

Review of FAD impacts on sea turtles



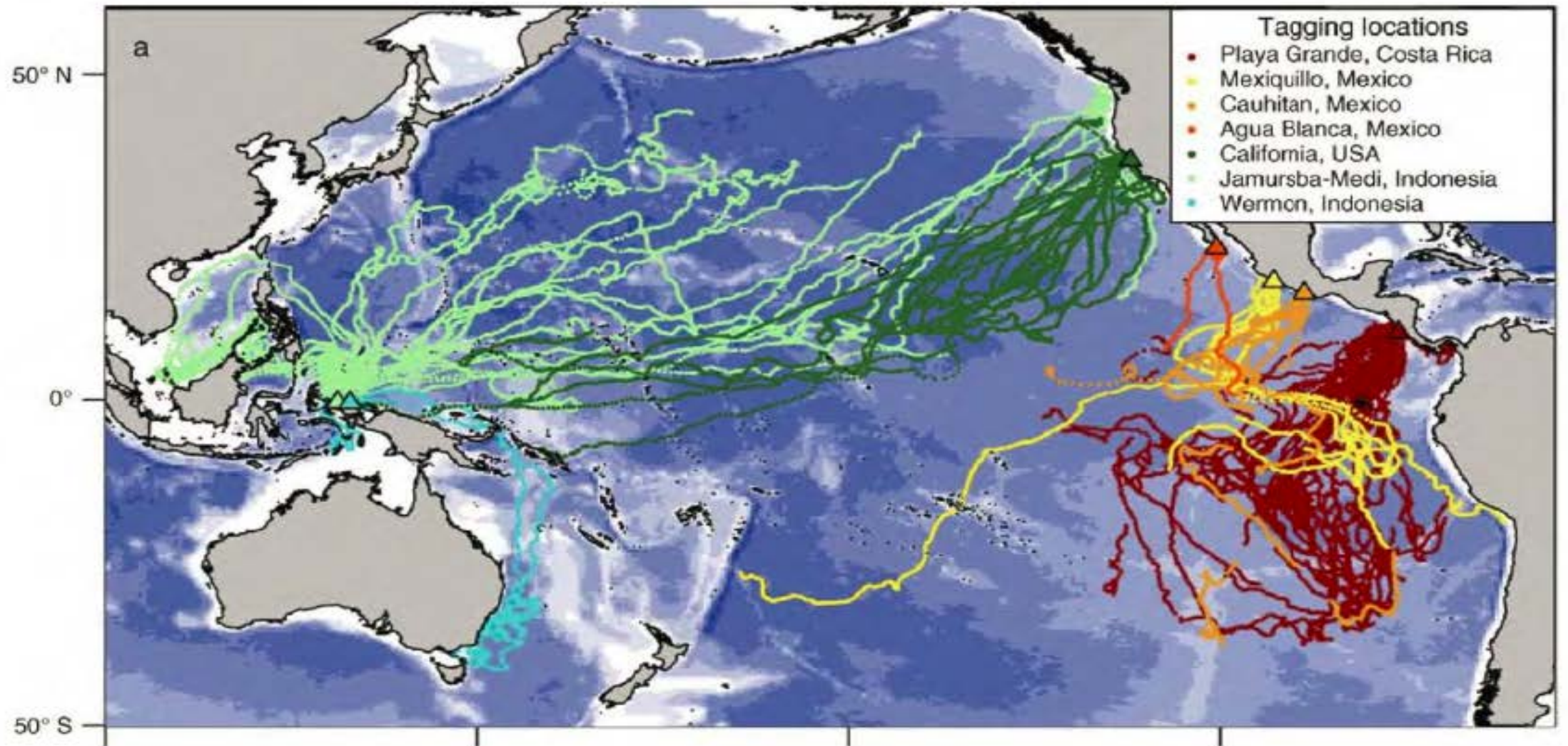


Figure 3. Satellite-tracked movements of 135 leatherback turtles in the Pacific Ocean coded by tagging location and overlaid on bathymetry. Figure from Bailey et al. 2012.

Threats from fisheries to sea turtles

Hooked in longlines (industrial or artisanal)

