Is it good or bad to fish with FADs?

Why fish around FADs?

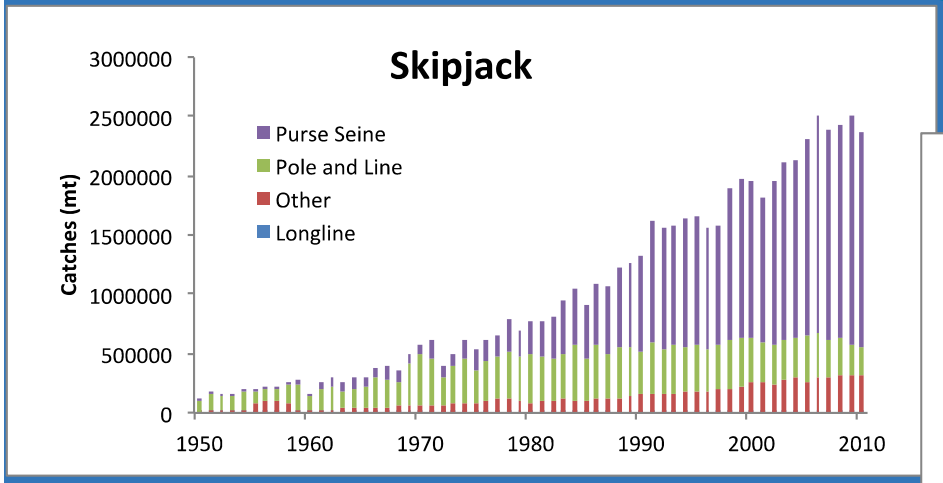
- Reduces search time
- Fewer ‘skunk’ sets

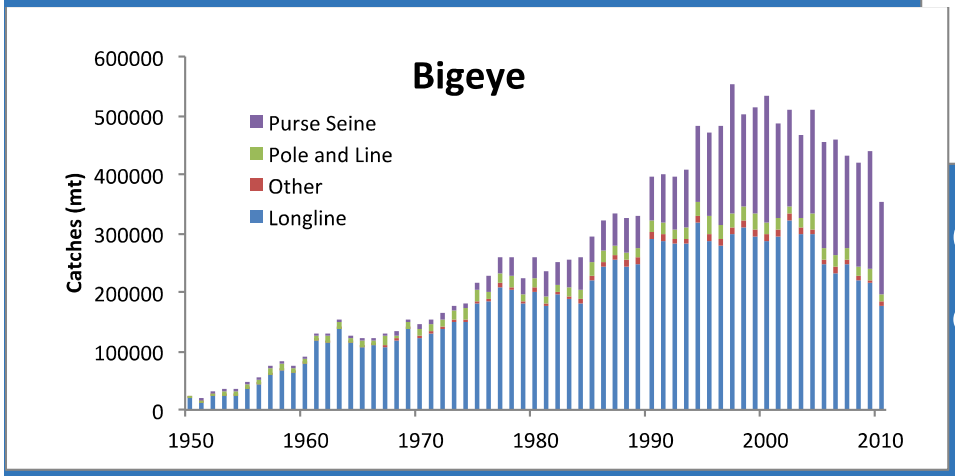
Impacts on tuna stocks

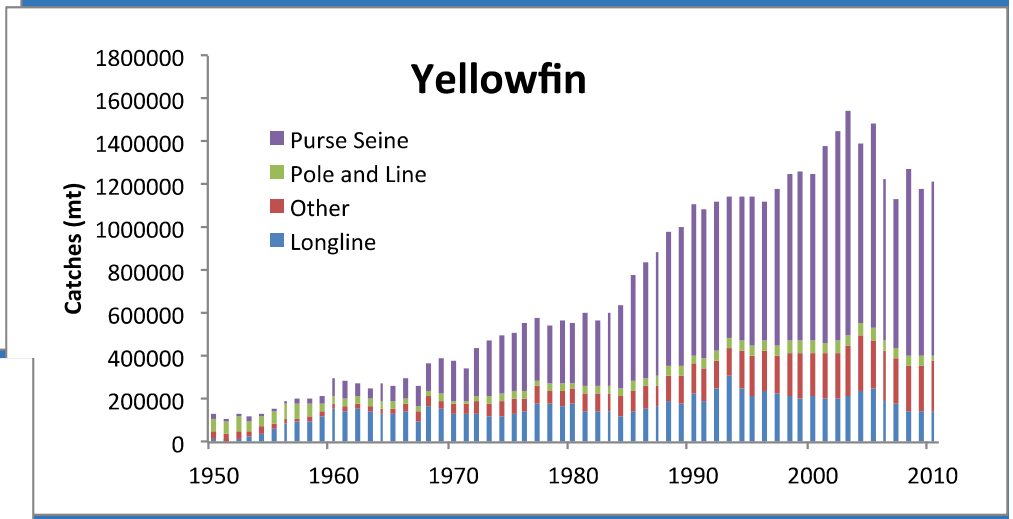
Impacts on Tuna Stocks

Note: Current statistics do not make it possible to distinguish catches made with anchored FADs, drifting FADs or natural logs The term “floating objects” is used.

