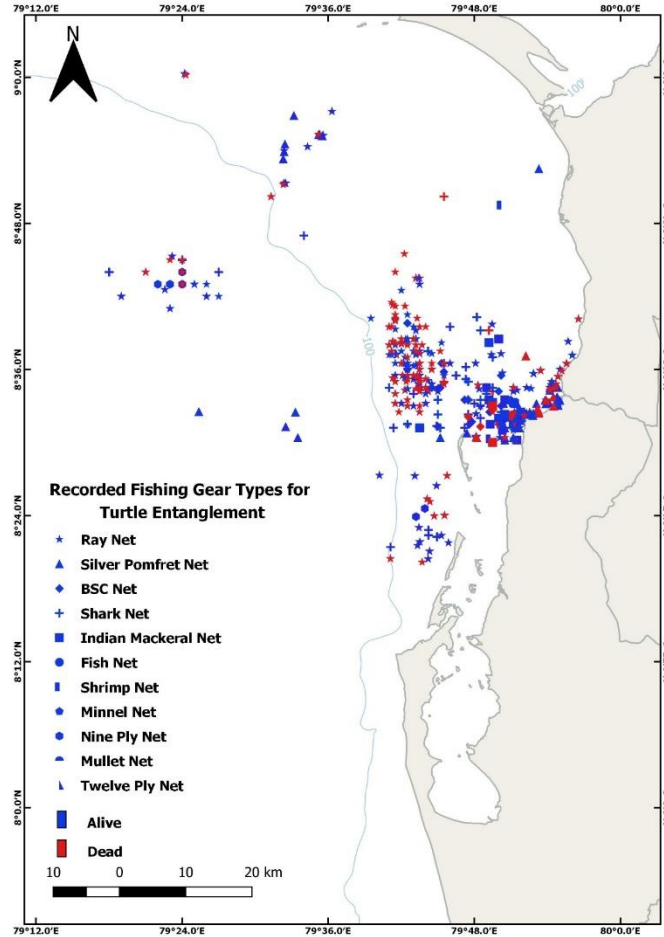




Sri Lanka Blue Swimming Crab FIP

Draft Report – Live Release of Turtles in the Gulf of Mannar Fishery

Reducing the ecological impact of blue swimming crab fishing on sea turtles in the Palk Bay and the Gulf of Mannar



Research and written by

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**On behalf of
Seafood Exporters' Association of Sri Lanka**

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Introduction

The BSC fisheries in the Palk Bay and the Gulf of Mannar are the only fisheries in Sri Lanka and the first BSC fisheries in South and South East Asia to achieve a **Good Alternative** rating from the Monterey Bay Aquarium's Seafood Watch Programme (December 2018) and to score > 0.80 against the Marine Stewardship Council's Fisheries Standard (May 2020).

SLBSC FIP Sub- Project 2023/2 was implemented in respect of concerns raised by the Monterey Bay Aquarium (MBA) Seafood Watch programme's concerns about the threat posed by bottom-set crab nets to turtles in the BSC fishery. The fisheries were scored as 1.00 [**AVOID**] by the MBA SW assessment of the BSC fisheries in 2018. Although the scores of the fisheries increased to 1.73 in 2023's updated assessment, concerns about the ecological impact of BSC fishing on turtle populations in the Gulf of Mannar remain the major barrier preventing the fishery from increasing their eco-recommendation from the current **GOOD ALTERNATIVE** to **BEST CHOICE** by 2026.

The sub project was able to collect data on turtle entanglement in fishing gears through fishermen to reduce the ecological impact of BSC fishing on turtles in the two fisheries. A summary of the results obtained through programme is provided through this report separately for the two fisheries, *i.e* Palk bay and Gulf of Mannar.

Gulf of Mannar

Accidental catch to the fishing nets has been listed as one of the main threats to the marine turtles in Sri Lanka (Jayathilaka, Perera, and Haputhanthri 2017). Therefore, the pelagikos (pvt) ltd conducted research in Mannar District and Puttalam District in Gulf of Mannar (GoM) to identify the fishing gear types that threaten most to the marine turtle population. The research was conducted using the data obtained through fishermen in selected fishing villages. The data regarding the turtles that were entangled in fishing nets were obtained from nine (09) villages *i.e.* Mahagunduwa, Sinnagunduwa, Uchchamuniya, Pookkulama, Palugahathurei, Kappalaiya, Thalawila, Erambugodalla and Alankudawa (Map 1). The data collection was started in December 2022. A data book was provided to a selected fisherman who could read and write well in each village to record the turtles that were entangled in their fishing nets. End of every month, the data were sent to the pelagikos staff by fishermen. The collected data were entered and analysed using Microsoft Excel software.

