

# Economics in Fisheries Management

LPWM2005 Fisheries Management

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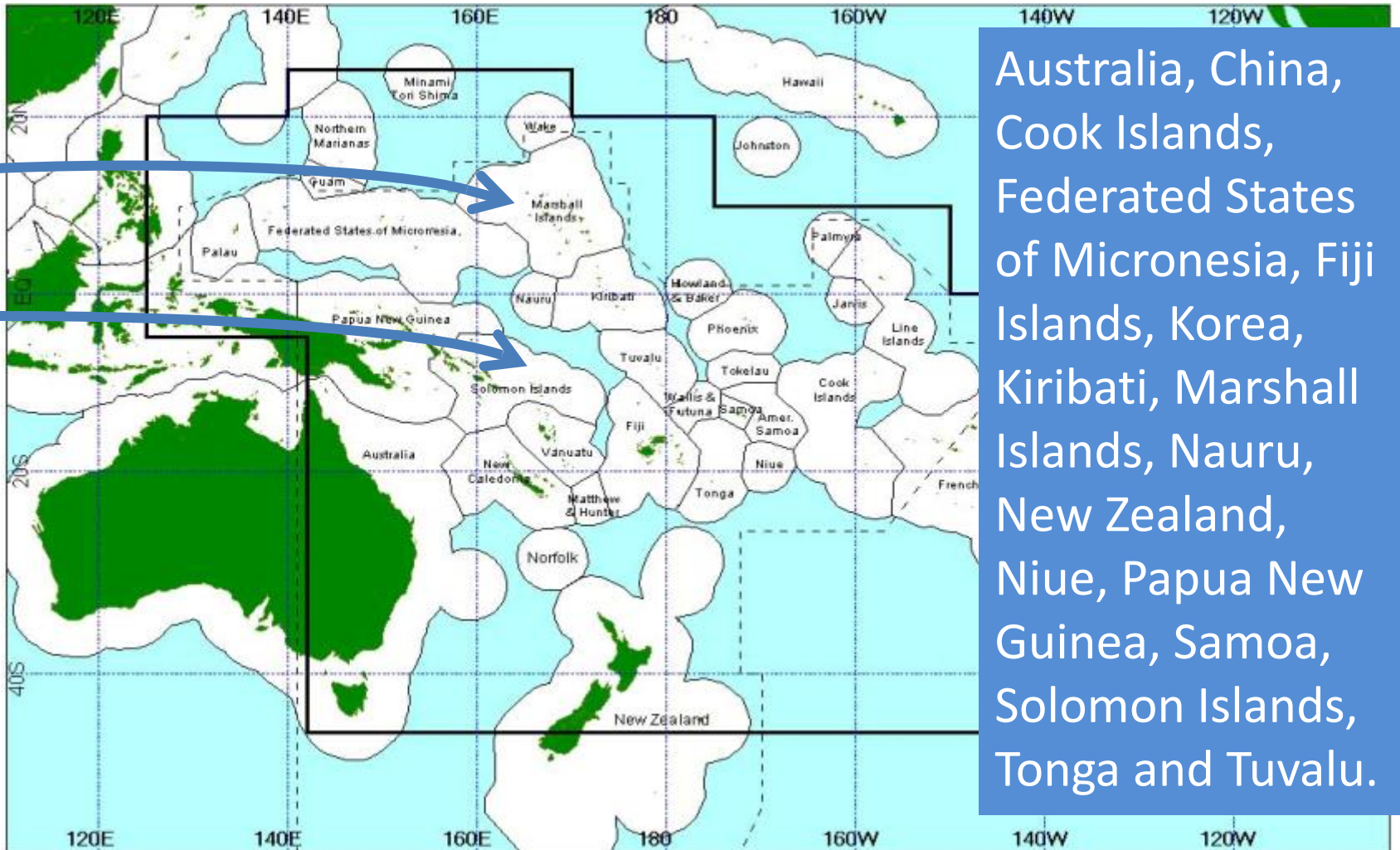
***Lecture 2. Applying the bioeconomic model and management options in the world's largest fishery***

**The University of Queensland, 16 August 2012**

# Accessing Notes to slides in pdf

1. Go to left hand bar, click on the 'Layers' icon (third from top);
2. Activate the 'Presentation notes' box;
3. To read Note, put cursor over 'speech' icon when it appears in top left corner of the slide.

# Western and Central Pacific Fisheries Commission Convention, Area and EEZs



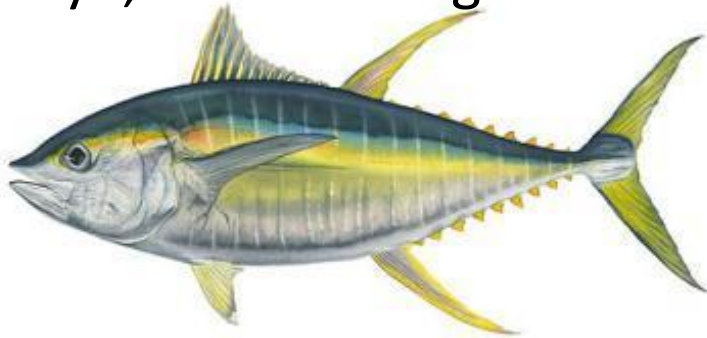
# See also Forum Fisheries Agency

The Pacific Islands Forum Fisheries Agency (FFA) strengthens national capacity and regional solidarity so its 17 members can manage, control and sustainably develop the tuna fisheries in their EEZs.

