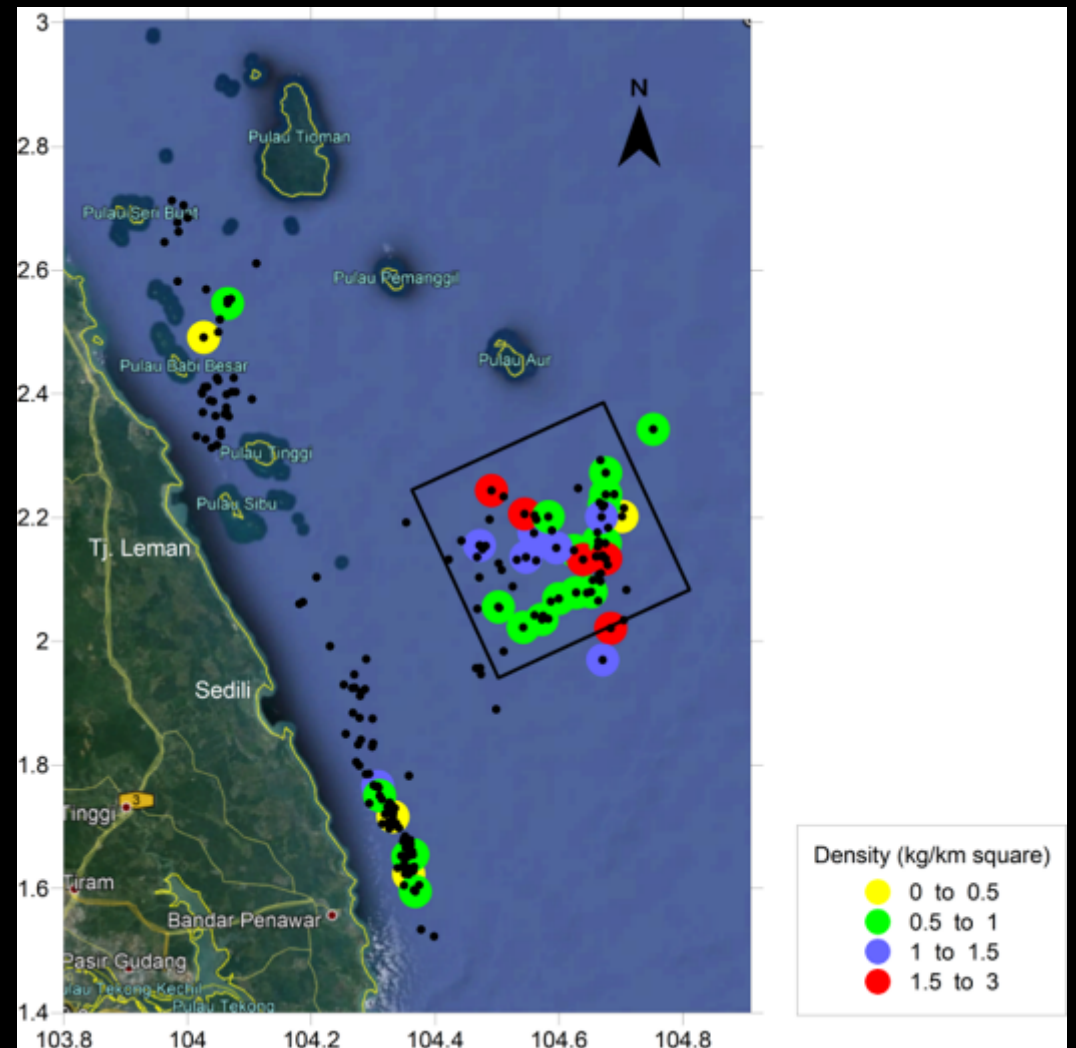
(MALAYSIA)

