

What does the equation tell us?

To reduce bycatch you can :

- ▣ Reduce BPUE “Fish better”
- ▣ Reduce Effort “Fish less”

What does the equation tell us?

- ▣ If effort increases, gains in bycatch reduction may be erased by the additional effort. So, effort control is a part of a bycatch reduction strategy
- Fisheries management is an integral process, you cannot deal with bycatch in an independent way.

Strategies to reduce bycatch (The lines of defense)
(Hall, 1996)

Avoid capture: closures, whale shark ban, non-entangling FADs, acoustics

Release from the net: sorting grids, large mesh nets, sea turtles, backdown

Release from deck: manta ray and shark handling, ramps, PUMPS!

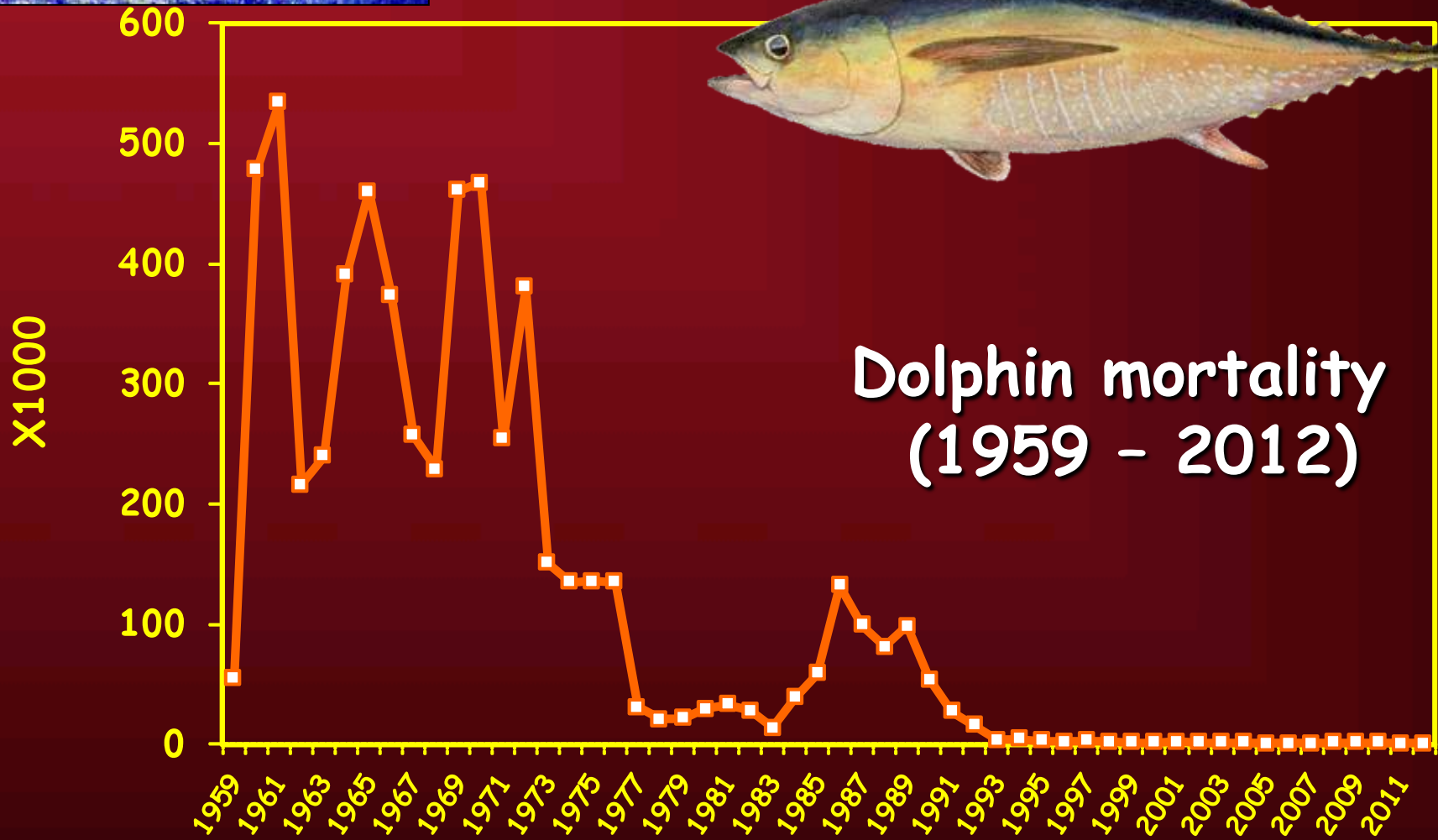
Utilize: modify capture system, storage, treatment