# Tunas of the W&CPO



**Skipjack:** Tropical/warm temp, pelagic, spawns 1yo, max wt 35kg



**Yellowfin:** Trop/sub-trop, pelagic, spawns 1-1.5yo, max wt 200kg



**Bigeye:** Sub-trop, pelagic, spawns 3-4yo, max wt 210kg

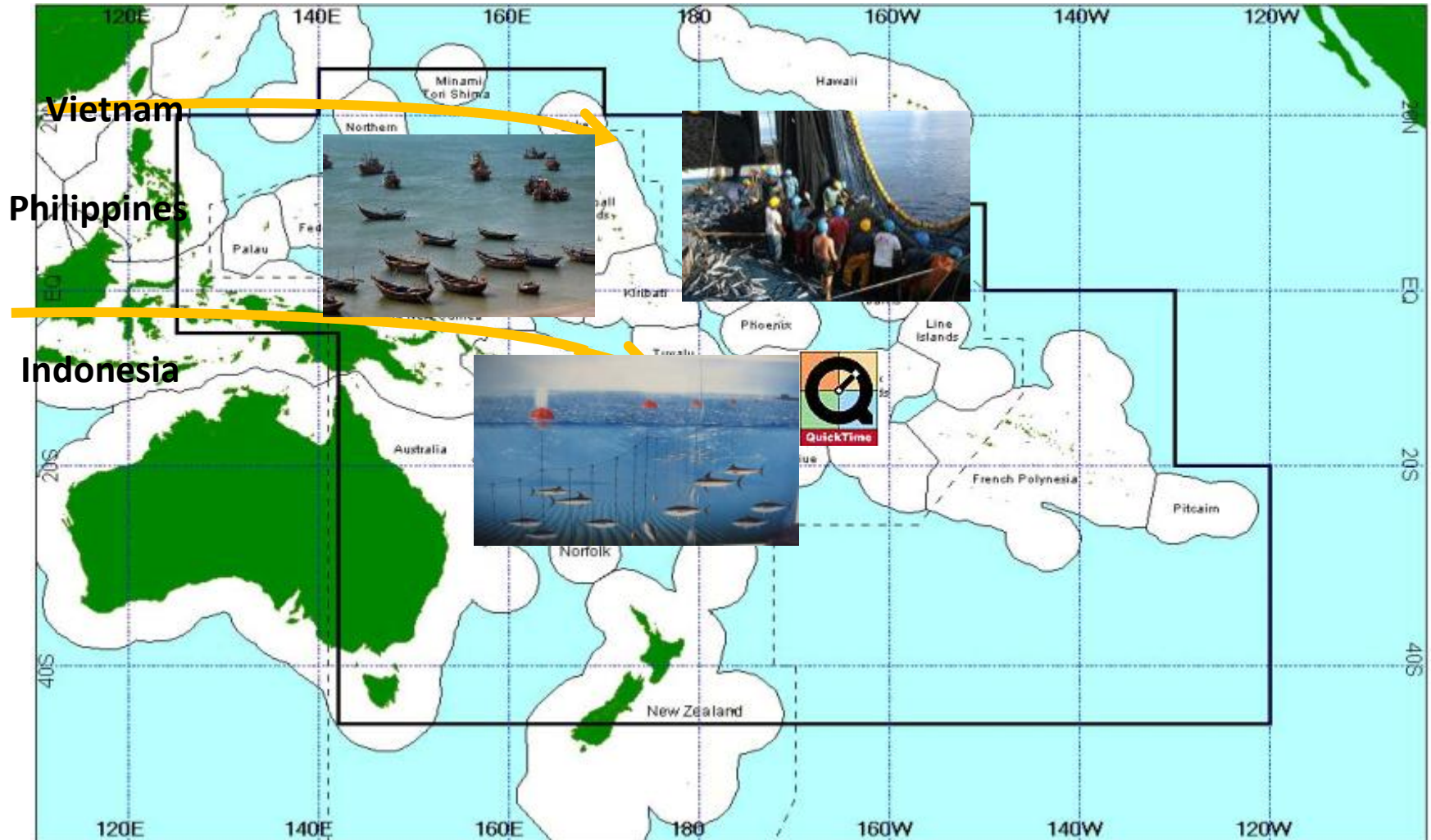


**Albacore:** Sub-trop/temp, pelagic, spawns 5yo, max wt 60kg

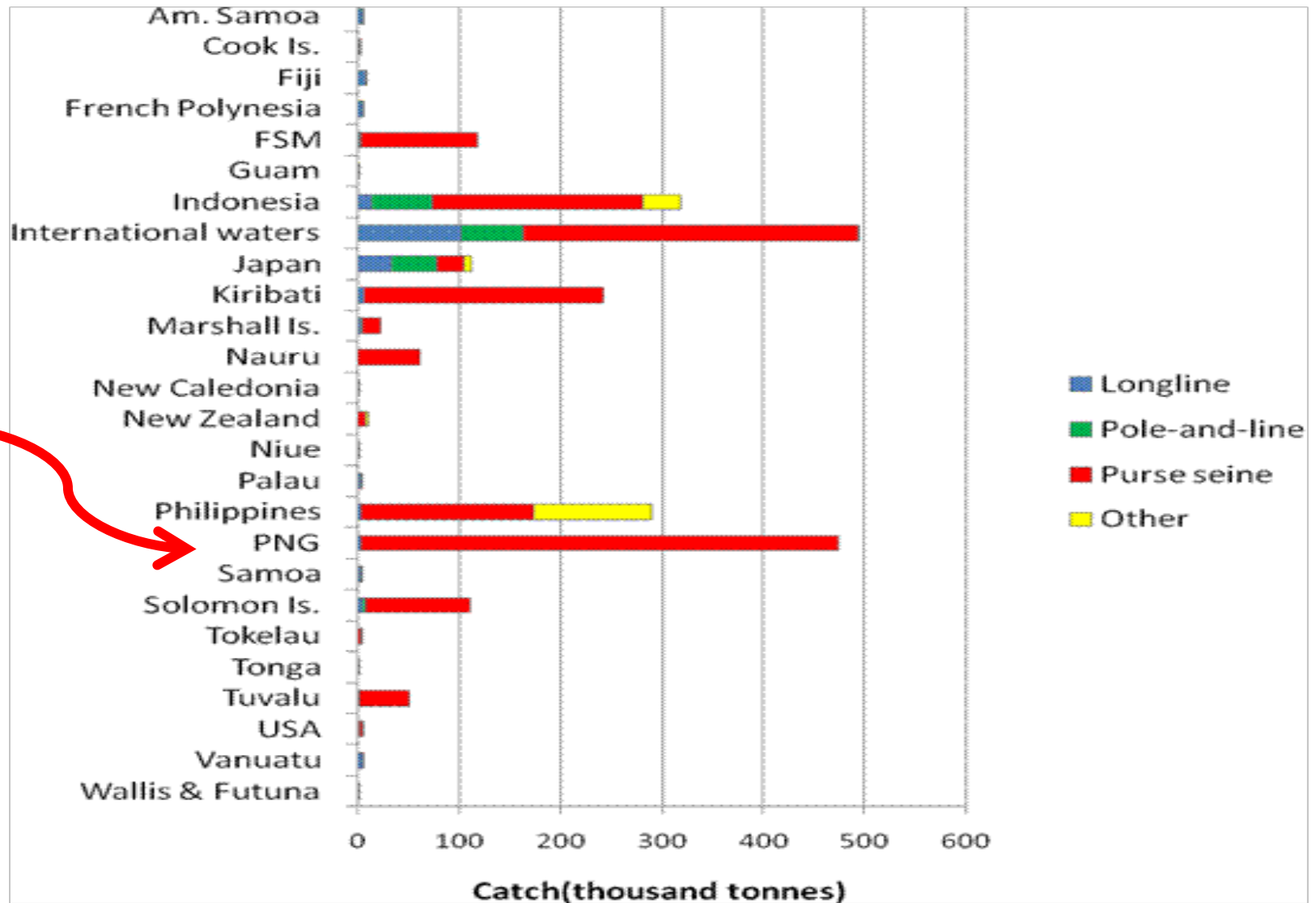




# WCPO types of tuna fishing

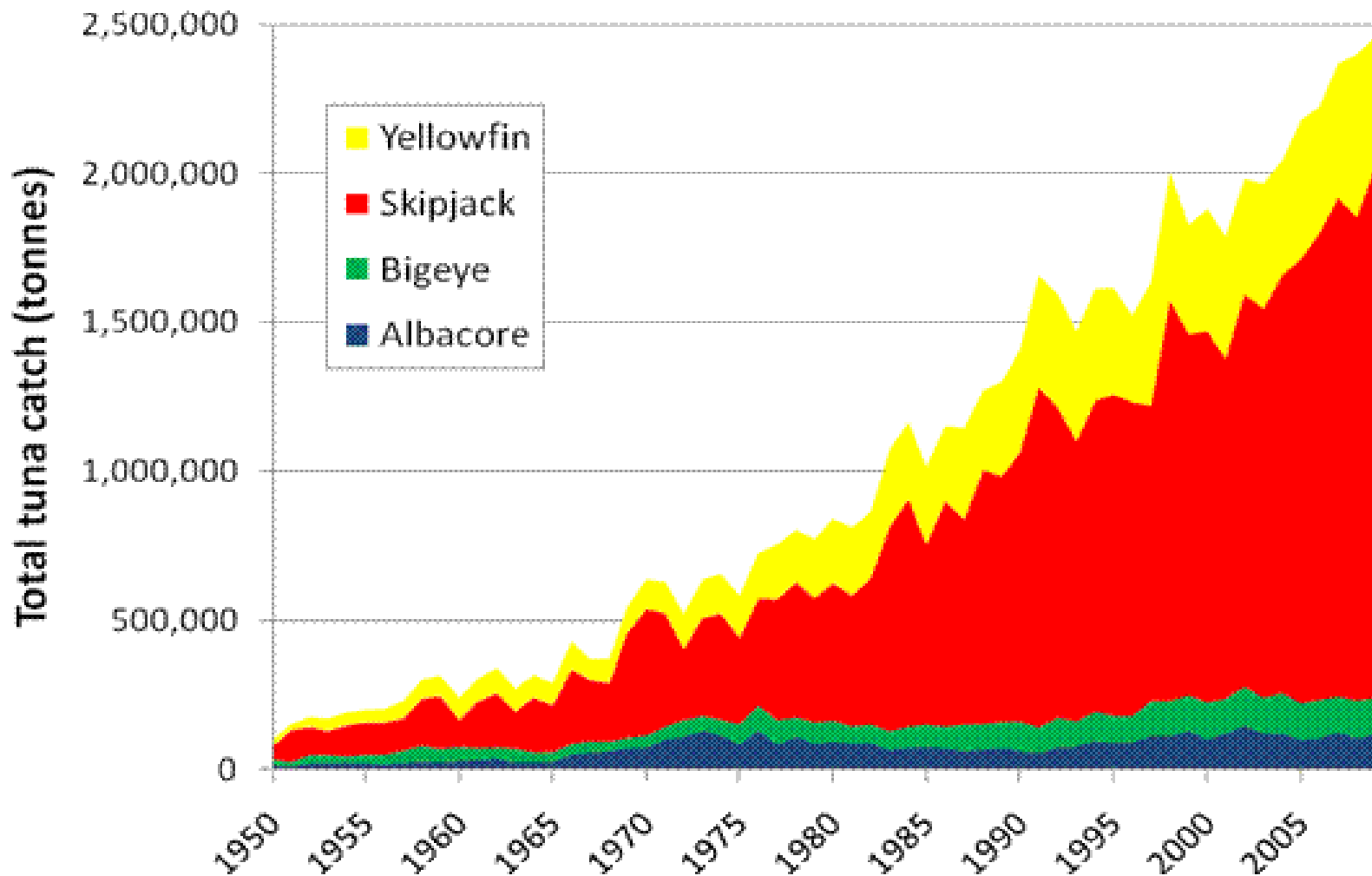