Lobster & Tiger Prawn

REFUGIA SPINY LOBSTER

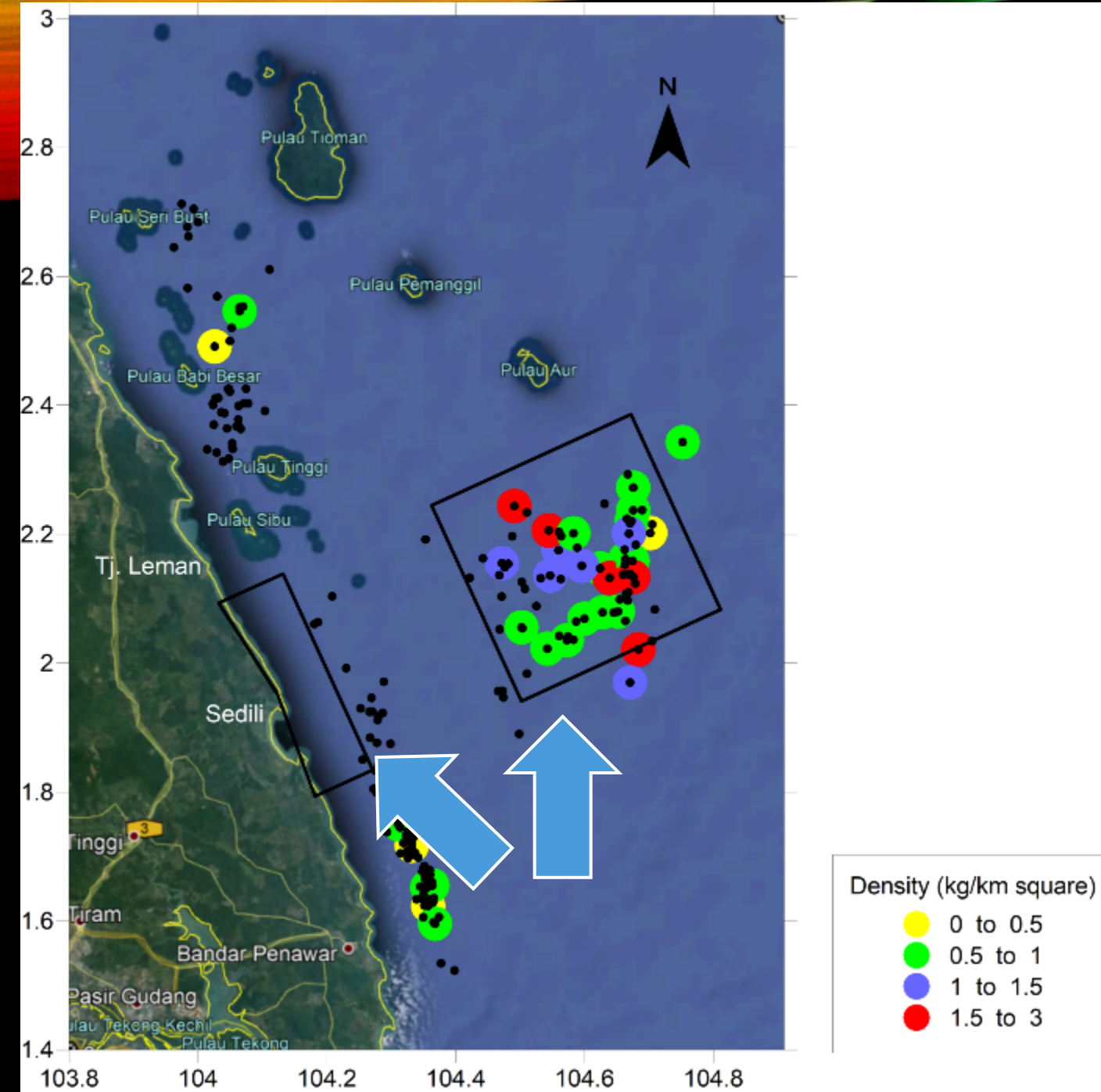
PROPOSED LOBSTER REFUGIA SITE (OPTION A)

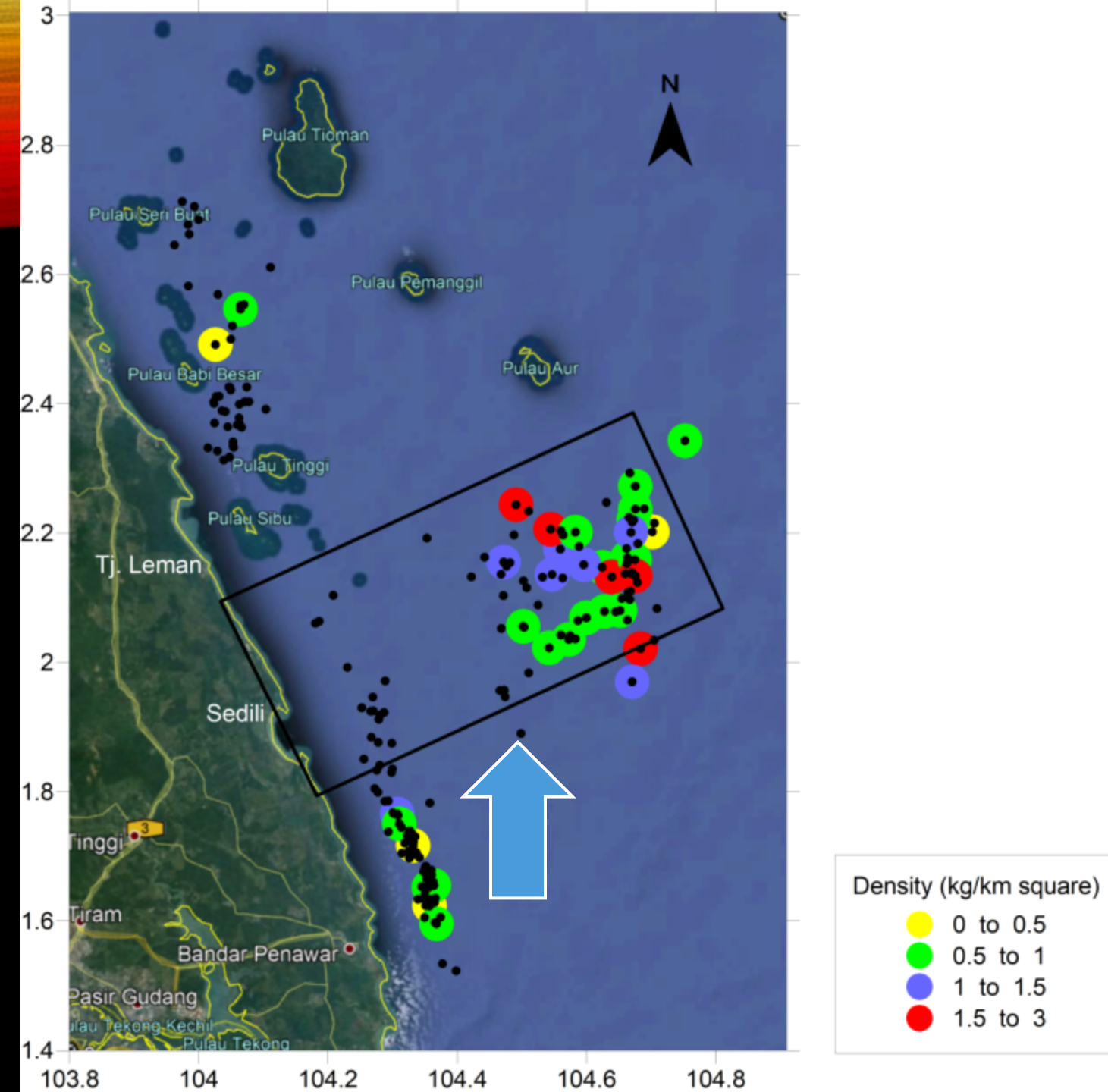
1. Site name: Tanjung Lemau, East Johor, Malaysia
2. Geographic location (lat, long in degrees and minutes):
 - 2° 14.670'N, 104° 21.753'E
 - 2° 23.146'N, 104° 40.334'E
 - 2° 4.972'N, 104° 48.686'E
 - 1° 56.441'N, 104° 30.137'E
- 3. Site information:
 - - Geography
 - South China Sea, open sea, 20 nautical miles from main shoreline, 5 nautical miles from nearest island (Aur Island), average water depth >20 m