The targets of tropical purse seiners

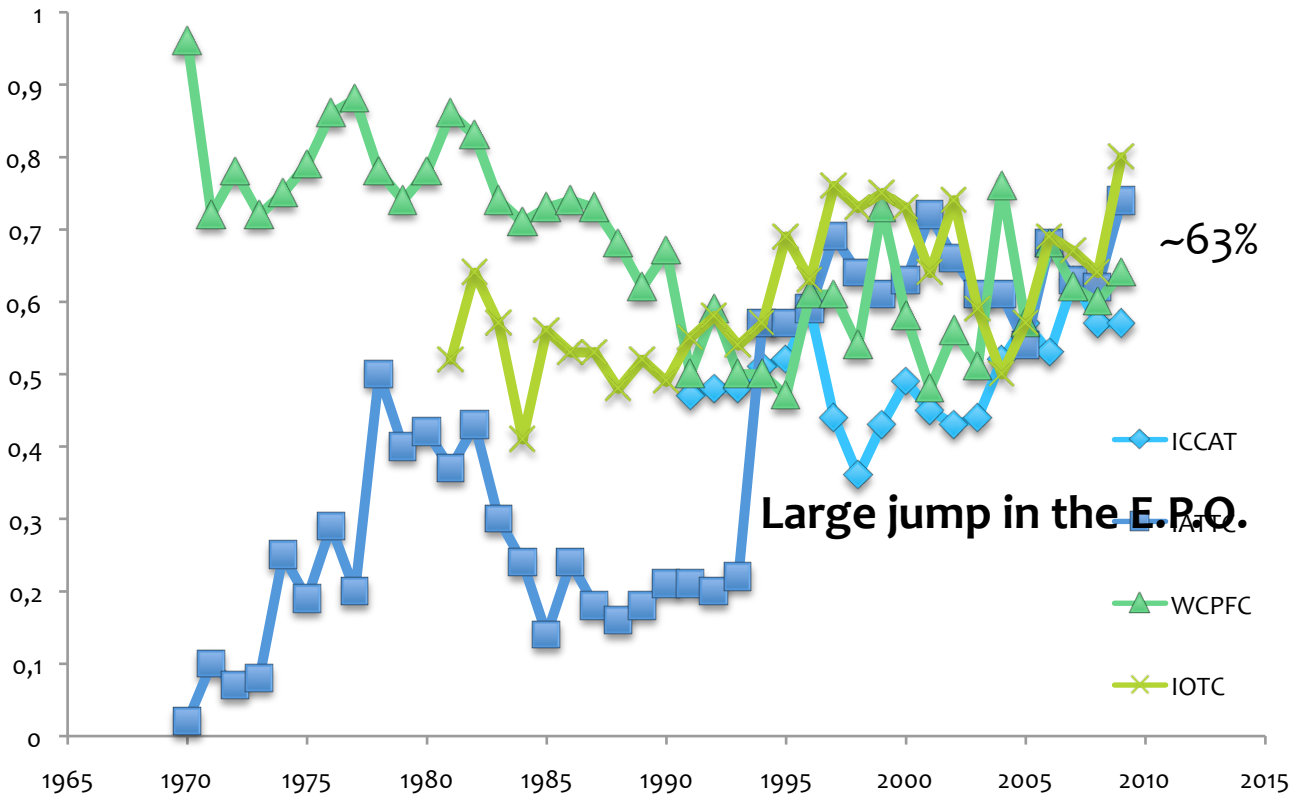




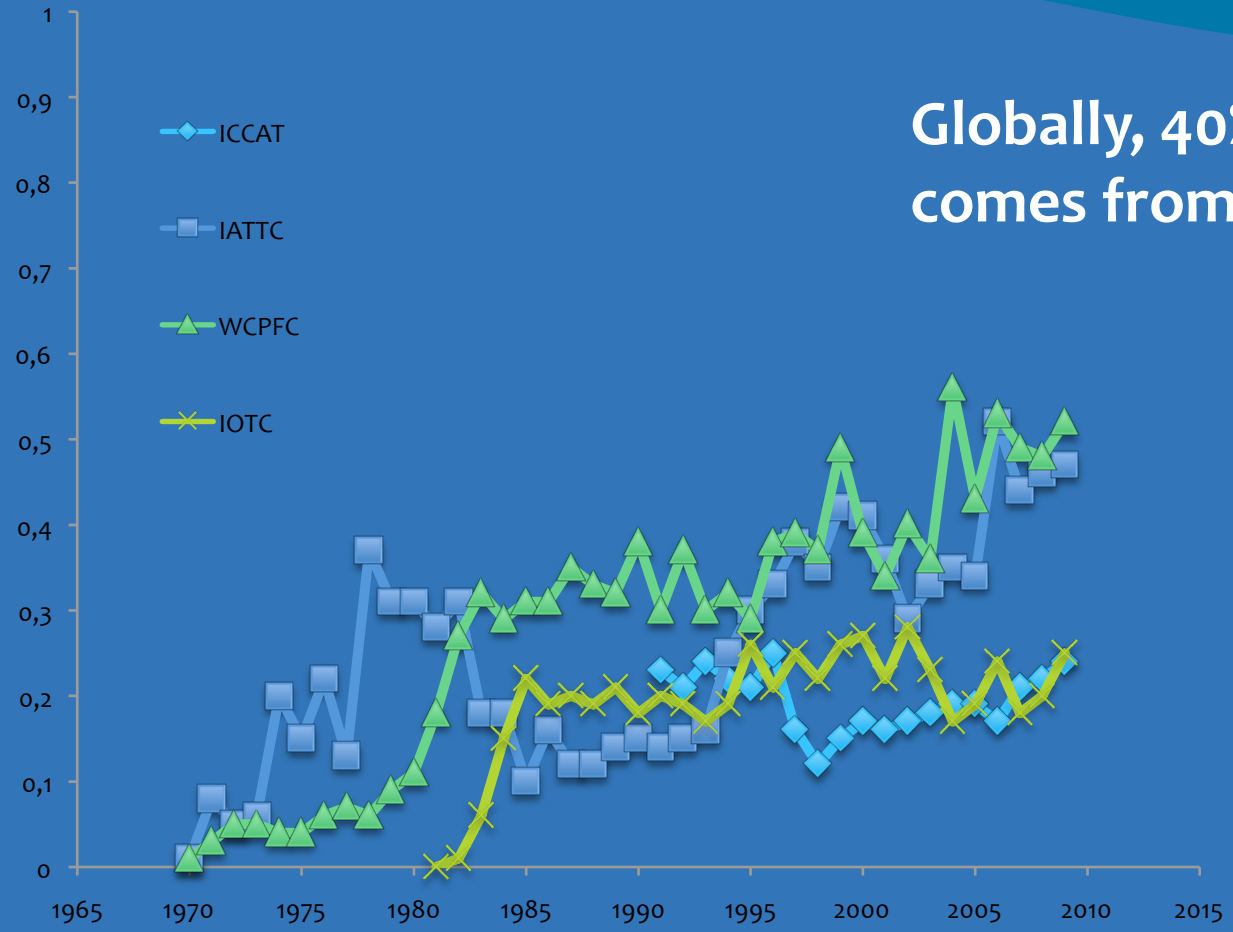


Globally, 40% of tropical tuna catch comes from floating object sets

Relative to all purse seining, floating object sets existed from the onset



