Surat Thani Blue Swimming Crab
Fishery Improvement Project

Milestone 36: Updated Literature Review on Risk from BSC Fishing on Habitats in Surat Thani

I. Coastal and Marine Habitats in Surat Thani Province

There are three critical coastal and marine habitats in Surat Thani Province namely seagrass beds, coral reefs, and mangroves. Mangroves occupied an area of 76.53 km^2 while coral reefs and seagrass beds occupied 57.87 km^2 and 24.37 km^2, respectively.

SEAGRASS

Seagrass beds in Surat Thani Province located along near shore sandy coast, mostly in fine and very fine substrate with 28-32 ppt salinity, 29 ^oC – 32 ^oC temperature, and 0.4–1.8 m transparency. Based on the latest survey of Department of Marine and Coastal Resources (DMCR) in the year 2020, there was a total area of 24.37 km^2 (15,233 Thai Rai) of seagrass beds in Surat Thani Province. The report of DMCR indicated that there were 2 types of Seagrass ecosystem found in Surat Thani Province: (1) Seagrass that growing nearby mangrove area which sea floor is fine muddy and sand substrates or soft sediment. This type of seagrass ecosystem located in Ban Don Bay; and (2) Seagrass that growing together in coral reef ecosystem which sea floor is sand and small pieces of coral and shell. This type of seagrass ecosystem located in the islands as Samui Island, Pha Ngan Island, Tao Island, and Nok Taphao Island.

Total areas of seagrass beds in Surat Thani Province during the year 2003-2020

Year	Total area (Thai Rai)
2003	3,875
2006	10,676
2011	10,460
2015	15,163
2017	16,936
2018	15,726
2019	14,126
2020	15,233

DMCR from the year 2014–2018). The report stated that 73.5 % of them were in good condition; 26.4% were moderate, and 0.1% was slightly deteriorated by nature.

Present status of seagrass in Surat Thani was recently surveyed by DMCR in the year 2020, based on data during the year 2019-2020. It was found that seagrass resources had moderate healthy status. The distribution and status of them are as following:

Seagrass Bed	Area in the year 2020 (Rai)	Latest survey year	Status	Species Found	Changes comparing with the past
Ban Don Bay	8,034	2020	Very healthy	*Enhalus acoroides* *Halophila ovalis*	Better
Nang Kum Bay	20	2016	Slightly healthy	*Enhalus acoroides*	Stable
Nok Taphao Island	158	2016	Moderate healthy	*Halodule uninervis* *Halophila beccarii* *Halophila ovalis*	Better
Samui Island	4,497	2020	Very healthy	*Enhalus acoroides* *Halophila decipiens* *Halodule pinifolia* *Syringodium isoetifolium* *Halophila ovalis* *Halophila minor* *Halophila decipiens* *Cymodocea rotundata* *Thalassia hemprichii*	Better
Pa Ngan Islands	2,464	2019	Very healthy	*Enhalus acoroides* *Thalassia hemprichii* *Halodule uninervis* *Halophila ovalis* *Halophila minor* *Cymodocea rotundata*	Better
Tao Island	60	2017	Very healthy	*Halophila ovalis*	Stable

The majority of seagrass resources in Surat Thani are distributed in Ban Don Bay followed by Koh Samui and Koh Pha Ngan. The total number of 10 species of seagrasses was recorded, namely, Spoon grass (*Halophila ovalis*), Small spoon grass (Halophila minor), Estuarine spoon grass (*Halophila beccarii*), Veinless spoon grass (*Halophila decipiens*), Round tipped seagrass (*Cymodocea rotundata*), Fiber strand grass (*Halodule uninervis* and *H. pinifolia*), Tropical eel grass (*Enhalus acoroides*), Dugong grass (*Thalassia hemprichii*), and Syringe grass (*Syringodium isoetifolium*).

Figure: 1 Map of Seagrass Areas in Surat Thani
Source: https://bigdata.dmcr.go.th/detail/resource/82 (Dated November 1, 2021)

Pressures on the seagrass in Surat Thani were caused by 1) coastal developments, 2) maritime transport, 3) fishing, 4) wastewater discharges, 5) natural coastal changes, and 6) global warming.