Entangled in longlines

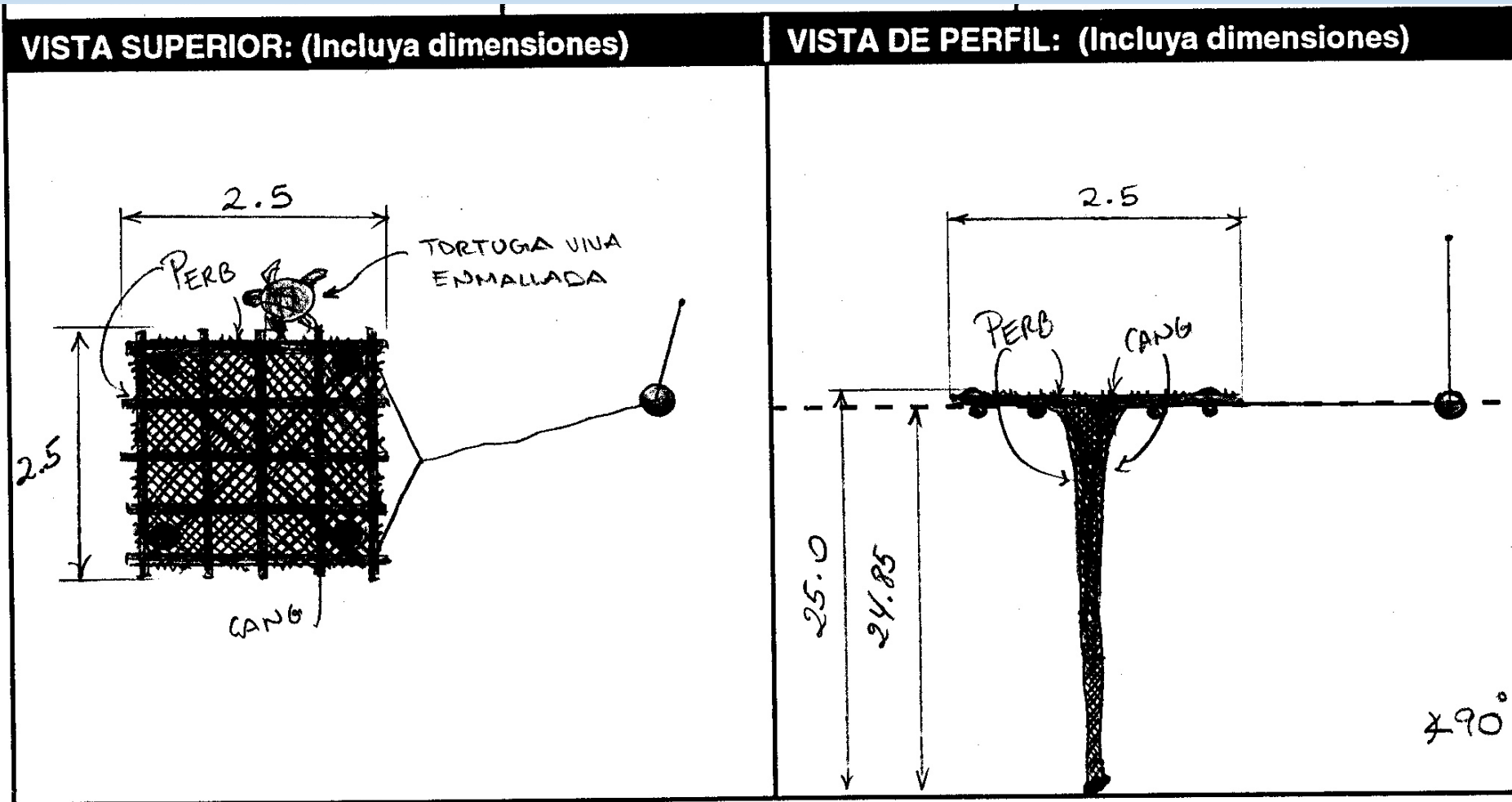
Caught in purse seines

Entangled in FADs or in webbing under FADs

Caught in gill or trammel nets

Caught in trawls

Turtles may be entangled in the FAD webbing



34 in 2016, but number is biased high

Captures of sea turtles – Eastern Pacific

FOB sets	Avg All years	2000	2001	2002	2003		2012	2013	2014	2015
Leatherback	2	1	0	1	0		1	1	8	
Olive ridley	479	459	765	709	755		398	417	309	
Unidentified	141	91	206	159	169		99	184	136	
Hawksbill	7	4	5	8	6		5	8	7	
Loggerhead	23	2	10	16	14		22	24	28	
Black/Green	80	97	140	112	107		78	59	70	
Total	731	654	1126	1005	1051		603	693	558	

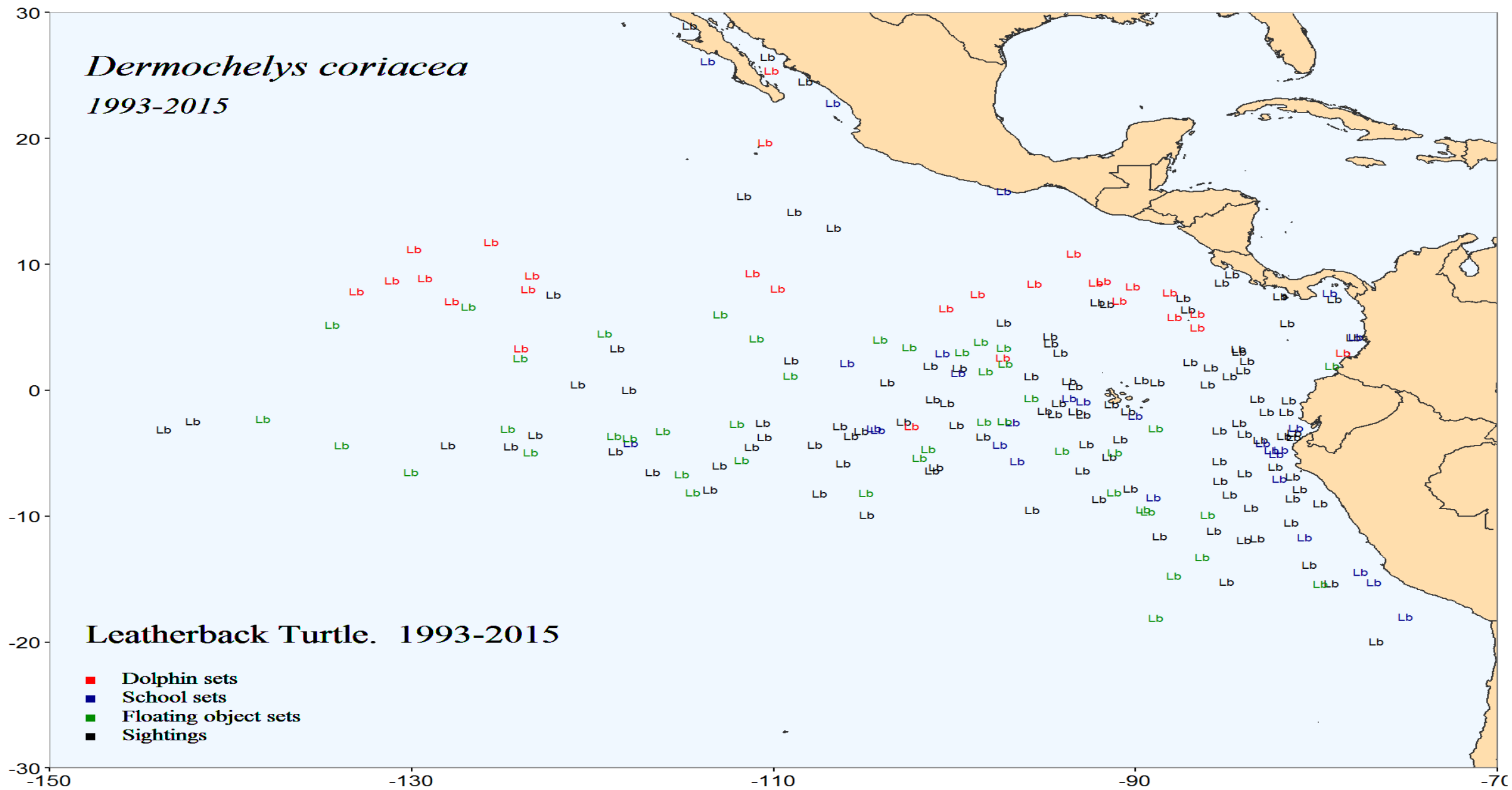
Sea turtle mortality in F. obj sets in the Eastern Pacific

Year	Black/Green	Hawksbill	Leatherback	Loggerhead	Olive ridley	Unidentified	Total
1994	7	0	1	0	50	34	93
1995	10	0	0	0	66	24	100
1996	11	0	0	0	47	30	88
1997	8	0	0	1	54	25	88
1998	7	3	0	1	66	26	103
1999	5	1	0	1	82	39	128
Recent years							
2013	1	1	0	0	7	2	11
2014	0	0	0	1	3	1	5
2015	0	0	0	0	2	0	2
Ave 1993-2015	3.1	0.4	0.0	0.5	25.9	11.3	41.2