PROPOSED LOBSTER REFUGIA SITE (OPTION B)

- Area size : 140,023 Ha / 1400 km² (zone C) + 39,146 Ha / 391 km² (zone A)
- Dimension: 20 x 20 nm + 5 x 20 nm
- Cover zone A and C
- Zone A protect juveniles during pre-spawning season
- Zone C protect spawners during spawning season





PROPOSED LOBSTER REFUGIA SITE (OPTION C)

- Area size : 287,636 Ha / 2876 km²
- Shoreline to 40 nm from mainland
- 5 nm from Aur Island
- Dimension: 20 x 40 nm
- Cover zone A, B and C
- **Need further discussions with stakeholders**

HISTORY, POPULATION, SOCIO-ECONOMY

- - **Aur Island**

- Races include Malay
- Small island, part of the Johor Marine Park (land area 7.2 km²)
- Population about 217 (Source: Mersing District Office)
- Main economic activity : Tourism (5 chalet operators)
- Other economic activity: Agriculture, Fisheries
- Facilities : clean water, electricity: genset (private), postal, police station, community hall, school, mosque
- Island is an important stopover for local fishermen seeking shelter from bad weather

Important coastal habitats in the area;

-Coral reefs near Aur Island, muddy and sandy mud sediment at refugia site



NUMBER AND TYPES OF FISHING VESSELS OPERATING IN THE REFUGIA AREA

Type of gear	No. of licensed fishing vessels (2018)	No. of fishermen (2018)
Trawl nets	199	1253
Gill / Drift nets	1525	3220
Stationary traps	17	39
Portable traps	17	108
Hooks & Lines	51	199
Fish purse seines	91	2562
Total	1900	7381

The species and size selectivity of the principal fishing :

- **Trawl nets (lobster as bycatch) – adult lobsters**
- **Gill / drift nets – mainly juveniles lobsters**
- **Traps – adult and juveniles lobsters**
- **Hooks and lines – adult lobsters**

THE ROLE OF FISHERIES REFUGIA IN THE PRODUCTION (AND ECONOMIC VALUE) OF PRIORITY SPECIES

- Ensure the adult lobsters to breed and spawn during peak spawning period



NUMBER OF FISHERIES COMMUNITIES IN THE AREA

- 4 Fisherman Association:
 1. (Fishermen Association Mersing Area)
 2. (Fishermen Association Endau Area)
 3. (Fishermen Association Sedili Area)
 4. (Fishermen Association Pengerang Area)



- Existing fisheries management measure in the area of the site
 - 2 nautical miles no-take-zone surrounding the Marine Parks island (including Aur Island)
 - Fishing zoning system (gear type restriction and boat capacity restriction according to distance from the shoreline)
- Usage of refugia by threatened and endangered marine species
 - Area are frequented by dolphins and sea turtles

