

Reflexiones

Pesca sostenible y anzuelos

circulares

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EcoPacífico +

Primer Taller Anzuelos Circulares / 1st Circle Hook Workshop

7-8 marzo 2022 / 7-8 March 2022



Experimental Observed Fishing Effort (2004-2012)

Number of trips	Number of sets	Number vessels	Number hooks J	Number hooks Circle
2564	11351	650	1 187 982	3 215 589

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



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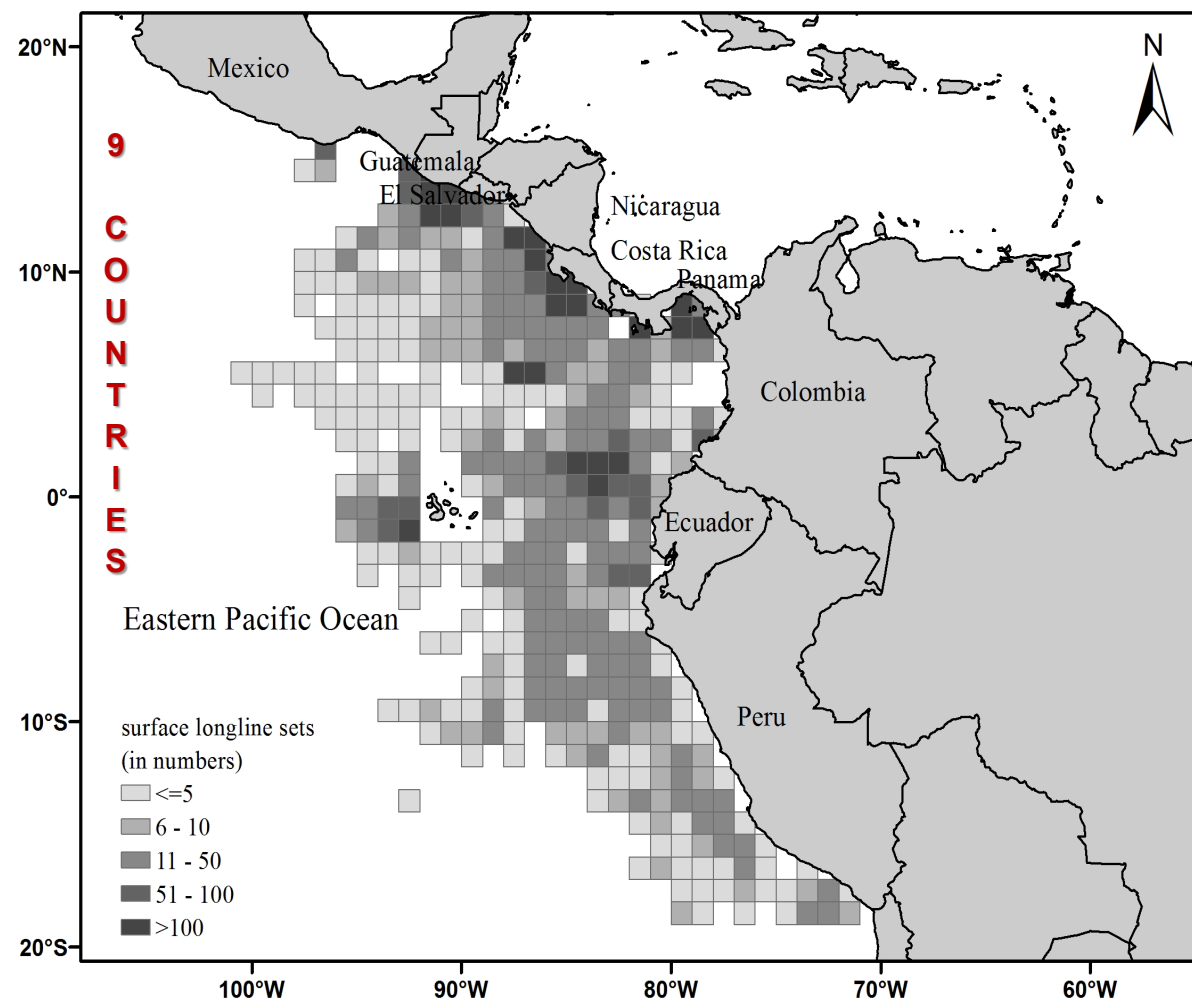
Surface longline fisheries