CORAL REEFS

There were 57.87 km^2 (36,170 Thai rai) of coral reefs located in Surat Thani Waters, typically in clear water around the islands as Tao Island, Pha Ngan Island, Samui Island, and Ang Thong Island. There were at least 40 genera in 13 families of coral found. The dominant species were Mountain coral (Porites luted), Anemone-like coral (*Gonioporo* sp.), Ring coral (*Favia* sp.) Staghorn coral (*Acropora* spp.), and Honeycomb coral (*Goniastrea* sp.). Based on the surveys in the year 2012-2018, it found that 77.91% of coral reefs in Surat Thani were in extremely damaged condition.

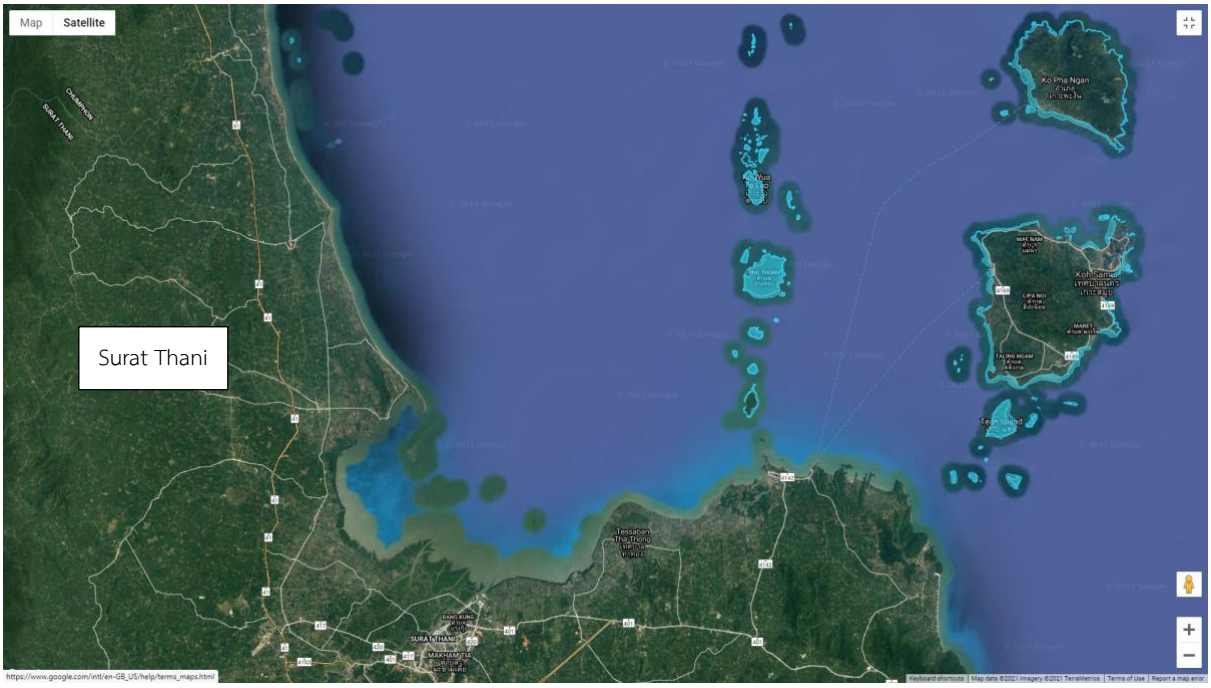

Figure 2: Map of Coral Reefs in Surat Thani
Source: https://bigdata.dmcr.go.th//detail/province/81/67 (Dated November 1, 2021)

Pressures on the coral reefs in Surat Thani were caused by 1) coastal developments, 2) tourist activities, 3) garbage discharges, 4) fishing, 5) wastewater discharged from communities and tourist areas, and 6) coral bleaching.