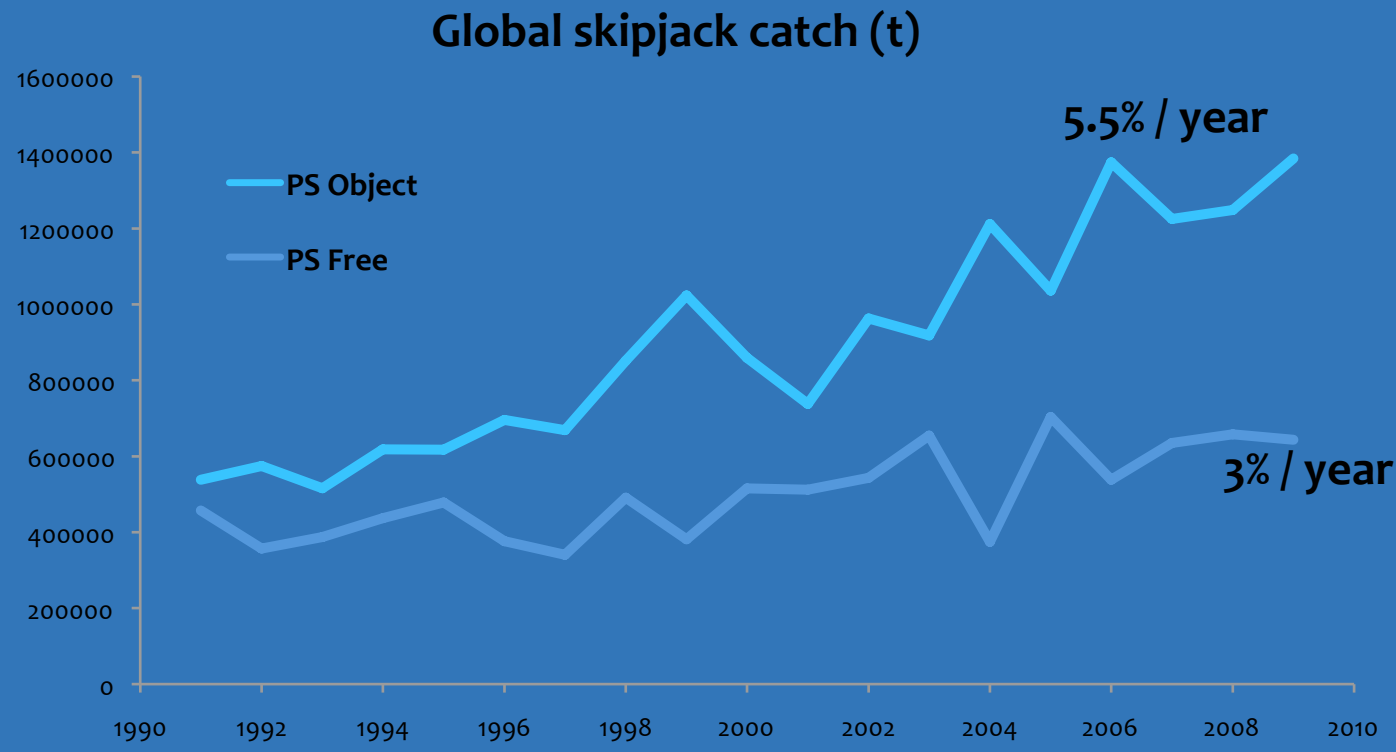
Relative to all fishing methods, catch on floating object sets has been growing



Globally, 40% of tropical tuna catch comes from floating object sets

Global skipjack catch is growing faster on object sets