# Annual catch tunas, 2007-2009, EEZs

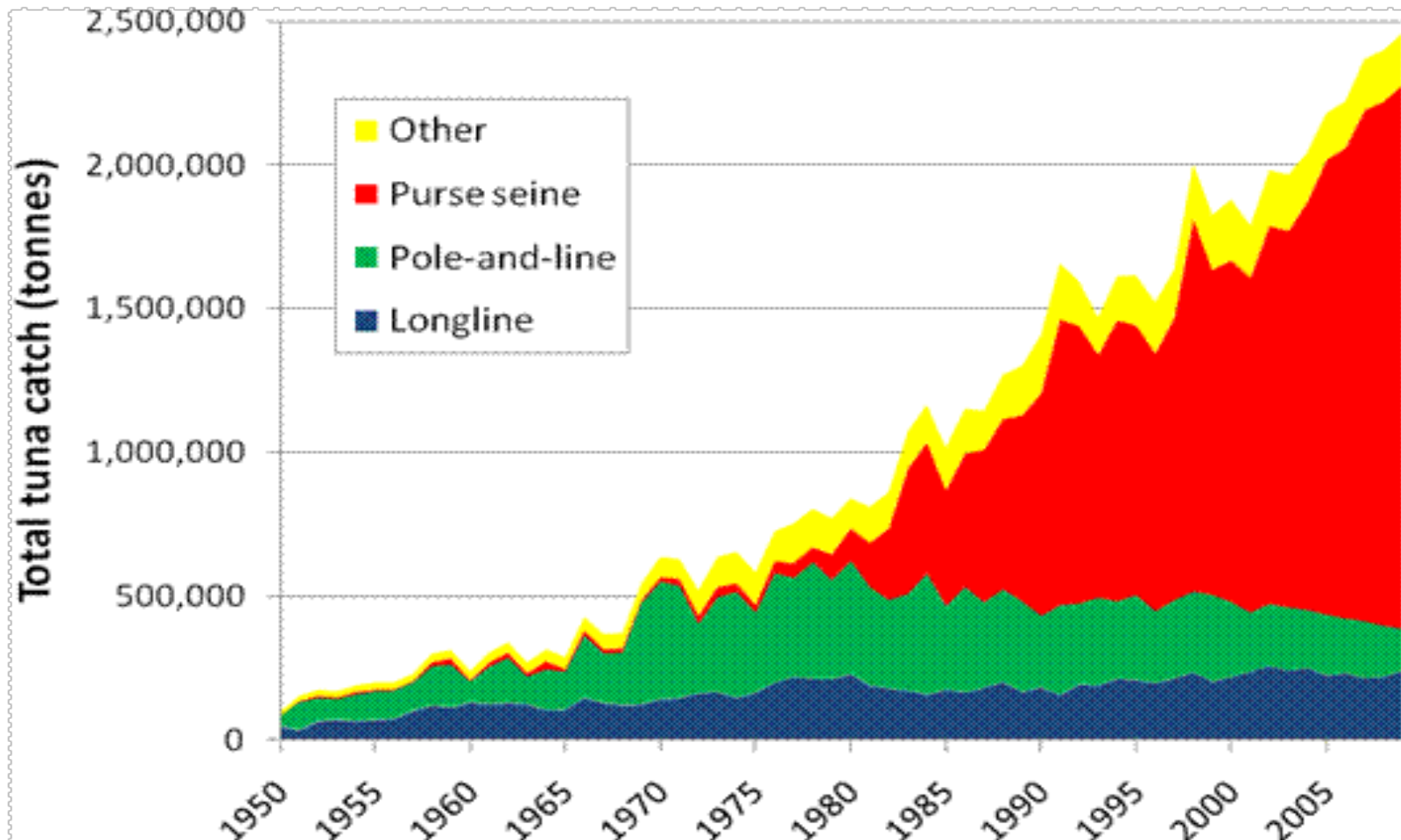




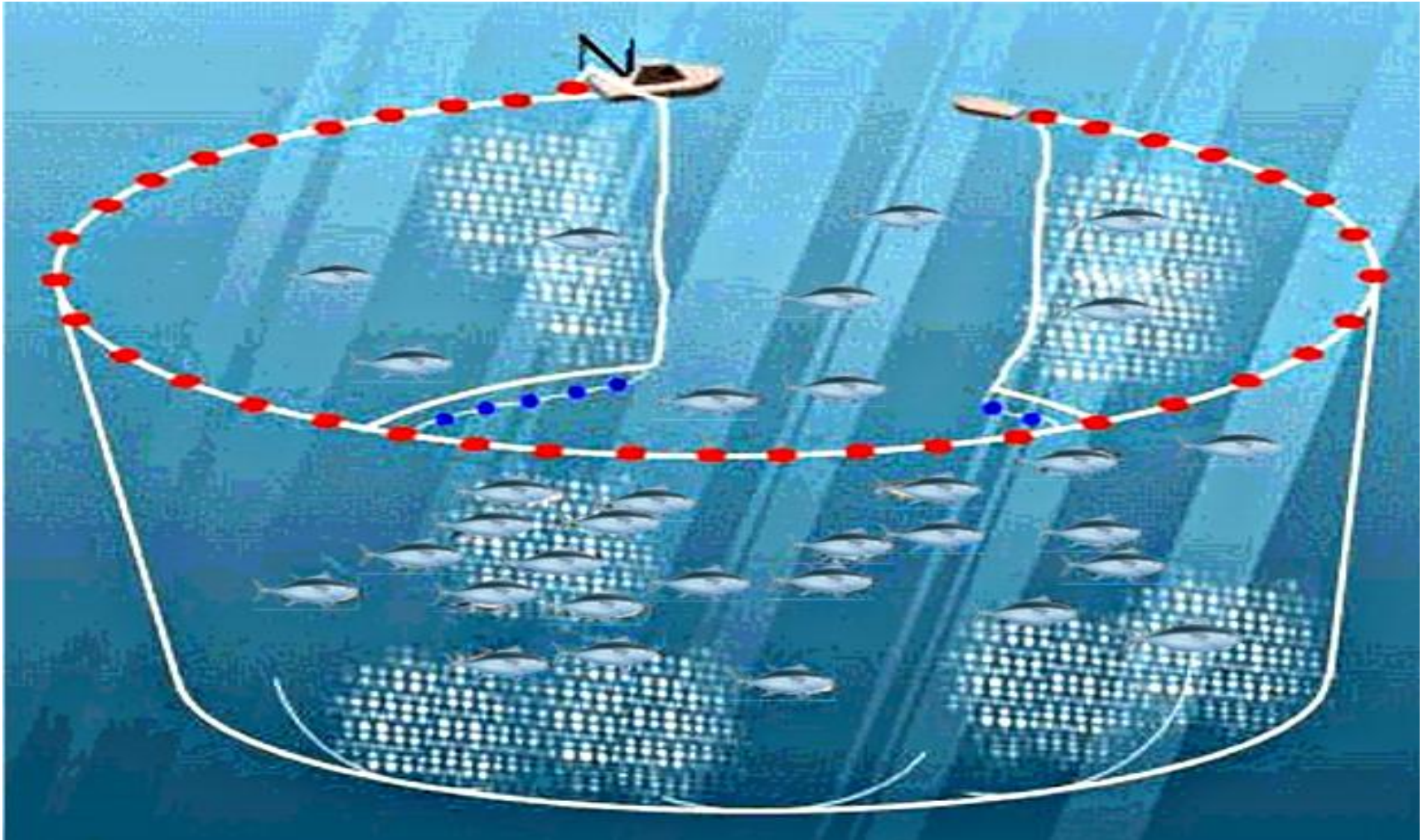
# Tuna catch by species WCPO-CA



# Tuna catch by gear WCPO-CA



# Purse seine fishing





# Papua New Guinea

# Pacific islands benefit from tuna resource



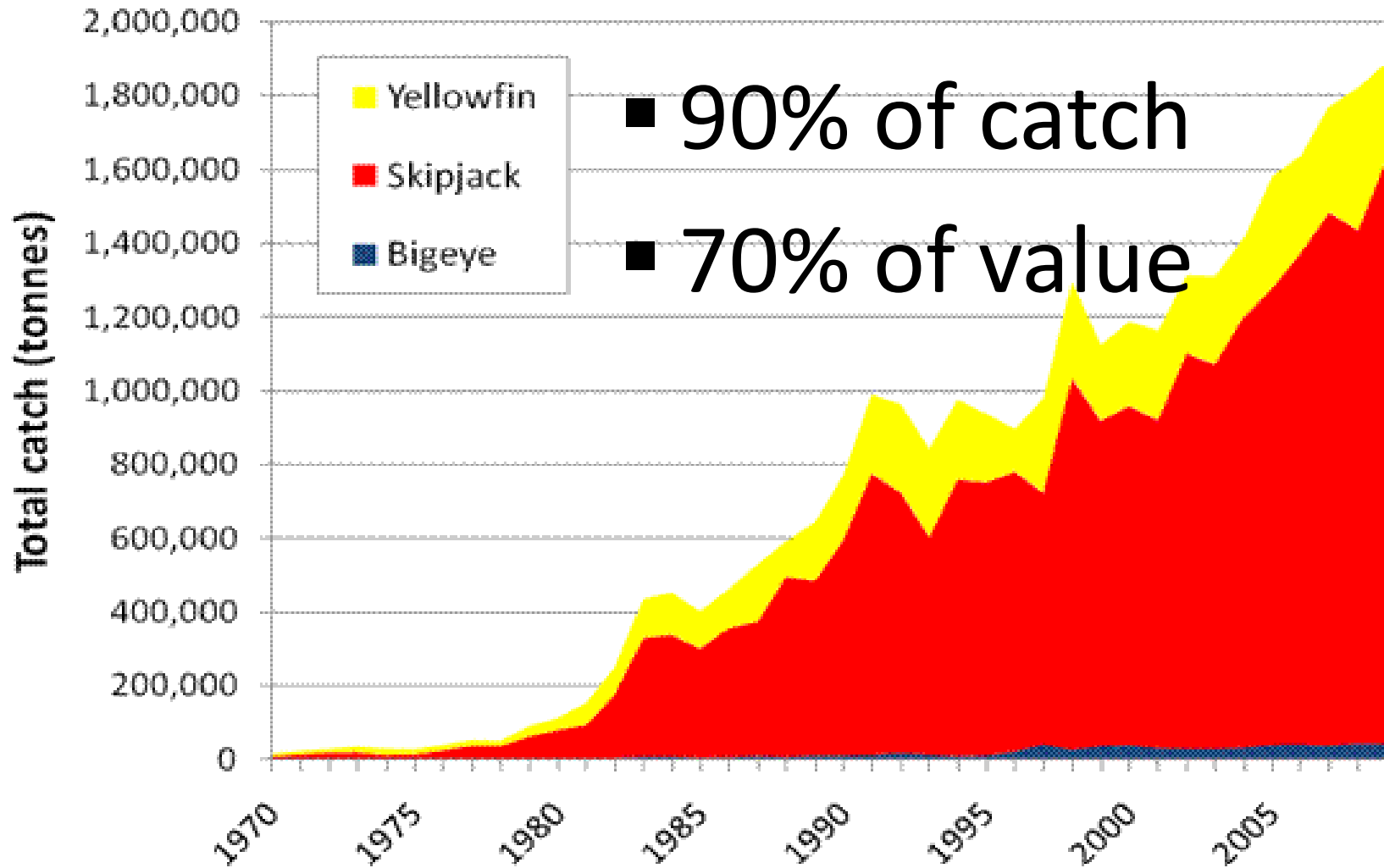
- **Income**  
(License fees, fish sales)
- **Employment**  
(fishing, processing, canning)

