Regional Dialogue on Management of Highly Migratory Fish Species
in the Bay of Bengal
23 November 2017; Kochi, India

Ecological and Economic Importance of Highly Migratory Fish Species – State of Knowledge

Bay of Bengal Programme
Inter-Governmental Organisation

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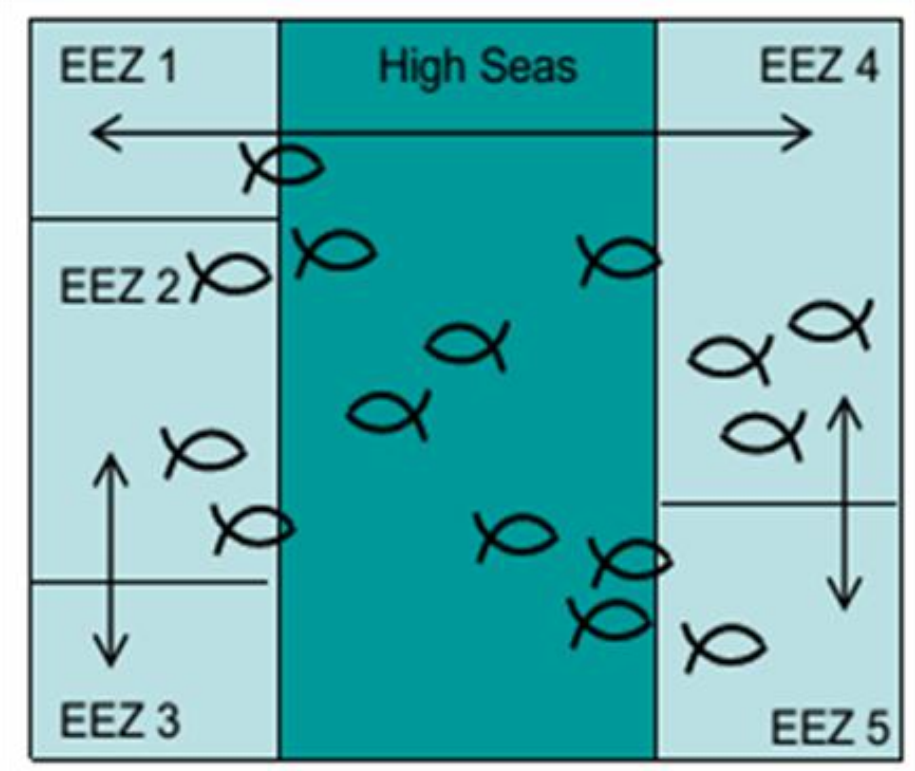
Highly Migratory Fish Species (HMFS)

- Has origin in Article 64 of UNCLOS
- Fish species or stocks that carry out extensive migrations occur in both EEZs and high seas.
- Usually denotes tunas and billfishes, but includes oceanic sharks and dolphinfish



HMFS in the Indian Ocean (UNCLOS Article 64; Annex 1)

Tunas & Billfishes (12 species)

- Albacore
- Bigeye
- Skipjack
- Yellowfin
- Marlins (3 spp)
- Indo-Pacific sailfish
- Swordfish
- Little tuna
- Frigate tuna
- Bullet tuna

(Longtail tuna, bonito, dogtooth tuna are not HMS)

Non-tunas (11 species)

- Thresher sharks (3 spp)
- Requiem sharks (2 spp)
- Hammerhead (1 sp)
- Mackerel sharks (3 spp)
- Whale shark
- Dolphinfish

Characteristics of Tunas & Billfishes

- Pelagic/Epipelagic
- Apex predators (opportunistic)
- High to very high fecundity
- Moderate to fast growth
- Capable of sustaining moderate to high yields
- Sexually dimorphic growth of many species
- Many species considered genetically homogenous
- Endothermic

