



**THE THIRD REGIONAL WORKSHOP ON SHARED STOCKS
IN THE SOUTH CHINA SEA AREA**

Kuala Terengganu, Malaysia 6 - 8 October, 1997

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**BIOLOGICAL PARAMETERS
AND POPULATION DYNAMICS
ON SHARED STOCKS OF
THE SOUTH CHINA SEA**

By:

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SMALL PELAGIC RESOURCES OF THE SOUTH CHINA SEA
(potential transboundary shared stocks)

Mackerels (*Rastrelliger* spp.)

Round scads (*Decapterus* spp.)

Scads (*Selar* spp., *Atule* spp.)

Torpedo scad (*Megalaspis cordyla*)

Sardines (*Sardinella* spp., *Dussumieria* spp.)

Small tunas (*Auxis thazard*, *Euthynnus* spp., *Thunnus tonggol*, *Sarda* spp.)

Spanish mackerels (*Scomberomorus* spp.)

Jacks, trevallies (*Caranx* spp., *Carangoides* spp.)

Anchovies (*Stolephorus* spp.)

Queenfish, leatherskin (*Scomberoides* spp.)

Barracudas (*Sphyraena* spp.)

Pomfrets (*Parastromateus niger*, *Stromateus* spp.)

Wolf-herrings (*Chirocentrus* spp.)

Hairtails (*Trichiurus* spp.)

Mulletts

Population dynamics parameters on shared stock species of the South China Sea

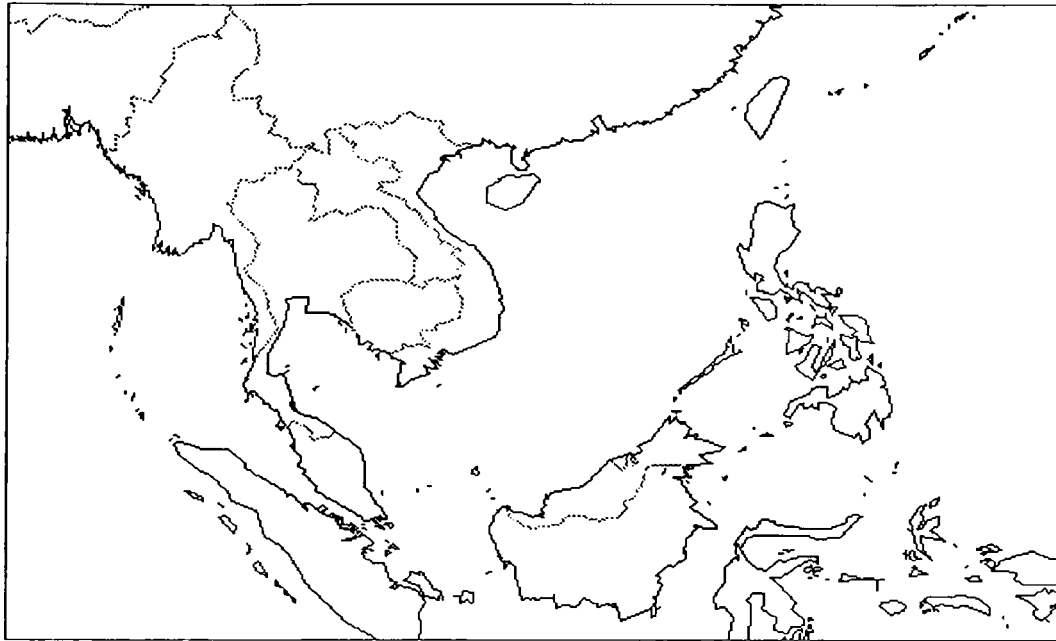
Fish group: Round scads
 Family names: Carangidae
 Species names: *Decapterus russelli*
 Common names: Slender scad

Area examined	Brunei	Malaysia		Thailand (Sabah & Sarawak)	Philippines	Vietnam
		E. coast, P. Malaysia	E. Mal			
Size composition minimum length maximum length mean length in catch		97 mm 260 mm 113-135 mm			30 cm	
Age and growth growth rate (K) length infinity (Linf) mortality (M) exploitation rate (E) total mortality (Z)		0.56-1.30 235-322 1.52-2.21 0.39-0.61 2.5-4.88			0.54-0.80 2.06-6.89 42-77%	
Spawning season area length at 1st maturity sex ratio (M:F)		July-Aug, April-May 21.9 mm (M), 21.1 mm (F)				
Fecundity						
Nursery ground						
Nursery periods						
Recruitment season mean length		May-June				
Length-weight rel.		$W=7.528 \times 10^{-6} L^3 3.052$				
Food and feeding habit						
Predators						

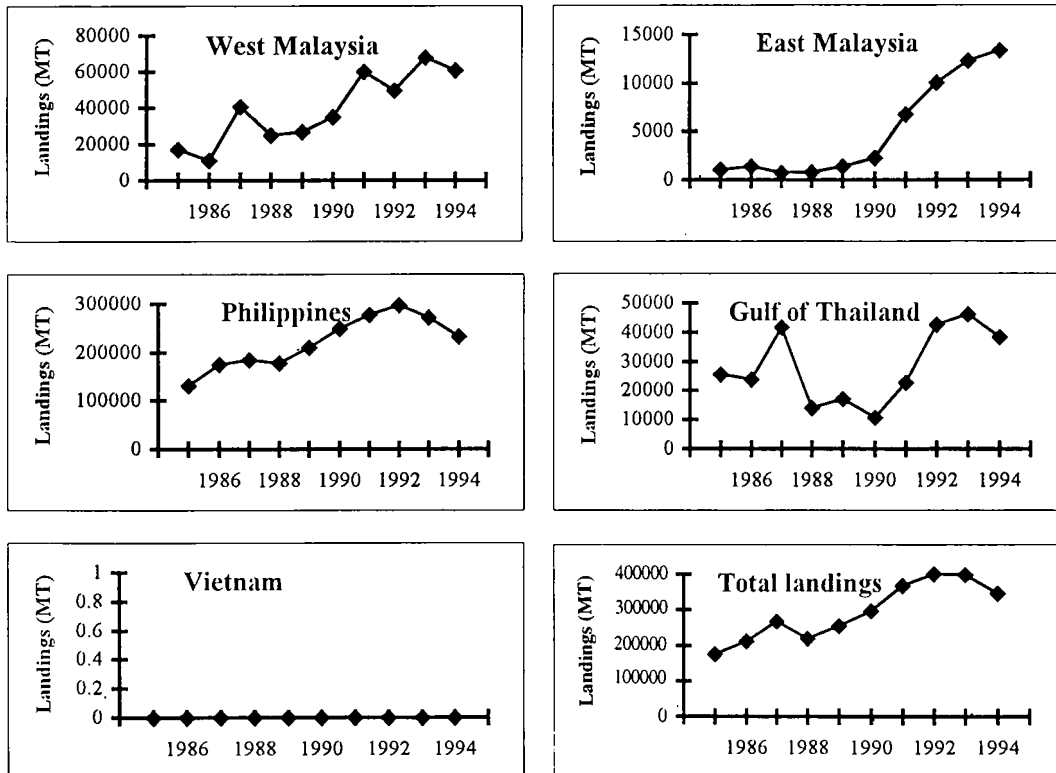
Note:

Geographical distributions of shared stocks in the South China Sea

Species names: *Decapterus* spp.