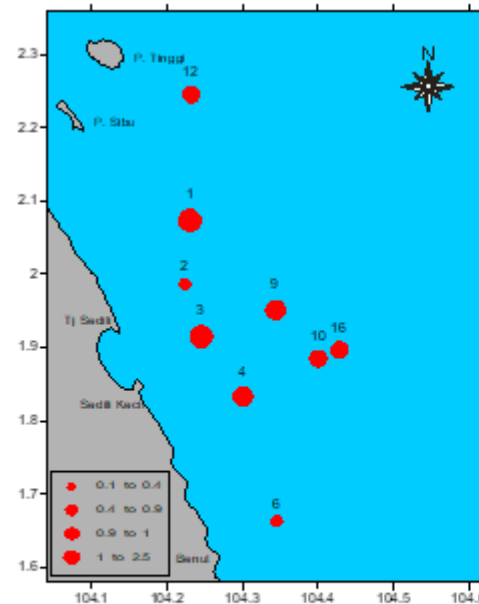


PRIORITY SPECIES INFORMATION:

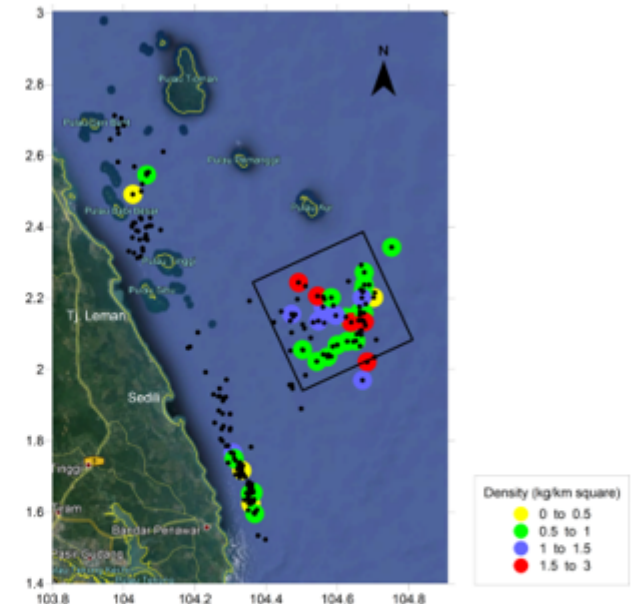
- Name (scientific/common/local name)
- ***Panulirus polyphagus***, Mud Spiny lobsters, udang kara



Distribution



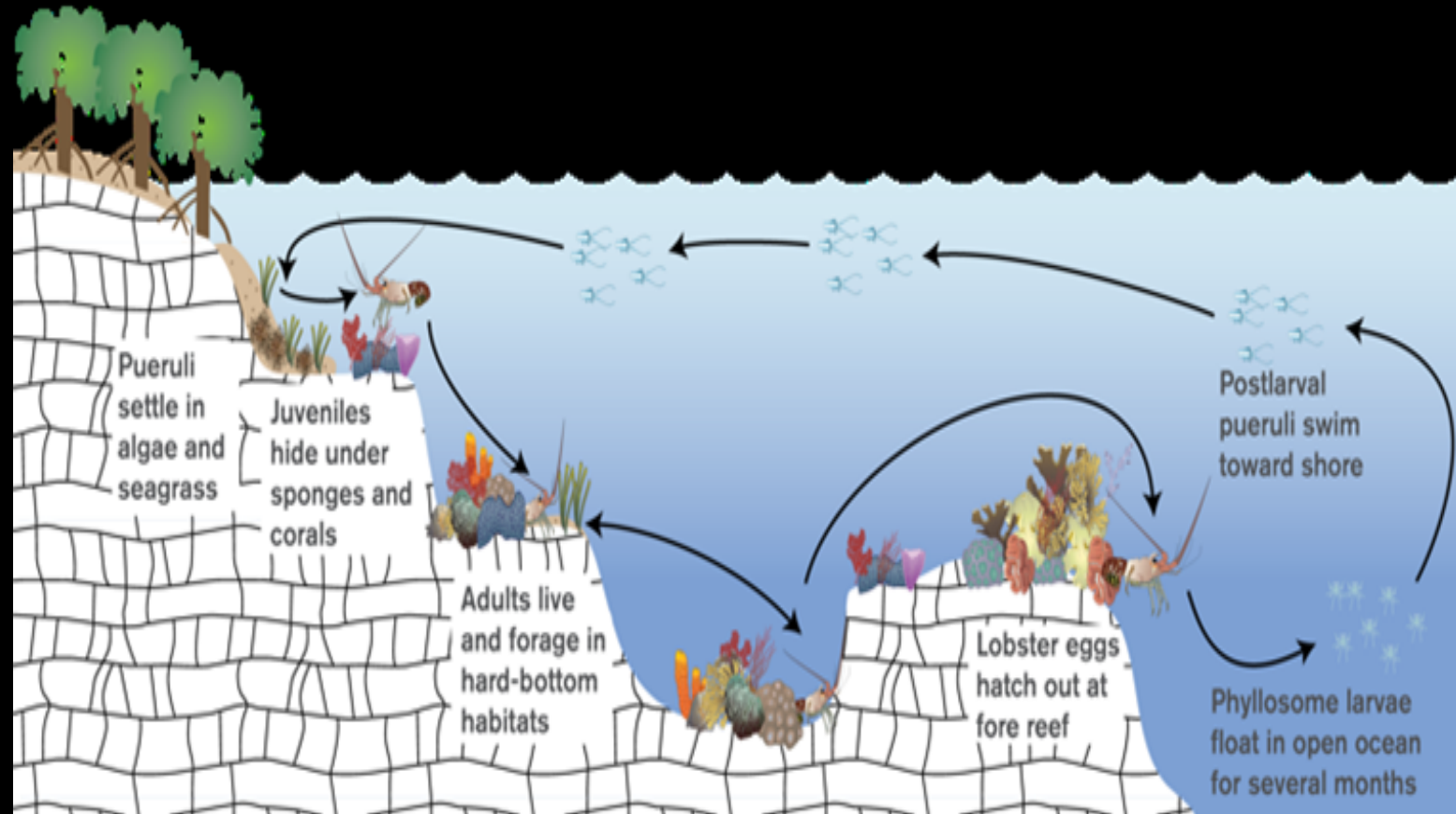
Distribution and Density of Phyllosoma (larvae) in East Johor (Aug 2017)