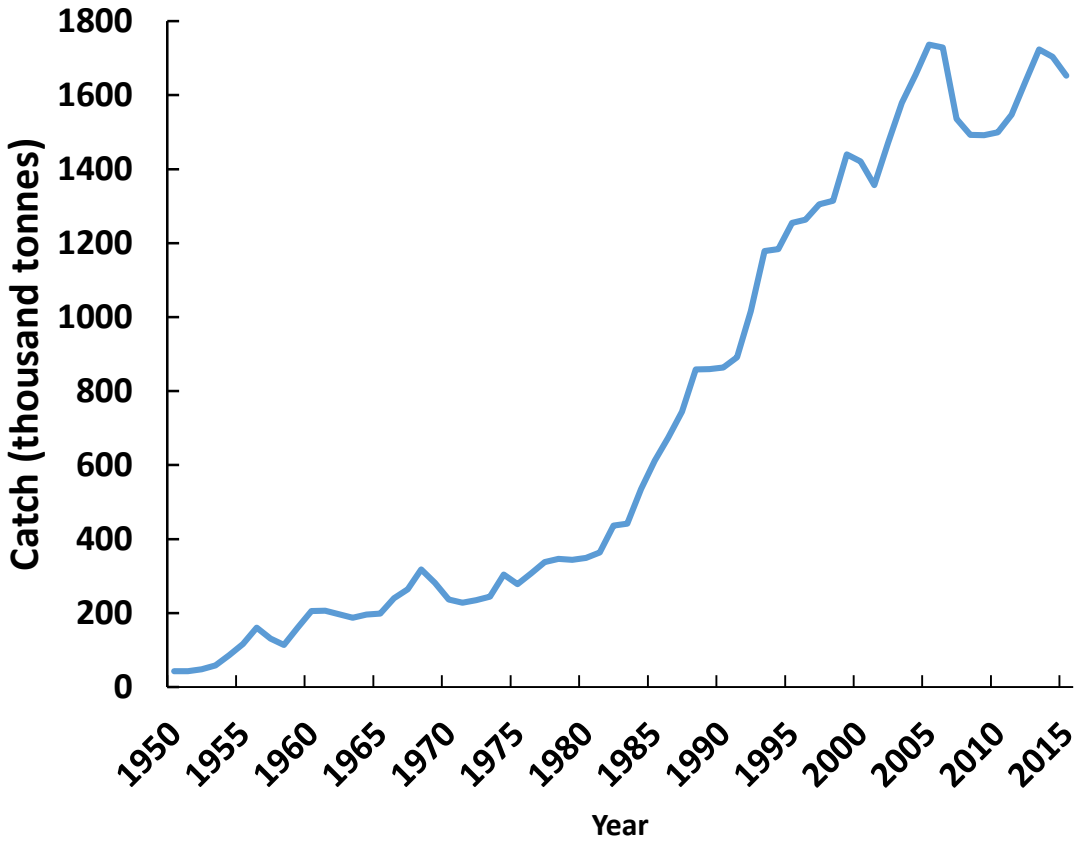
Ecological importance

- Being apex predators (trophic level: > 4.0), control the energy flow in the ecosystem from the top.
- The standing stock of ~ 2 million tonnes of tunas and tuna-like fishes in the Indian Ocean may consume ~ 60,000 t daily (@ 3% daily food consumption);
- Decline in top predators changes the structure and function of marine communities;
- Transfer energy from small fishes low in trophic level to higher trophic level.