Map showing geographical distribution of fishing and spawning ground and migration patterns



Trend landings of *Decapterus* spp. by gear group in the East Coast of Peninsular Malaysia.

Fisheries and stock status: biomass
underexploited/overexploited

Population dynamics parameters on shared stock species of the South China Sea

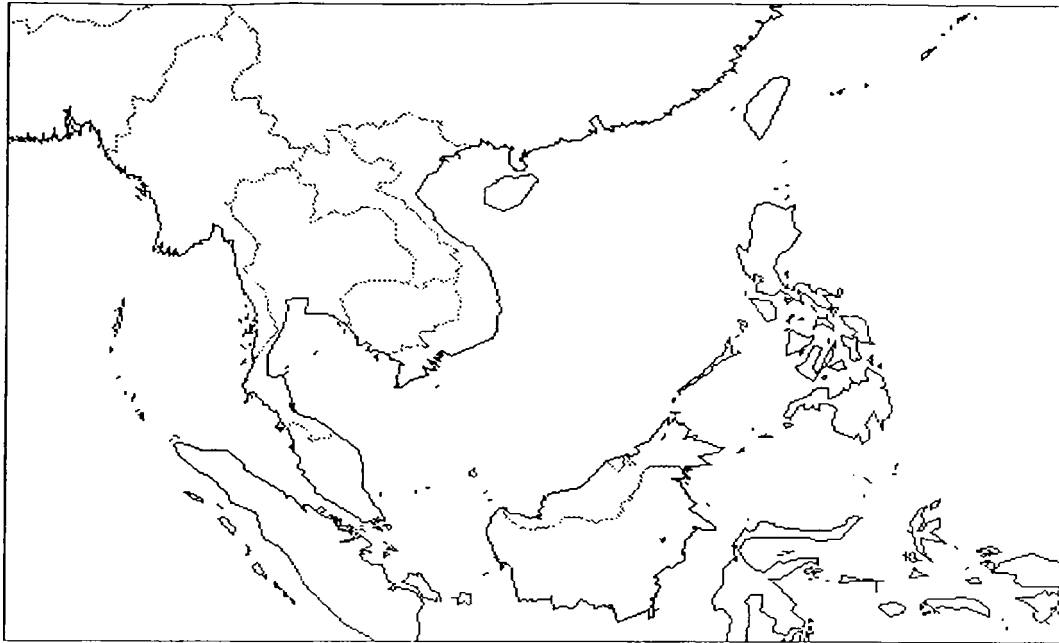
Fish group: Jacks and Trevallies
 Family names: Carangidae
 Species names:
 Common names:

Area examined	Brunei	Malaysia		Thailand (Sabah & Sarawak)	Philippines	Vietnam
		E. coast, P. Malaysia	E. Mal			
Size composition minimum length maximum length mean length in catch						
Age and growth growth rate (K) length infinity (Linf) mortality (M) exploitation rate (E) total mortality (Z)						
Spawning season area length at 1st maturity sex ratio (M:F)						
Fecundity						
Nursery ground						
Nursery periods						
Recruitment season mean length						
Length-weight rel.						
Food and feeding habit						
Predators						

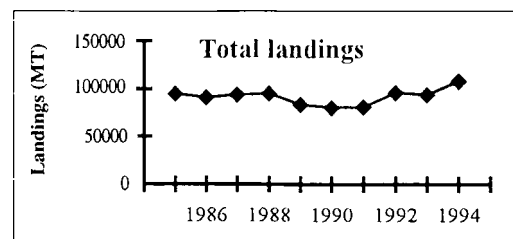
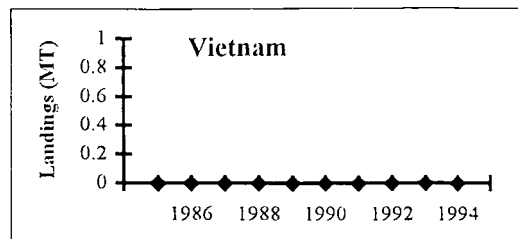
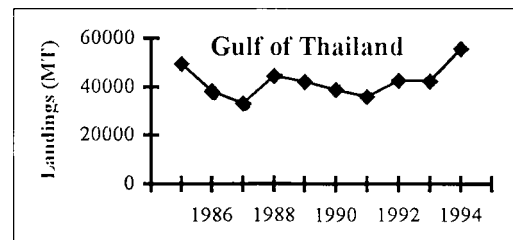
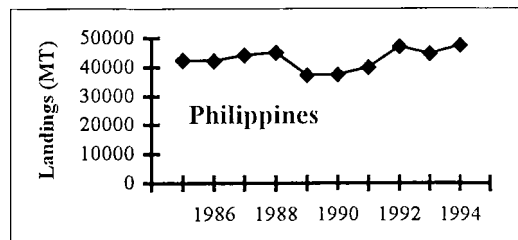
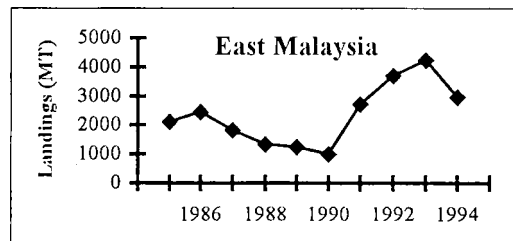
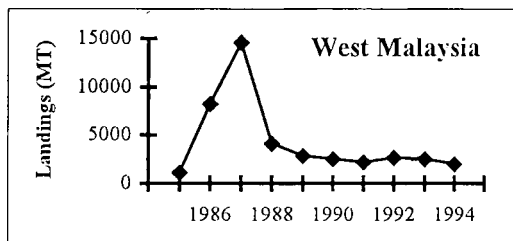
Note:

Geographical distributions of shared stocks in the South China Sea

Species names: Jacks, trevallies



Map showing geographical distribution of fishing and spawning ground and migration patterns



Trend landings of *Caranx* spp. by gear group in the East Coast of Peninsular Malaysia.