The total number of observations obtained through fishermen from December 2022 to June 2024 was 1,471 (Table 1). Table 01 presents the number of observations obtained in each year. 94% (1,387) of the total observations were recorded by fishermen in Mannar District (Table 1).

Table 1 The number of observations obtained through fishermen from 2022 to 2024

	2022	2023	2024	Total	%
Puttalam	2	810	575	1,387	94%
Mannar		49	35	84	6%
GoM	2	859	610	1,471	

2,860 individual turtles have been entangled in fishing nets during the period of December 2022 to June 2024 (Table 2). Table 2 presents the number of individual turtles caught by each District throughout this time period. 94% of the individual turtles caught in fishing nets have been obtained from Puttalam District and 6% from the Mannar District.

Table 2 The number of individual turtles observed from 2022 to 2024

	2022	2023	2024	Total	%
Puttalam	3	1552	1146	2701	94%
Mannar		87	72	159	6%
GoM	3	1639	1218	2860	

The turtle species that have been recorded in Puttalam District were olive ridley turtle (*Lepidochelys olivacea*), green turtle (*Chelonia mydas*), hawksbill turtle (*Eretmochelys imbricata*), loggerhead turtle (*Dermodochelys coriacea*) and leatherback turtle (*Caretta caretta*). Only olive ridley and green turtle have been recorded from Mannar District. All villages have observed the olive ridley turtle entangling in their fishing nets (Table 3). The other turtle species that have been entangled in fishing gears by village were green turtle, hawksbill turtle, loggerhead turtle and leatherback turtle respectively (Table 3).

Table 3 The type of turtle species entangled in fishing gears by each village

Village	Olive ridley	Green	Hawksbill	Loggerhead	Leatherback
Puttalam					
Mahagunduwa	Yes	Yes	Yes	No	No
Palugahathurei	Yes	No	Yes	No	No
Pookkulama	Yes	Yes	Yes	No	Yes
Sinnagunduwa	Yes	Yes	No	No	No
Uchchamuniya	Yes	No	No	Yes	Yes
Alankudawa	Yes	No	Yes	Yes	No
Erambugodalla	Yes	No	No		No
Kappadiya	Yes	No	Yes		No
Thalawila	Yes	Yes			
Mannar					
Kayakuli	Yes	Yes			
Mullikulam	Yes	Yes			

2,860 individual turtles that entangled in fishing nets have been recorded in Gulf of Mannar (Table 04). 79% (2,269) of the individuals were olive ridley. The highest turtle species recorded after olive ridley turtles were hawksbill (206) and green (156) respectively (Table 04).

Table 4 The number of individuals that have been entangled in fishing nets in GoM

Species	No.	%
<i>Olive ridley turtle</i>	2,269	79%
<i>Hawksbill turtle</i>	206	7%
<i>Olive ridley turtle/ Green turtle</i>	179	6%
<i>Green turtle</i>	156	5%
<i>Green turtle/Hawksbill turtle</i>	14	0%
<i>Loggerhead turtle</i>	9	0%
<i>Unidentified turtle</i>	9	0%
<i>Olive ridley turtle/Loggerhead turtle</i>	8	0%
<i>Leatherback turtle</i>	6	0%
<i>Olive ridley turtle/Hawksbill turtle</i>	4	0%
GoM	2,860	

2,206 individuals out of 2,701 in Puttalam District were olive ridley turtles which is 82% of the total (Table 5) and also there were individuals that the number hasn't identified clearly according to the species. Here, too, a number of olive ridley turtles are included (Table 5). 87 out of 159 individuals were green turtles in Mannar District (55%) (Table 5).

Table 5 The number of individuals that have been entangled in fishing nets in each district

Species	No.	% District
Puttalam	2,701	
<i>Olive ridley turtle</i>	2,206	82%
<i>Hawksbill turtle</i>	206	8%
<i>Olive ridley turtle/ Green turtle</i>	179	7%
<i>Green turtle</i>	69	3%
<i>Green turtle/Hawksbill turtle</i>	14	1%
<i>Loggerhead turtle</i>	9	0%
<i>Olive ridley turtle/Loggerhead turtle</i>	8	0%
<i>Leatherback turtle</i>	6	0%
<i>Olive ridley turtle/Hawksbill turtle</i>	4	0%
Mannar	159	
<i>Green turtle</i>	87	55%
<i>Olive ridley turtle</i>	63	40%
<i>Unidentified turtle</i>	9	6%
GoM	2,860	