Annual growth in FAD usage perhaps 2.5%/year



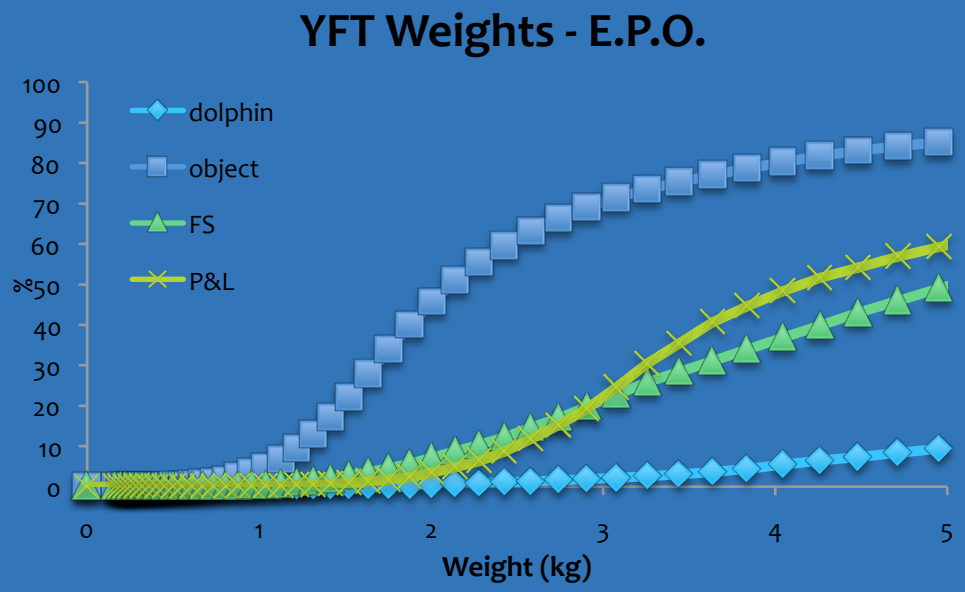
2 potential Impacts

1. Loss of potential yield (by catching small fish that have the potential to grow to a much larger size if they survive)