Mitigation actions and equipment

- PS: Release, non[entangling FADs

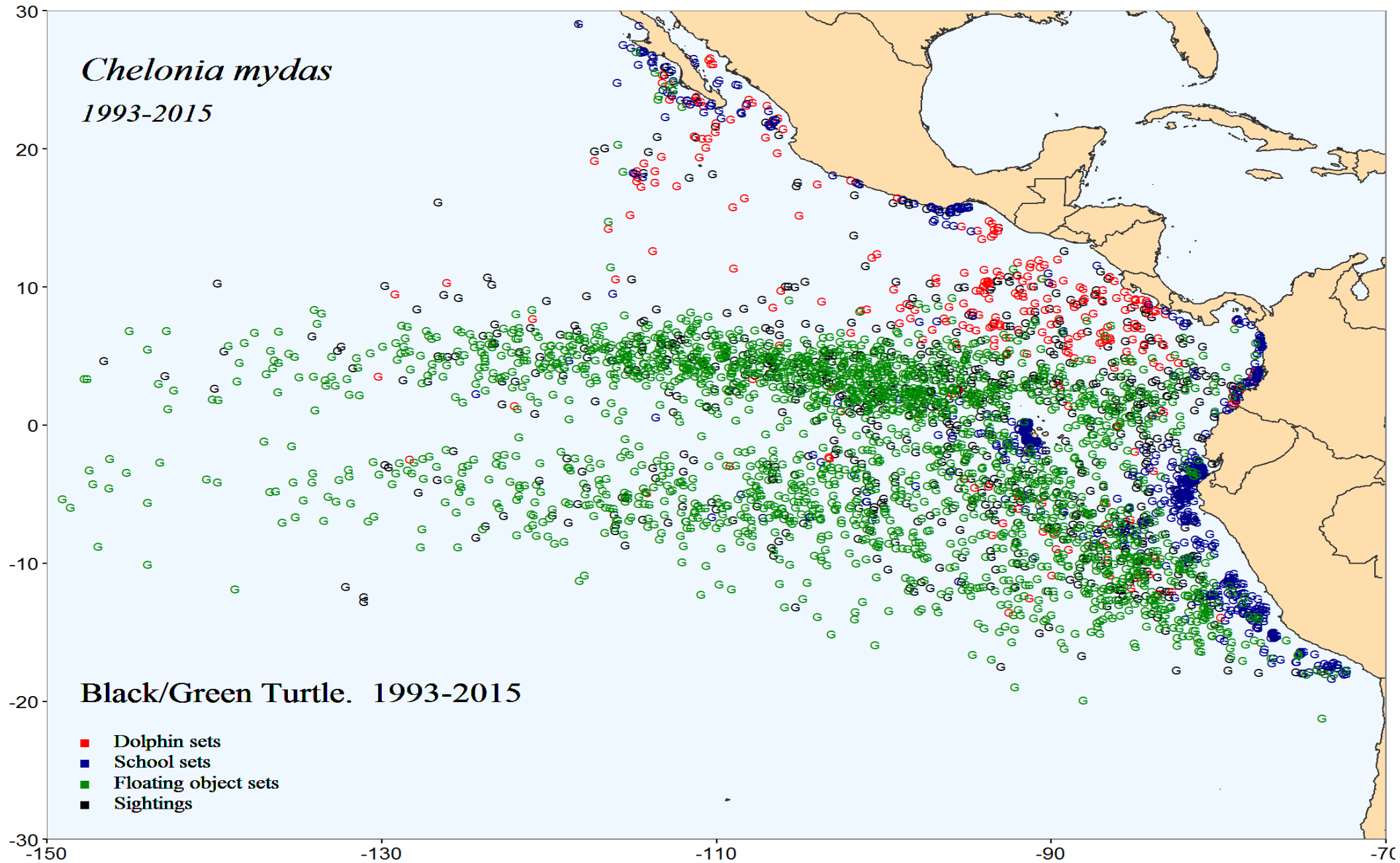
Dermochelys coriacea
1993-2015



Leatherback Turtle. 1993-2015

- Dolphin sets
- School sets
- Floating object sets
- Sightings

Chelonia mydas
1993-2015



Actions for purse seine fishers

- **Follow FAO Guidelines**
- **Release turtles alive and help recovery**
- **Disentangle turtles from webbing under FADs**
- **Train crews in release techniques**
- **Deploy speedboat where net goes up**
- **Stop lifting of the net if turtle entangled**
- **Use dipnets to handle turtles**

Fishing gears and sea turtles

Coastal
Gillnets

High Seas
Longlines

Purse
seines

Trawls

Artisanal
longlines

Coastal Gillnets and Trammel nets



Mitigating sea turtle by-catch in coastal passive net fisheries

Eric Gilman^{1}, Jeff Gearhart², Blake Price³, Scott Eckert⁴, Henry Milliken⁵, John Wang⁶, Yonat Swimmer⁷, Daisuke Shiode⁸, Osamu Abe⁹, S. Hoyt Peckham¹⁰, Milani Chaloupka¹¹, Martin Hall¹², Jeff Mangel¹³, Joanna Alfaro-Shigueto¹³, Paul Dalzell¹⁴ & Asuka Ishizaki¹⁴*

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Developing visual deterrents to reduce sea turtle bycatch in gill net fisheries

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Developing ultraviolet illumination of gillnets as a method to reduce sea turtle bycatch

John Wang, Joel Barkan, Shara Fisler, Carlos Godinez-Reyes, Yonat Swimmer

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<https://www.iattc.org/Downloads.htm>

Gear description forms and manual

Gillnet and Trammel Net Gear Description Form

Vessel name	Registration	Date	Location	Recorded by
NET INFORMATION				
TYPE : Gillnet [] 1 Trammel net [] 2 Note: For trammel nets fill 1 form for both the interior and exterior layers, and add to the data if it has 2 outside layers or just one			DIMENSIONS FOR EACH PANEL	
VERTICAL LOCATION: Surface [] 1 Mid-water [] 2 Bottom [] 3			Length: _____ meter/fathom Length after hanging: _____ meter/fathom Hanging ratio: Float line _____ Lead line _____	
SETTING MODE: Drifting [] 1 Anchored [] 2 Staked [] 3 Sweeping [] 4			Height: _____ meter/mesh Tie down line: Yes...Height _____ m No []	
NET OPERATION: Manual [] 1 Mechanical [] 2			No. OF PANELS FISHED: _____	
NET CONFIGURATION: — [] 1) [] 2 O [] 3 Π [] 4 N [] 5 Λ [] 6				
TOTAL SURFACE NET: Length: _____ Height: _____				

**Coastal (artisanal?)
longlines**

Eastern Pacific Regional Program to Reduce Sea Turtle Mortality in Small-scale Longline Fisheries