Fisheries and stock status: biomass
underexploited/overexploited

Population dynamics parameters on shared stock species of the South China Sea

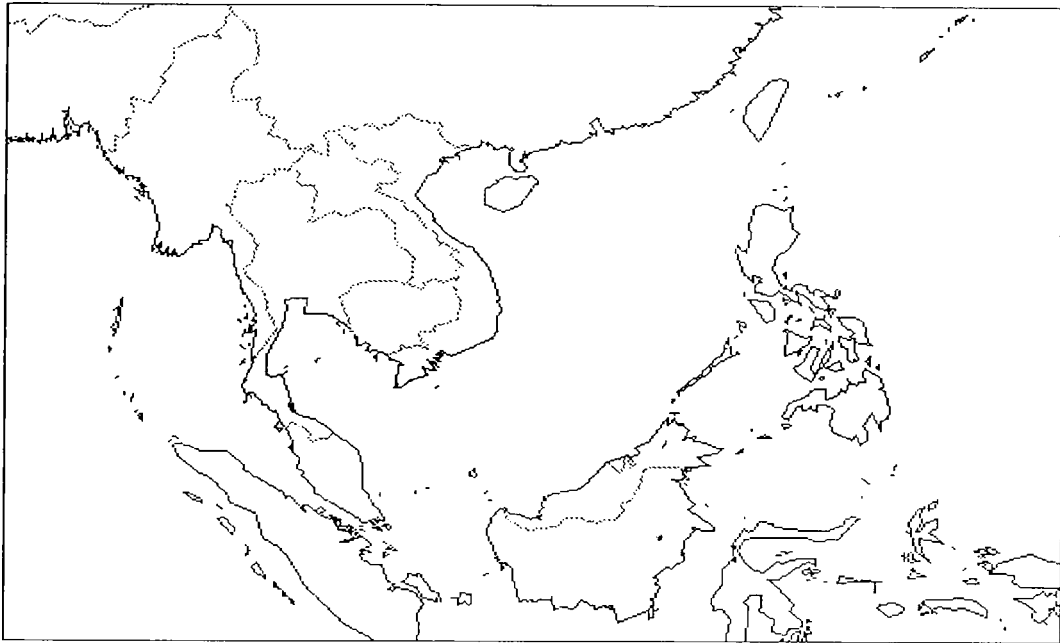
Fish group: King mackerels
 Family names: Scombridae
 Species names: *Scomberomorus commerson*
 Common names: Narrow-barred Spanish mackerels

Area examined	Brunei	Malaysia		Thailand (Sabah & Sarawak)	Philippines	Vietnam
		E. coast, P. Malaysia	E. Mal			
Size composition minimum length maximum length mean length in catch		50 cm 220 cm 50-55 cm		20 cm 92 cm 50 cm		
Age and growth growth rate (K) length infinity (L _{inf}) mortality (M) exploitation rate (E) total mortality (Z)		1.15 1.37 0.48 3.13		0.12 	0.7 1.23 1.49	
Spawning season area length at 1st maturity sex ratio (M:F)		65 (M), 70 (F)		Feb.-March, Jun-Sept. 58.6 cm 1:1.6		
Fecundity				5-3.8 million		
Nursery ground						
Nursery periods						
Recruitment season mean length				March-May, July-Oct. 11-21		
Length-weight rel.		W=0.00 L ^{3.55}		L 2.8843		
Food and feeding habit		Stolephorus, sardinella, small carangids, squids, penaeid shrimps				
Predators						

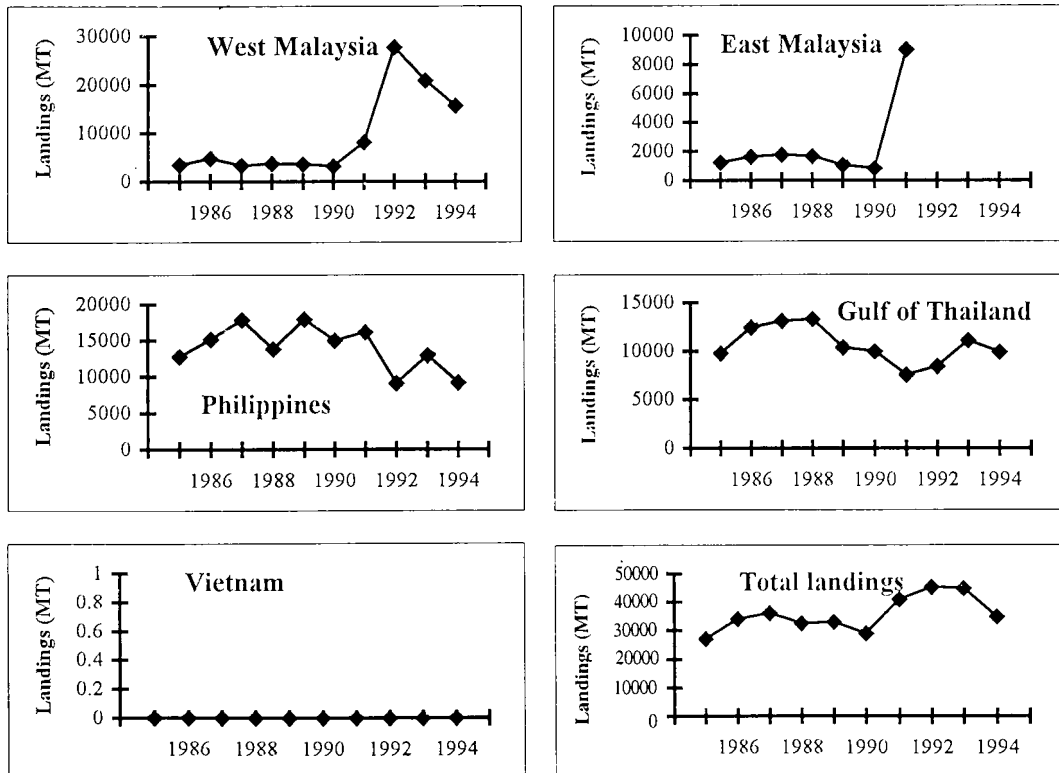
Note:

Geographical distributions of shared stocks in the South China Sea

Species names: *Scomberomorus* spp.