2. Reduction of spawning biomass or stock size (by catching too many fish, either adults or juveniles)

Loss of potential yield

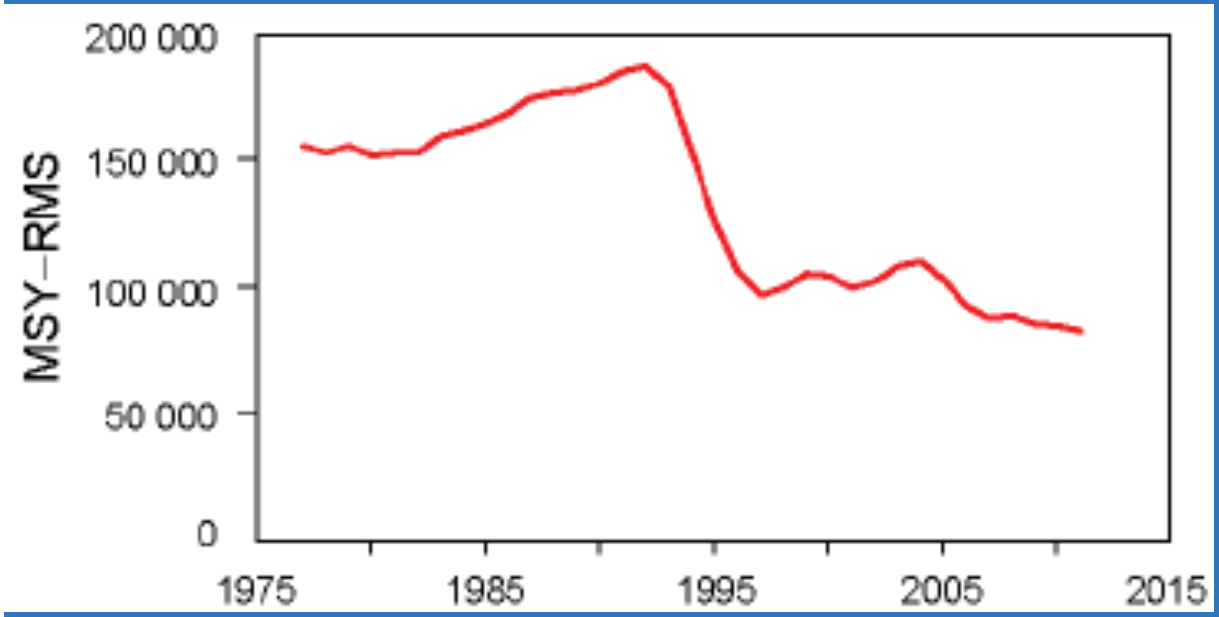
Floating object sets tend to catch smaller tunas (yellowfin and bigeye)



Set Type	% under 5 Kg
Dolphin	9%
Free School	49%
P&L	59%
Object	85%

Loss of potential yield

MSY for E.P.O. bigeye has decreased, coinciding with increased catch on objects



The relative mix of fishing gears has allocation implications

Reducing the fishing mortality of small bigeye and yellowfin tuna

Two main measures used by RFMOs:

- Moratorium of FAD fishing / full time-area closures
- Retention of all tunas of all sizes

Other options:

- Limiting the number of sets on floating objects
- Limiting the number of electronic buoys attached to floating objects
- Economic incentives

Overfishing

All sources of fishing mortality reduce spawning biomass, either today or later.

A stock can be overfished by taking too many juveniles or too many adults, or both.

All sources of fishing mortality need to be monitored and managed.

