



MULTI-DISCIPLINARY RESEARCH IN A SMALL-SCALE ARGENTINE GILLNET FISHERY FOR REDUCING BYCATCH OF THREATENED SPECIES

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Bycatch

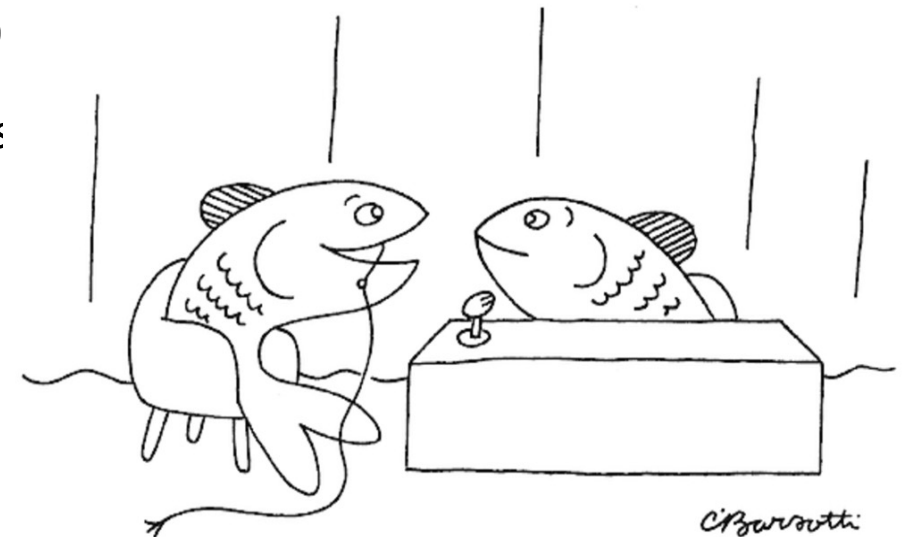
Alverson et al., 1994:

Discards: any catch (target and non-target) returned to the sea for economic, legal or personal reasons

Bycatch: Catch of non-target species (= incidental catch)

- includes species interacting with fishing operations that go unobserved or unaccounted for (e.g., large whale entanglements)

SSF: Often it's all catch!



“Oh, definitely, I feel there’s a reason I was given a second chance.”

Bycatch – why bother?

Major threat to 67% of all critically endangered, endangered, and vulnerable marine mammals, seabirds, and elasmobranchs (Žydelis et al. 2009)

Most immediate threat to many species of marine mammals, fishes, birds, and reptiles

Can result in added fishing time (such as for releasing caught animals), gear damage, gear loss, and increased regulatory measures

Ecological and economic impacts when keystone species are removed from an ecosystem (e.g., whale carbon pump; whale watching)

SSF – relatively environmentally benign?