Distribution of adult Lobster

LIFE CYCLE AND MATING BEHAVIOR

- Gonadosomatic index and size frequency
 - Egg-bearing lobsters are usually found during the months of July-September
 - This coincide with a previous study by Alias Man (2000), which state that the peak breeding season is in August
- -Area of habitat in each stage/migration pattern
 - Juvenile stage: rocky shore area
 - Spawning adult: coral reef sloping to deeper water
 - Larvae: open sea



LENGTH AT FIRST MATURITY / SIZE / WEIGHT / AGE

- Female lobsters begin to bear eggs when they reach size of 400g and total length of 200mm (Alias *et al.* 2000)
- Fecundity 72 000 – 945 000 (depending on size) (Kagwade, 1988)
- Size at first maturity (male 51-55 mm CL; female 51-60 mm) (Kizhakudan & Patel, 2010), 80 mm CL (Alias *et al.* 2000)



CPUE/Stock size/ MSY

Table : The potential yield (metric ton) and exploitation rate (year⁻¹) of spiny lobster and slipper lobster in the East Johor waters from the year 2017 survey

Species	Spiny Lobster
Area, a (km ²)	1,812
Density, D (kg.km ⁻²)	7.26
Biomass, Bc (metric ton)	26.3
Landing, Y (metric ton)	4 – 113
Mortality, M	0.45
Potential Yield, MSY (metric ton)	8 – 62
Exploitation Rate, E (year ⁻¹)	0.2 – 0.9

INFORMATION FOR GIS MAPPING:

- - Fisheries refugia boundary
 - 2° 14.670'N, 104° 21.753'E
 - 2° 23.146'N, 104° 40.334'E
 - 2° 4.972'N, 104° 48.686'E
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- - Fishing area by each fishing gear
 - Zon A: 0-5nm: Drift net, traps, rod and lines
 - Zon B: 5-12nm: trawlers, traps,
 - Zon C: 12nm-EEZ: trawlers

- - Important coastal habitats
 - Mangroves, mud flat, seagrass, coral reef.
- - Area of habitat in each stage/migration pattern of priority species
 - Juvenile stage: rocky shore area
 - Spawning adult: coral reef
 - Larvae: open sea

REFUGIA TIGER PRAWN (ADULT)