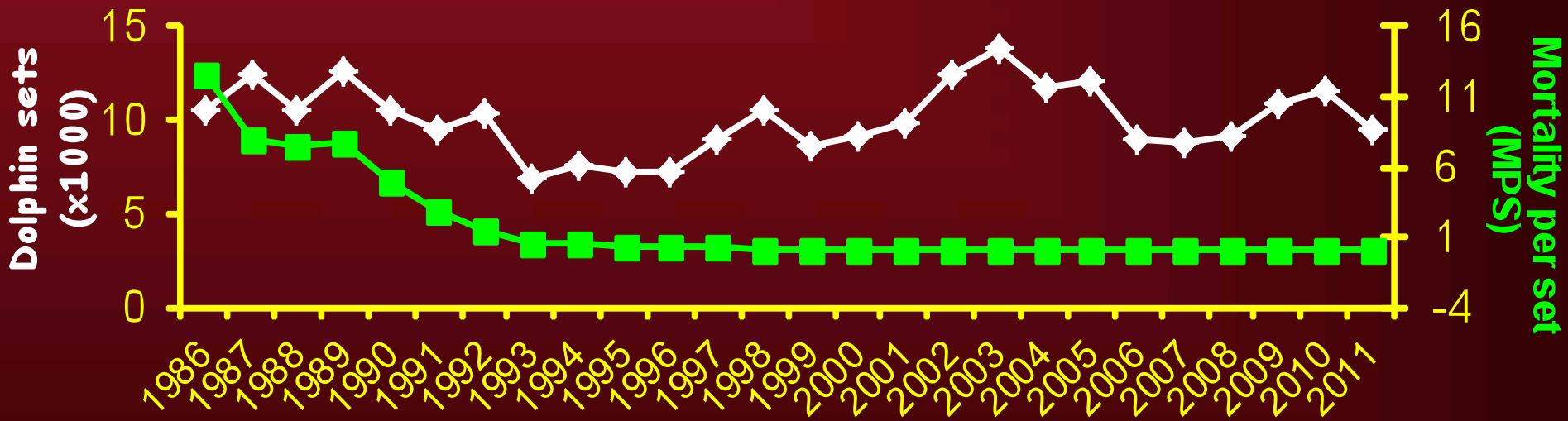
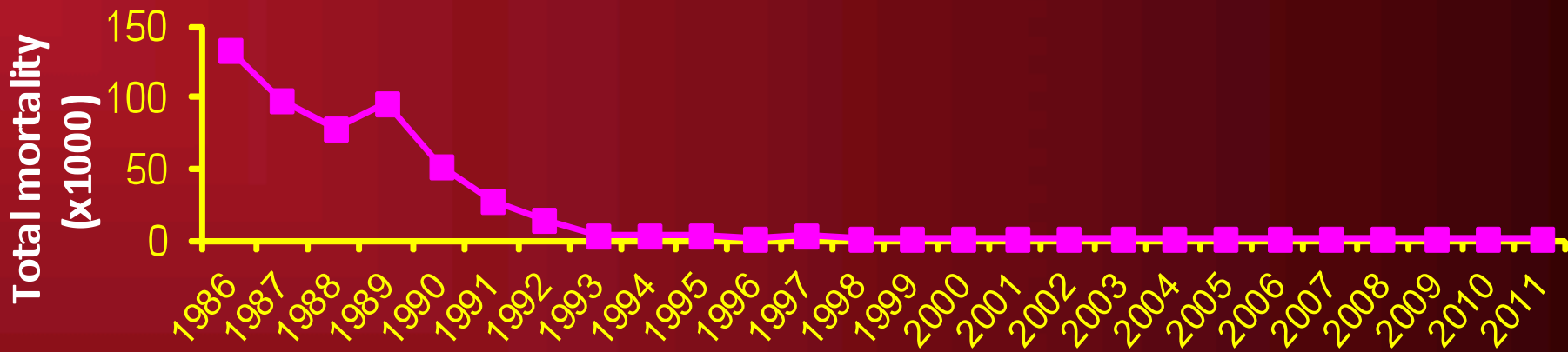
The tuna-dolphin lessons