Sea turtles

ABSTRACT

Since 2004, governments and non-governmental organizations, together with the fishing communities from nine countries, from Mexico to Peru, have implemented joint efforts to reduce incidental mortality of sea turtles in artisanal longline fisheries of the Eastern Pacific Ocean (EPO). These countries are involved in a Regional Sea Turtle Bycatch Program to achieve this goal. Circle hooks have been proposed as a way to mitigate incidental mortality of sea turtles. Thus, we analyze the performance of circle hooks in relation to J-style and tuna hooks on the hooking rates of target and non-target species in the artisanal surface longline fisheries of three of the participating countries with the largest sample sizes (Ecuador, Panama and Costa Rica). These fisheries target mahi-mahi, *Coryphaena hippurus*, or a combination of tunas, billfishes and sharks (TBS), and use different techniques and gear configurations to catch their targets. For the TBS fishery we presented the results of comparisons between tuna hooks and 16/0 circle hooks from Ecuador, Panama and Costa Rica, and between tuna hooks and 18/0 circle hooks in Costa Rica. For the mahi-mahi fishery, we analyzed the performance of 14/0 and 15/0 circle hooks in Ecuadorian vessels and 16/0 circle hooks in Costa Rican vessels vs. the traditional J-style hooks. A total of 730,362 hooks were observed in 3126 sets. Hooking rates for target and non-target species were not consistent for all fisheries and countries analyzed. However, circle hooks reduced sea turtle hooking rates in most of the comparisons.

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Marine turtles hooking rates

Tasas de enganche de tortugas marinas

Surface	Comparison	Costa Rica	Panama	Ecuador	Perú
TBS	J-C16	=	50%*	50%*	12%
	J-C18	75%*			
MAHI MAHI	J-C16	25%*			
	J-C15			=	65%*
	J-C14			45%*	40%
	C15-C14		=	=	
	C15-C13		=		

Target species hooking rates

Tasas de enganche de especies objetivo

Surface	Comparison	Costa Rica	Panama	Ecuador	Perú
TBS	J-C16	10%*	=	20%*	=
	J-C18	50%*			
MAHI MAHI	J-C16	=			
	J-C15			40%*	50%*
	J-C14			30%*	50%*
	C15-C14		=	=	
	C15-C13				

Tiburón, Atún y Espada

Especies o grupo de especies	Capture J hook	Capture C18 hook	CPUE J hook	CPUE C18 hook	Z	p-valor
<i>Thunnus albacares</i>	16	25	0,42	0,68	1,10	0,308
<i>Coryphaena hippurus</i>	130	111	3,40	3,01	-0,27	0,806
<i>Xiphias gladius</i>	20	38	0,52	1,03	2,02	0,037
<i>Istiophorus platypterus</i>	40	45	1,05	1,22	0,17	0,869
Otros picudos	29	28	0,76	0,76	-0,01	0,993
<i>Prionace glauca</i>	53	81	1,39	2,20	1,56	0,126
<i>Carcharhinus falciformis</i>	594	934	15,55	25,36	2,99	0,002
Alopiidae	30	32	0,79	0,87	0,39	0,694
Sphyrnidae	27	34	0,71	0,92	1,81	0,036
Todos los peces y condrictios	947	1351	24,79	36,68	3,25	0,001
<i>Chelonia mydas mydas/agassizii</i>	19	1	0,50	0,03	-3,75	0,000
<i>Eretmochelys imbricata</i>	1	0	0,03	0,00	-----	-----
<i>Lepidochelys olivacea</i>	30	12	0,79	0,33	-2,44	0,012
Todas las tortugas	50	13	1,31	0,35	-3,54	0,000

Dorado

Especie o grupo de especies.	Captura J anz	Captura C16 anz	CPUE J anz	CPUE C16 anz	Z	p-valor
Dorado	1904	2075	24,66	27,86	1,52	0,129
<i>Istiophorus platypterus</i>	151	163	1,96	2,19	1,49	0,134
<i>Carcharhinus falciformis</i>	59	84	0,76	1,13	2,05	0,039
<i>Alopias spp.</i>	43	59	0,56	0,79	1,16	0,257
Todos los peces	46	55	0,60	0,74	1,67	0,097
Todos los peces y condrictios	2242	2506	29,04	33,65	2,14	0,033
<i>Chelonia mydas mydas/agassizii</i>	45	46	0,58	0,62	0,04	0,976
<i>Eretmochelys imbricata</i>	2	6	0,03	0,08	-----	-----
<i>Lepidochelys olivacea</i>	179	112	2,32	1,50	-2,60	0,003
Testudinata	1	5	0,01	0,07	-----	-----
Todas las tortugas	227	169	2,94	2,27	-2,23	0,020