1. Site name:

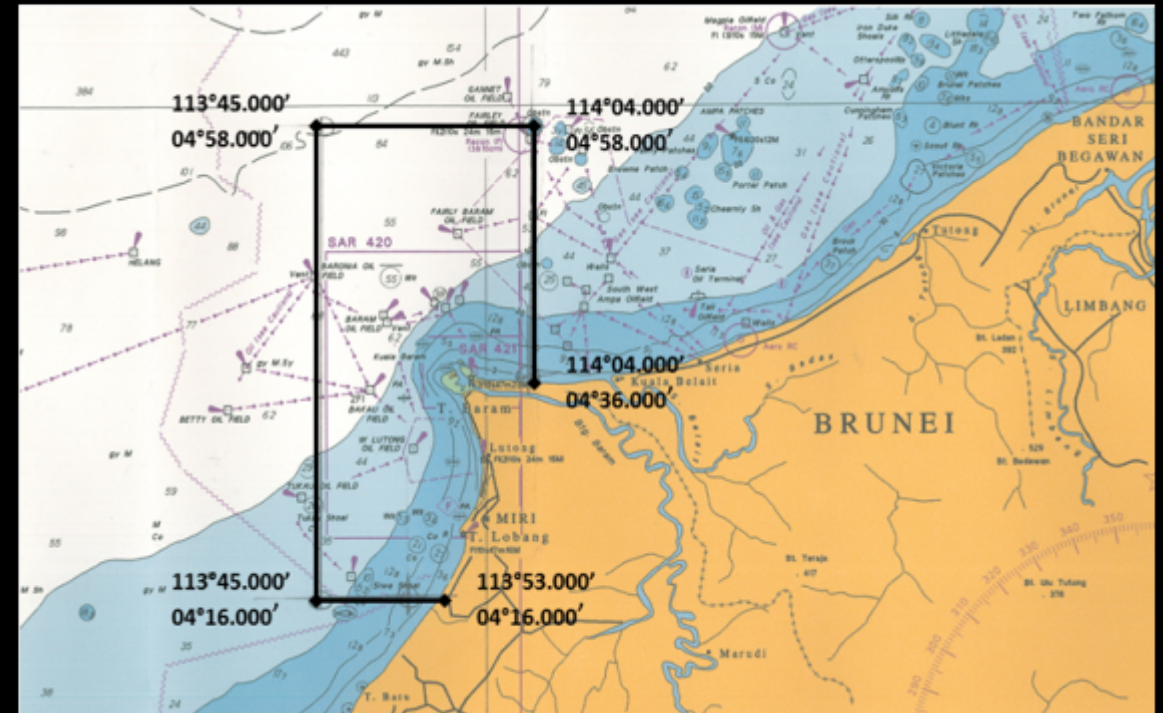
- Kuala Baram, Miri, Sarawak

2. Geographic location (lat, long in degrees and minutes):

- $4^{\circ} 45.000'$, $113^{\circ} 57.000'$
- $4^{\circ} 36.000'$, $114^{\circ} 4.000'$
- $4^{\circ} 23.000'$, $113^{\circ} 58.000'$
- $4^{\circ} 37.000'$, $113^{\circ} 49.000'$

3. Site information:

- - Geography
 - Nearby border of Brunei
- - History, population, socio-economy
 - Races include Iban, Malay, Orang Ulu, Kedayan, Kayan, Kelabit, Chinese
 - Socio-economy-Most of population are fishermen and farmers. Logging also one of the activities in Kuala Baram.



PROPOSED TIGER PRAWN REFUGIA SITE (JUVENILE)-

- 3 rivers identified,
- Pasu river
- Lutong river and
- Sibuti river



IMPORTANT COASTAL HABITATS IN THE AREA

- There are size able mangrove in Kuala Baram area,
- Coral reef are found offshore, Sibuti , Miri-Sibuti National Marine Park nearby (manage by Sarawak state government)
- In Miri waters, coral reef are located at the Miri-Sibuti Coral Reef National Park.
- It is the largest offshore national park in Sarawak, gazette in 2007 and comprises an area of 186,930 hectare.
- There is no seagrass beds in the vicinity.

Number and types of fishing vessels operating in the refugia area

Inboard powered Fishing vessel	5-9.9 GRT	10-14.9 GRT	15-19.9 GRT	20-24.9 GRT	25-39.9 GRT	40-69.9 GRT	70 GRT and above
No. of boats	1	2	2	10	17	41	4

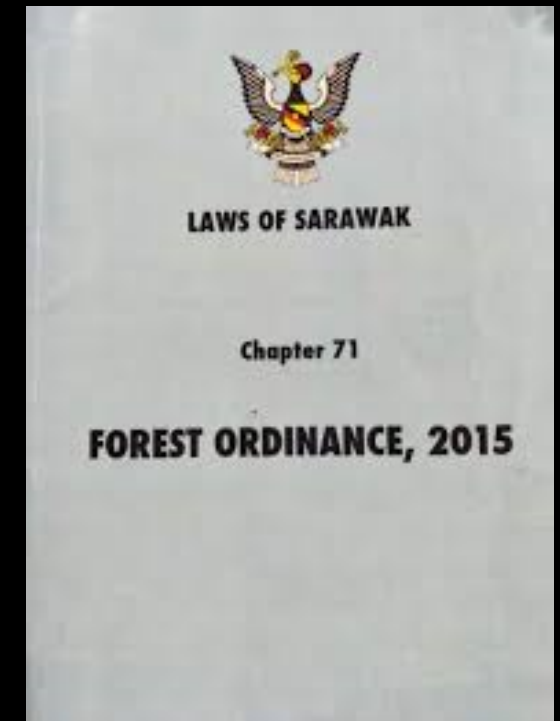
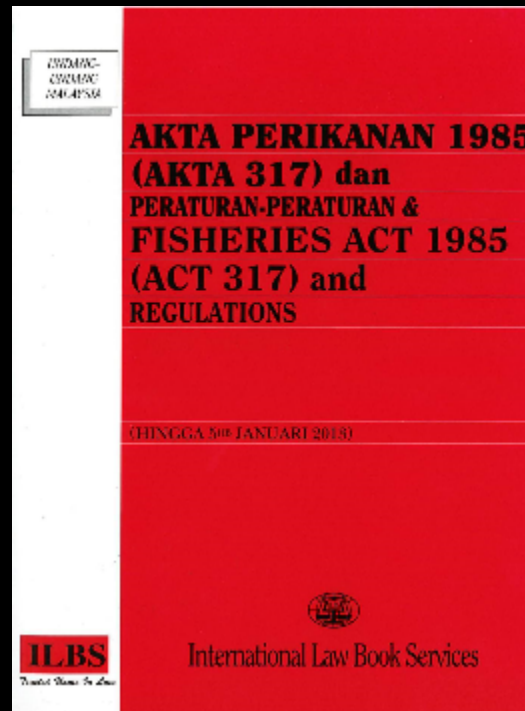
- Outboard powered fishing vessel- 376 boats