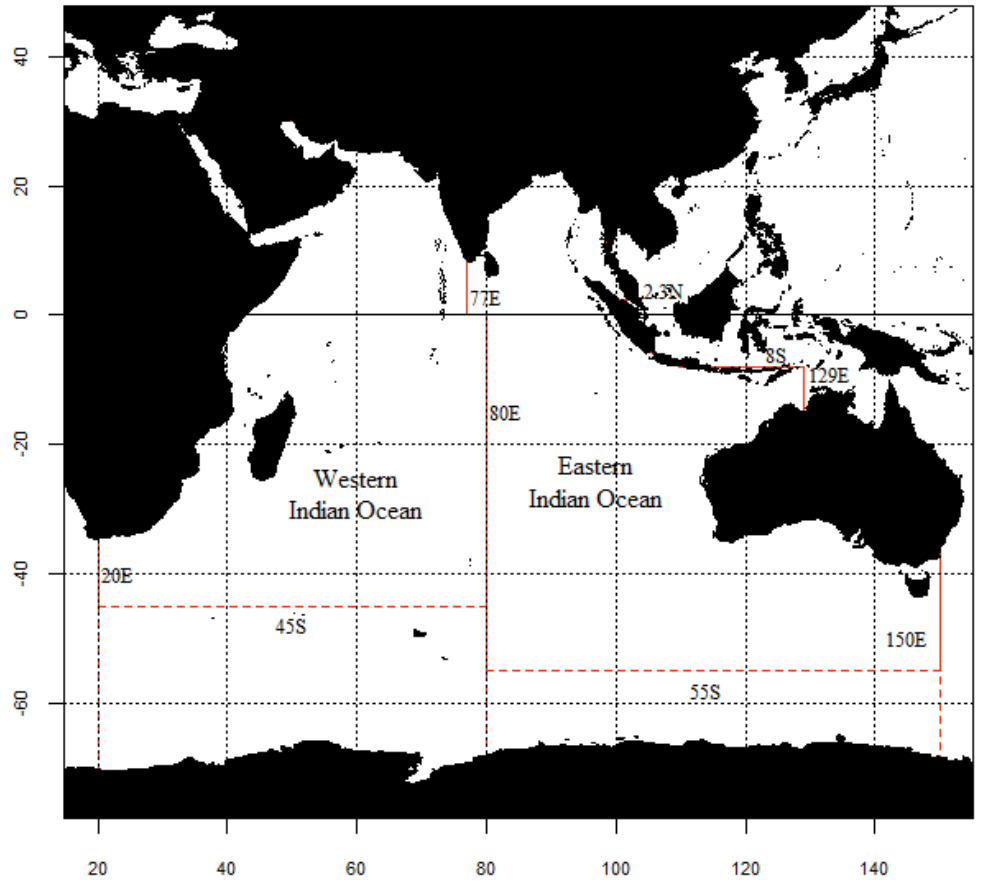
Ecological importance

- Being migratory, they transfer and disperse energy from coastal ecosystems to open oceans and vice versa;
- Faecal production amounts to 10% of food consumption; thereby, 6,000 t added daily to the fertility of the oceans;
- Being large-sized fish with longer life span, the oceanic prime tunas are considered as sentinels and are indicators of ocean health.
- Tunas should be managed for maintenance of the entire ecological processes, and not for sustaining their populations alone.

Tuna and tuna-like fish catch in the Indian Ocean
(Data source: IOTC)



- Western Indian Ocean produces much more tuna (66%) than the east (34%).
- West has greater primary productivity due to favourable current, dissolved oxygen and Indian Ocean Dipole.



Top 10 countries catching tuna in Indian Ocean

Country	Average catch (t) during 2005-14	%
Indonesia	266,048	19.7
Iran Islamic Republic	157,471	11.7
Spain	138,945	10.3
Maldives	121,145	9.0
Sri Lanka	117,984	8.7
India	100,243	7.4
France	79,276	5.9
Seychelles	72,925	5.4
Taiwan, China	65,442	4.8
Pakistan	36,971	2.7