# R&D Madang tuna cannery

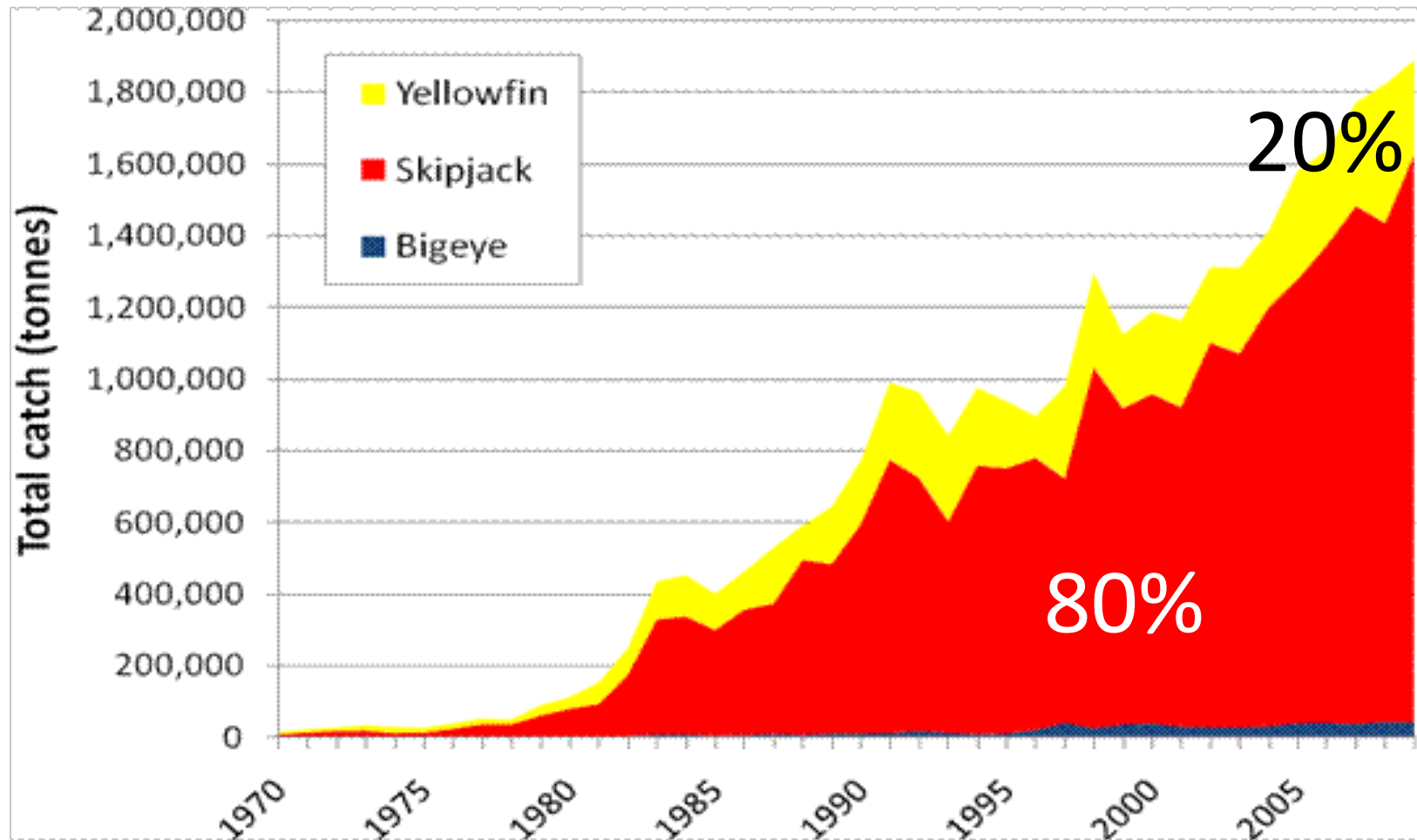




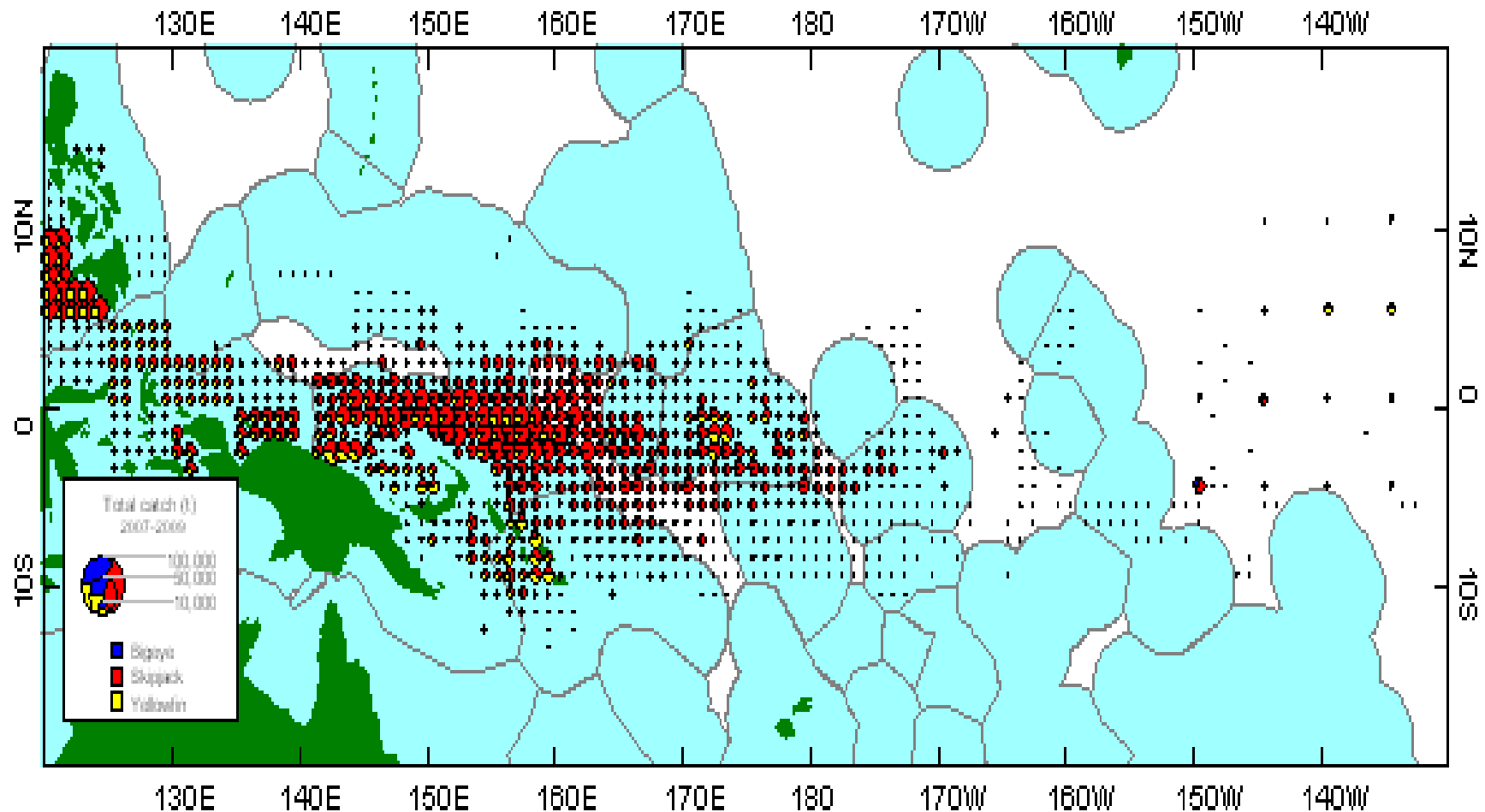
# Purse seine and tuna



# Purse seine catch by species



# Purse seine catch by species and location 2007-2009



# Hauling, purse seine



# Completion of hauling superseiner

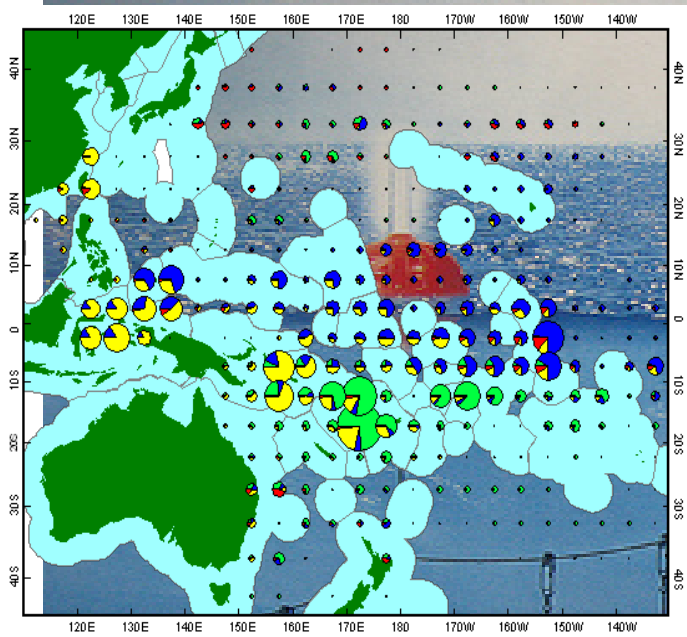


# Longline fishing

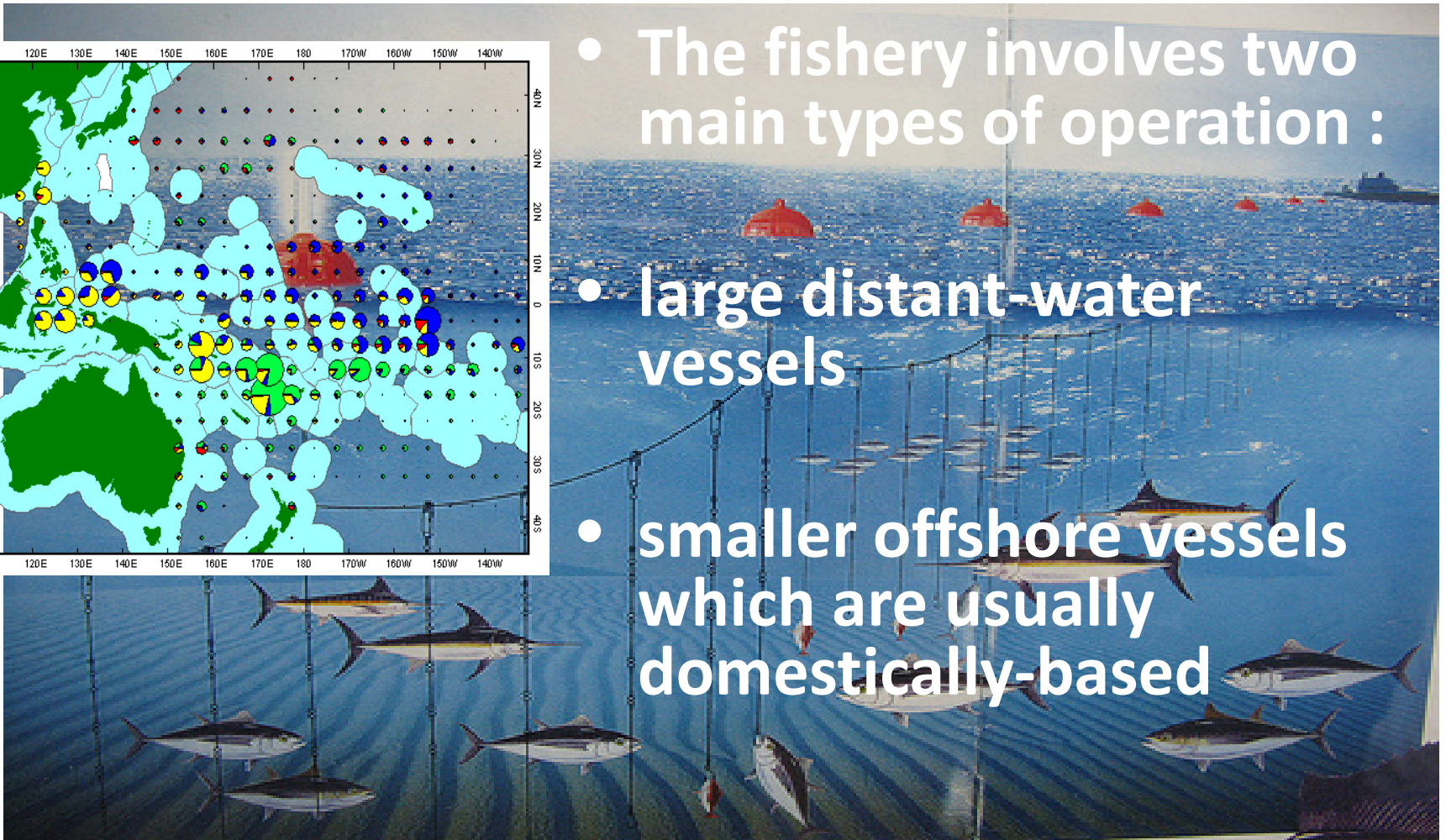




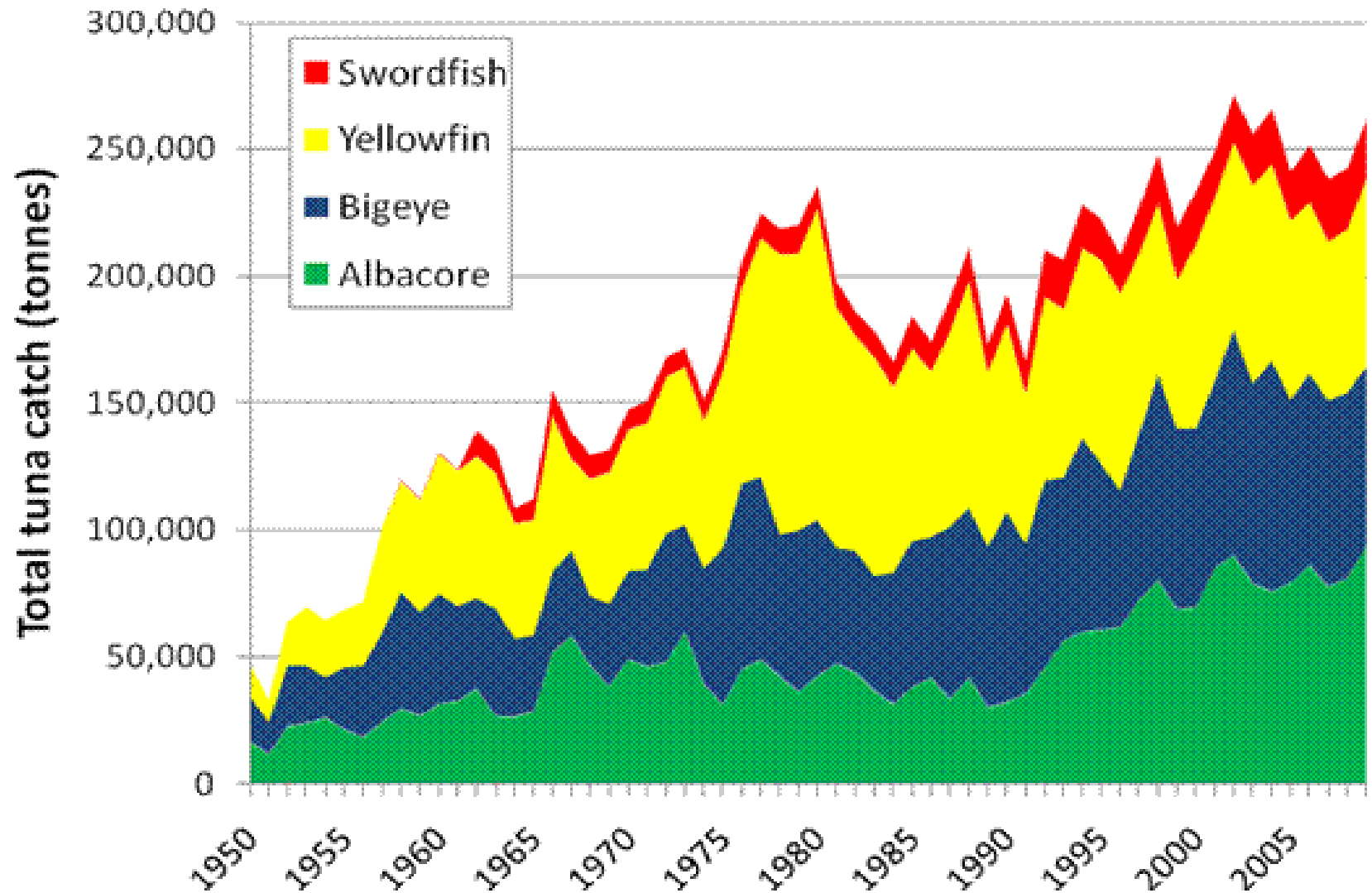
# Longline fishery



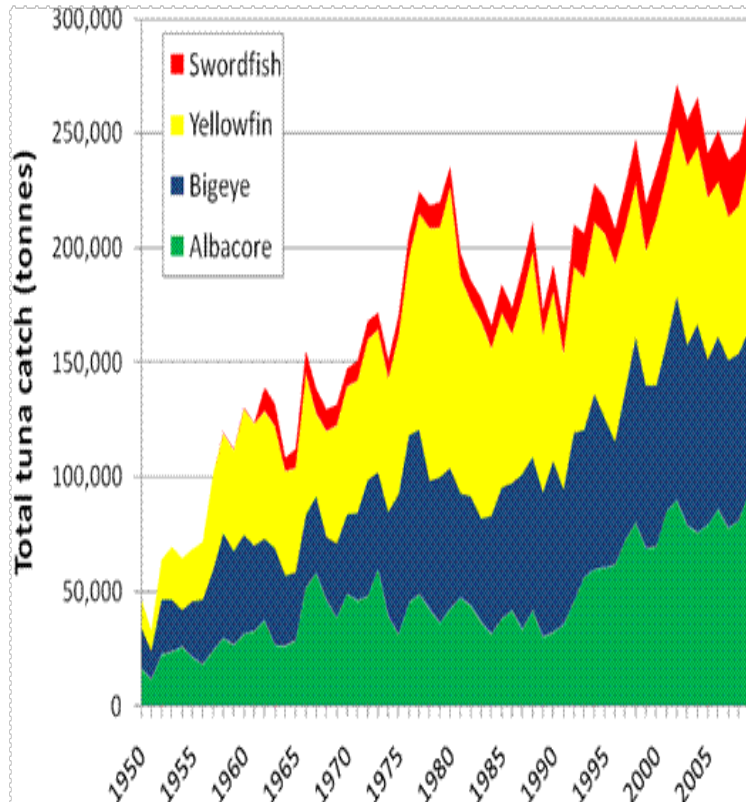
- The fishery involves two main types of operation :
- large distant-water vessels
- smaller offshore vessels which are usually domestically-based