- ▣ Understand factors that cause bycatch
- ▣ Work with fishermen to find solutions
- ▣ Look for sensible ways to implement them
- ▣ Cooperation
- ▣ Transparency

Explore solutions in a systematic way

The evolution of the bycatches in the tuna purse seine fisheries



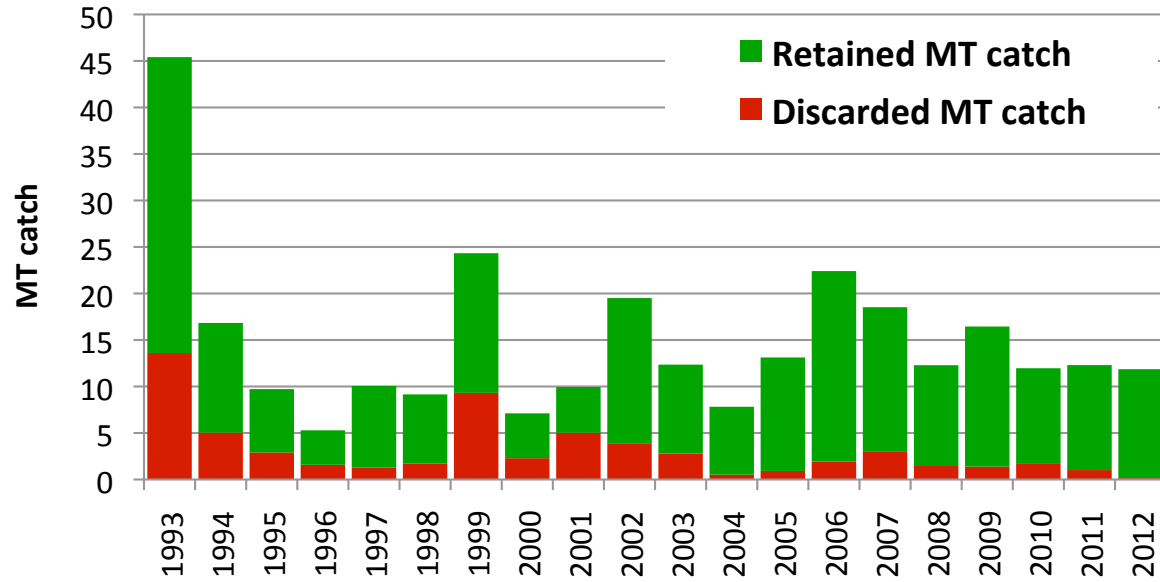


The dolphin-safe approach was a single-issue approach, blind to the impacts on the target populations or on other ecosystem components.