- The species and size selectivity of the principal fishing gear used:

- Mostly demersal species including tiger prawn. Fishing gears used is trawl, drift net, cast net

EXISTING FISHERIES MANAGEMENT MEASURE IN THE AREA OF THE SITE

- Fisheries Act 1985,
- Sarawak forestry Ordinance



PRIORITY SPECIES INFORMATION:

- - Name (scientific/common/local name)
 - ***Penaeus monodon***/Udang harimau/Tiger prawn
- - Morphology
 - The rostrum, extending beyond the tip of the antennular peduncle, has 6 to 8 (mostly 7) dorsal and 2 to 4 (mostly 3) ventral teeth, and is sigmoidal in shape.



DISTRIBUTION

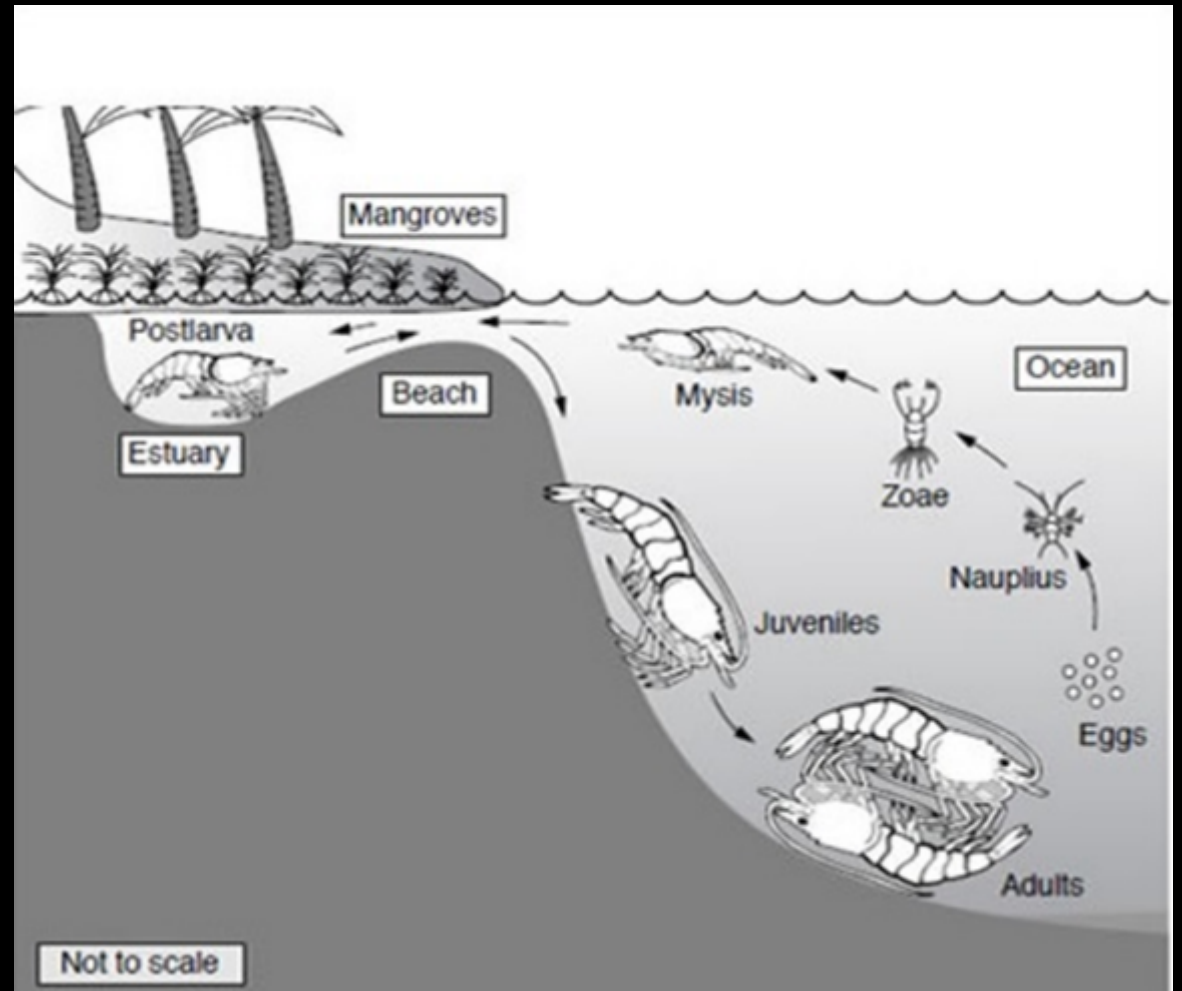
- The giant tiger prawn is widely distributed throughout the greater part of the Indo-West Pacific region: South Africa, Tanzania, Kenya, Somalia, Madagascar, Saudi Arabia, Oman,
- Pakistan, India, Bangladesh, Sri Lanka, Indonesia, Thailand, Malaysia, Singapore, Philippines, Hongkong, Taiwan, Korea, Japan, Australia, and Papua New Guinea