Map showing geographical distribution of fishing and spawning ground and migration patterns



Trend landings of *Scomberomorus* spp. by gear group in the East Coast of Peninsular Malaysia.

Fisheries and stock status: biomass
underexploited/overexploited

Population dynamics parameters on shared stock species of the South China Sea

Fish group: Tunas
 Family names: Scombridae
 Species names: *Thunnus tonggol*
 Common names: Longtail tuna

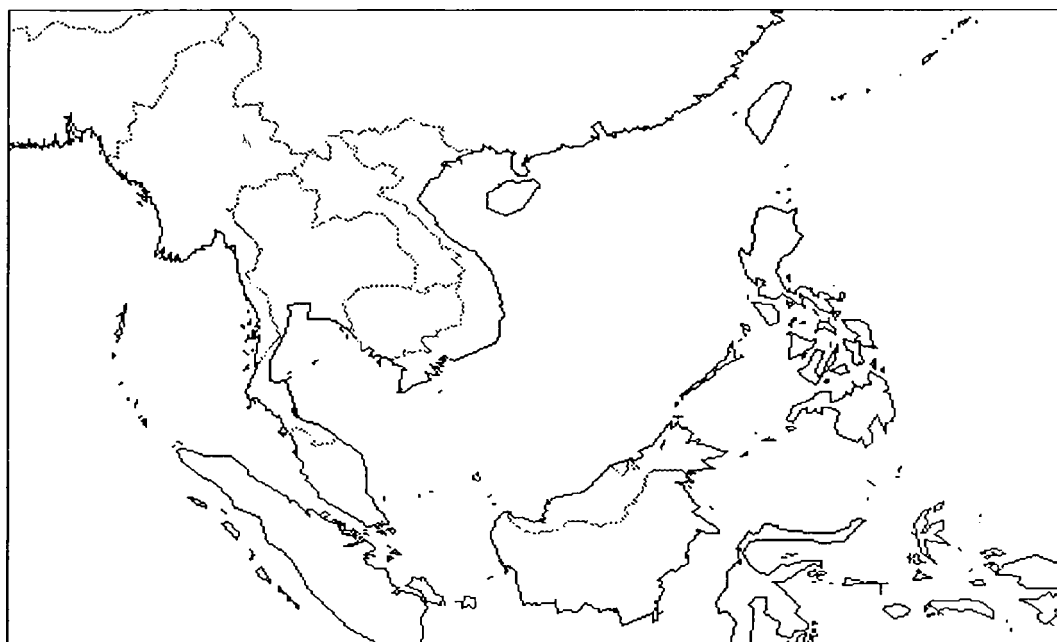
214

Area examined	Brunei	Malaysia		Thailand (Sabah & Sarawak)	Philippines	Vietnam
		E. coast, P. Malaysia	E. Mal			
Size composition minimum length maximum length mean length in catch		80 cm 35 cm		38.5 cm		
Age and growth growth rate (K) length infinity (L _{inf}) mortality (M) exploitation rate (E) total mortality (Z)		0.6 2.45			0.7 1.23 1.49	
Spawning season area length at 1st maturity sex ratio (M:F)				Mar-May, July-Dec. 39 cm 1:1		
Fecundity				1.4 million		
Nursery ground						
Nursery periods						
Recruitment season mean length				Jan.-Feb., Apr.-Jun. 22-26 cm		
Length-weight rel.		W=0.0075 L ^{3.19}		W=2.1x10.5 L ^{2.979}		
Food and feeding habit						
Predators						

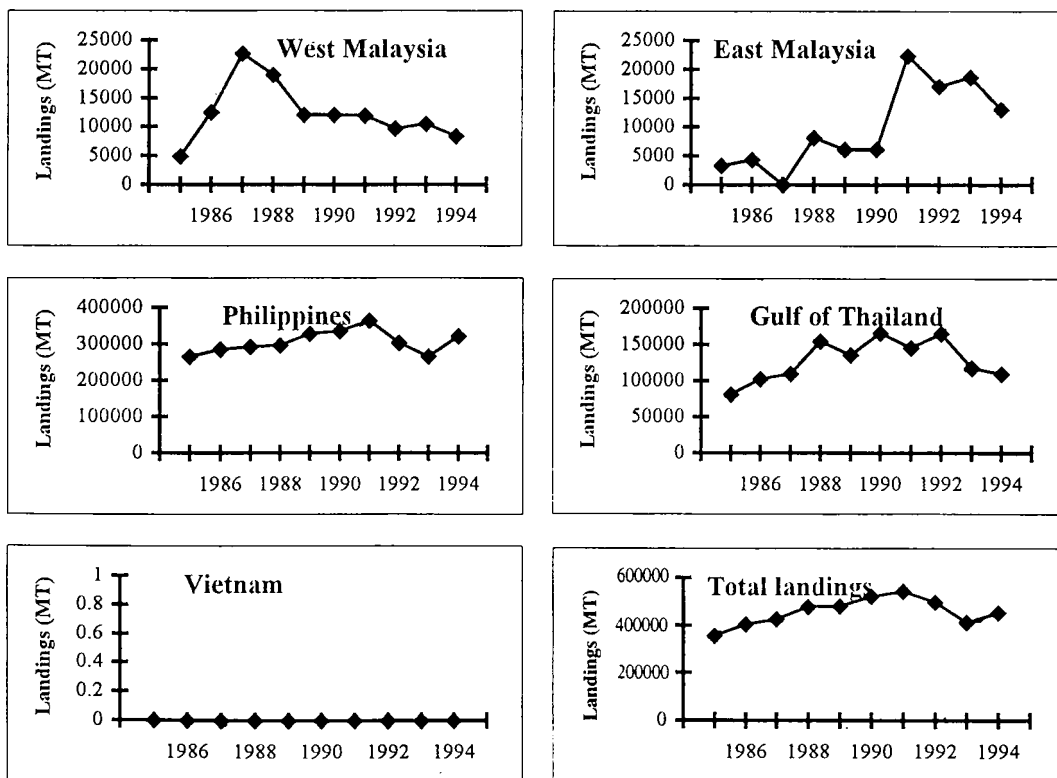
Note:

Geographical distributions of shared stocks in the South China Sea

Species names: Naritic tunas



Map showing geographical distribution of fishing and spawning ground and migration patterns



Trend landings of *Auxis thazard* by gear group in the East Coast of Peninsular Malaysia.