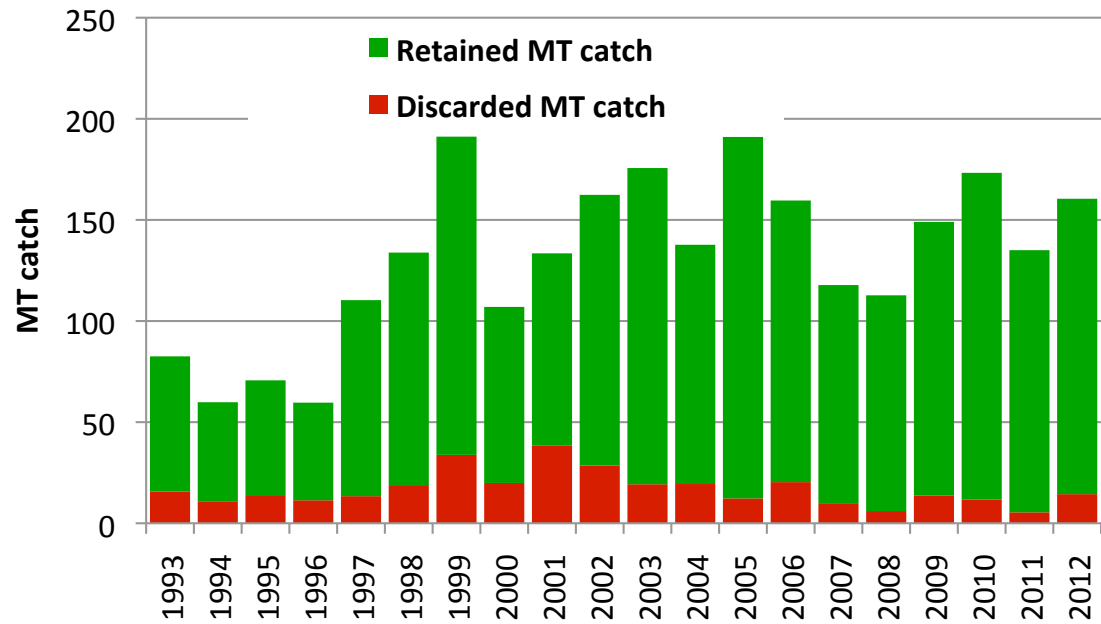
- New capture techniques in the net
- New storage partition
- New handling of other species
- Development of new products