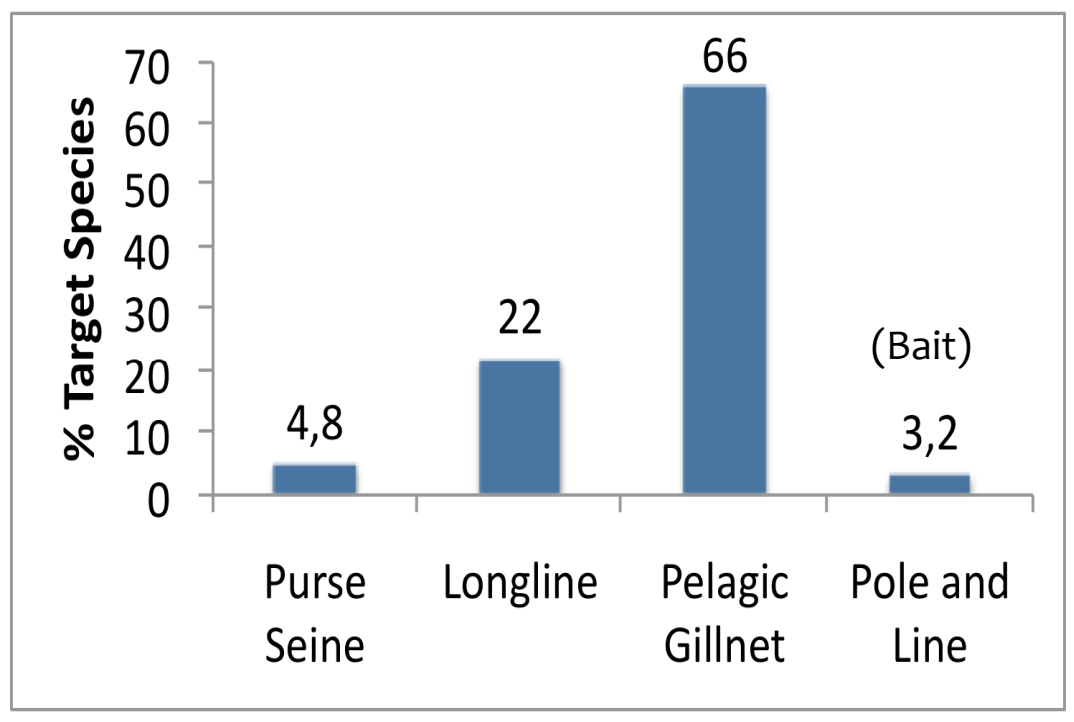
Overfishing

Species	Ocean	%object	F/Fmsy	B/Bmsy
BET	**EPO**	**70**	**1.05**	1.12
SKJ	EPO	64	1	>1
SKJ	AO-E	62	<1	>1
SJK	WCPO	56	0.37	2.94
BET	**WCPO**	**38**	**1.46**	1.19
YFT	WCPO	36	0.77	1.47
SKJ	IO	31	<1	2.56
BET	AO	21	0.95	1.01
BET	IO	20	<1	1
YFT	EPO	17	0.87	1
YFT	IO	17	0.84	1.61
YFT	**AO**	**13**	0.86	**0.96**
SKJ	AO-W	9	<1	>1