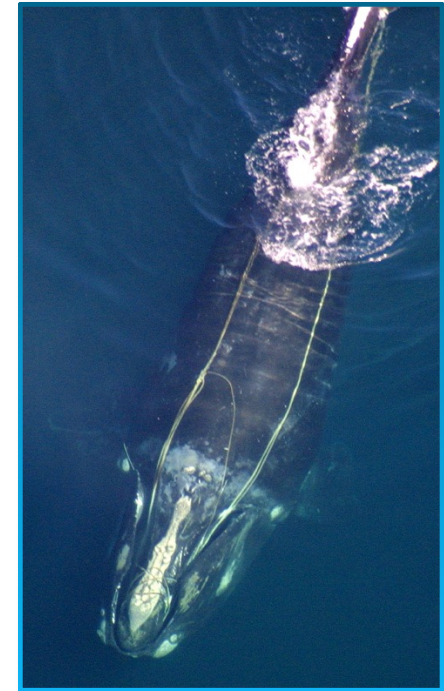
Sea turtles - ENDANGERED



Baiji (China) - EXTINCT



Vaquita (Mexico) - <30 INDIVIDUALS REMAIN

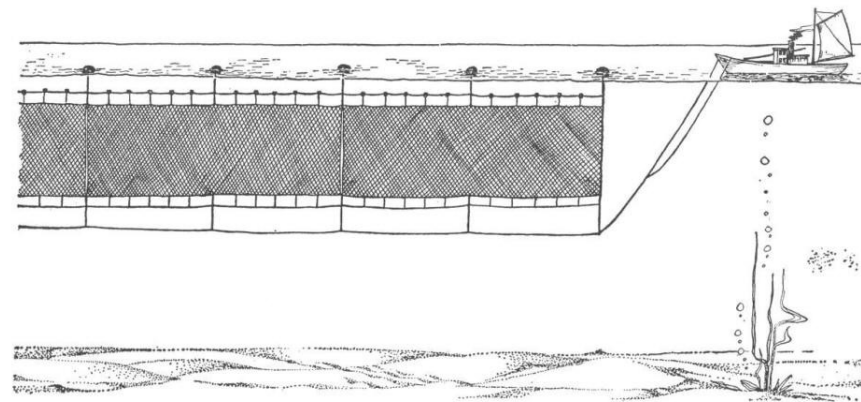
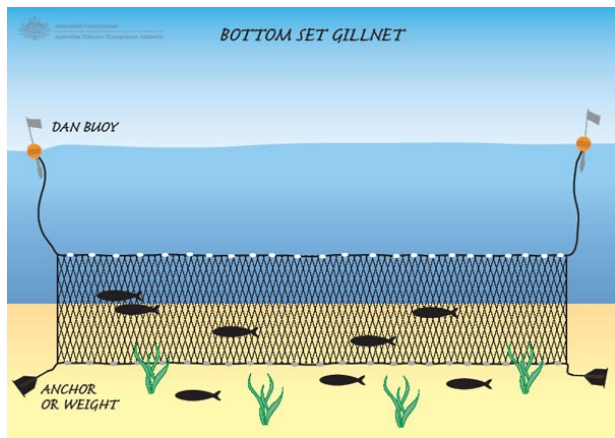


N.A. Right whale (US/Canada) - <450 INDIVIDUALS REMAIN

Gillnets

Reeves et al (2013): “...**bycatch remains a critical issue** demanding urgent attention if there is to be any hope of preventing further losses of marine mammal diversity and abundance, and of protecting, or restoring, ecological health.”

FAO (2018): “...there is an **overwhelming bycatch risk to marine mammals**, in general, posed by gillnets...”



Umali, 1950

Alternative fishing gear

Franciscana dolphin (*Pontoporia blainvillei*)

Population size: ~ 30,000 - 50,000 (IUCN: Vulnerable)

Shallow (</= 50m), coastal

Greatest threat: bycatch, almost exclusively in gillnets (small-scale and large-scale industrial)



The Gillnet Fishery of Bahia de Samborombón/Cabo San Antonio



Main commercial catch



White-mouth croaker
Micropogonias furnieri



Striped weakfish
Cynoscion guatucupa/striatus

Franciscana bycatch



500-800 dolphins/yr - unsustainable

TEST	CONCEPT	RESULT	REFERENCE/S
Vary mesh size	Alter entanglement propensity	No bycatch reduction	Bordino, unpublished
Pinger (10 kHz, 132 dB re 1 pPa @ 1 m)	Deter or alert dolphins	Significant bycatch reduction	Bordino et al, 2002
Pinger (70kHz, 132 dB re 1 pPa @ 1 m)	Deter or alert dolphins; avoid sea lion attraction	Significant bycatch reduction; sea lion interaction same between pingered and unpingered nets	Bordino et al, 2004
Barium sulfate and stiff nylon nets	Alert dolphins using echolocation or reduce entanglement because of increased net stiffness	No significant reduction in bycatch nor target catch between all net types	Bordino et al, 2013
Handlines as an alternative gear	Maintain a viable fishery without catching franciscana	Reduced bycatch of dolphins and sea turtles; better quality of catch	Bordino et al, in prep.
Pinger (70kHz, 132 dB re 1 pPa @ 1 m)	Deter or alert dolphins <i>using fewer pingers</i>	Trial underway	Bordino and Werner, in prep.