MANGROVE

There was a total area of 76.53 km^2 (47,829.71 Thai rai) of mangroves in Surat Thani Province (Department of Marine and Coastal Resources, 2018). It scattered along the inner coast of Ban Don Bay, from Chaiya to Don Sak Districts. A number of 24 species in 14 genera of 10 families of the mangrove trees were recorded, mainly in the family Rhizophoraceae. Total density of the mangrove trees in Surat Thani Province was 192.26 trees/1,600 m^2 (1 Thai rai), of which the most abundant species was *Rhizophora apiculata* at 36.00 trees/1,600 m2 , followed by *Rhizophora mucronata* and *Bruguiera cylindrical* at the density of 35.39 trees/1,600 m^2 and 24.96 trees/1,600 m^2, respectively. Total biomass of mangroves in Surat Thani Province was 61.08 ton/1,600 m^2 which accumulated carbon at the amount of 28.71 ton/1,600 m^2. It was calculated

that all mangroves in Surat Thani Province contributed the total carbon storage of 1.373 million ton carbon to the area. There were 3 families of economic fish found inhabited mangrove areas, namely, Mugilidae, Istiophoridae, and Ambassidae.

Figure 3: Map of Mangrove Area in Surat Thani
Source: https://bigdata.dmcr.go.th/detail/resource/83 (Dated November 1, 2021)

Pressures on the mangroves in Surat Thani were caused by 1) invasion for aquaculture, mainly shrimp farms; 2) increases of tourism business – construction of homestay, fishing port, and channel dredging; 3) utilization of mangrove trees in households; 4) unclear-mangrove boundaries; 5) permanent land settlement for local residents in mangrove areas; and 6) expansion of coastal communities.

II. Impacts of BSC Fishery on Coastal and Marine Habitats in Surat Thani Province

Main fishing gears using to catch BSC in Surat Thani Province are crab trap and gillnet operating with 3 vessel sizes: artisanal vessels (less than 9.9 GT), medium-scale vessels (10-29.9 GT), and large-scale vessels (from 30 GT up).

1. Crab Traps

1.1 Artisanal Crab Trap Vessels

The artisanal crab trap vessels are operated in near shore waters in Tha Chana and Chaiya districts. There were some of them operated fishing in Chumporn Province Waters. The main catch composition is BSC (98% of total catch).