There is no obvious relationship with amount of floating object catch

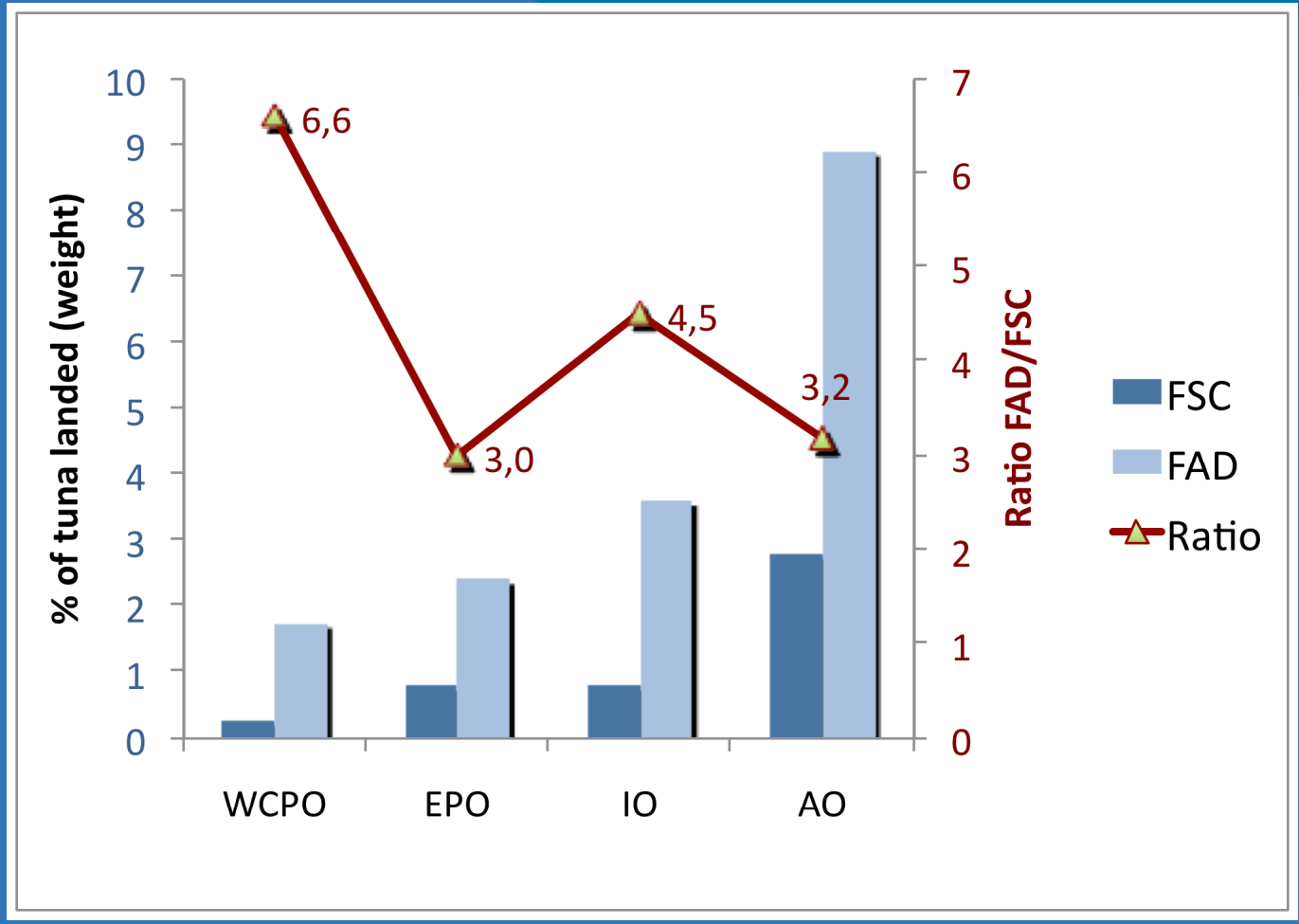
Impacts on non target species

Bycatch rates: Comparison of tuna fisheries Kelleher (2005, FAO)



Bycatch as % Target Species (weight)

Bycatch of purse seiners (excluding discards of SKJ, YFT, BET) estimated from scientific observers onboard



Other Tuna & Finfish (80-95% of PS bycatch)

Fast growing, highly fertile and characterized by a high natural mortality rate → No particular ecological concern

But monitoring is necessary

Neritic tuna (e.g. kawakawa)

Oceanic triggerfish

Dolphinfish / mahi mahi

Rainbow runner

Sharks (2 to 17% of PS bycatch)

Silky shark
(Carcharhinus falciformis)

Oceanic white tip
(Carcharhinus longimanus)

Around 90% of sharks caught on FADs

Slow growth, late maturation, low fecundity, and long reproductive cycles, they are amongst the least resilient of fish species to intense exploitation

Sharks (Gilman 2010)

Longline	Purse seine
Some fisheries target sharks	Pacific (1992-98): an order of magnitude lower than longline
Western and Central Pacific (mid 1990's – mid 2000's) **102 000 tons**	Western and Central Pacific (mid 1990's – mid 2000's) **2 000 tons**

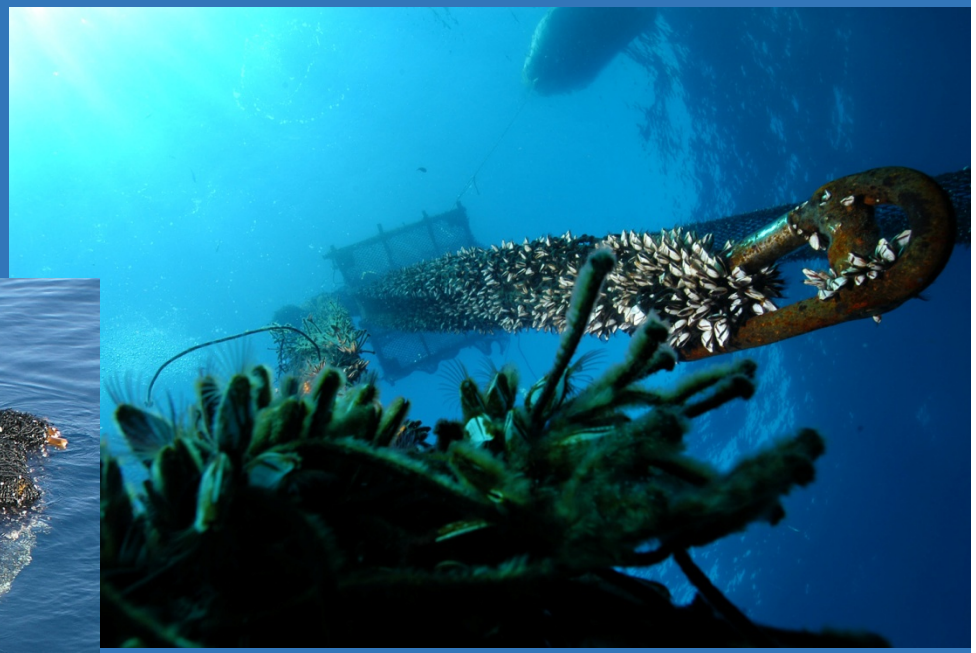
Turtles (Gilman 2010)