utilization

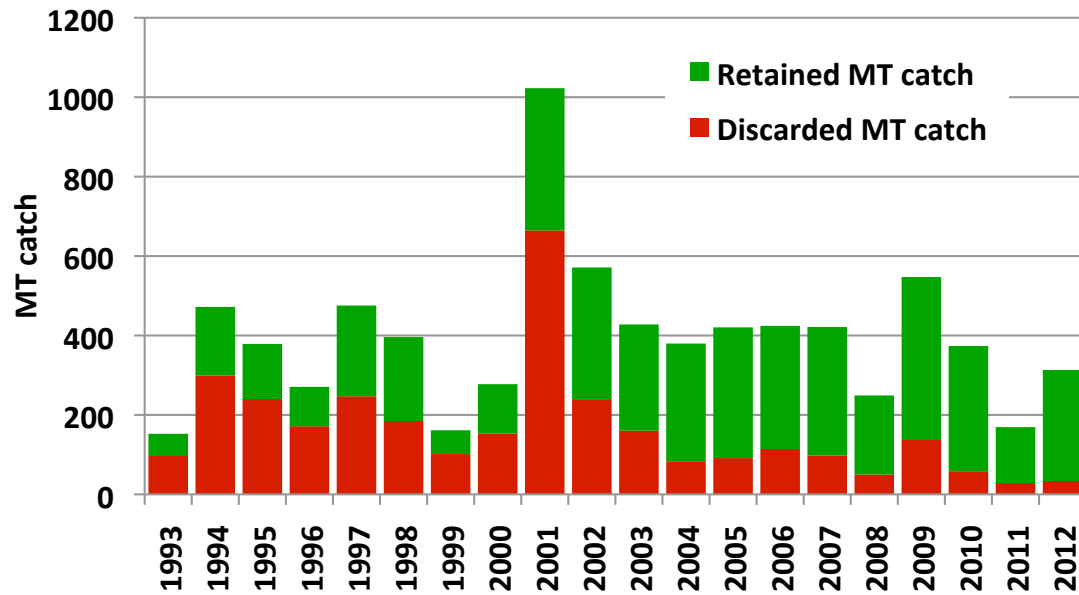
Striped marlin



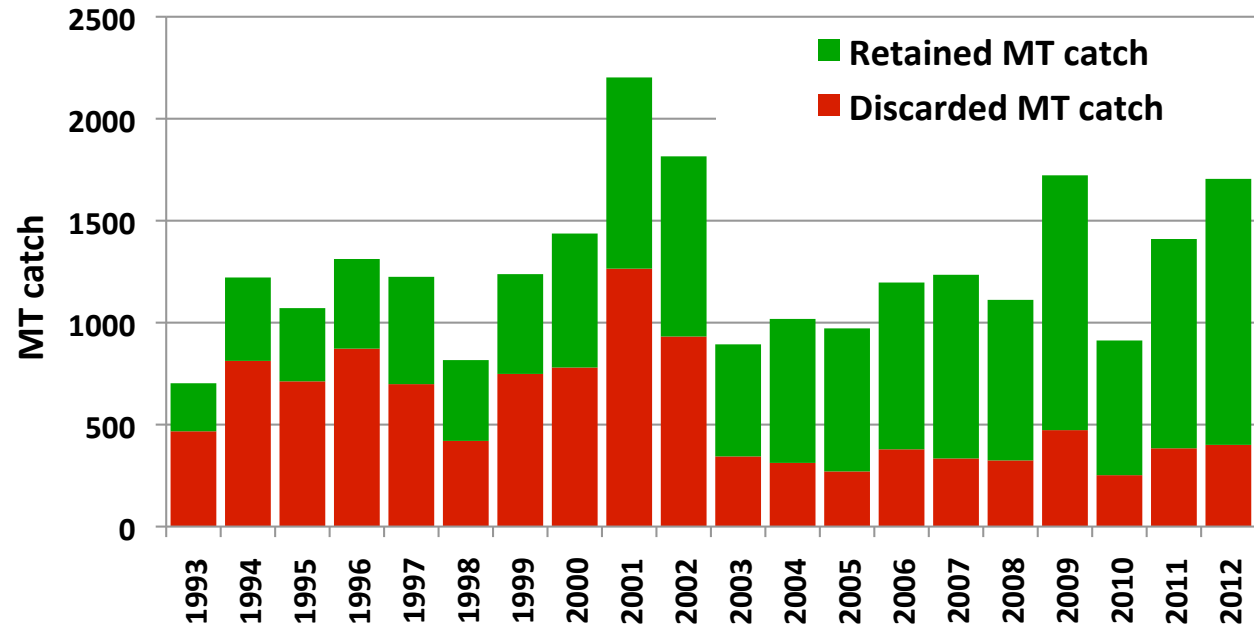
Blue marlin



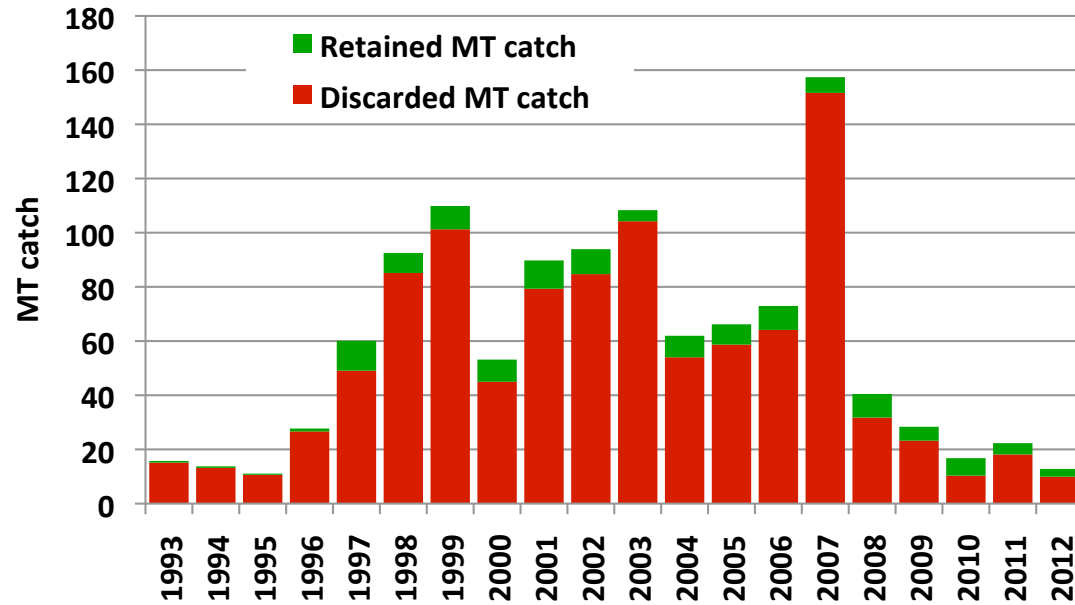
Wahoo



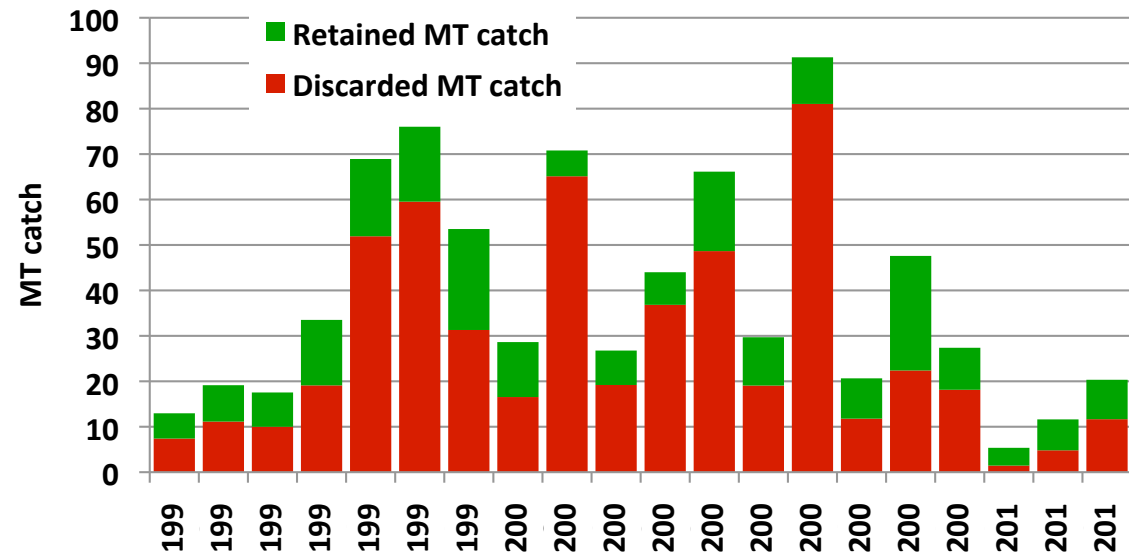
Mahi mahi



Rainbow runner



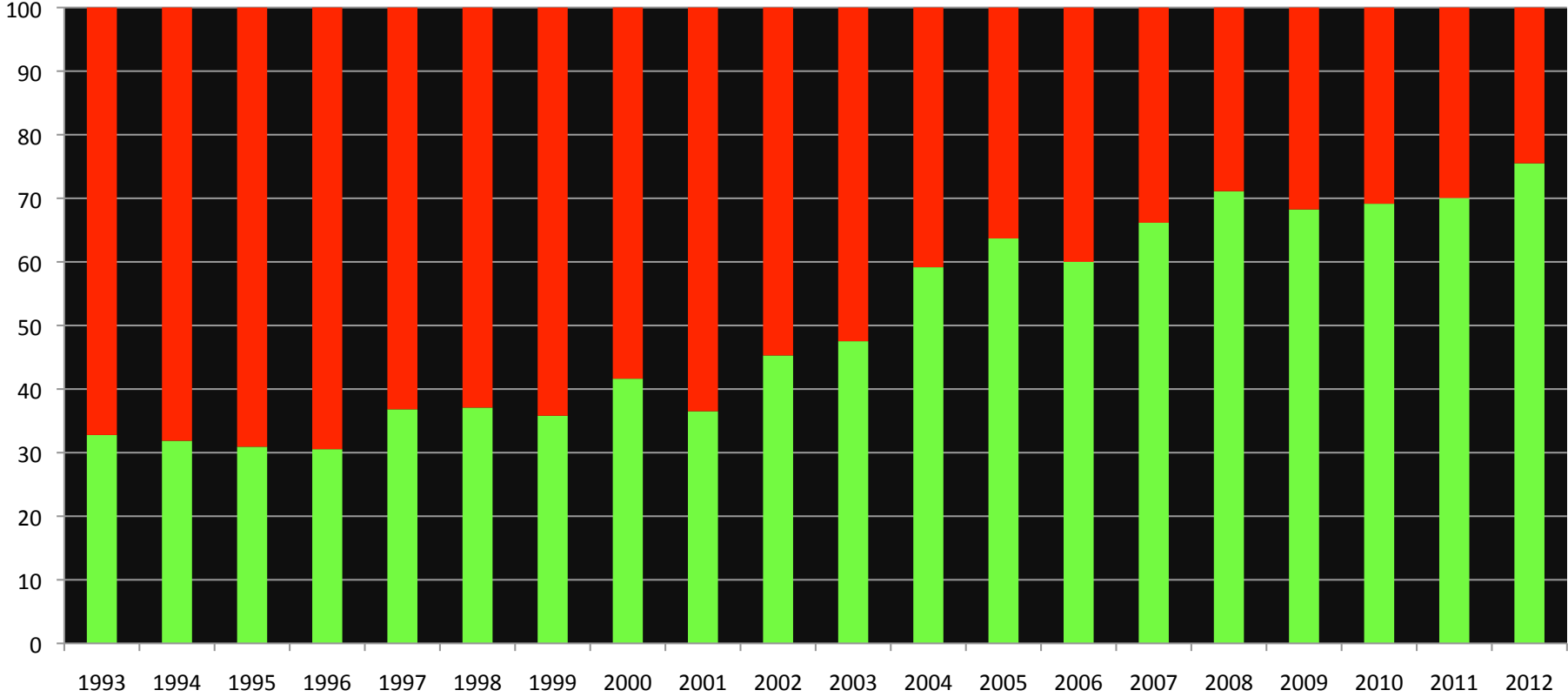
Yellowtail



Captures Non-tuna species

■ % Retained MT catch

■ % Discarded MT catch





All years(1993-2009) (Except dolphins)	Declines in RED					