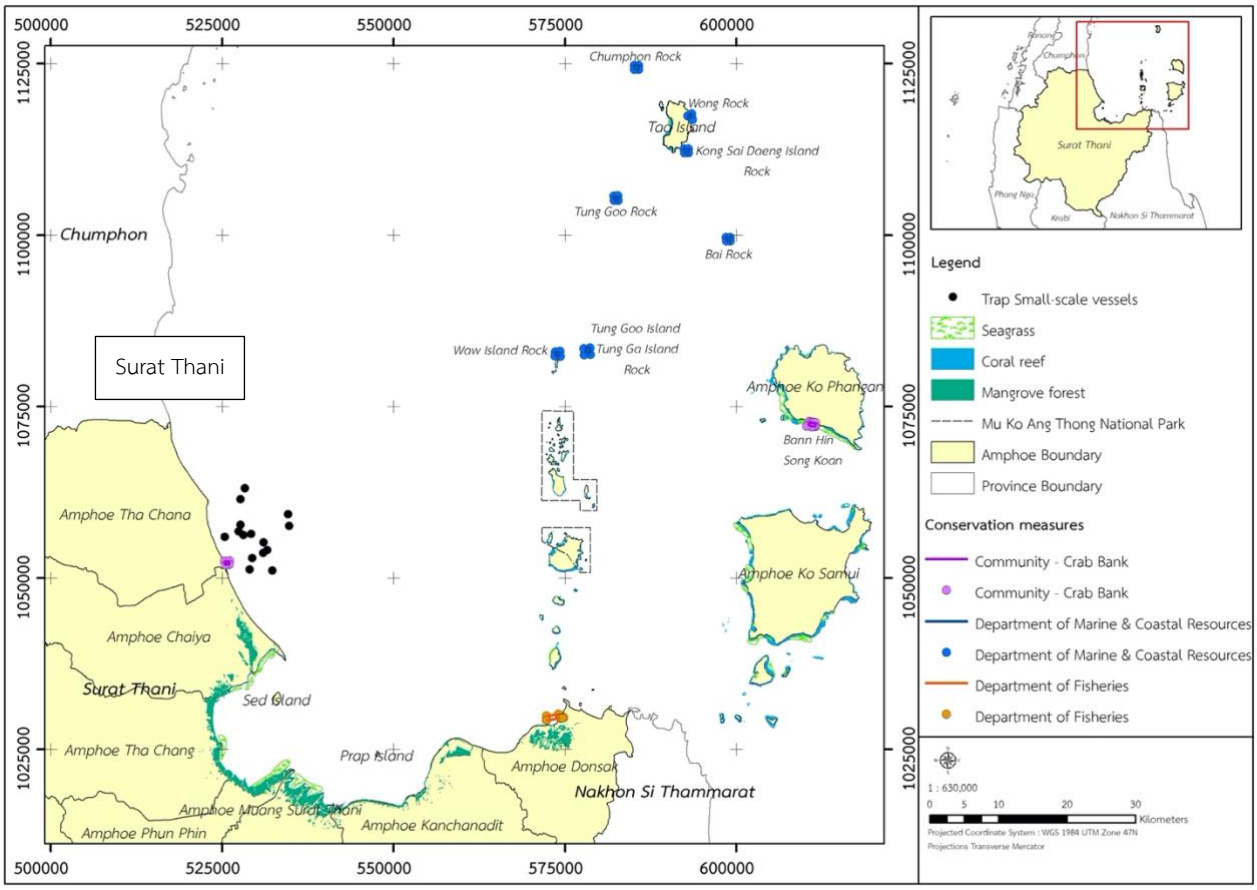

Figure 4: Fishing Grounds of Artisanal Crab Trap Vessels in Surat Thani Province in the year 2020
Source: Thai DoF and Milestone 37: Habitat Restoration Projects

Fishing ground of artisanal crab trap vessels did not show overlap with mangroves, coral reefs, and seagrass beds.

1.2 Medium-scale crab trap vessels

Medium-scale crab trap vessels are widely operated in Surat Thani waters that quite away mainland. The intensive area of fishing ground in around Ang Thong Islands. The main catch composition is BSC (82% of total catch).

Similar to artisanal crab trap vessels, the fishing ground of medium-scale crab trap vessels did not overlap with mangroves, coral reefs, and seagrass beds.