Main producer countries :



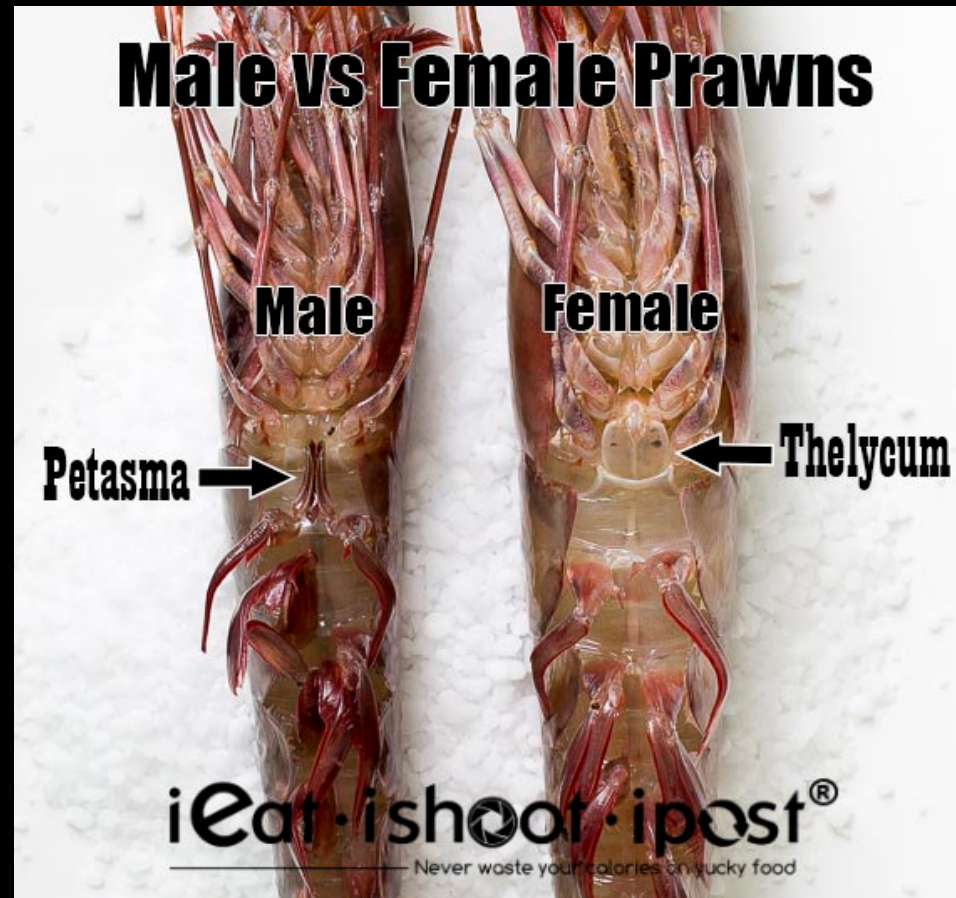
LIFE CYCLE AND MATING BEHAVIOR

- The life history of *P. monodon* has an offshore planktonic larval phase of about 14 to 20 days,
- an estuarine, benthic postlarval and juvenile phase of over 6 months
- a coastal subadult phase of 5 to 6 months
- and an inshore and offshore ocean adult and spawning phase



LENGTH AT FIRST MATURITY / SIZE / WEIGHT / AGE

- Male :
 - 37 mm Carapace length (CL),
 - 35 g Body weight(BW),
 - 10 months
- Female :
 - 47 mm CL,
 - 67.7 BW,
 - 10 months




AREA OF HABITAT IN EACH STAGE/MIGRATION PATTERN

- *Penaeus monodon* is found at depths from 0 to 110 m, in
- habiting bottom mud and sand.
- Giant tiger prawn live in brackish, estuarine (juveniles) and marine (adults) environments (FAO, 1980).
- In its natural range, *P. monodon* frequents water temperatures of 18–34.5 °C and salinities of 5–45 ppt (Branford, 1981; Chen, 1990).
- It is even grown commercially at salinities of 1–5 ppt (Musig and Boonnom, 1998).
- *Penaeus monodon* appears to select muddy mangrove channels and often associates with marginal or floating vegetation (de Freitas, 1986).

CPUE/STOCK SIZE/ MSY

- Spawners :23.00 metric tonnes
- Ovarian maturation stages starts from May until November yearly (I – V)
- Juvenile : Density : 0.025 – 6.8 g/m²
- : Biomass : 11.73 to 20.77 kg



Thank you
Terima kasih