Dolphinfish



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

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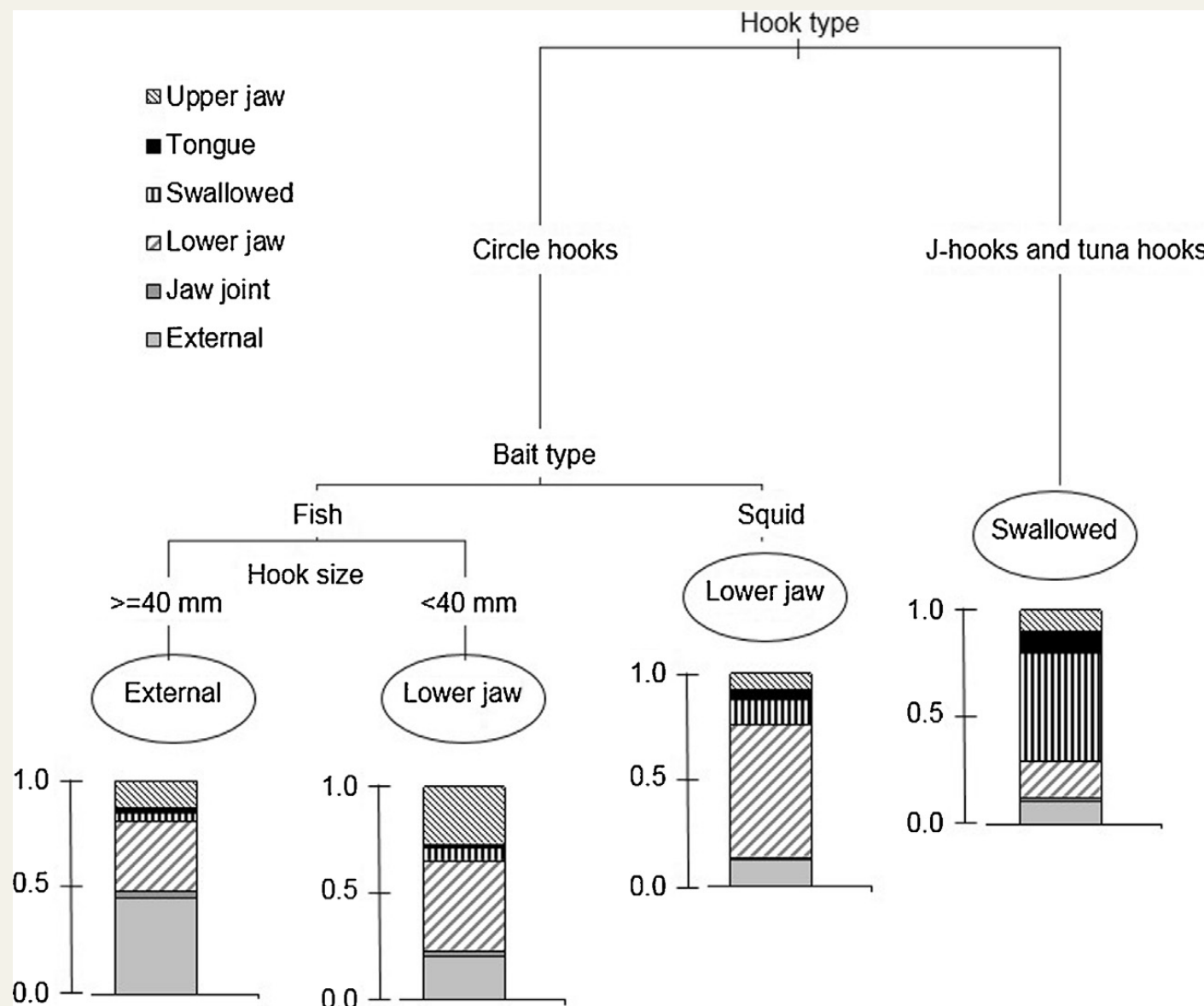
Bait