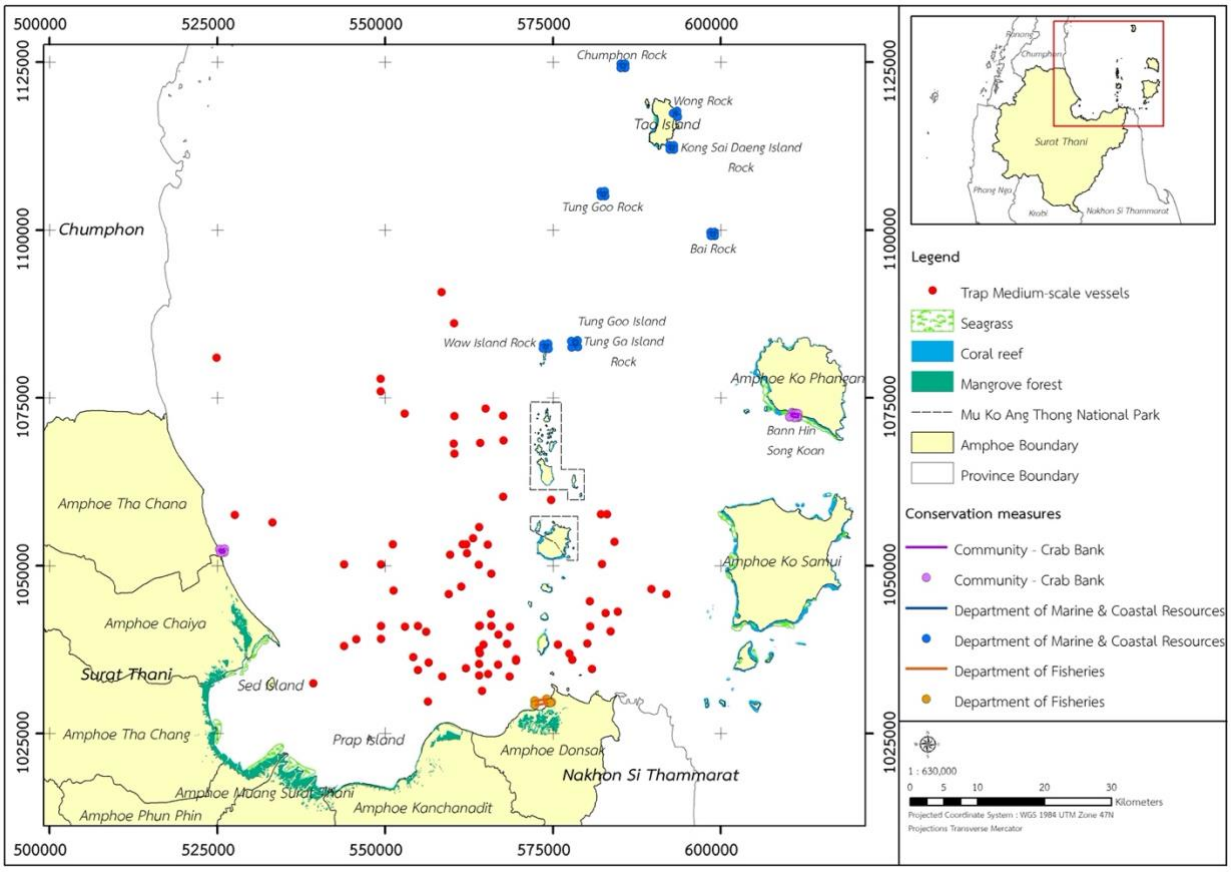

Figure 5: Fishing Grounds of Medium-scale Crab Trap Vessels in Surat Thani Province in the year 2020
Source: Thai DoF and Milestone 37: Habitat Restoration Projects

1.3 Large-scale Crab Trap Vessel

DoF cannot identify their fishing ground only in Surat Thani waters because they operated fishing across provinces. This links to traceability issue if BSC products would like to claim or ensure buyers that they came from FIP. It is suggested that FIP partners should discuss whether the FIP should include large-scale trap vessels as we cannot identify fishing ground.

2. Crab Gillnet

2.1 Artisanal Crab Gillnet Vessels

Artisanal gillnet vessels are widely operated in Surat Thani waters. The intensive area of artisanal gillnet fishing gound in Tha Chana and Chaiya Districts. The main catch composition is BSC (95% of total catch). The fishing ground of artisanal gillnet vessels did not show overlap with mangroves, coral reefs, and seagrass beds (see Figure 6)

2.2 Medium-scale Crab Gillnet Vessels

Their fishing ground is similar to artisanal vessels. They have operated their fishing in Surat Thani waters only. The fishing ground of medium-scale gillnet vessels did not show overlap with mangroves, coral reefs, and seagrass beds.