Longline	Purse seine
10 000's to 100 000's caught each year in each ocean	5-200 caught per year per ocean, 95% released alive But some turtles entangled in netting under FADs

Impacts on habitats and ecological consequences

Logs have always been natural components of the « surface » habitat of tuna

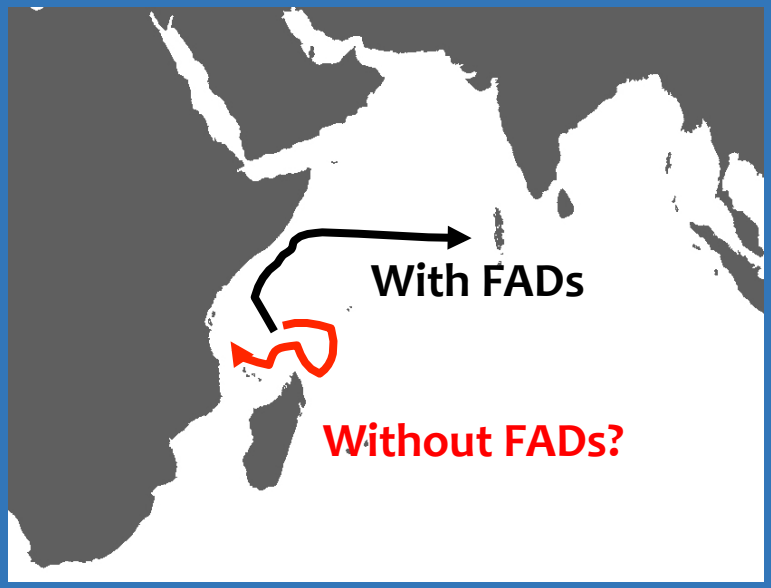
Deployment of FADs:
How much do FADs change the « surface » habitat?

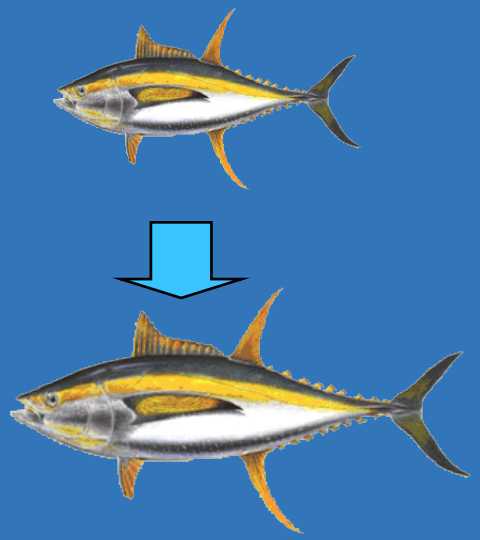


What could be the effects of these changes? The hypothesis of the Ecological trap

Behavioural impacts

Biological impacts





Are FADs ecological traps for tuna?
(Change migration patterns, modify growth, etc.)
→ Controversial results

In favor

- Kleiber & Hampton (1994)
- Marsac et al. (2000)
- Hallier & Gaertner (2008)
- Jaquemet et al. (2010)

Against

- Kleiber & Hampton (1994)
- Dagorn et al. (2007)
- Stehfest & Dagorn (2010)
- Schaefer & Fuller (2010)
- Robert et al. (submitted)

There are still only a few solid empirical examples of ecological traps in the published literature (Robertson & Hutton 2006).

Need for reference points, in order to assess the changes in behavior and biology due to the use of FADs

Management needs

Monitoring the number of FADs and electronic buoys

FADs are a major part of the fishing effort

They must be monitored and managed like any other type of fishing effort

Monitor biological and behavioral indices

Collect time-series of:

1. Adult survival, reproductive success
2. Condition indices of tuna in various areas
3. Residence times of tuna at FADs
4. School sizes

Future of FADs?

There is a route towards the sustainable use of FADs IF all stakeholders consider FADs like any fishing gear that must be monitored and managed with appropriate measures