Fisheries and stock status: biomass
underexploited/overexploited

Population dynamics parameters on shared stock species of the South China Sea

Fish group: Sardines
 Family names: Clupeidae
 Species names:
 Common names:

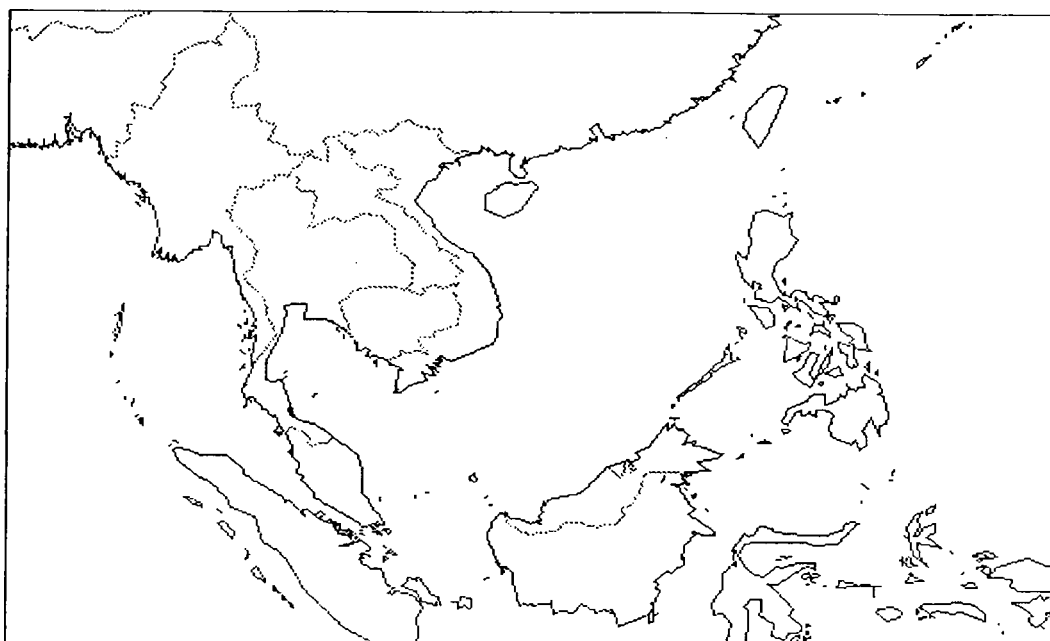
216

Area examined	Brunei	Malaysia		Thailand (Sabah & Sarawak)	Philippines	Vietnam
		E. coast, P. Malaysia	E. Mal			
Size composition minimum length maximum length mean length in catch						
Age and growth growth rate (K) length infinity (Linf) mortality (M) exploitation rate (E) total mortality (Z)						
Spawning season area length at 1st maturity sex ratio (M:F)						
Fecundity						
Nursery ground						
Nursery periods						
Recruitment season mean length						
Length-weight rel.						
Food and feeding habit						
Predators						

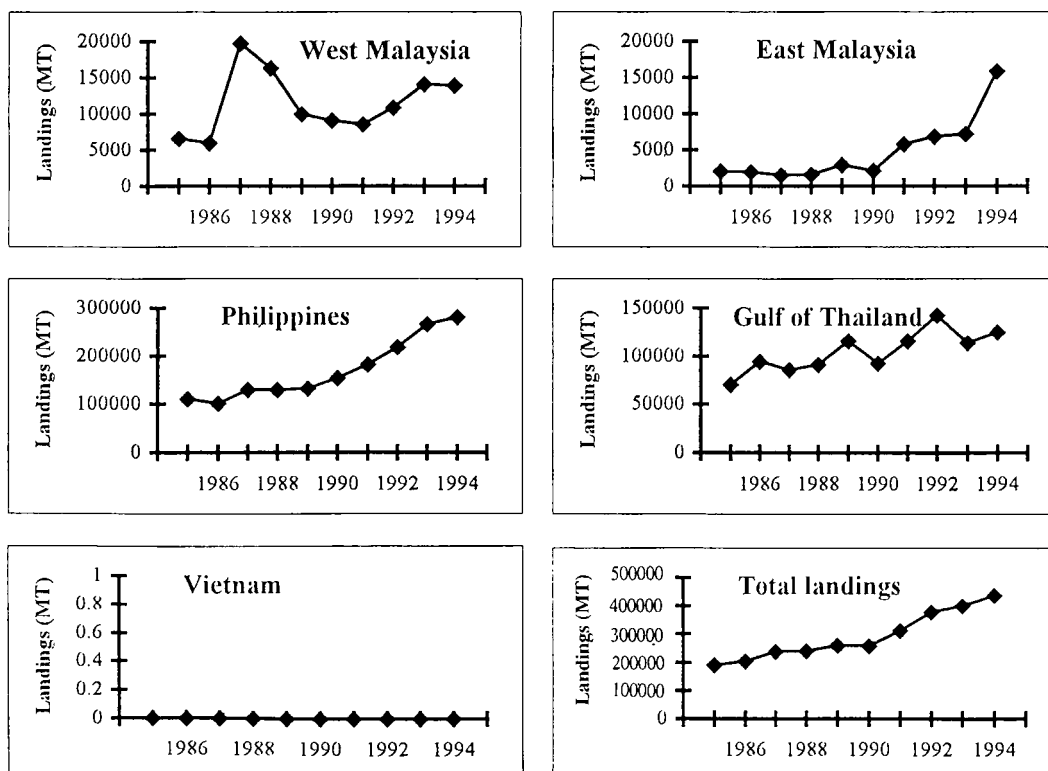
Note: Mansor and Hamid, 1990; Mansor and Abdullah, 1995; Mohsin and Ambak, 1996

Geographical distributions of shared stocks in the South China Sea

Species names: *Sardinella* spp.



Map showing geographical distribution of fishing and spawning ground and migration patterns



Trend landings of *Sardinella* spp. by gear group in the East Coast of Peninsular Malaysia.