47 countries

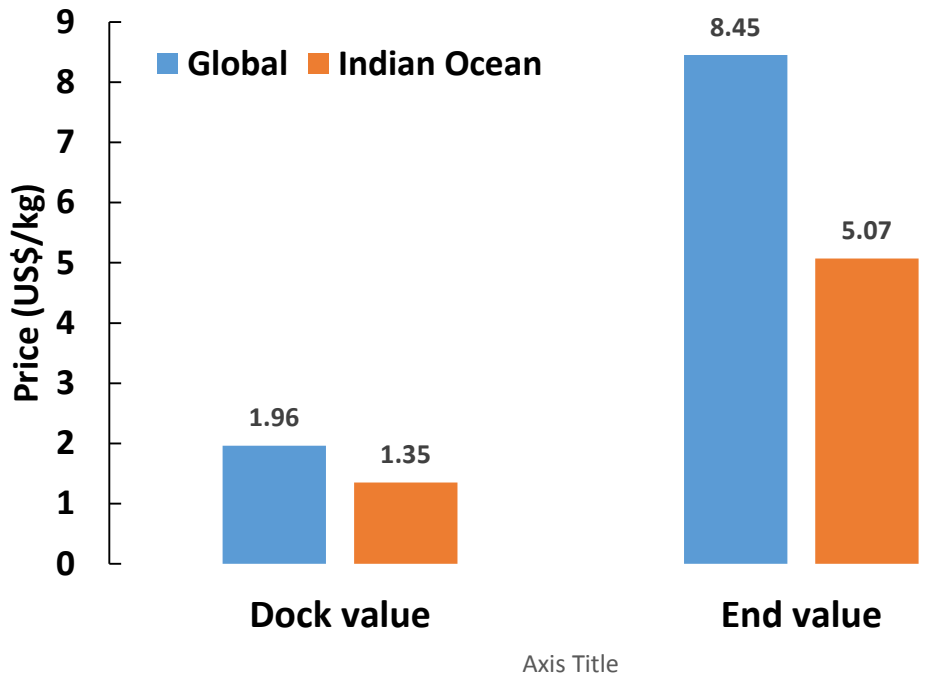
DWFN catch 20%

Economic importance

- Prime species of tunas are highly traded fish in international markets.
- Value of global tuna products is about US$5 billion, which is 9% of totasl global fish trade.
- Traded in fresh, frozen, chilled and canned forms.
- Globally, about 75% of tunas consumed as canned product.
- Sashmi market for raw fish fetched very high price.

Economic value of tuna fisheries

Area	Catch (million tonnes)	Dock value* (billion US$)	End value* (billion US$)
Global	4.99	9.76	42.21
Indian Ocean	1.72	2.32**	8.72



Source: Pew Trust (2016)

Estimated *potential* sustainable value of both the principal and neritic tuna stocks in the Indian Ocean is USD 2.06 billion.

Potential for improving economic valuation of tuna fisheries

The actual (current) economic value of tuna stocks in the IO is not known (in terms of the current levels of resource rent being generated).

[1] economic impact of tuna fisheries (employment, revenues from domestic licensing and revenues from fishing agreements with DWFN),