According to the analysis, most threatened fishing nets for the turtles were ray nets, silver pomfret net and shark nets in Puttalam District (Table 6). The highest number of species have been entangled into ray nets, *i.e.* 1572 (58%) individuals (Table 6). 504 and 126 individuals have been entangled in silver pomfret net and shark net respectively (Table 6). 12% (321) of the total individuals (2,701) entangled in fishing nets have been died in Puttalam District. The dead individuals have been recorded from ray nets (262), silver pomfret nets (33), shark net (9) (Table 6), *i.e.* 82%, 10%, and 3% of the total dead turtles in Puttalam District. The large number of individual turtles have been died due to the entanglement in ray nets and it is 17% of the total individuals entangled in ray nets (Table 6) and 7% of turtles entangled in silver pomfret nets and 7% of turtles caught in shark nets have died (Table 6).

In Mannar District, 16% (321) of the total individuals (159) entangled in fishing nets have been die. 80% of turtle individuals, the type of fishing gear that got entangled hasn't been recorded by fishermen (Table 6) (*indicated as N/A*). According to the obtained data, the turtles have been mostly entangled in ray nets (24), *i.e.* 15% of the individuals entangled in fishing gears in Mannar District (Table 6). Only two (02) dead individuals have been recorded from ray nets (Table 6).

Table 6 The number of individuals dead and alive according to the different types of fishing nets

	Observation	No.	%	Alive			Dead		
				No.	% Net Type	% District	No.	% Net Type	% District
Puttalam	1,387	2,701		2,382		88%	321		12%
Ray Net	590	1,572	58%	1,310	83%	49%	262	17%	82%
Silver Pomfret Net	311	514	19%	481	94%	18%	33	6%	10%
Shark Net	98	126	5%	119	94%	4%	9	7%	3%
BSC Net	177	215	8%	210	98%	8%	7	3%	2%
Indian Mackerel Net	32	38	1%	35	92%	1%	3	8%	1%
Large Fish Net	14	20	1%	18	90%	1%	2	10%	1%
Fish Net	51	56	2%	54	96%	2%	2	4%	1%
Shrimp Net	9	10	0%	9	90%	0%	1	10%	0%
Barramundi Net	14	18	1%	17	94%	1%	1	6%	0%
Beach Seine	46	59	2%	56	95%	2%	1	2%	0%
Longline	30	53	2%	53	100%	2%			
Mullet Net	2	3	0%	3	100%	0%			
Queenfish Net	5	6	0%	6	100%	0%			
Sardinella Net	3	4	0%	4	100%	0%			
Tangus	1	2	0%	2	100%	0%			
Trammel Net	4	5	0%	5	100%	0%			
Mannar	84	159		129		81%	25		16%
N/A	58	127	80%	104	82%	81%	23	18%	92%
Ray Net	19	24	15%	17	71%	13%	2	8%	8%
Fish Net	1	1	1%	1	100%	1%			
Hook	4	4	3%	4	100%	3%			
Shark Net	1	1	1%	1	100%	1%			
Stake Net	1	2	1%	2	100%	2%			
GoM	1,471	2,860		2,511	88%		346	12%	

Table 7 presents the type of species that have been caught in ray nets, silver pomfret nets and shark nets in Puttalam District and in ray nests in Mannar District. This shows that all types of turtle species have been entangled in the ray nets in Puttalam District, but only green and olive ridley have been recorded in Mannar District. Olive ridley, hawksbills and green have been caught into both silver pomfret and shark nets. Apart from that leatherback has been recorded in silver pomfret net and loggerhead has been recorded in shark net.