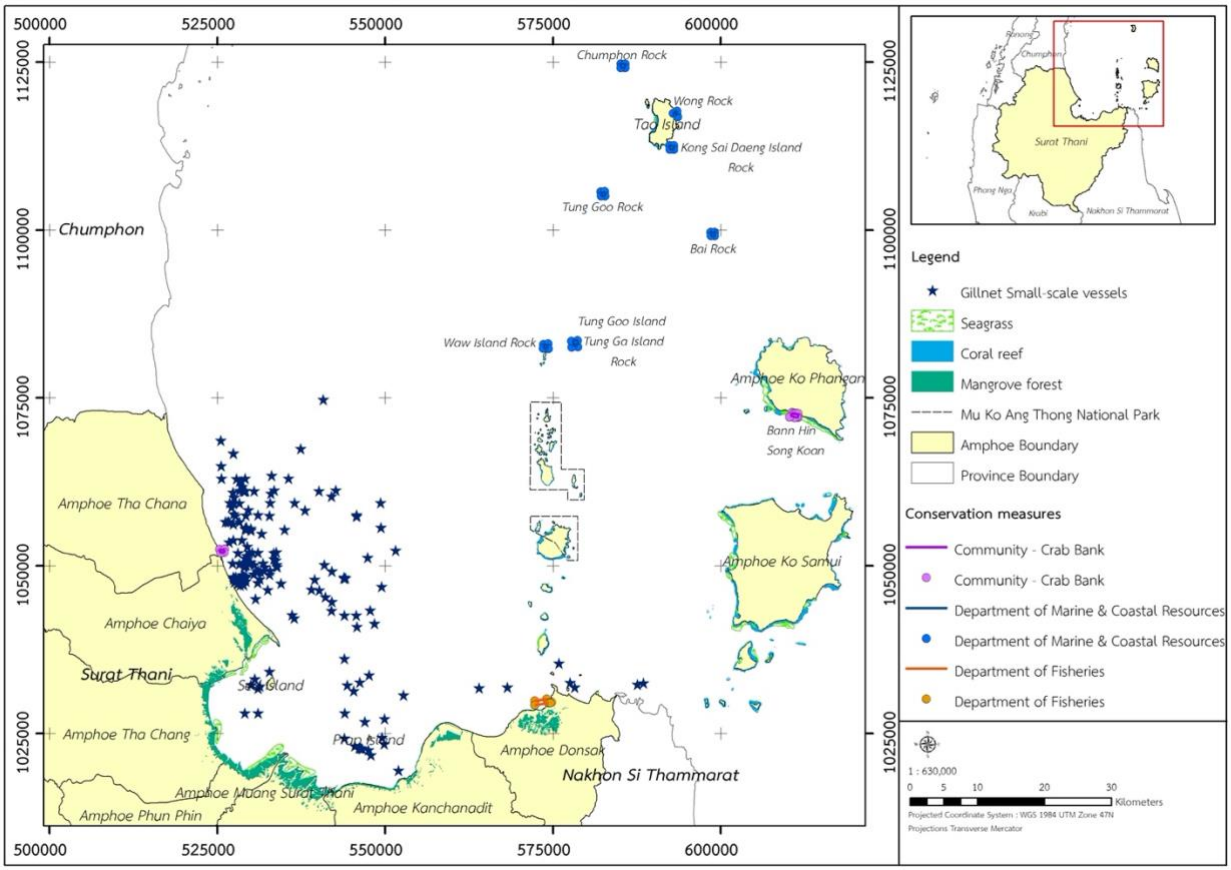

Figure 6: Fishing Grounds of Artisanal Crab Gillnet Vessels in Surat Thani Province in the year 2020
Source: Thai DoF and Milestone 37: Habitat Restoration Projects