Longline fisheries in the region

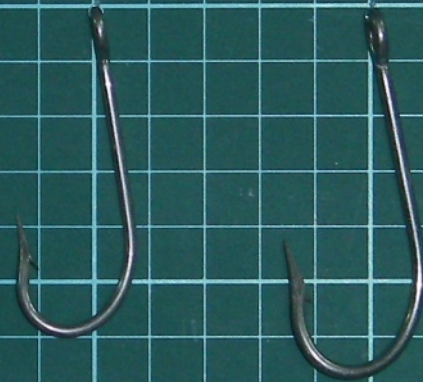
- TBS (Tuna, Billfish, Shark)
- Mahi mahi



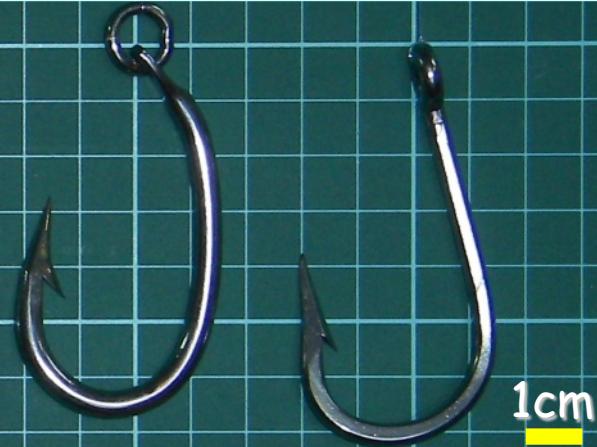
Hook exchanges in the Program

Hooks currently in use

"J"



"Tuna" & "J"



Fisheries

Mahi-mahi

TBS

Proposed replacement hooks



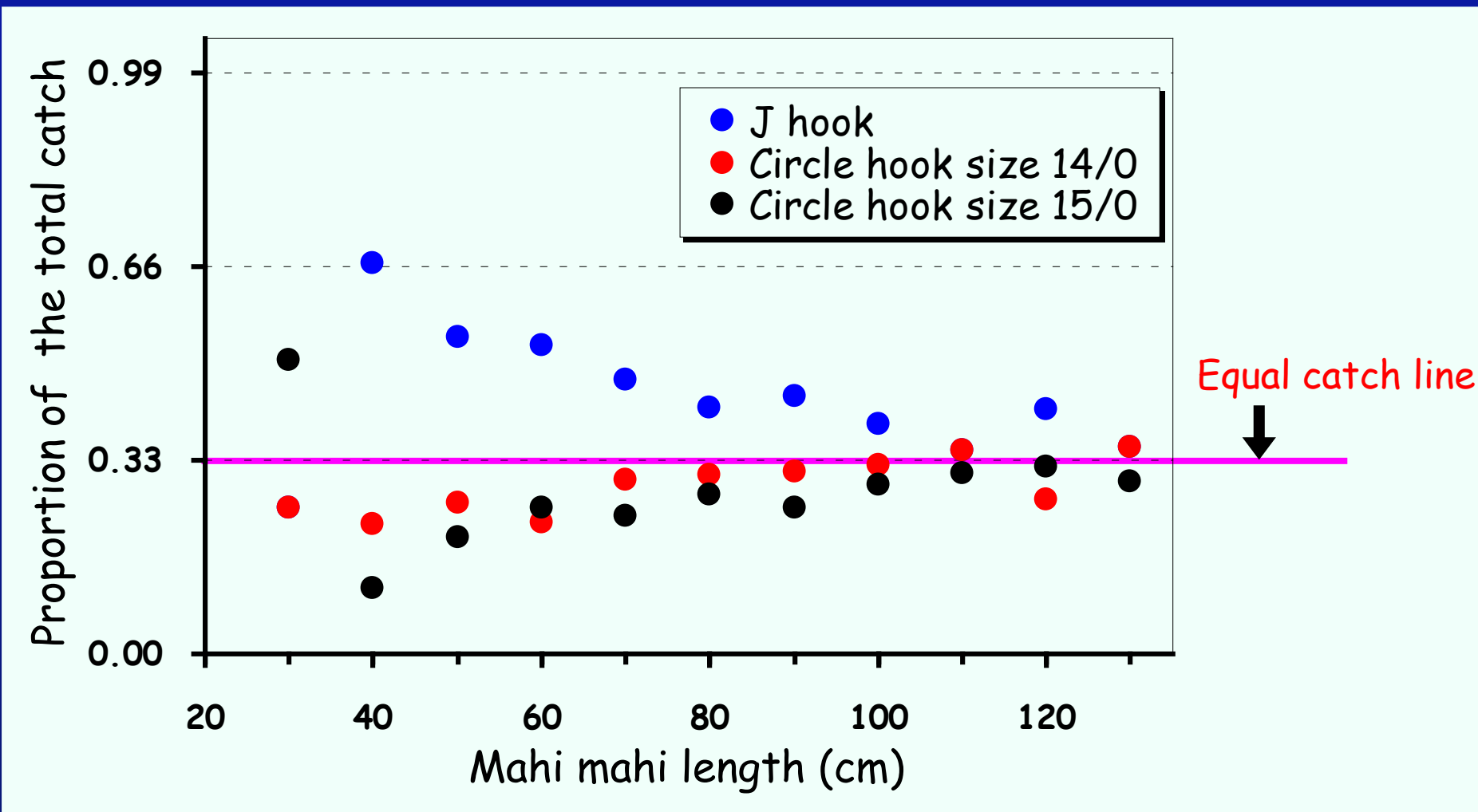
C14/0

C15/0

C16/0
with ring

C16/0
without ring

For small mahi-mahi, J hooks are more effective



Observer effort
used in analysis

Hook type

	J	C14	C15	Total
Nr of hooks	10919	10900	10381	32200

Vessels



PERU

"Huamanga"

(16 m)

From

Fisheries Training
Center of Paita

Multipurpose F/V



ECUADOR

Siempre Olayita

"Siempre Olayita"

(22 m)