	Bycatch in MT per 1,000 MT tons tuna					
	Dolphin Sets		School Sets		Log Sets	
Species	(1993-2009)	2012	(1993-2009)	2012	(1993-2009)	2012
Sailfish	1.78	0.21	3.9	0.1	0.18	0.02
Black Marlin	0.11	0.00	0.25	0.00	0.76	0.13
Striped Marlin	0.06	0.00	0.17	0.02	0.18	0.00
Blue Marlin	0.04	0.01	0.15	0.13	0.78	0.49
Swordfish	0.1				0.27	0.00
Other large Fish	0.1				30.78	3.4
Mahi mahi	0.8				1,365.66	437.59
Wahoo	0.5				622.55	73.71
Rainbow Runner	0.0				476.21	39.4
Yellowtail	1.25	0.01	106.24	16.83	116.59	70.85
Silky Sharks	7.55	0.06	33.72	0.92	96.59	19.52
Oceanic whitetip shark	0.5	0.00	2.02	0.03	14.1	0.08
Hammerhead	0.33	0.04	2.49	0.41	5.71	1.17
Manta	4.36	1.26	30.36	32.3	0.54	0.43
Pelagic Stingray	1.19	0.66	5.48	0.31	0.59	0.5
Other/Unid Shark	4.25	0.2	81.94	0.34	12.77	2.84
Olive ridley turtle	0.04	0.00	0.13	0.00	0.17	0.02
Green Turtle	0.00	0.00	0.03	0.00	0.02	0.00

High price
Full retention
Large mesh/sorting grids