Table 7 Types of species entangled into most threatened type of fishing nets

	Observation	No.	Alive	Dead
Puttalam				
Ray Net	590	1572	567	204
<i>Olive ridley turtle</i>	450	1206	440	155
<i>Olive ridley turtle/ Green turtle</i>	41	167	41	23
<i>Hawksbill turtle</i>	53	107	50	10
<i>Green turtle</i>	35	59	30	8
<i>Green turtle/Hawksbill turtle</i>	2	14	2	1
<i>Olive ridley turtle/Loggerhead turtle</i>	3	8	2	2
<i>Loggerhead turtle</i>	3	5	1	2
<i>Olive ridley turtle/Hawksbill turtle</i>	1	4	1	1
<i>Leatherback turtle</i>	2	2		2
Silver Pomfret Net	311	514	305	29
<i>Olive ridley turtle</i>	266	442	260	24
<i>Hawksbill turtle</i>	42	67	42	5
<i>Green turtle</i>	2	3	2	
<i>Leatherback turtle</i>	1	2	1	
Shark Net	98	126	97	7
<i>Olive ridley turtle</i>	86	110	85	6
<i>Hawksbill turtle</i>	5	7	5	
<i>Green turtle</i>	4	5	4	1
<i>Loggerhead turtle</i>	2	2	2	
<i>Olive ridley turtle/ Green turtle</i>	1	2	1	
Mannar				
Ray Net	19	24	19	19
<i>Olive ridley turtle</i>	11	16	11	11
<i>Green turtle</i>	8	8	8	8

Table 8 presents the number of individuals has caught into fishing nets according to the different mesh sizes of fishing nets. According to the analysis, large number of individual turtles have died due to the large mesh sizes *i.e.* above four and half inches (4½”) in Puttalam District. 80% of the total dead individuals (256) in Puttalam District have been died entangling in 18-inch mesh size nets (Table 8). The 7” mesh size nets responsible for the 10% of the total dead turtle individuals in Puttalam District. In Mannar District, it was not known the mesh size of the fishing nets that 92% the dead individuals entangled (indicated as N/A) (Table 8). 8% of the total dead individuals have been died due to 18” mesh size nets.

Table 8 Number of individuals entangled according to the different mesh sizes

	Observations	No.	Alive	Dead	Dead%
Puttalam	1387	2701	2382	321	
18"	578	1541	1285	256	80%
7"	312	517	484	33	10%
5"	247	301	291	12	4%
4½"	53	80	71	11	3%
3½"	46	52	50	2	1%
12"	1	3	2	1	0%
2"	6	6	5	1	0%
2½"	21	25	24	1	0%
21"	2	5	4	1	0%
5½"	3	4	3	1	0%
6"	2	3	2	1	0%
N/A	78	115	112	1	0%
10"	2	2	2		
1½"	2	3	3		
1¾"	3	4	4		
16/6"	2	3	3		
2¼"	10	10	10		
2¾"	2	2	2		
3"	1	1	1		
3¼"	5	6	6		
3¾"	1	1	1		
4"	6	10	10		
4¼"	1	1	1		
4¾"	1	1	1		
5"/2¾"	1	1	1		
8"	1	4	4		
Mannar	84	159	129	25	
N/A	62	131	108	23	92%
18"	15	20	13	2	8%
1½"	1	2	2	0	
14"	4	4	4	0	
2½"	1	1	1	0	
7"	1	1	1	0	
GoM	1471	2860	2511	346	

Table 9 presents the number of individuals has caught into nets according to the different ply of the fishing nets. Here the missing data on ply has been indicated as 'N/A'. This shows that the largest number of individual turtles have been died due to the nets with the ply of 30 (71%), 4 (9%) and 21 (7%) (Table 9) in Puttalam District. In Mannar District, it was not known the mesh size of the fishing nets that 92% the dead individuals entangled. Two (02) (8%) of the total dead individuals have been died due to the 28 ply (Table 9)