&

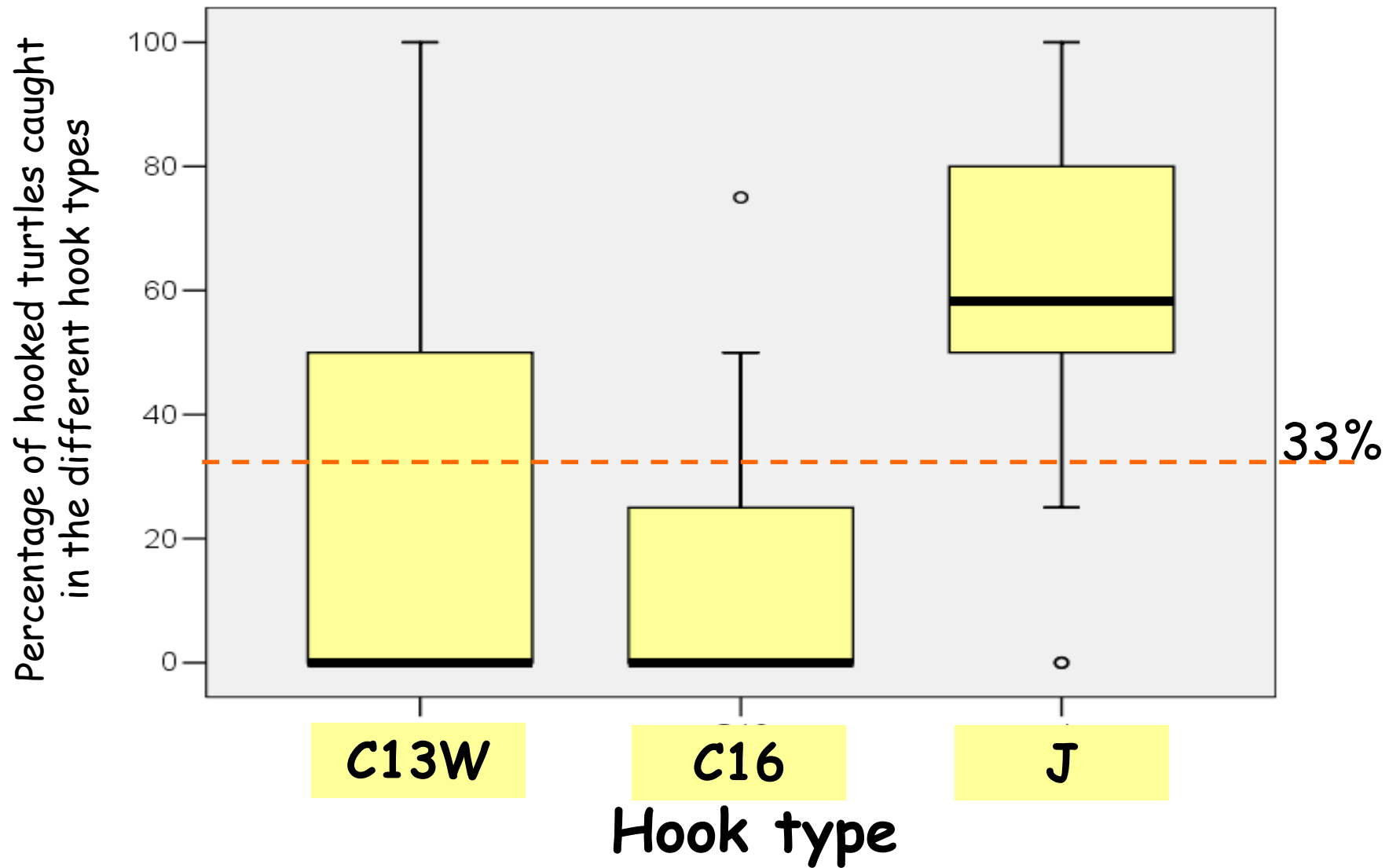
4 Fibras

(7 m)

Longliner

"Fibras"

Sea turtle hookings



Nr. turtles hooked: 45 (37: Olive Ridley, 8: Black)

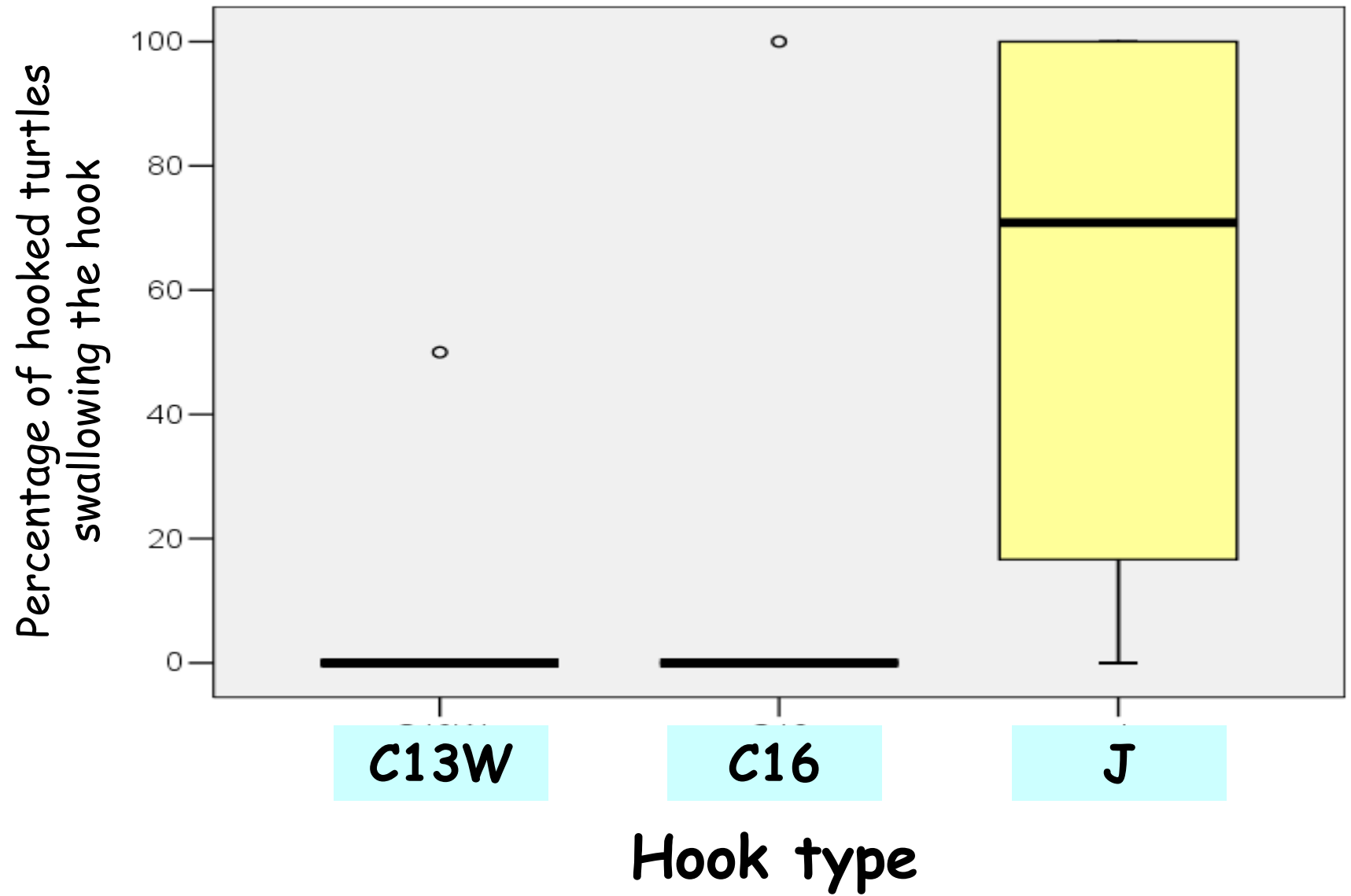
Test of hook performance for turtles

- The log of the odds that a hook caught a turtle was modeled using logistic regression, with explanatory variables:
 - location effect (Peru, Ecuador)
 - hook-type effect (J, C13W, C16) (p-value=0.039 *).