Fisheries and stock status: biomass
underexploited/overexploited

Population dynamics parameters on shared stock species of the South China Sea

Fish group: Torpedo trevally
 Family names: Carangidae
 Species names: *Megalaspis cordyla*
 Common names: Hardtail scad

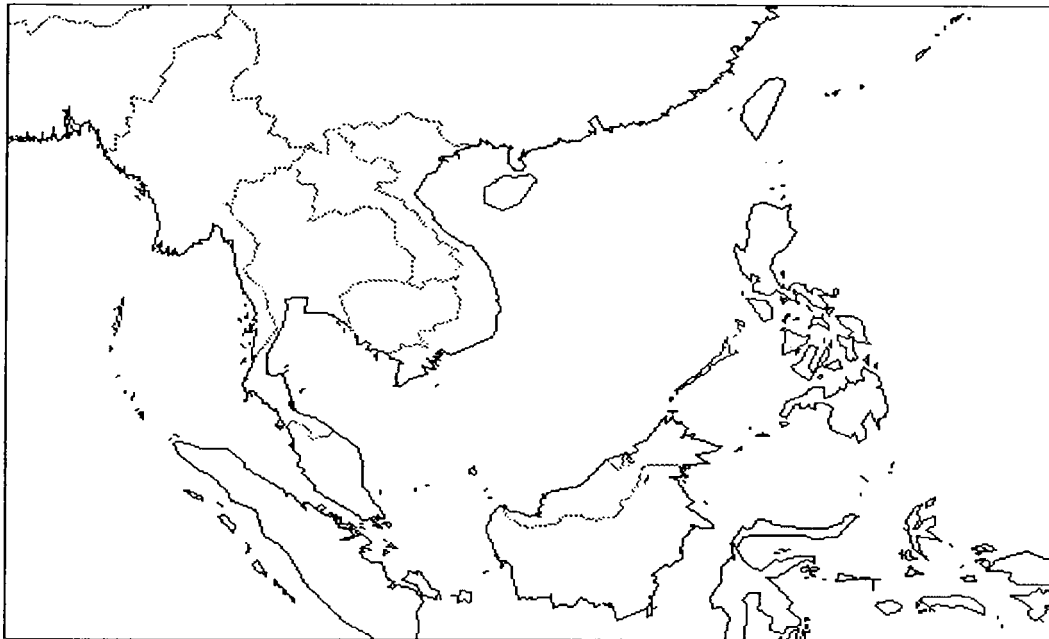
218

Area examined	Brunei	Malaysia		Thailand (Sabah & Sarawak)	Philippines	Vietnam
		E. coast, P. Malaysia	E. Mal			
Size composition minimum length maximum length mean length in catch		20 cm 39.7 cm 23 cm		22 cm 28.8 cm		
Age and growth growth rate (K) length infinity (Linf) mortality (M) exploitation rate (E) total mortality (Z)		0.9 3.13		0.2		
Spawning season area length at 1st maturity sex ratio (M:F)				Dec.-May, Aug.-Nov.. 1:0.8		
Fecundity						
Nursery ground						
Nursery periods						
Recruitment season mean length				May-Sept. 10.5-11.5 cm		
Length-weight rel.		$W=0.0017 L^{2.84}$		$W=2.1 \times 10^{-5} L^{2.9785}$		
Food and feeding habit						
Predators						

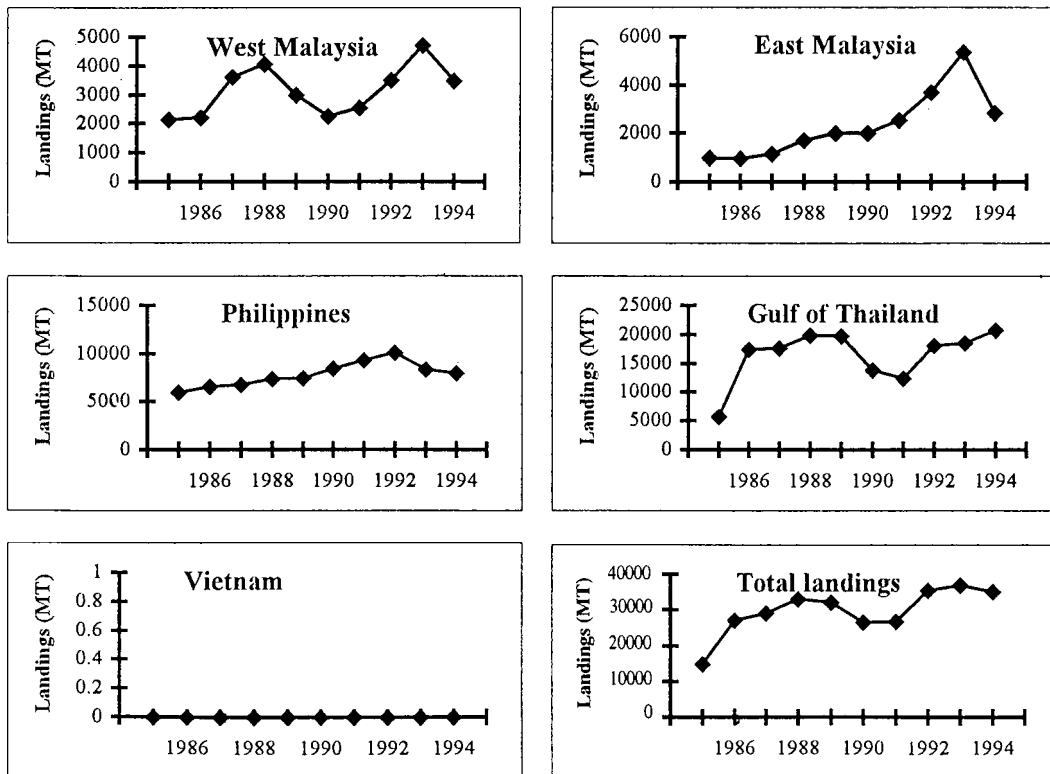
Note:

Geographical distributions of shared stocks in the South China Sea

Species names: *Megalaspis cordyla*.



Map showing geographical distribution of fishing and spawning ground and migration patterns



Trend landings of *Megalaspis cordyla* by gear group in the East Coast of Peninsular Malaysia.