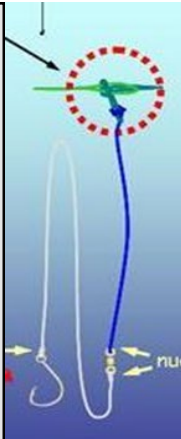
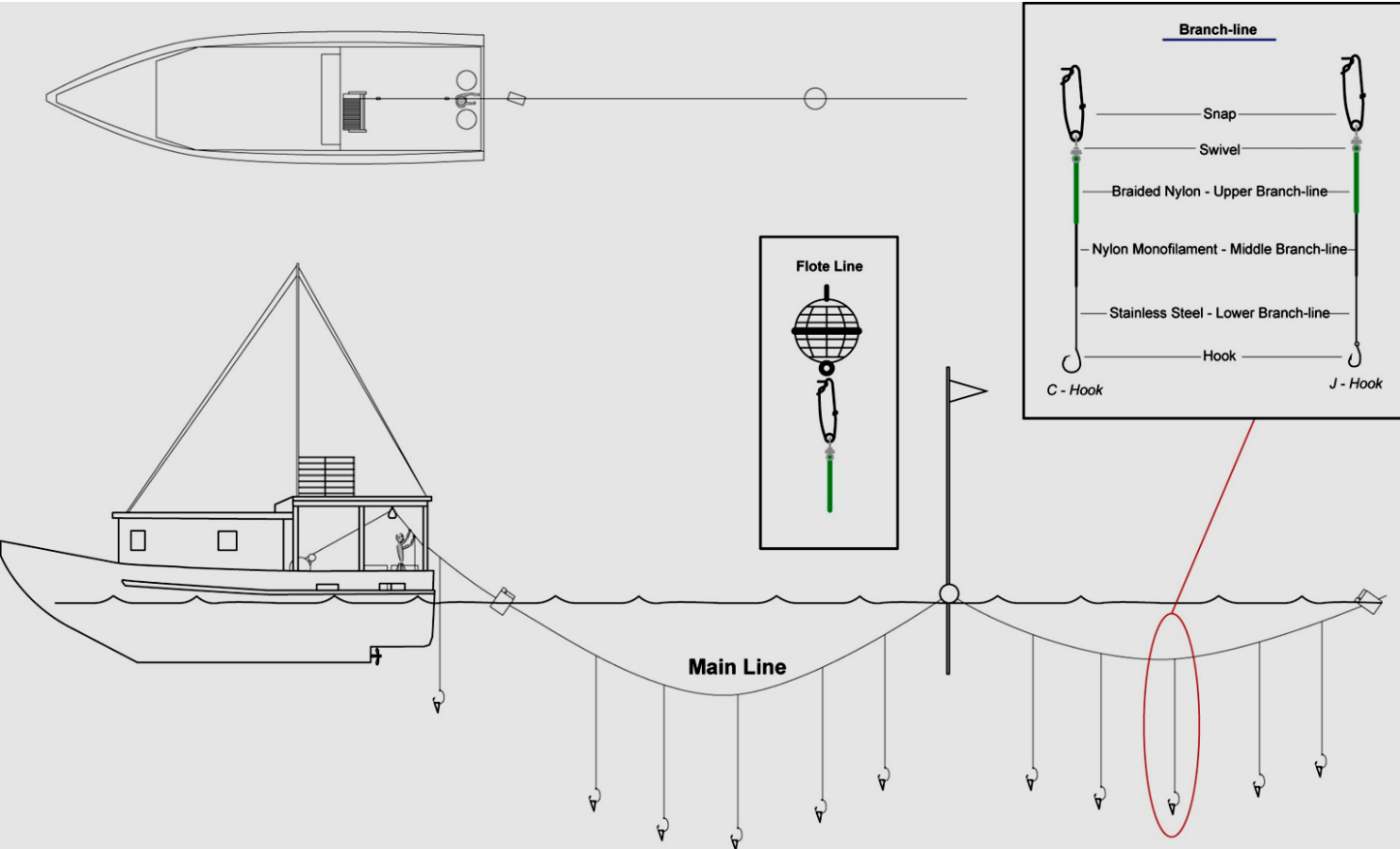
Olive ridley