J vs C13W	(p-value C13W = 0.0445 *)
J vs C16	(p-value C16 = 0.0185 **)

- location-hook-type interaction (p-value=0.233 NS).
- fishing operation effect (to account for pairing of hooks on the same line; fixed effect)
- Likelihood ratio statistics were used to test for significance of terms in the model; p-values for these tests were derived using randomization methods.

Proportion of hooked turtles swallowing the hook



Test of the proportion of hooks swallowed

- The log of the odds that a hooked turtle swallowed the hook was modeled using logistic regression, with explanatory variables:

- location effect (Peru, Ecuador)
- hook-type effect (J, C13W, C16) (p-value = 0.011 *).

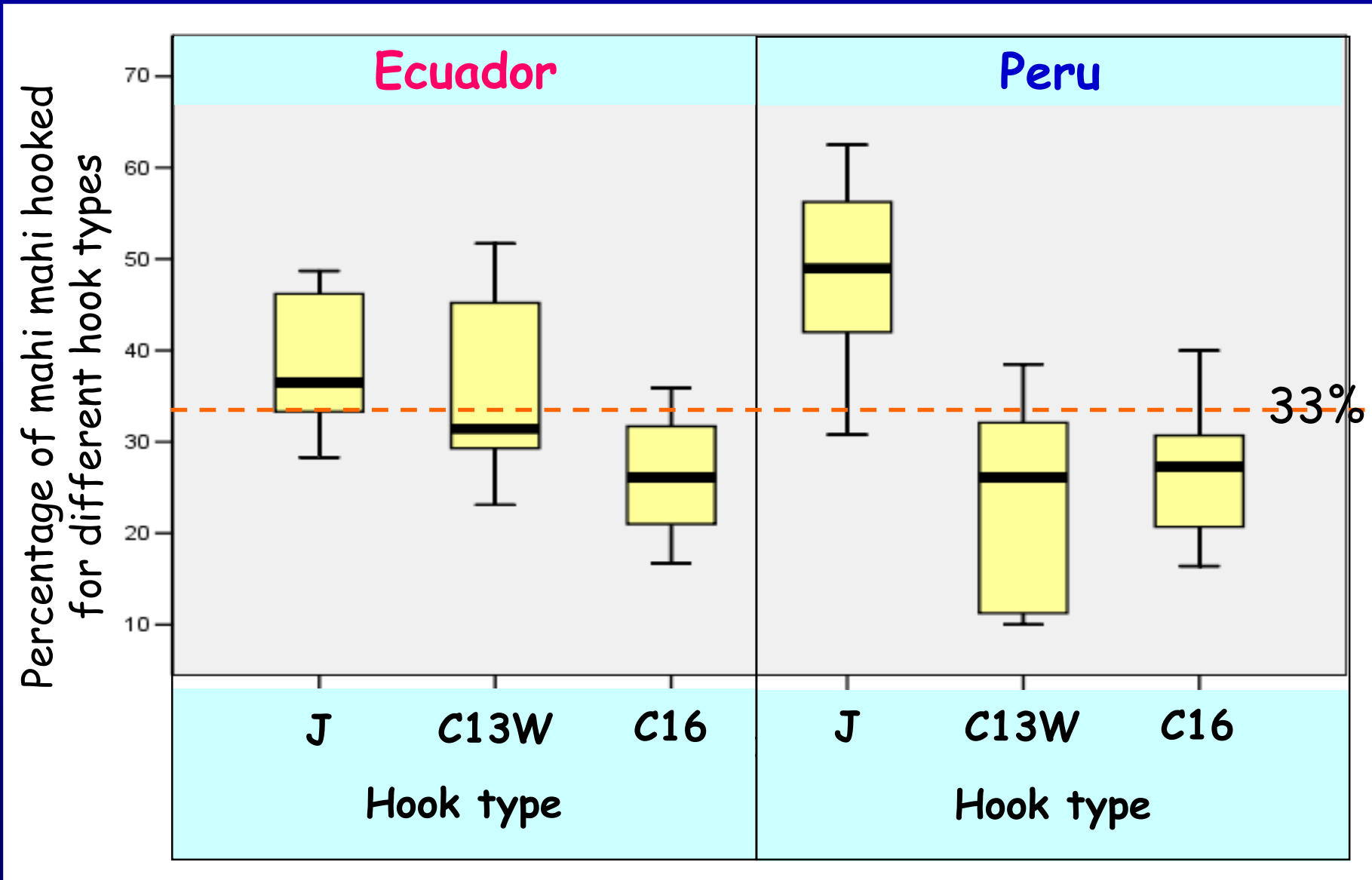
J vs C13W (p-value C13W = 0.031 *)

J vs C16 (p-value C16 = 0.057 ~ *)