Fisheries and stock status: biomass
underexploited/overexploited

Population dynamics parameters on shared stock species of the South China Sea

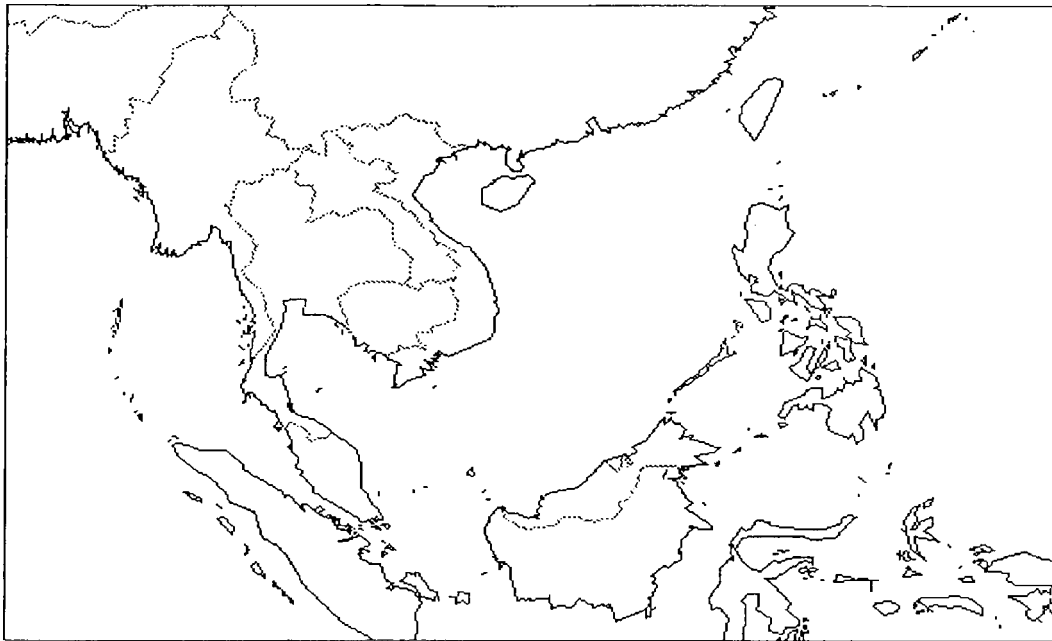
Fish group: Scads
 Family names: Carangidae
 Species names: *Atule mate*
 Common names: Yellowtail scad

Area examined	Brunei	Malaysia		Thailand (Sabah & Sarawak)	Philippines	Vietnam
		E. coast, P. Malaysia	E. Mal			
Size composition minimum length maximum length mean length in catch		28 cm 16 cm				
Age and growth growth rate (K) length infinity (Linf) mortality (M) exploitation rate (E) total mortality (Z)		0.6-1.2 28-30.3 1.74-2.05 3.64			0.17 1.23 1.49	
Spawning season area length at 1st maturity sex ratio (M:F)		Mar-May, 23.9 cm (M), 23.8 (F)				
Fecundity						
Nursery ground						
Nursery periods						
Recruitment season mean length				Jan.-Mar, July-Sept. 5.5-6.5 cm		
Length-weight rel.		W=0.0025 L ^{3.5}				
Food and feeding habit						
Predators						

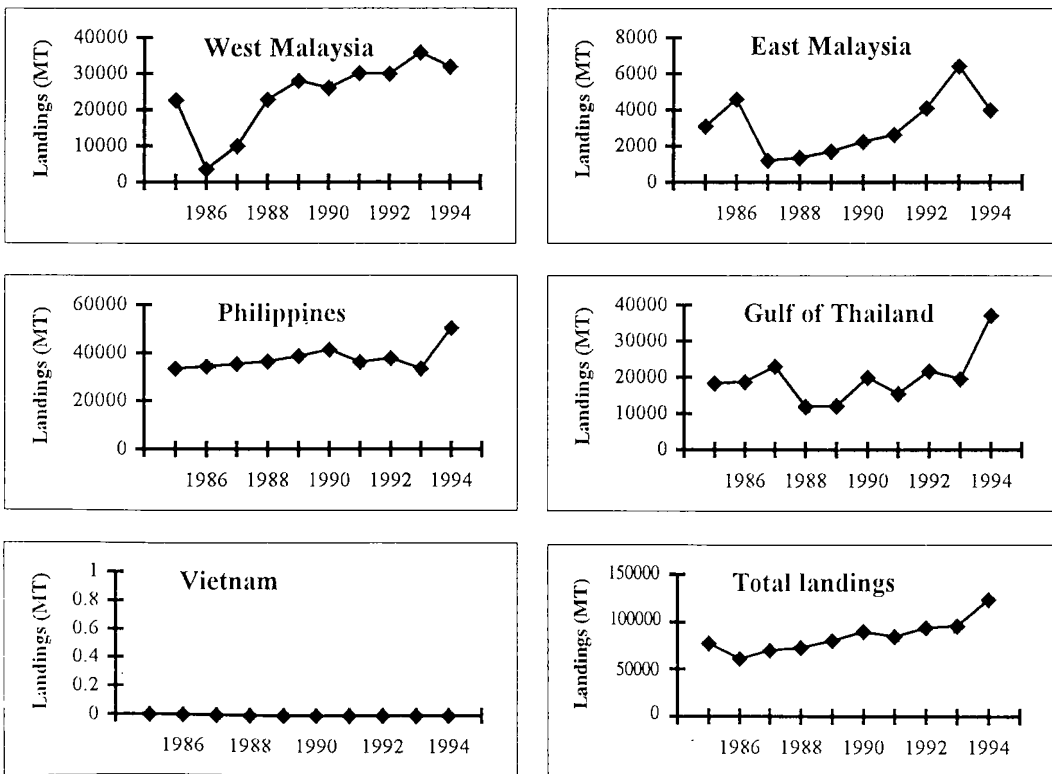
Note:

Geographical distributions of shared stocks in the South China Sea

Species names: *Selar* spp.



Map showing geographical distribution of fishing and spawning ground and migration patterns



Trend landings of *Selar* spp. by gear group in the East Coast of Peninsular Malaysia.

Fisheries and stock status: biomass
underexploited/overexploited

Population dynamics parameters on shared stock species of the South China Sea

Fish group: Mackerels
 Family names: Scombridae
 Species names: *Rastrelliger brachysoma*
 Common names: Indo-Pacific mackerel

Area examined	Brunei	Malaysia		Thailand (Sabah & Sarawak)	Philippines	Vietnam
		E. coast, P. Malaysia	E. Mal			
Size composition minimum length maximum length mean length in catch		20.1 cm			34 cm	
Age and growth growth rate (K) length infinity (Linf) mortality (M) exploitation rate (E) total mortality (Z)		0.36-0.44 0.38 0.82			1.1 4.27	
Spawning season area length at 1st maturity sex ratio (M:F)		Oct.-Mar, Straits of Malacca 18.5 cm		Jan.-Mar, June-Aug. 16.5-17 cm		
Fecundity				118,685-222,455 (mean 170,570)		
Nursery ground						
Nursery periods						
Recruitment season mean length						
Length-weight rel.		W=0.006138 L ^{3.215}				
Food and feeding habit						
Predators						