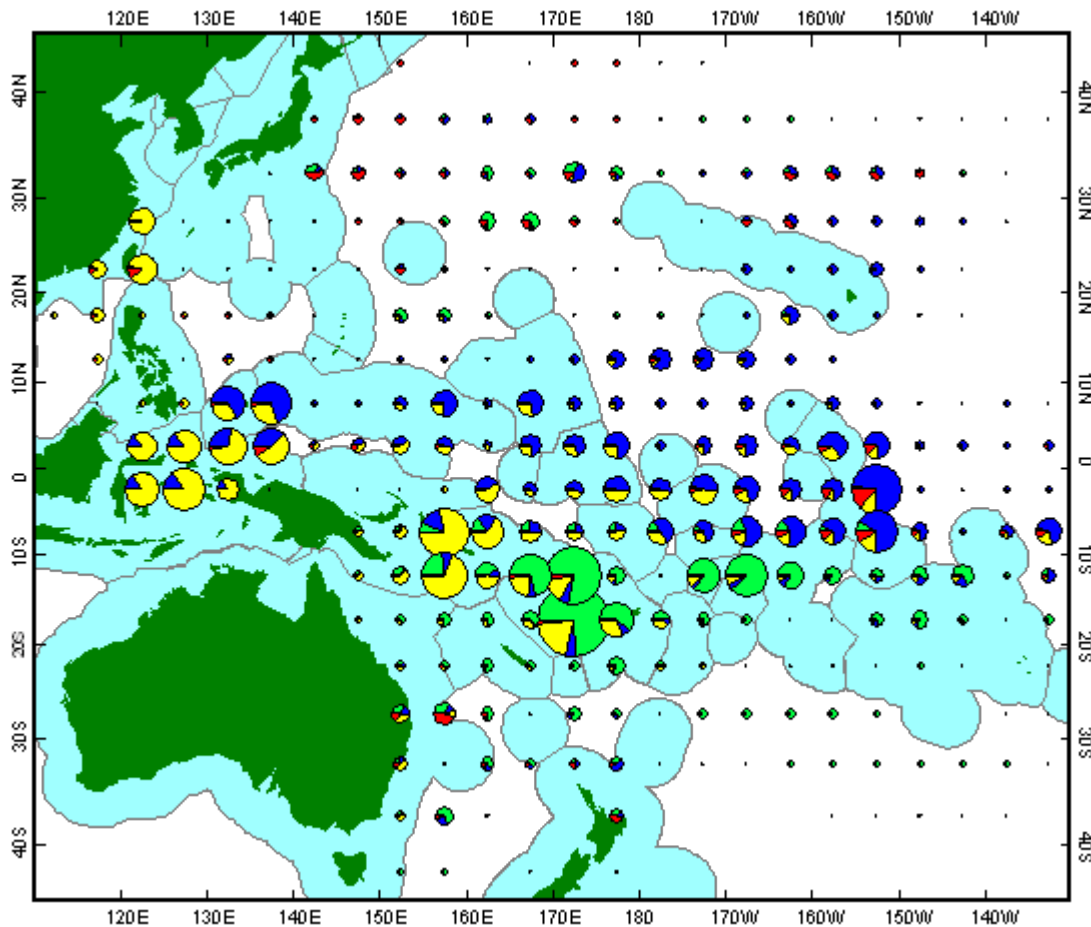
# Longline catches WCPO-CA



# Longline catches in WCPO-CA



# Longline catch



**Longline catch,**  
2007-2009.

**Green:** Albacore

**Yellow:** Yellowfin

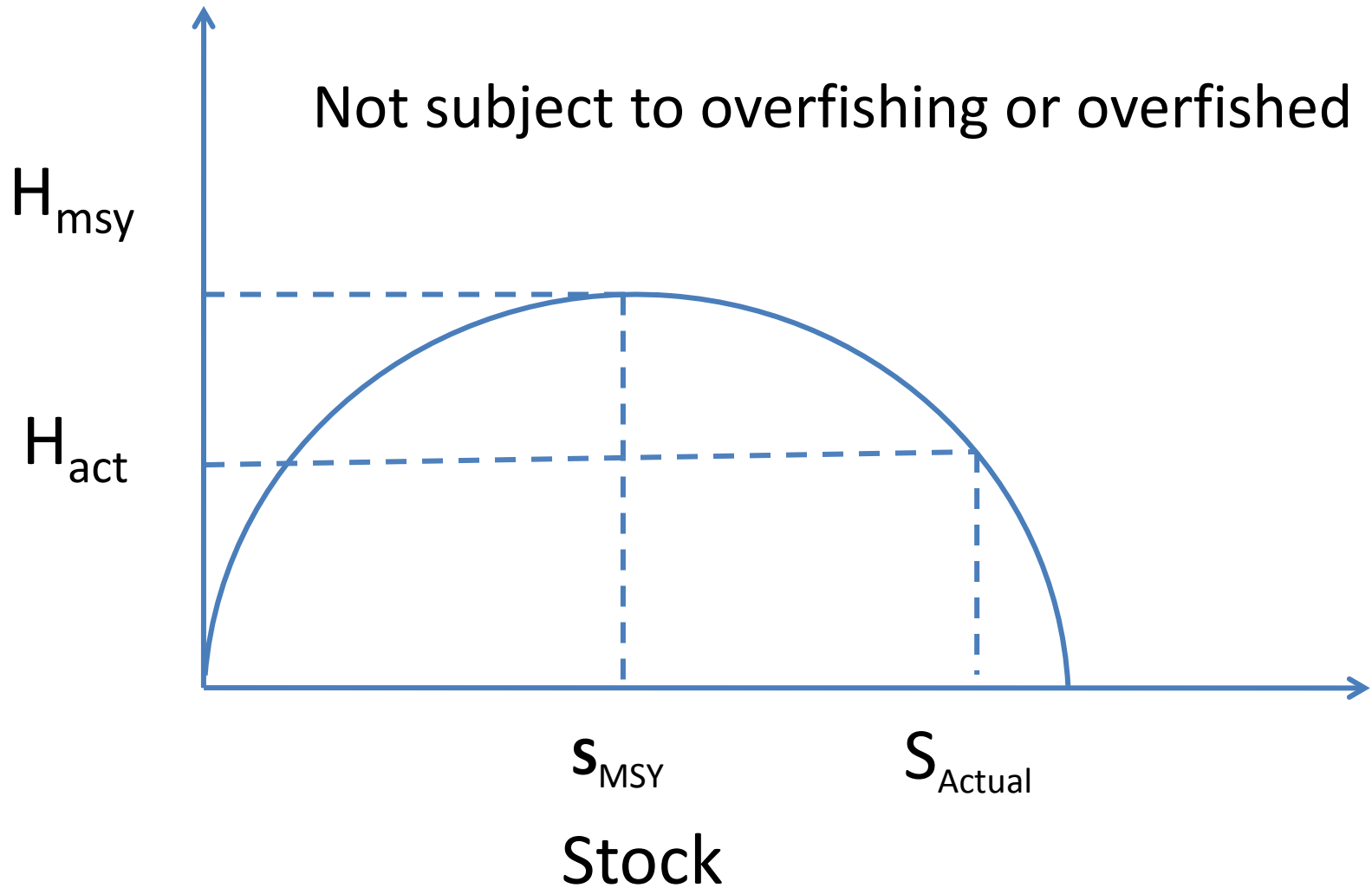
**Blue:** Bigeye

**Red:** Swordfish

# Tuna stocks

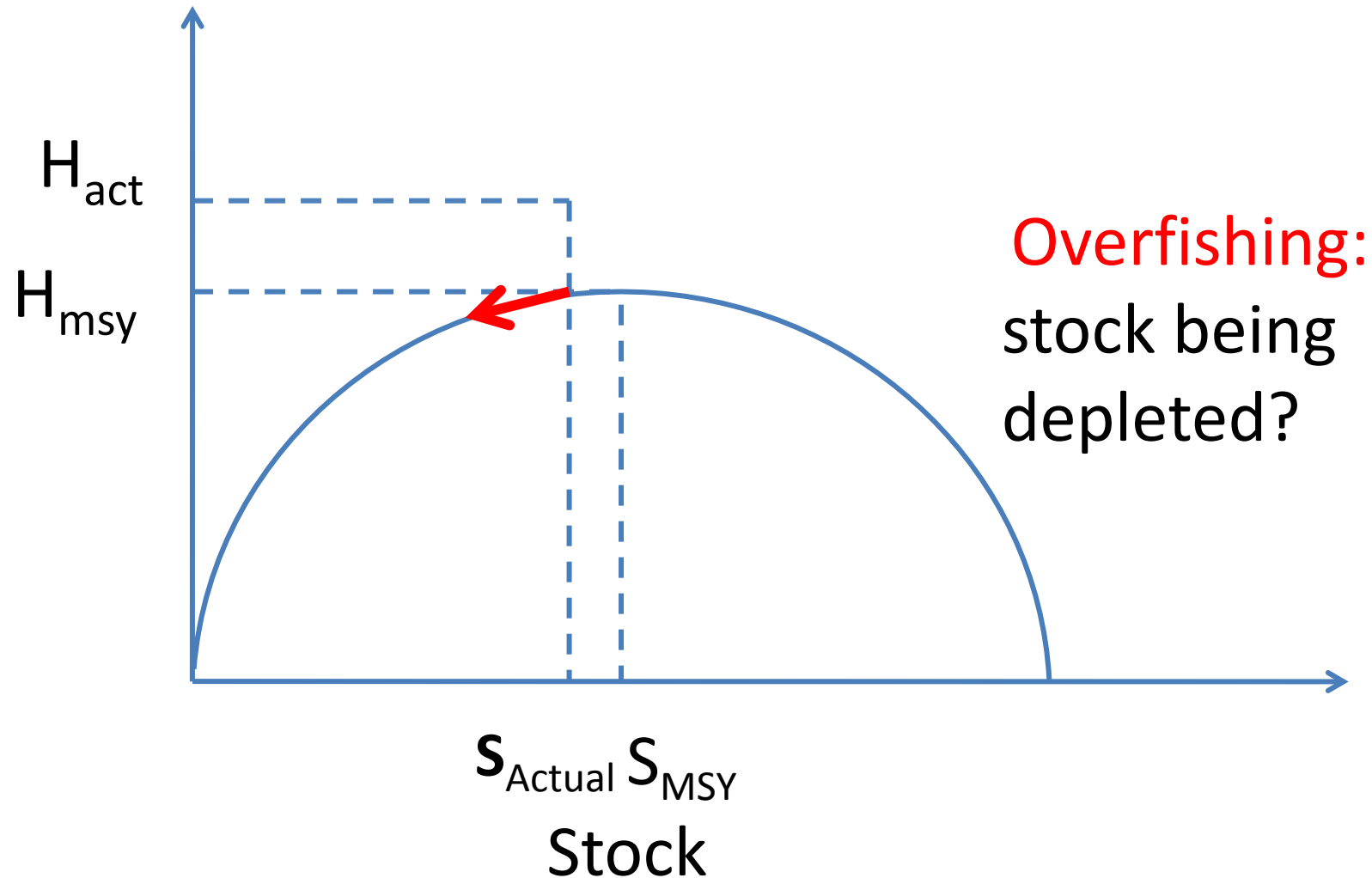
What is stock status of tunas given rapidly rising fishing effort and catches?