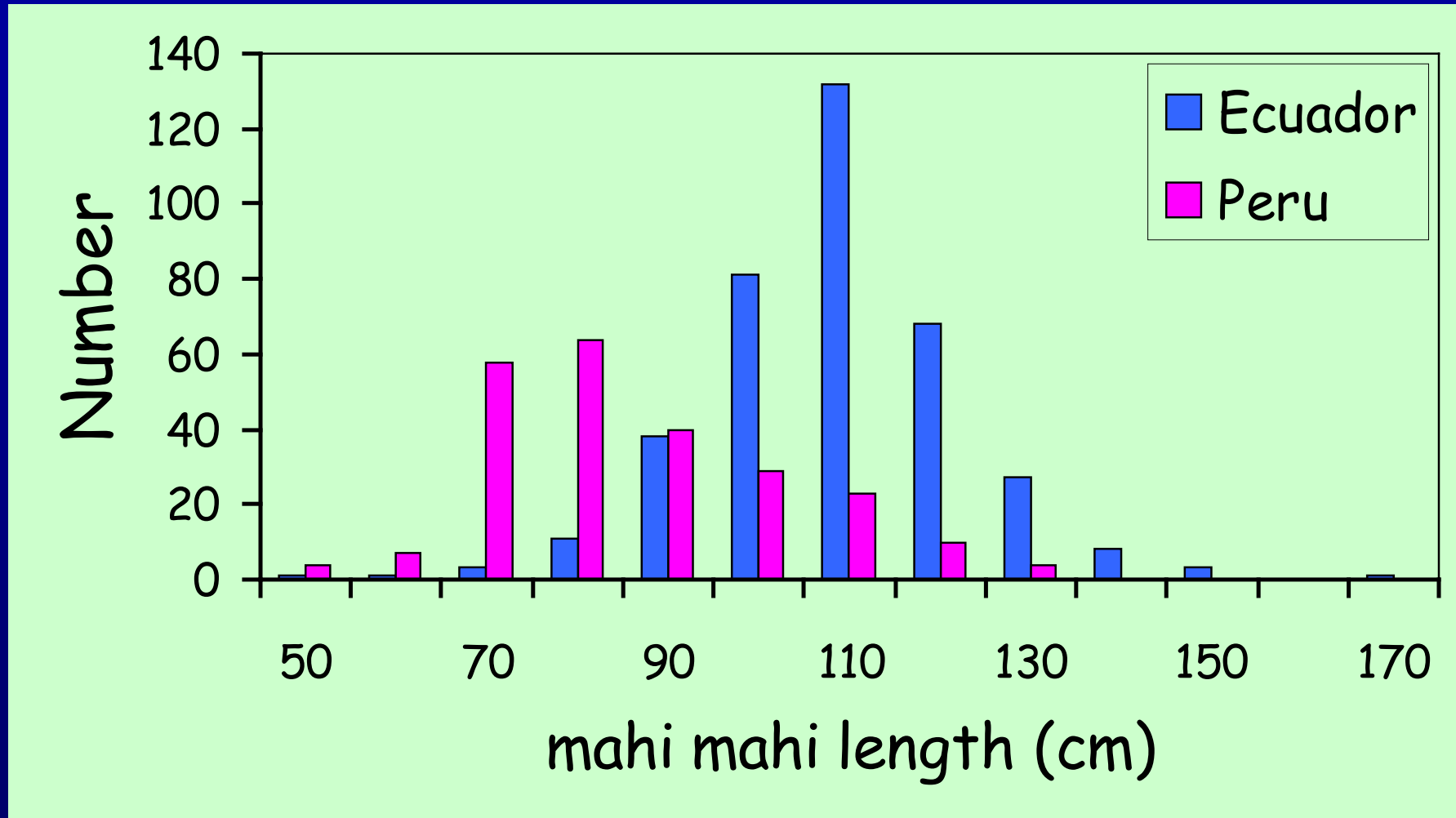
- (There were insufficient data to model interactions or a fishing operation effect.)

- Likelihood ratio statistics (asymptotic F distribution) and t -tests were used to test for significance of terms in the model.

Percentage of hooked mahi mahi for the different hook types



Length distribution of mahi mahi



CIRCLE HOOKS IN COMMERCIAL, RECREATIONAL, AND ARTISANAL FISHERIES: RESEARCH STATUS AND NEEDS FOR IMPROVED CONSERVATION AND MANAGEMENT

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John E Graves, Martin Hall, Mahmood Shivji,
and Yonat Swimmer*



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Circle hooks: Developing better fishing practices in the artisanal longline fisheries of the Eastern Pacific Ocean



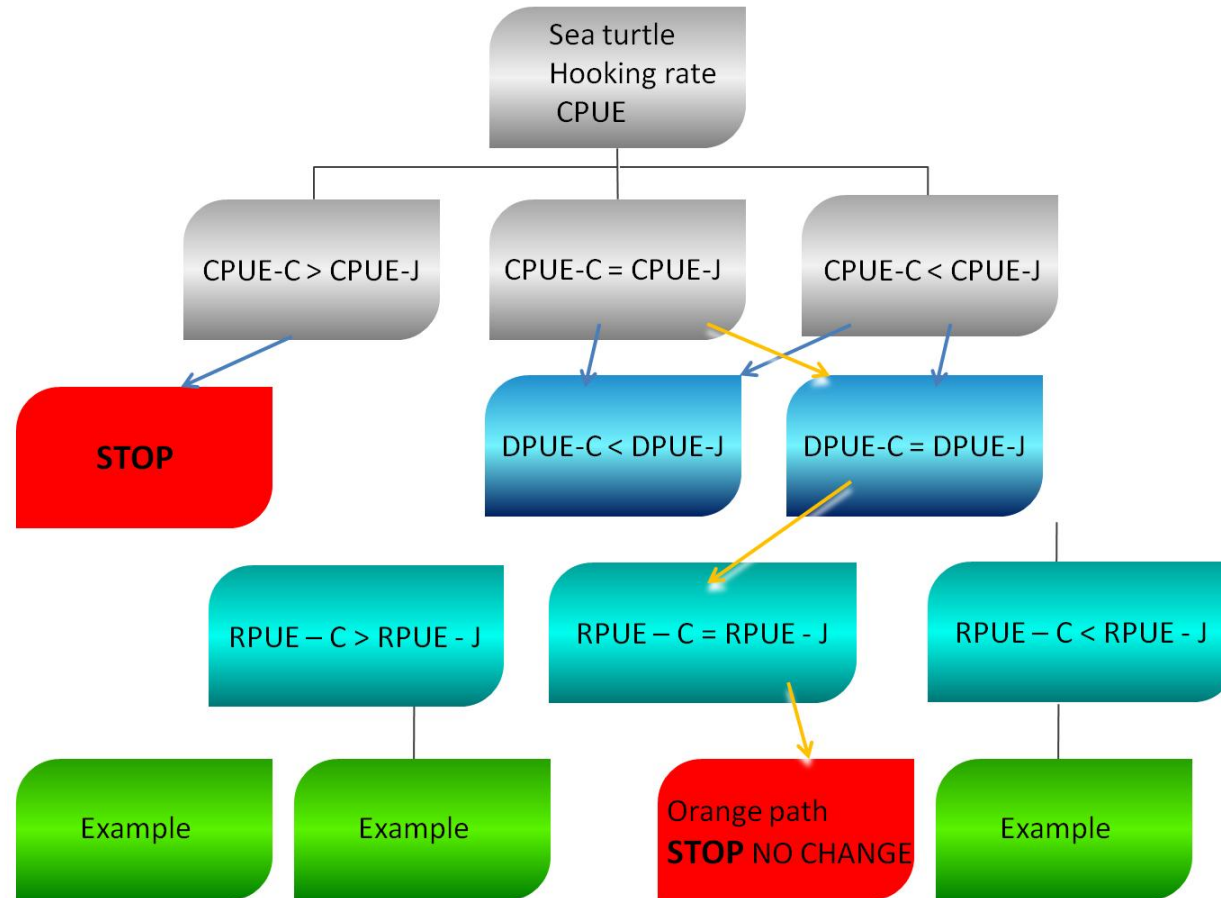
Sandra Andraka^{a,*}, Moisés Mug^a, Martin Hall^b, Maite Pons^c, Lucas Pacheco^d, Manuel Parrales^e, Liliana Rendón^e, María L. Parga^f, Takahisa Mituhasi^g, Álvaro Segura^h, David Ortegaⁱ, Erick Villagrán^j, Sara Pérez^j, Celina de Paz^k, Salvador Siu^k, Velkiss Gadea^l, Julián Caicedo^m, Luis A. Zapata^m, Jimmy Martínez^e, Pablo Guerreroⁿ, Michael Valqui^o, Nick Vogel^b