Population dynamics parameters on shared stock species of the South China Sea

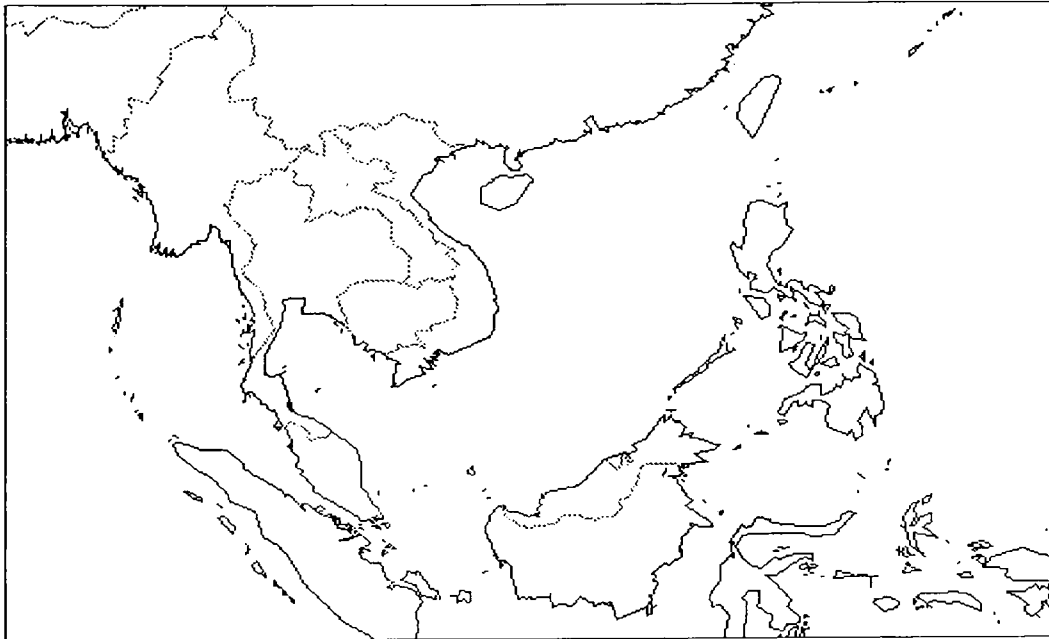
Fish group: Mackerels
 Family names: Scombridae
 Species names: *Rastrelliger kanagurta*
 Common names: Indian mackerel

Area examined	Brunei	Malaysia		Thailand (Sabah & Sarawak)	Philippines	Vietnam
		E. coast, P. Malaysia	E. Mal			
Size composition minimum length maximum length mean length in catch		94 mm 372 mm 180-200 mm			35 cm 21-29 cm	
Age and growth growth rate (K) length infinity (L _{inf}) mortality (M) exploitation rate (E) total mortality (Z)		0.42-1.33 277-326 1.01-2.14 0.49-0.83 3.33-5.92			0.7-1.65 25.5-39 4.27	
Spawning season area length at 1st maturity sex ratio (M:F)		May-June, Sept.-Oct. 242 mm (M), 238 mm (F)			23 cm	
Fecundity		96,712-224,633				
Nursery ground						
Nursery periods						
Recruitment season mean length		April-June, Sept.-Oct.				
Length-weight rel.		$W=3.035 \times 10^{-6} L^3 \cdot 245$	$\text{Log } W = -5.591 + 3.282 \text{ Log } T$	$W=0.1985 \times 10^{-7} L^3 \cdot 7653$		
Food and feeding habit		diatoms, peridinians, copepods mysids, pteropods, larval bivalves, fish eggs				
Predators		shark, marlin, ribbon fish, tunas, dolphin fish				

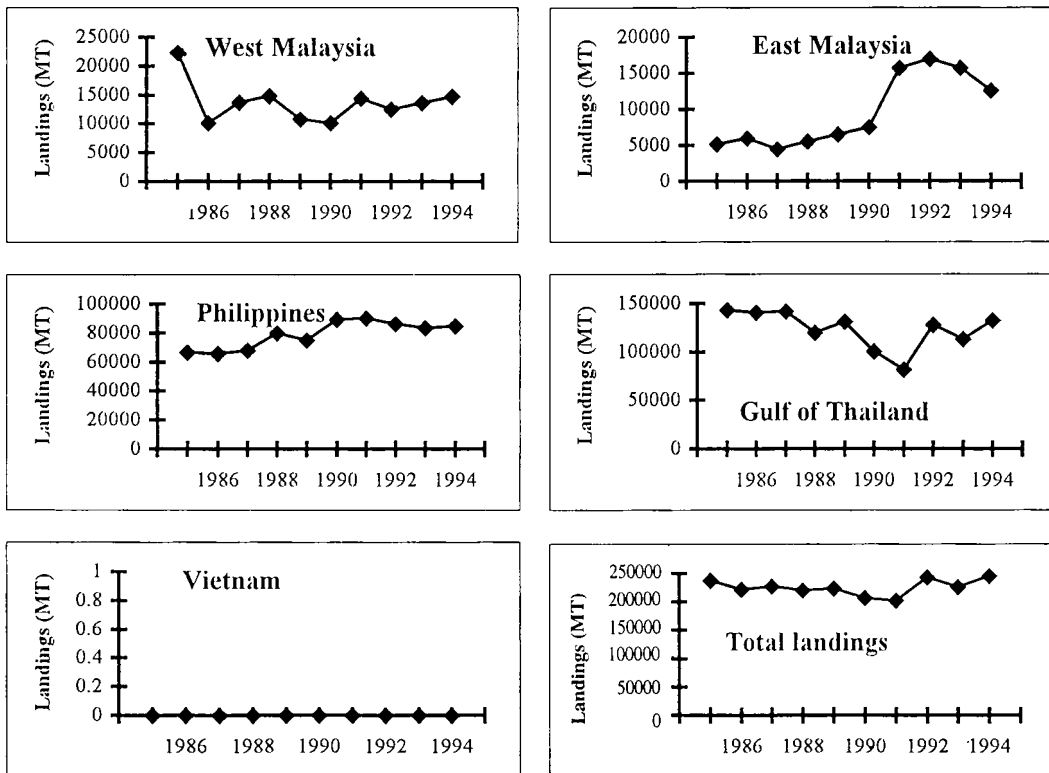
Note: Mansor and Hamid, 1990; Mansor and Abdullah, 1995; Mohsin and Ambak, 1996

Geographical distributions of shared stocks in the South China Sea

Species names: *Rastrelliger* spp.



Map showing geographical distribution of fishing and spawning ground and migration patterns



Trend landings of *Rastrelliger* spp. by gear group in the East Coast of Peninsular Malaysia.

Fisheries and stock status: biomass
underexploited/overexploited