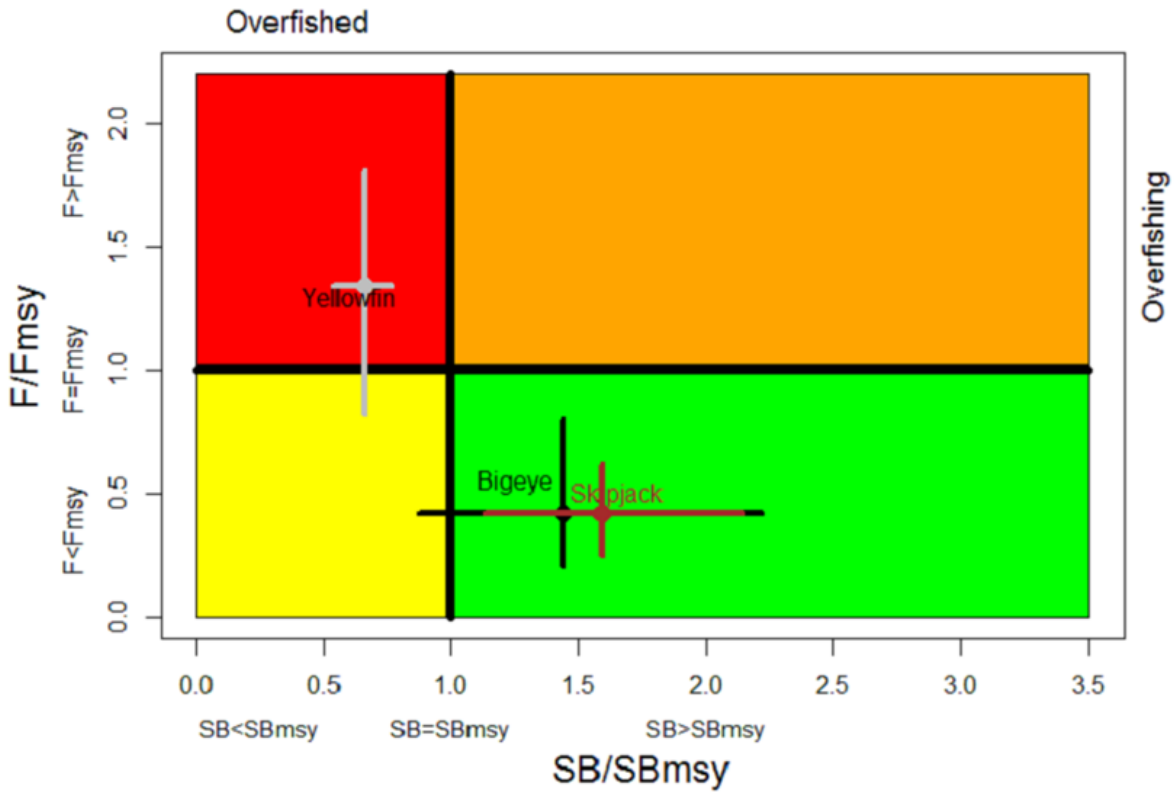
[2] activity/value of the tuna trade (import and export quantities and values), and

[3] value of fisheries production (measured as the financial turnover of the sector, using landings and price data).

Tuna catch (2010-14) and MSY in Indian Ocean

Species	Catch (t)	MSY (t)
Albacore	38,181	47,600
Bigeye	102,214	132,000
Skipjack	402,229	684,000
Yellowfin	373,824	421,000
Sailfish	29,143	25,000
Swordfish	28,494	39,400
Black marlin	11,962	10,200
Blue marlin	13,190	11,700
Striped marlin	4,112	5,220
Kawakawa	156,066	152,000
Bullet tuna	8,952	Not known
Frigate tuna	97,930	Not known
Total	**1,159,415**	**1,528,120**

Kobe plot for major tunas in the IO (2015) *(source: IOTC)*



F/F_{MSY} >1 = Stock subject to overfishing
F/F_{MSY} ≤1 = Stock not subject to overfishing

SB/SB_{MSY} <1 = Stock overfished
SB/SB_{MSY} ≥1 = Stock not overfished

Tuna stock status in Indian Ocean in 2015 (source: IOTC)

Species	Subject to overfishing	Not subject to overfishing	Overfished	Not overfished	Recommendations
Albacore, Bigeye, Skipjack, Swordfish		●		●	Immediate management measure not required. Monitoring required.
Kawakawa		●		●	For sustainability, catch should be reduced by 20%.
Black marlin, Sailfish	●			●	Precautionary measure to reduce catch.
Blue marlin		●	●		Precautionary measure to reduce catch.
Yellowfin, Striped marlin	●		●		Catch should be reduced by 20 to 30%.

Bycatch in tuna fisheries

Group	Species	E/NT species	Gear
Sharks	23	9	GN, LL, PS
Rays	11	1	GN, PS, LL
Turtles	4	1	GN, LL, PS
Birds	15	5	LL
Whales	3	1	GN, LL, PS
Dolphins	3	1	GN, LL

Conclusion

- The fishery for HMFS will realise full economic potential only if the following areas are addressed:
    - Improvement in economics assessment
    - Catch upto Maximum Economic Yield
    - Improved performance through the value chain
    - Upgrading of fisheries governance and management framework
    - Development of regional vision and strategy

Thank you