	Catch higher	Catch same	Catch lower
ST Bycatch higher	Useless	Useless	Hard sell
ST Bycatch same	Useless	Useless	Hard sell
ST Bycatch lower	Easy to sell, but ????????	EASY CHOICE	Hard sell

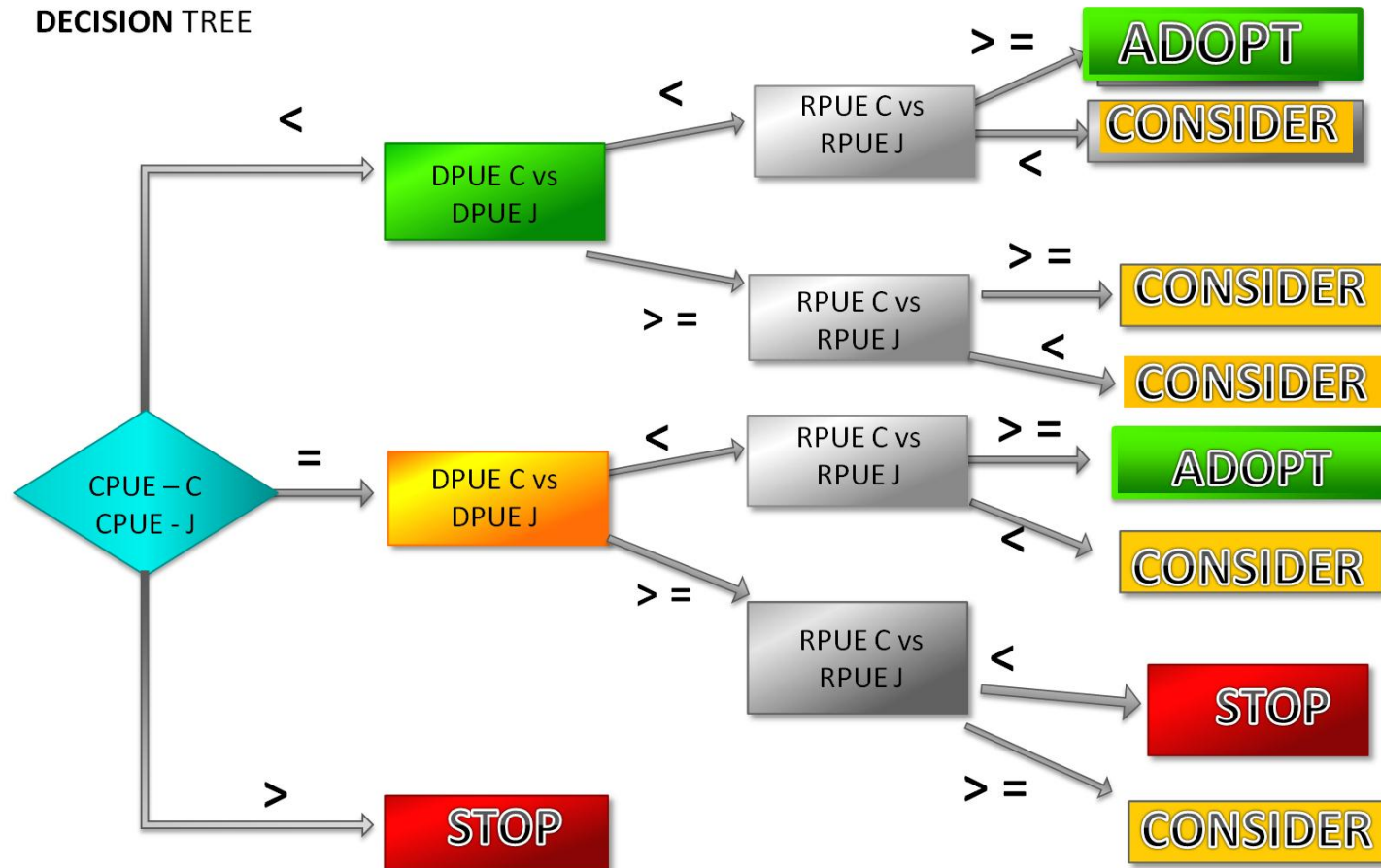
	Bycatch B higher	Bycatch B same	Bycatch B lower
ST Bycatch higher	Bad Choice	Useless	???????
ST Bycatch same	Useless	Useless	???????
ST Bycatch lower	???????	EASY CHOICE	EASY CHOICE

J Vs C18 TBS fishery.

Species or group of especies.	CPUE J hook	CPUE C18 hook	Z	p-valor
<i>Thunnus albacares</i>	0,42	0,68	1,10	0,308
<i>Coryphaena hippurus</i>	3,40	3,01	-0,27	0,806
<i>Xiphias gladius</i>	0,52	1,03	2,02	0,037
<i>Istiophorus platypterus</i>	1,05	1,22	0,17	0,869
Other billfishes	0,76	0,76	-0,01	0,993
<i>Prionace glauca</i>	1,39	2,20	1,56	0,126
<i>Carcharhinus falciformis</i>	15,55	25,36	2,99	0,002
Alopiidae	0,79	0,87	0,39	0,694
Sphyrnidae	0,71	0,92	1,81	0,036
All fishes and condriictios	24,79	36,68	3,25	0,001
<i>Chelonia mydas mydas/agassizii</i>	0,50	0,03	-3,75	0,000
<i>Eretmochelys imbricata</i>	0,03	0,00	-----	-----
<i>Lepidochelys olivacea</i>	0,79	0,33	-2,44	0,012
All turtles	1,31	0,35	-3,54	0,000



DECISION TREE



Sea Turtles of the Eastern Pacific Advances in Research and Conservation

Edited by

Jeffrey A. Seminoff and Bryan P. Wallace

No “Silver Bullets” but Plenty of Options

Working with Artisanal Fishers in the Eastern Pacific
to Reduce Incidental Sea Turtle Mortality
in Longline Fisheries

MARTIN HALL, YONAT SWIMMER,
AND MARILUZ PARGA



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Hooking locations in sea turtles incidentally captured by artisanal
longline fisheries in the Eastern Pacific Ocean

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Mitigating bycatches in tuna fisheries.

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 - Sections on purse seine bycatches, sea turtles – longlines, seabirds – longlines, small scale longlines and sea turtles, sharks and longlines