# Status of stocks WCPO: Skipjack

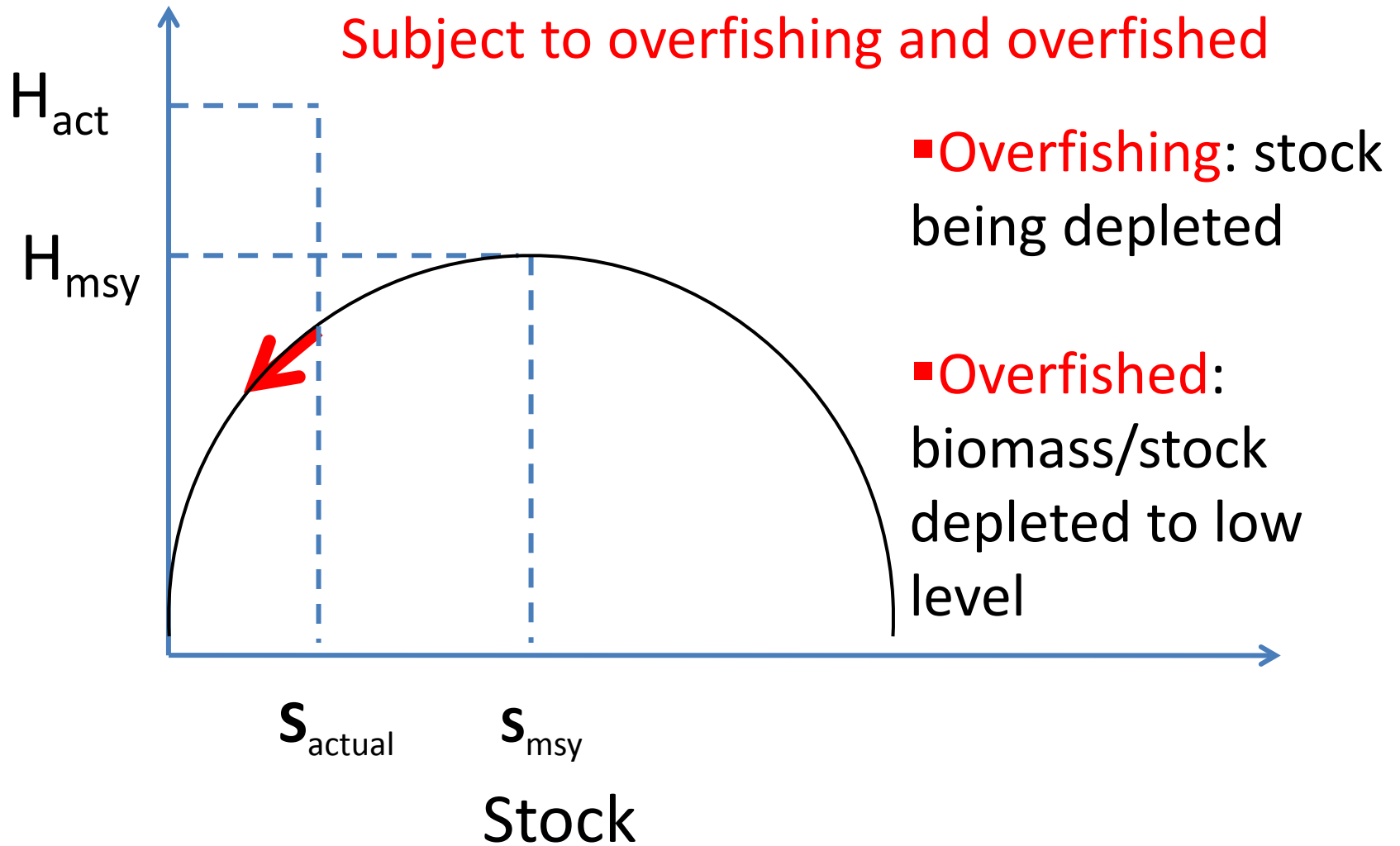




# Status of stocks WCPO: Yellowfin



# Status of stocks WCPO: Bigeye



# The bioeconomic model and the WCPTF, from Lecture 1

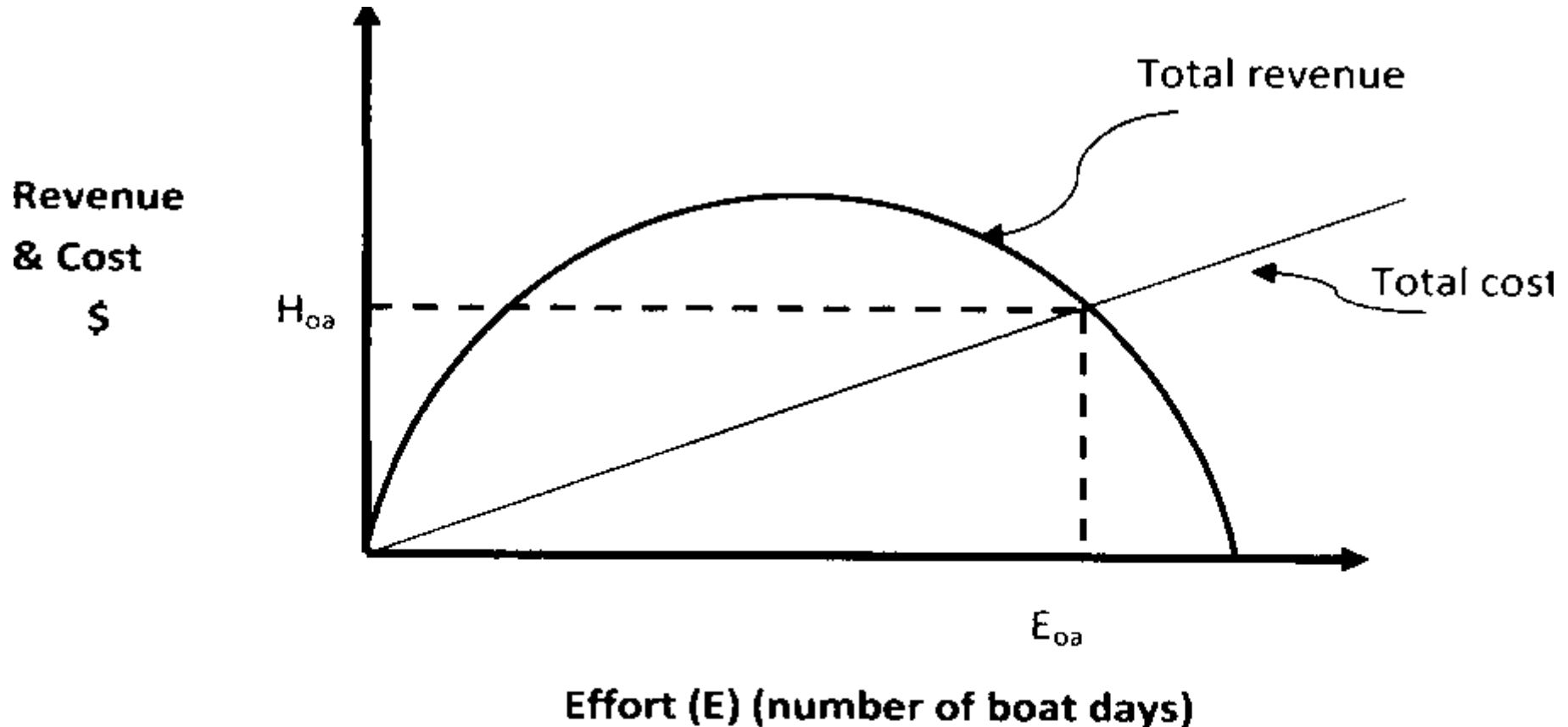


Fig. 4a: Open access fishery

# Stocks depleted and rents dissipated, from Lecture 1

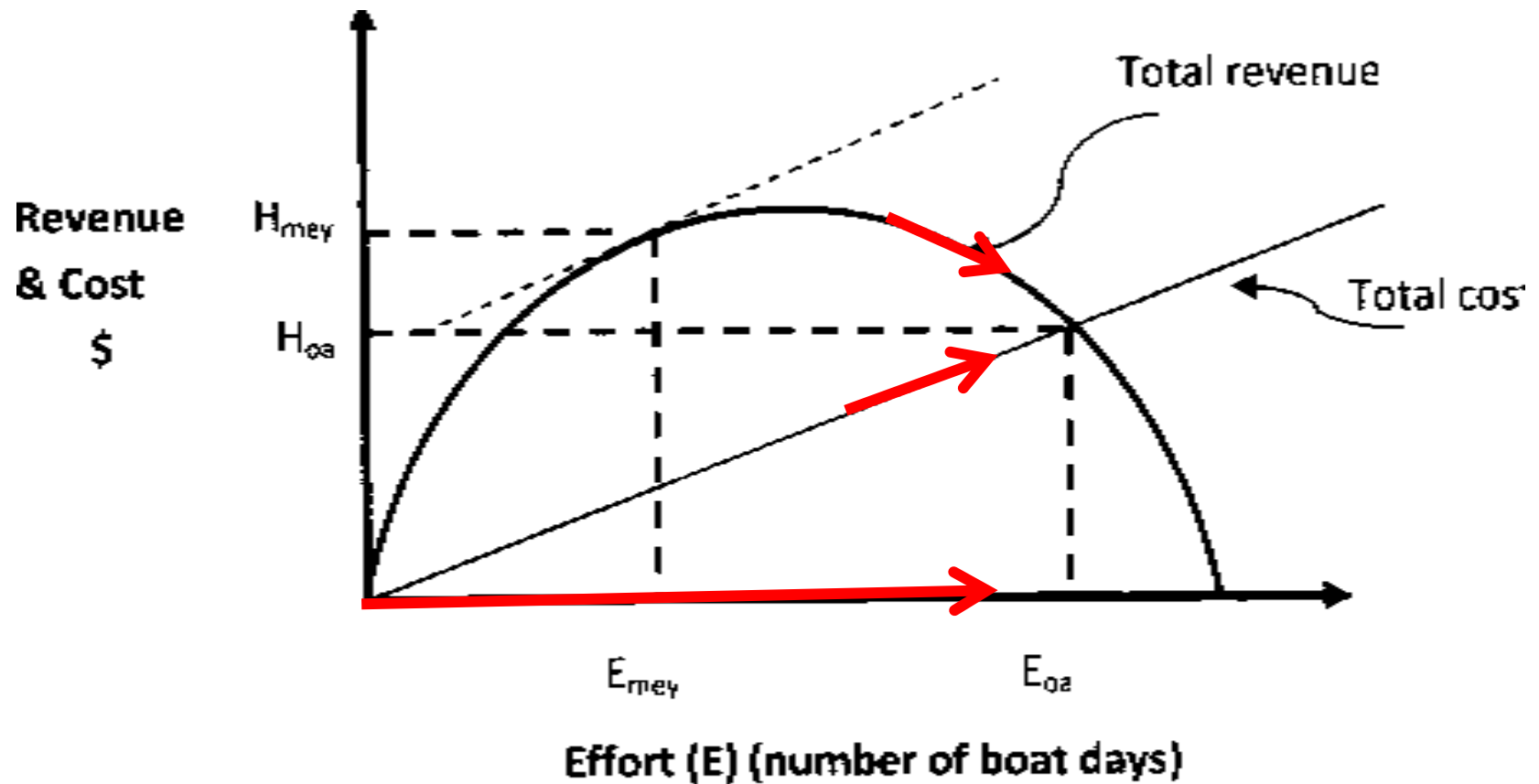


Fig. 5: Efficient harvest in a fishery

# Problem: Juvenile big eye in skipjack catch

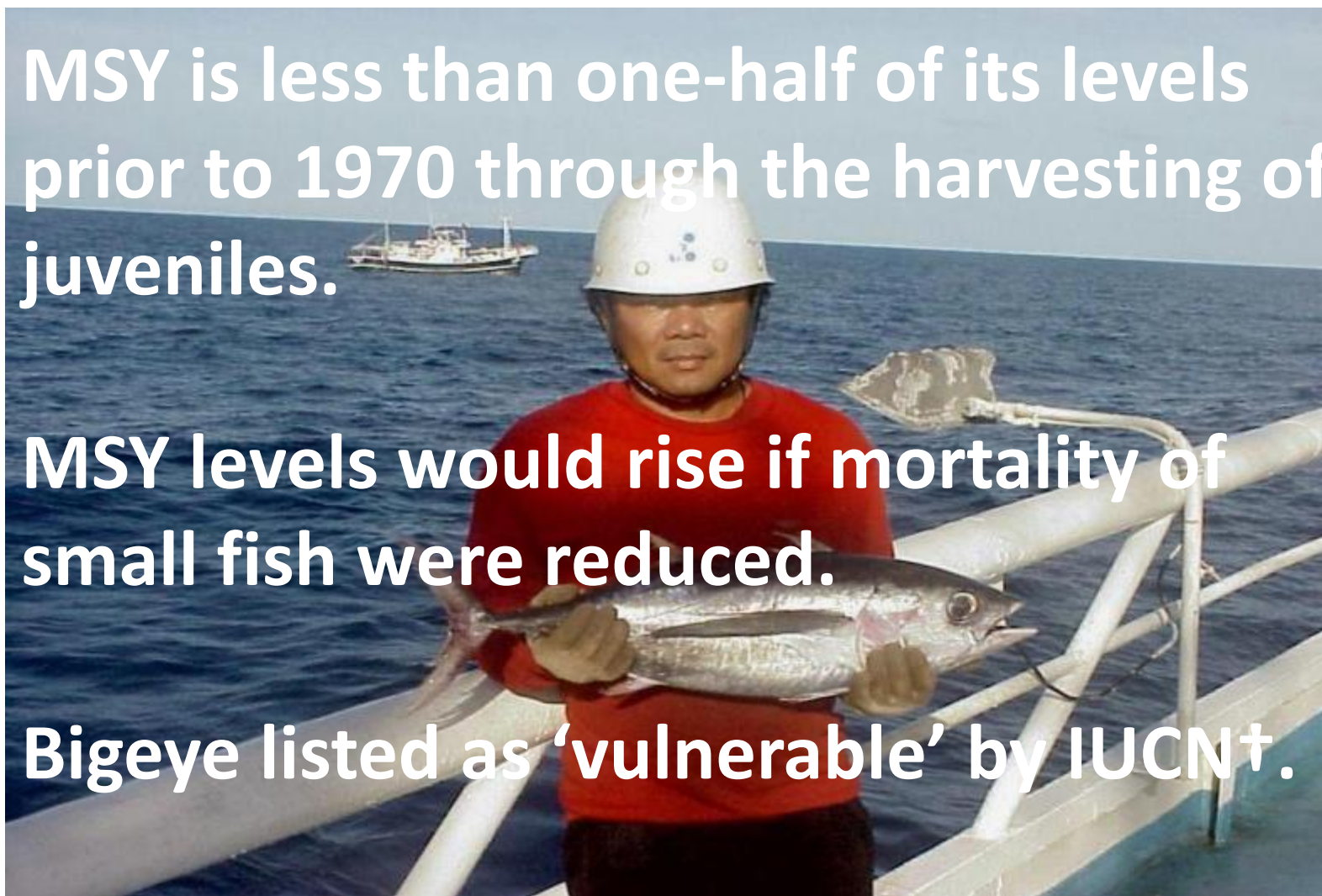


# Status of bigeye stocks

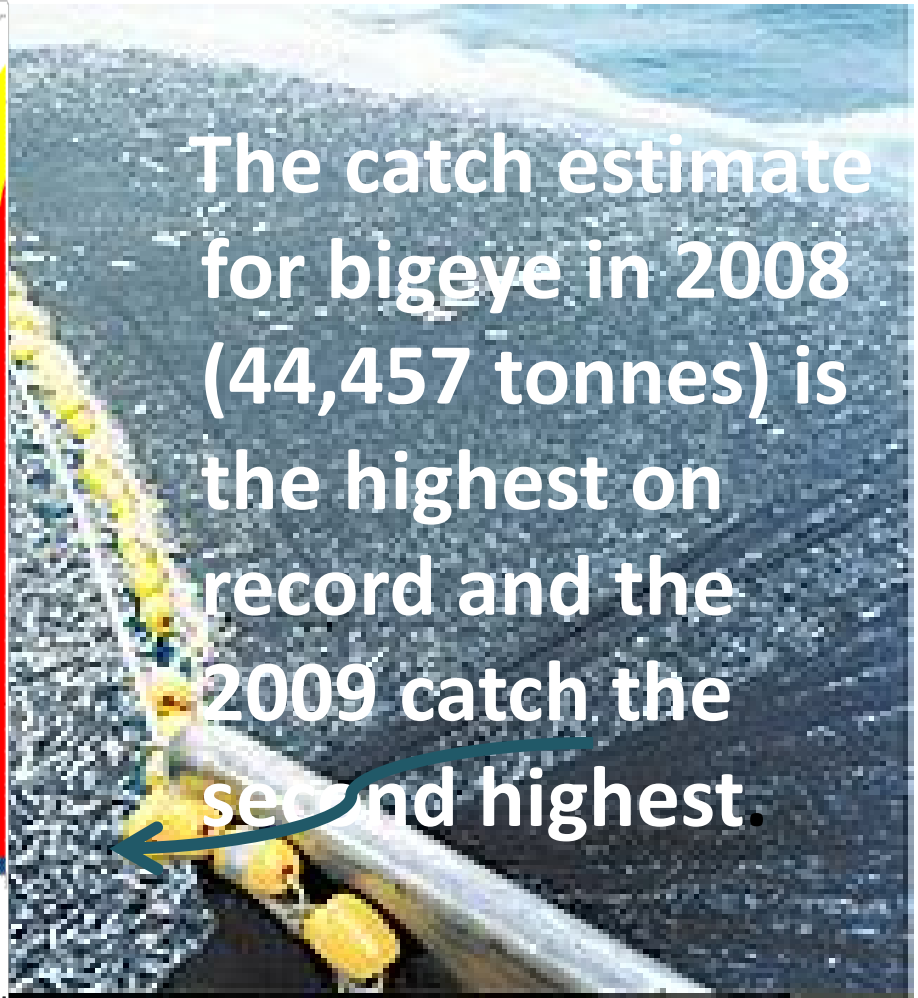
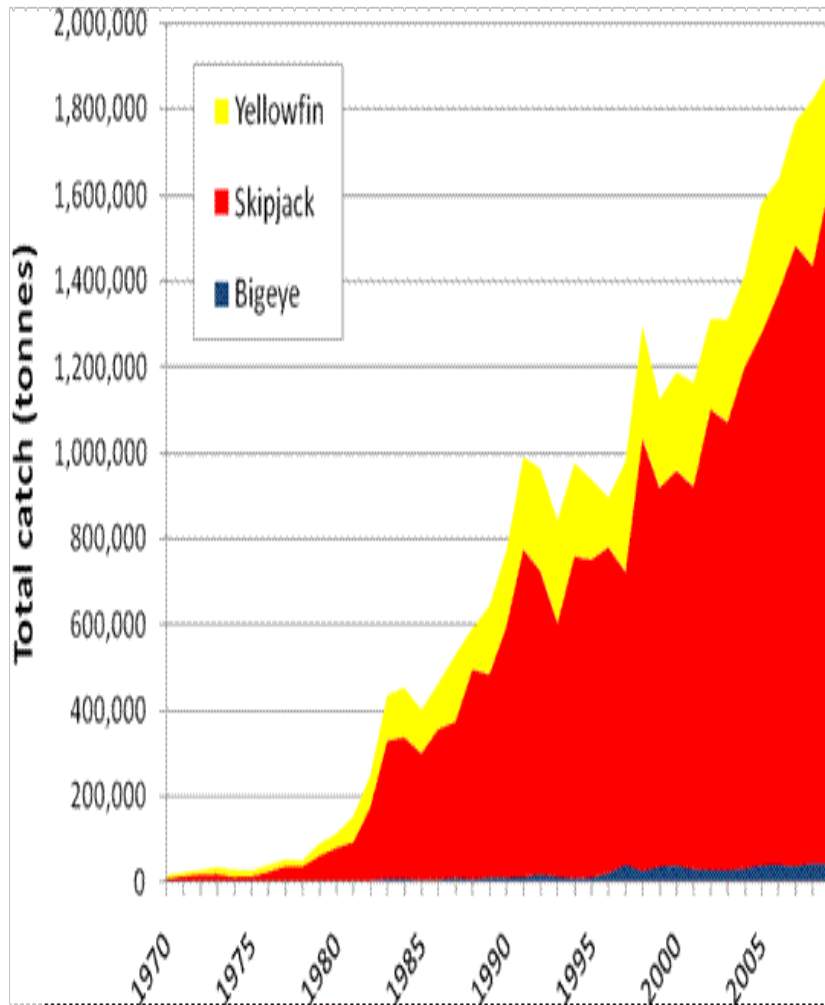
MSY is less than one-half of its levels prior to 1970 through the harvesting of juveniles.