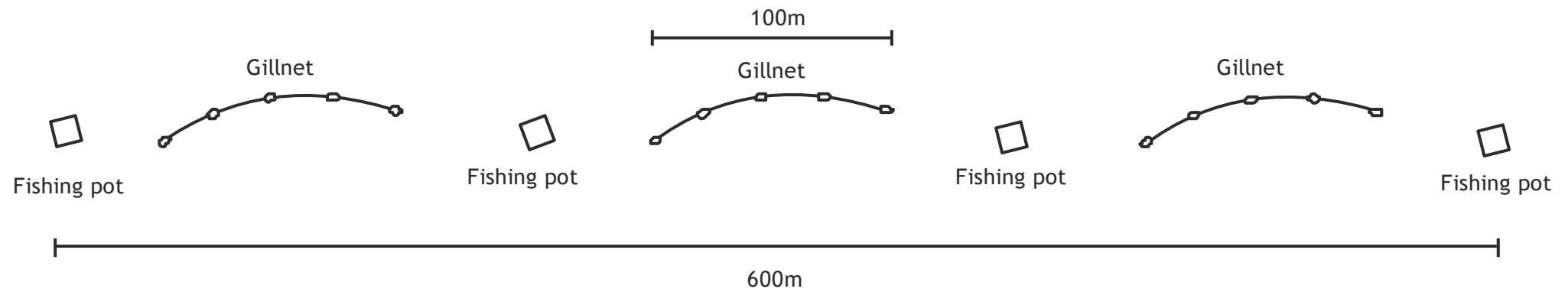
Testing alternative gear: Pots

Fishermen: 5

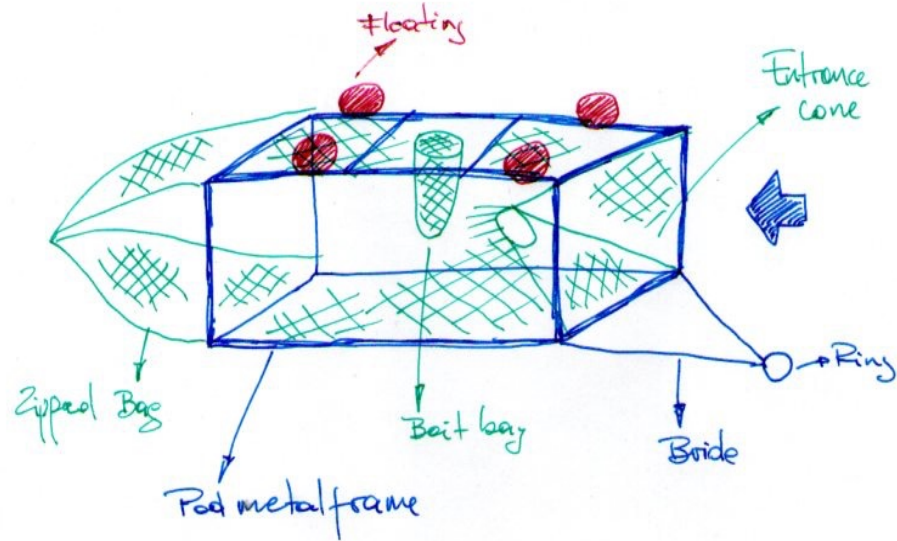
Main data recorded: Catch (species by length and weight) and bycatch

Period: July-Sept, and Dec. 2015

Deployment scheme:

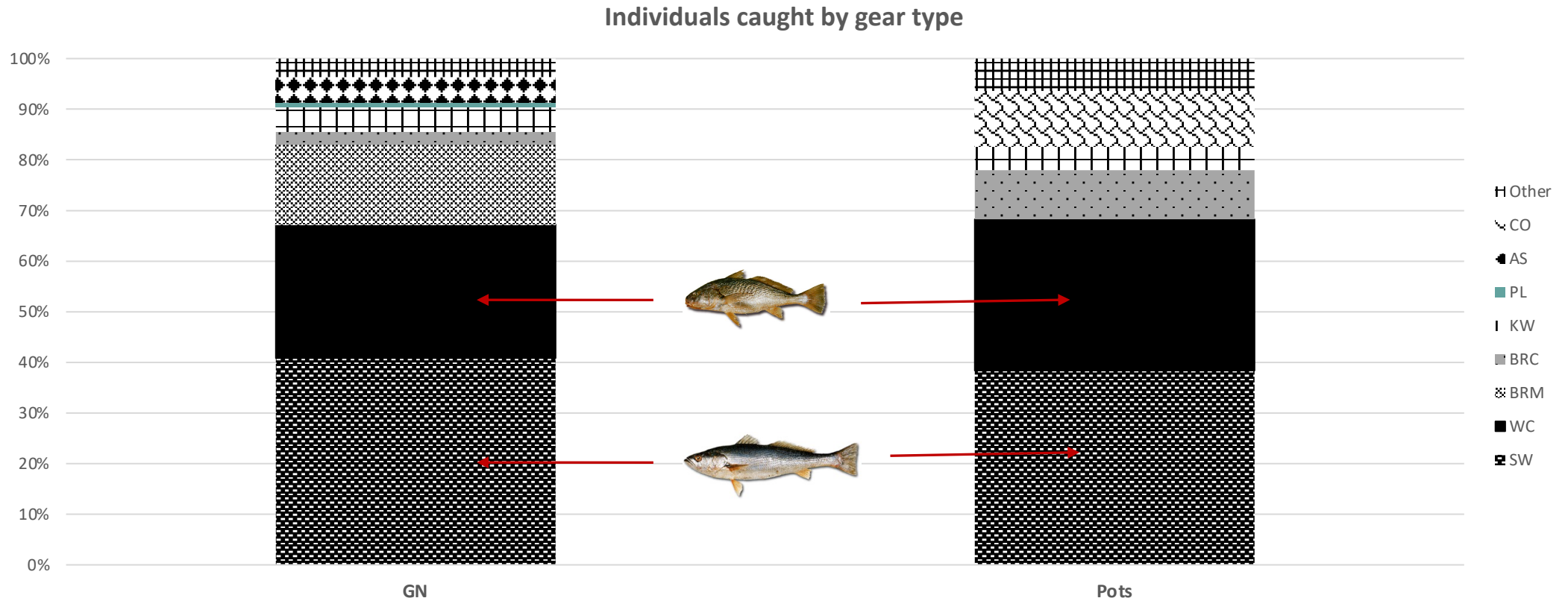


Collapsible fish pots



Results

	Gillnets	Fishing Pots
Number of sets	525	710
Soak time	12,343.8	4,963.3
Total catch (kg)	7,008.9	1,327.8



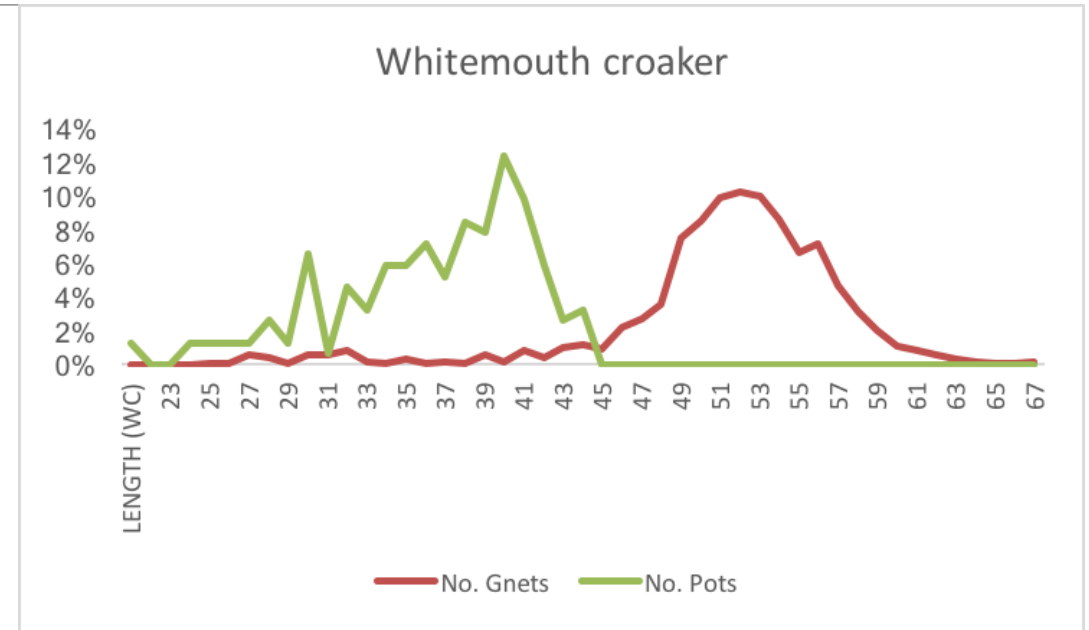
Good news!

No bycatch of dolphins or sea turtles in pot gear - 26 dolphins (all dead) and one loggerhead sea turtle (released alive) in gillnet gear

Higher percentage of pot catch in better condition (89% vs 79%)

Similar percentages of size classes (TL) for each species between gear types except Whitemouth croaker

Mixed results



Could pots be an alternative gear used in the gillnet fishery?

In this study, it took 4963.3 hours to catch 1327.8kg of fish using pots. *How many hours would it take pots to catch 7008.9 kg of fish (gillnets)?*

$$1327.8\text{kg} * x = 4963.3 \text{ (pot fishing hours)} * 7008.9 \text{ (kg of gillnet catch)}$$

$$x = 26199.18 \text{ hours}$$

Assuming an average soak time of 1.9 hours (STDEV of .14), this translates to 14036 pot sets (5 times the # sets in this trial = 14036/710 = **19.8 pots/day**)

One gillnetter can hold 6 collapsible pots. Three separate sets of two pots with 2 hours soak time seems manageable over one morning of fishing and close to the 19.8 target (comparable catch with gillnets).

Pot trial conclusion

Might be feasible as a gear alternative.

Requires economic study accounting for differences in fish class sizes, quality of catch, and a social study to identify willingness to switch gears.

Pots are a new gear type in this area – with more experience the gear will likely be fished better.

Huge benefit for bycatch!

Next steps: Economic analysis; re-test after troubleshooting catch of undersized WC

Dedication: Pablo Bordino



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FUNDING ANNOUNCEMENT

FUND FOR MARINE MAMMAL BYCATCH SOLUTIONS



Credit: Anderson Cabot Center | New England Aquarium