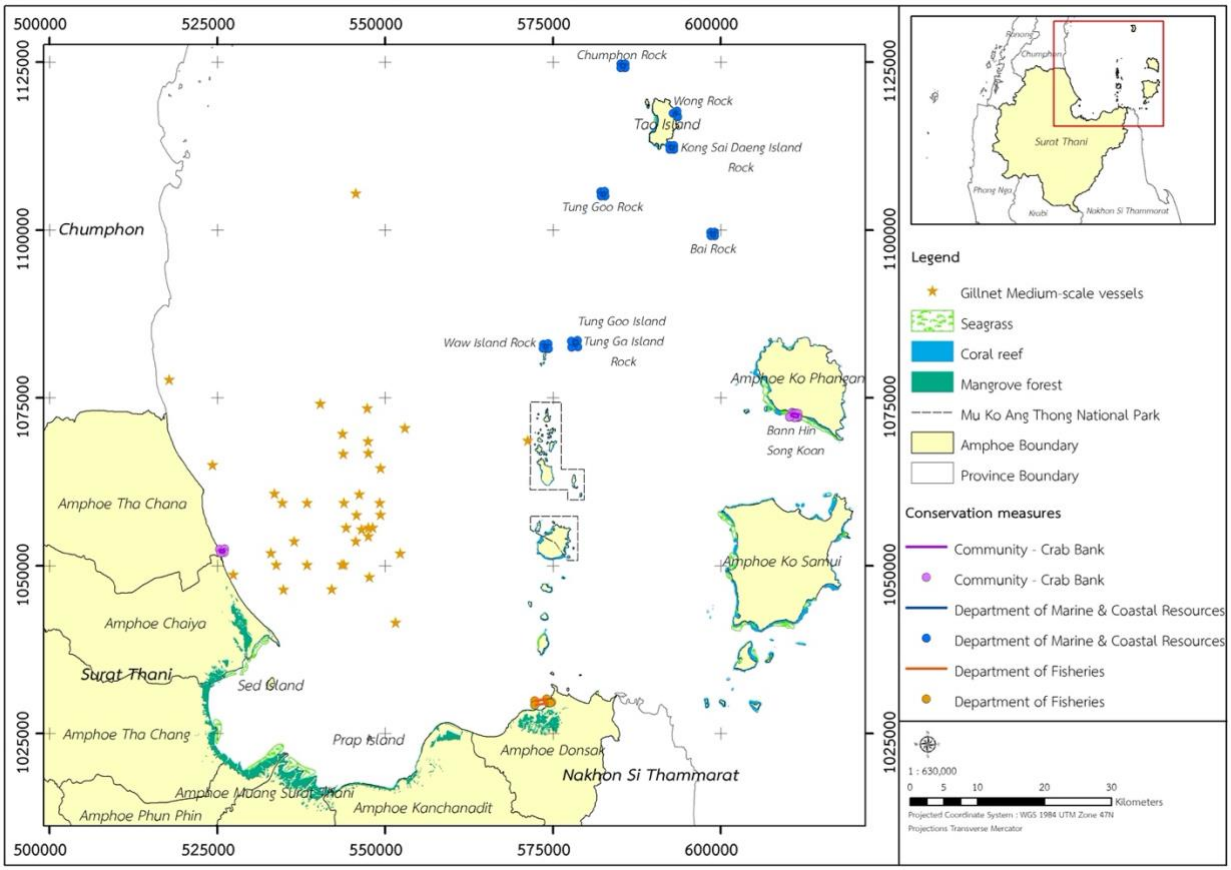

Figure 7: Fishing Grounds of Medium-scale Crab Gillnet Vessels in Surat Thani Province in the year 2020
Source: Thai DoF and Milestone 37: Habitat Restoration Projects

2.3 Large-scale Crab Gillnet Vessels

DoF cannot identify their fishing ground only in Surat Thani waters because they operated fishing across provinces. This links to traceability issue if BSC products would like to claim or ensure buyers that they came from FIP. Similar to large-scale crab trap vessels, It is suggested that FIP partners should discuss whether the FIP should include this type of vessels or not, as we cannot identify fishing ground.

Note for large-scale vessels of both gears, it is possible to track their fishing grounds and operations via VMS but FIP industry partners need to request to DoF to reveal data for traceability and management purposes, not for publicly available. Additionally, another issue is that how we can ensure that vessel operators will separate BSC catch from fishing operations in different provinces.

The preliminary results based on the overlay of BSC fishing grounds and three coastal and marine habitats in Surat Thani indicated that the fishing grounds did not overlap with mangroves, coral reefs, and seagrass beds.

When considering physical impact of fishing gear on the habitat/substrate, the BSC trap and gillnet fishing take place over sand/mud. According to the SFW criteria, crab traps and bottom-set gillnets that come into contact with substrates other than boulders/coral reef (e.g., mud, sand, and other non-sensitive/resilient substrates) are scored a 3 out of 5, or "low" concern. (Source: Table 4.1.1 of SFW Standard for Fisheries Version F4 (April 2020-Present))

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