MSY levels would rise if mortality of small fish were reduced.

Bigeye listed as 'vulnerable' by IUCN†.

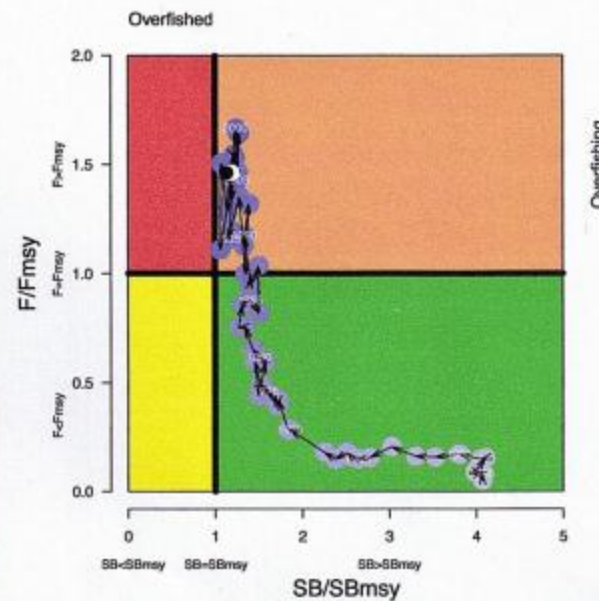
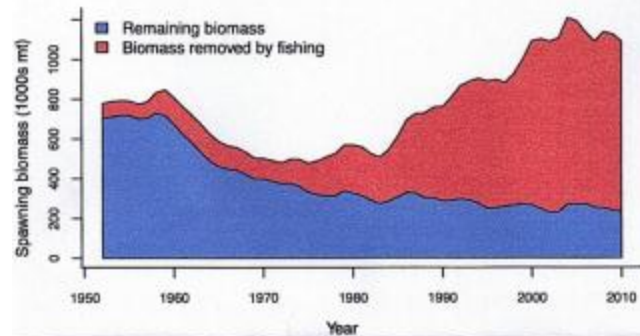
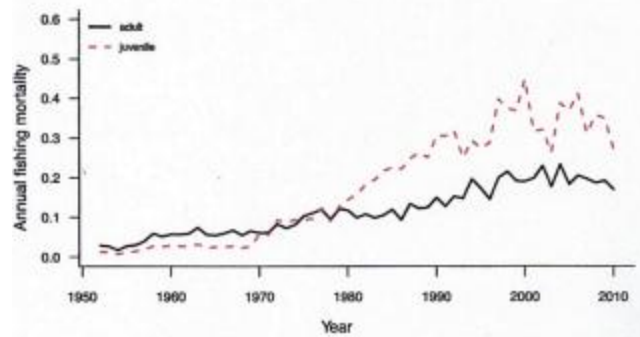
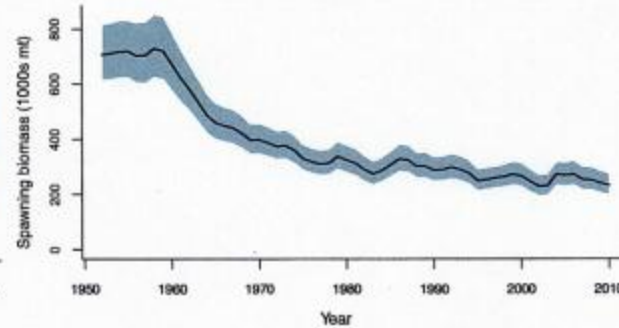
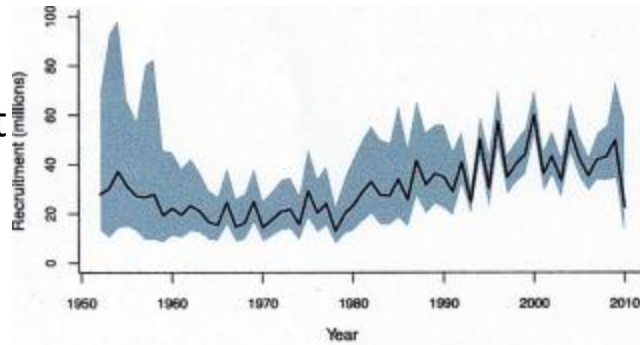


# Bigeye in purse seine





# Bigeye status



Recruitment

Spawning biomass

Fishing mortality

Biomass removed (red) and remaining (blue)

# Fish aggregating device (FAD)




# Tuna aggregating on FAD




Juvenile  
bigeye and  
yellowfin  
tuna are  
caught on  
FADs

What management measures are being taken by parties to the WCPOC?



# Conservation and Management Measure 2008-11 of WCPFC

- **30% reduction in bigeye tuna fishing mortality** from the annual average during the period 2001-2004 or 2004;
- **No increase in fishing mortality for yellowfin tuna** beyond the annual average during the period 2001-2004 average or 2004; and
- **The level of purse seine fishing effort in days fished (EEZs and high seas) does not exceed 2004 levels or the average of 2001-2004.”**



# Conservation and Management Measure 2008-11

“The purse seine fishery in EEZs in the area bounded by 20°N and 20°S shall be **closed to fishing on FADs** between 0000 hours on 1 August and 2400 hours on 30 September.” (Years 2009 and 2010.)”



# WCPC, Scientific Committee, 2010

“...CMM-2008-01 is extremely **unlikely to achieve** its most important objective: reducing fishing mortality on the WCPO bigeye tuna stock by 30%


Furthermore, if the high seas pockets closure results in effort being transferred to high seas areas to the east, where bigeye tuna generally form a greater proportion of the purse-seine catch, the objectives of CMM-2008-01 will be **even less likely to be achieved.**”





# WCPC, Scientific Committee, 2010

“...the FAD closure did not have an impact over the entire year but was effective only during the small window of the actual closure...”



# Failure: Note multi-species, multi-gear and multinational limitations

**Management measures have been widely disregarded by Commission members because of:**

- a) unwillingness of countries to limit fishing mortality on juvenile bigeye and yellowfin when this might negatively impact their catches of skipjack, the main target of the fishery and a species not under threat;**
- b) unwillingness of countries involved in bigeye-targeted longline fishing to reduce their catches when they perceive excessive catches of juvenile fish by purseine to be the main cause of the problem; and**
- c) the political difficulties faced by Philippines and Indonesia in implementing any effective regulation of their domestic tuna fisheries.**



# Pressure for expansion rather than contraction

...there is continued pressure to expand fishing effort to:

- a) meet the **legitimate economic aspirations** of SPC members;
- b) to provide **access for new entrants** to the fishery from Europe and Latin America and
- c) the established **distant-water fishing nations** wish to **maintain their historical share** of the fishery.

# Instruments for management - options

TACs

ITQs

Regulations

# Instruments for management - issues

## TACs and ITQs

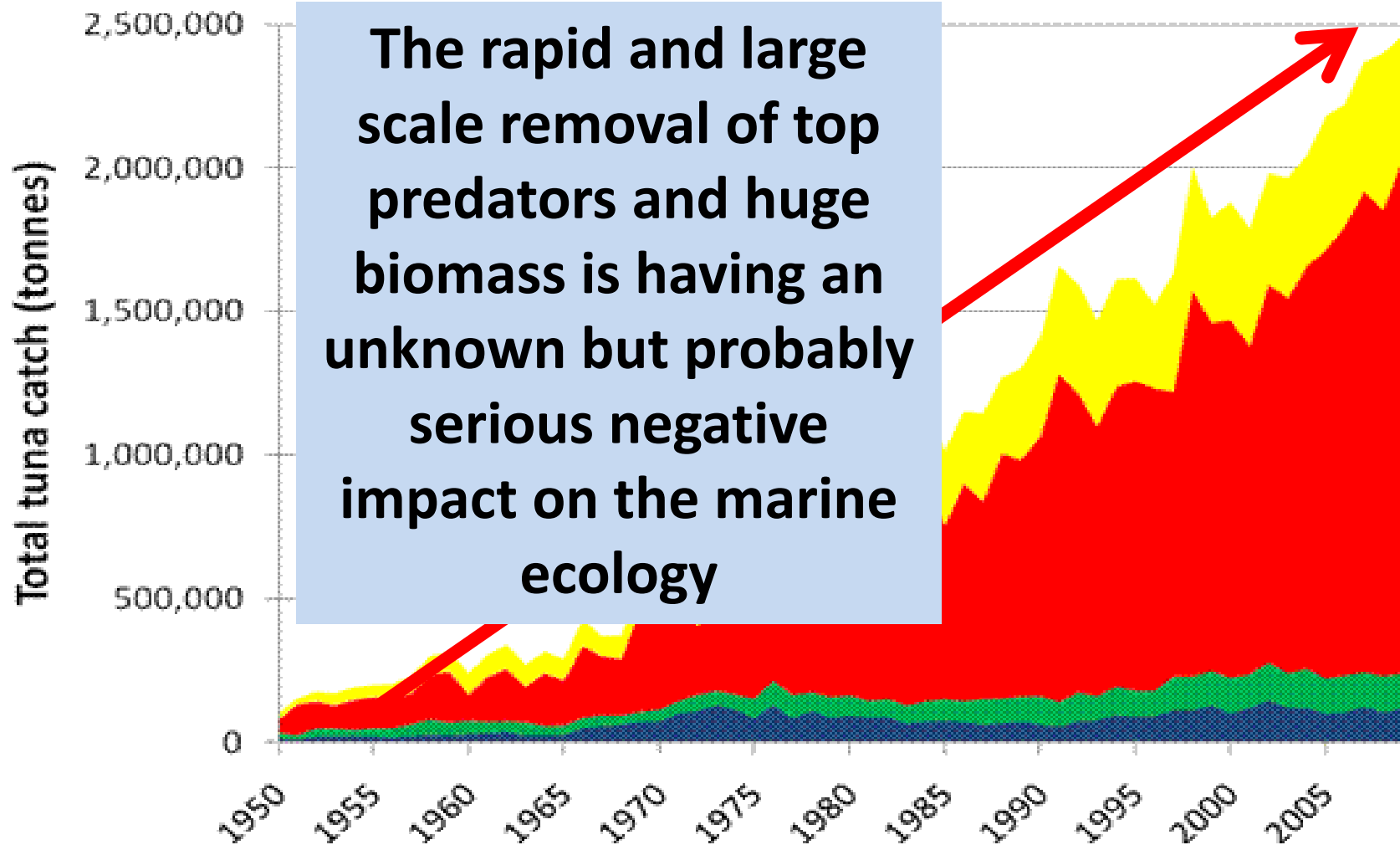
- Need to monitor individual and **collective** catches /police fishery – costly
- Not all countries are party to the Convention
- How to allocate quota between longline and purse seine fisheries
- Given the multi-species fishery, how would fishers be made to comply with TACs or quotas for bigeye when TACs and quotas for skipjack or yellowfin are unfilled? And how would the discard of over-quota fish be dealt with?