Surface longline

ABSTRACT

Bycatch by longline fisheries, especially by artisanal small-scale fisheries, is one of the main conservation problems for some sea turtle populations around the world. Since 2004, a network of professionals under the "Eastern Pacific Regional Sea Turtle Bycatch Program" have been working with artisanal longline fishers in the Eastern Pacific Ocean (EPO) to reduce sea turtle bycatch and related mortality. Trials assessing circle hooks of different sizes and shapes, and different baits, have been conducted to determine the effectiveness in the reduction of sea turtle bycatch and changes in hooking location. In this paper, information from 1823 olive ridley sea turtles incidentally captured in the EPO were analyzed to assess how hook type (J, tuna hooks or circle hooks), hook size, bait type (squid or fish), turtle size and target species (tunas, sharks or mahi-mahi) affect hooking location on sea turtles. This were modeled with a Classification and Regression Tree using hooking location as a multinomial variable response (for 6 categories of hooking locations); and also as a binomial response (swallowed vs. non-swallowed) using a Generalized Linear Mixed Model (GLMM). Hook type and size, plus bait type, were the most important factors affecting hooking location, while turtle size and target species did not have any significant effect. J-hooks and tuna hooks had a much greater probability of being swallowed than circle hooks. In addition, as the hook size increased, the likelihood of swallowing it decreased. The use of fish bait in combination with larger circle hooks tended to produce higher proportions of external hookings. An increase in external or lower mandible hookings is preferred since these locations are assumed to be less dangerous for the animal's post-release survival, and because hooks and attached gear are easier to remove by well-trained fishermen.



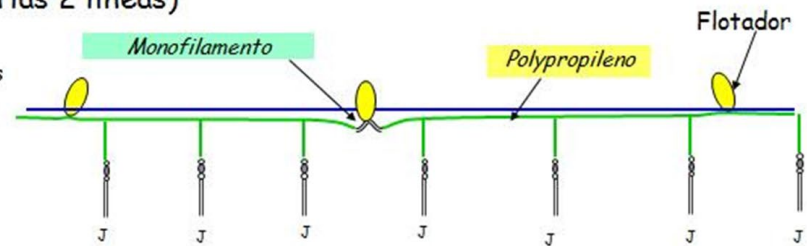


OTRAS SOLUCIONES/ OTHER SOLUTIONS

Disposición del experimento en las líneas

Experimental (en las 2 líneas)

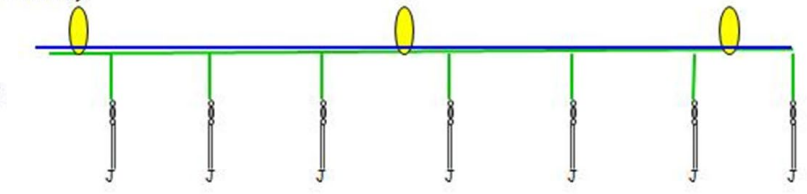
Nro de anzuelos/línea:
180 anzuelos



Control (Tipo Convensional)

1 línea

Nro de anzuelos/línea:
180 anzuelos



Materiales de línea

- Polypropileno (PP)
- Nylon monofilamento (PA mono)

Aprendizajes y aportes

Learnings and contributions

- ✓ Los cambios en la tecnología no funcionan si no hay un cambio de actitud y comportamiento.
- ✓ Los anzuelos circulares y otras modificaciones tecnológicas no sustituyen el manejo de la pesquerías.
- ✓ Buscar soluciones que funcionan a bordo en las condiciones de las pesquerías.



- ✓ Changes in technology do not work if there is no change in attitude and behavior.
- ✓ Circle hooks and other technological modifications are not a substitute for fisheries management.
- ✓ Look for solutions that work on board in the conditions of the fisheries.

Aprendizajes y aportes

Learnings and contributions

- ✓ Es difícil unificar una solución o propuesta para todo el OPO.
- ✓ Conocer la situación actual de las pesquerías en cada uno de los países del OPO.
- ✓ Conocer más sobre la cadena de mercado de anzuelos circulares.
- ✓ Involucrar sectores productivos y comercializadores.
- ✓ Invertir esfuerzo en mejores prácticas y entrenamientos masivos.



- ✓ It is difficult to unify a solution /proposal for the entire OPO.
- ✓ Knowledge of the current situation of the fisheries in each of the EPO countries.
- ✓ Learn more about the circle hook market chain.
- ✓ Involve productive and market sector.
- ✓ Invest effort in best practices and mass training