## Regulation

- How will costs of a reduction in catches be allocated?
- How will coordinated action by parties be achieved?

Note: See Lecture 1 Notes for more on management instruments

# Ecosystem effects?



# Big bycatch!



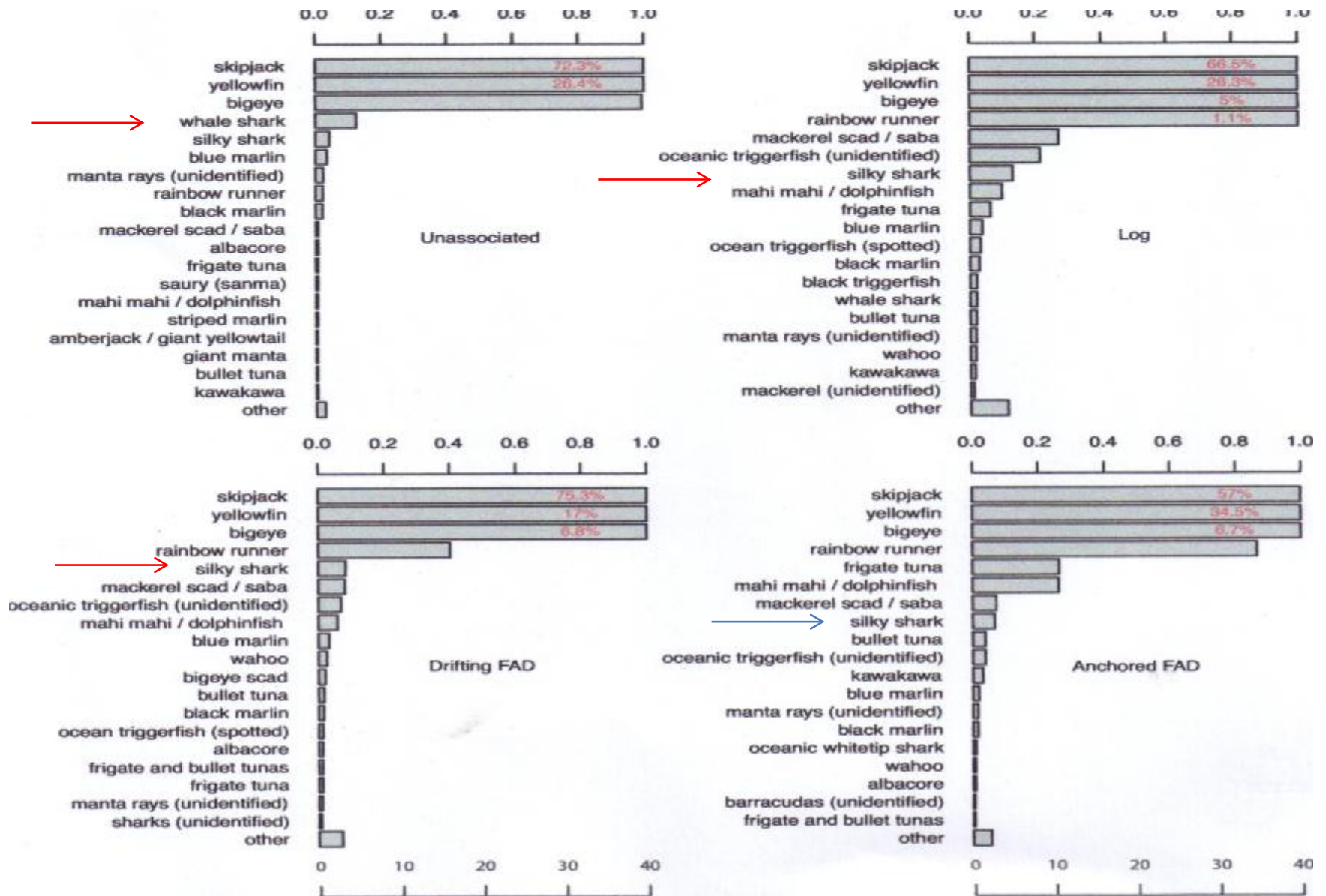
Bycatch compromises ecosystem values



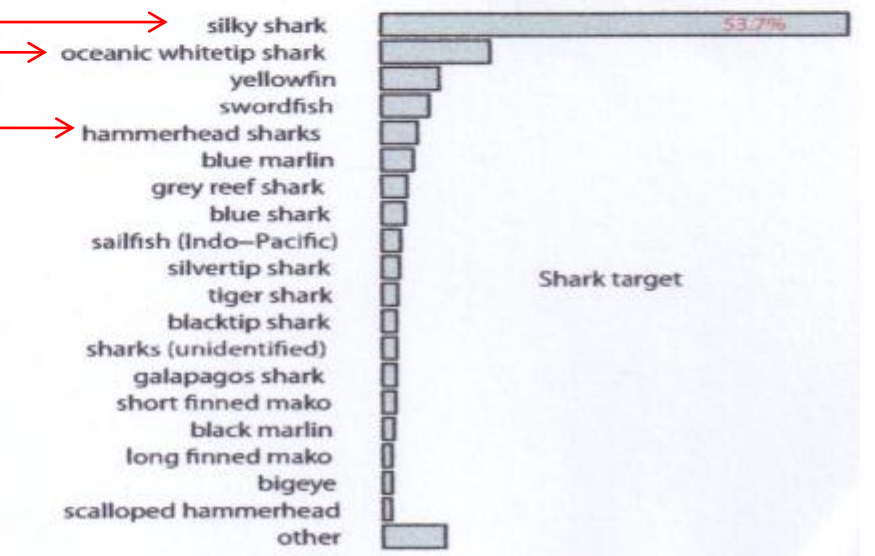
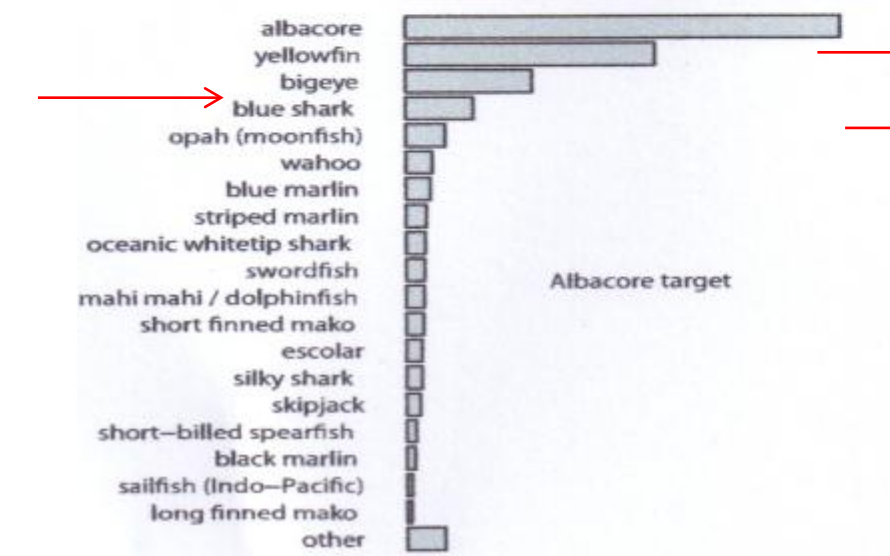
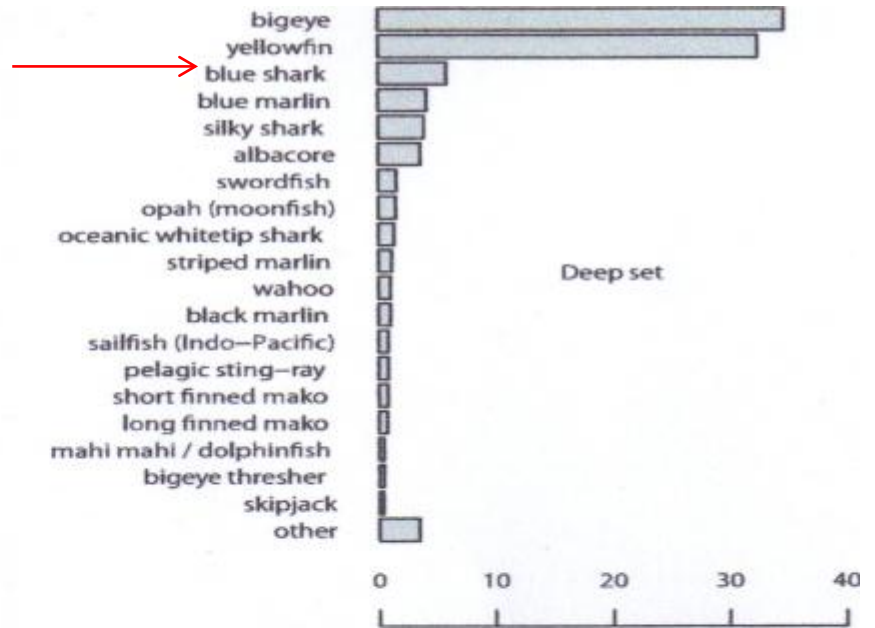
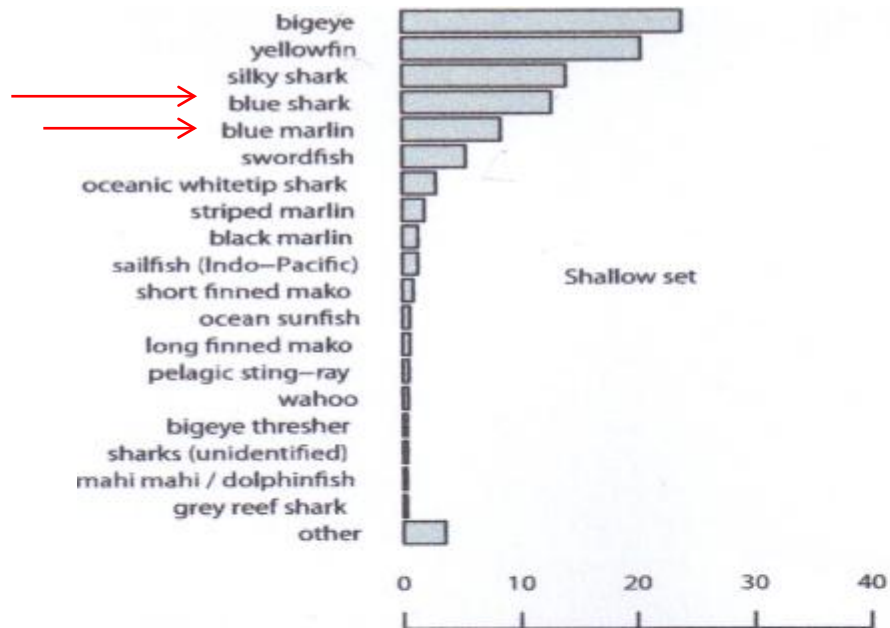
# Longline fishing bycatch in the WCPO



# Catch composition purse-seine



# Catch composition, continued, longline



# Pole and line fishing is low impact



# Conclusion:

SWPTF is **still**, *de facto*, an open access fishery

- The regional body is incapable of proposing and introducing an equitable arrangement that would allocate the cost of reduced catches in the short run.
- A political solution, involving regulation in the fishery – given the difficulty of applying efficient management instruments – is necessary.
- The threats to the marine ecosystem would ease with a reduced fishing effort (See Preservation Values lecture 1).

# Key words

- **Highly migratory fish stock**
- **Multinational fishery**
- **Regional management body**
- **Multispecies fishery**
- **Multi-gear fishery**
- **Fish aggregating device**
- **Open access fishery**
- **Subject to overfishing**
- **Overfished**

# Key messages

- **Modelling of the fishery is instructive**
- **There are urgent management imperatives**

**But:**

- **Effective application of management instruments is difficult**
- **Fall back on regulation will be necessary**



# Key question

Instead of invoking MSY as the benchmark for fisheries management, why didn't the Scientific Committee and the SPC invoke the findings that MEY would be raised by reducing catches of all tuna species, thus strengthening the argument for a reduction in fishing effort in the SWPTF? (See Lecture 3.)

Challenge: What role for Australia in fisheries management in the W&CPO?

Given that it has membership of the WCP Commission and has relatively little at stake, shouldn't Australia take the lead in proposing solutions?