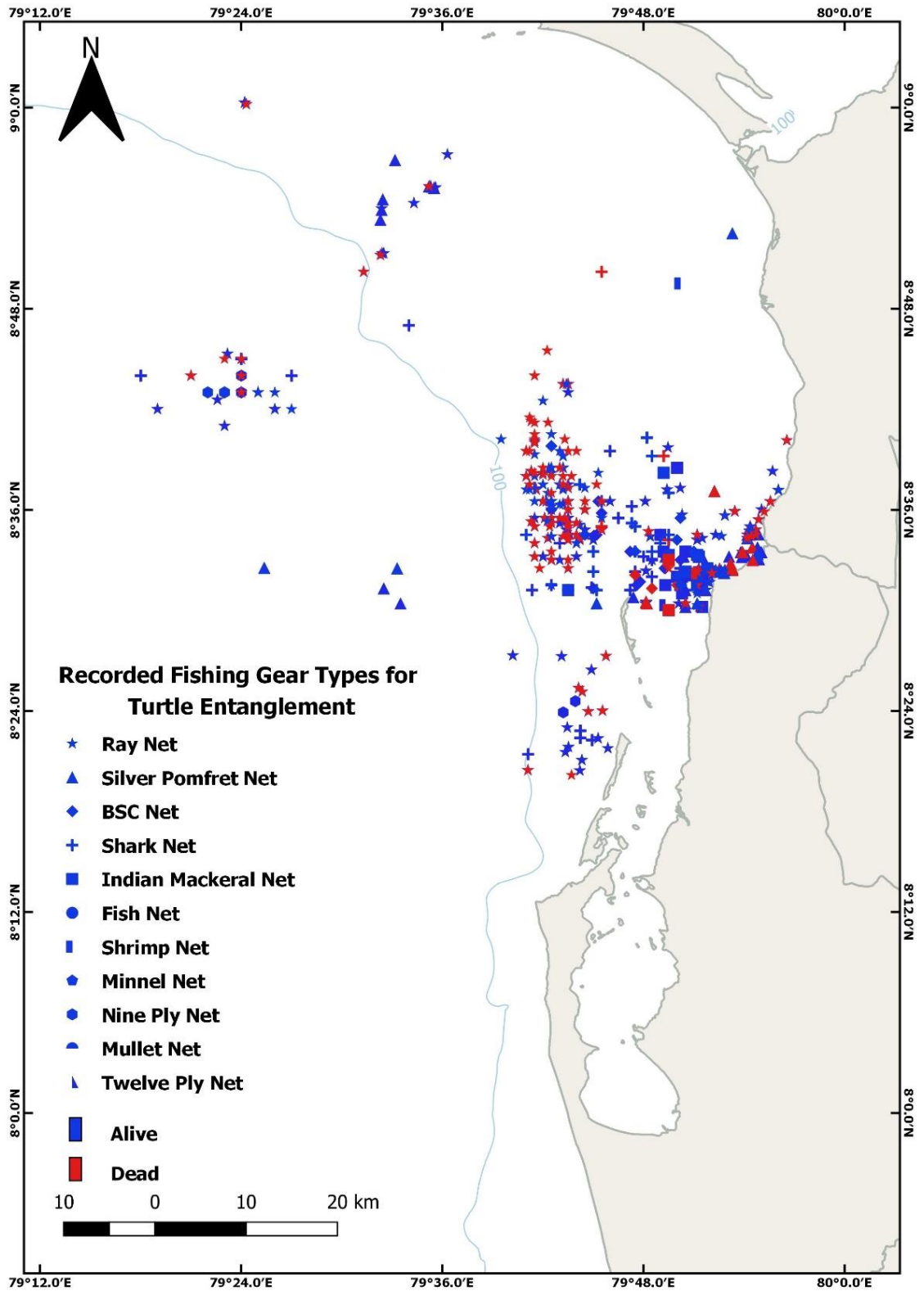
Table 9 Number of individuals entangled according to the different ply of the nets

	Observations	No.	Alive	Dead	Dead%
Puttalam	1387	2701	2382	321	
30	518	1441	1213	229	71%
4	219	398	370	28	9%
21	60	101	77	23	7%
36	92	127	118	11	3%
<i>Minnel</i>	190	227	217	10	3%
<i>Indian</i>	155	189	184	7	2%
<i>N/A</i>	89	132	124	6	2%
9	22	31	26	5	2%
1	7	8	7	1	0%
12	9	11	10	1	0%
2	6	9	9		
6	7	9	9		
7	3	4	4		
15	5	7	7		
18	4	6	6		
20	1	1	1		
Mannar	84	159	129	25	
<i>N/A</i>	124	134	111	23	92%
28	64	3	1	2	8%
21	3	1	1	0	
24	1	8	3	0	
30	3	13	13	0	
GoM	1471	2860	2511	346	

The locations of the dead and alive turtle individuals according to the different net types have been presented in Map 2. Red colour symbols indicate the dead individuals and the blue color indicates the live individuals.



Map 1 – Fishing Villages that turtle entanglement data collected



Map 1 - The locations of the dead and alive turtle individuals according to the different net types

PB

An analysis needs to be done to get information on which type of fishing gears are threat to turtles. Fishermen from Nadunthivu (Delft) are providing data on turtle entangling in their fishing gears. A data collection book was provided to a selected person in the village who could read and write well in each village to record the turtles that were entangled in their fishing nets. This person was selected after having a discussion with the Fisheries Society office bearers. End of every month, the data were sent to the pelagikos staff by fisherman. The collected data were entered and analysed using Microsoft Excel software.

The data regarding the turtles that were entangled in fishing nets were obtained from one village *i.e.* Nadunthivu in Palk Bay. The number of observations obtained through fishermen from March 2023 to June, 2024 was 124 (Table 1).

Table 1 The number of observations obtained through fishermen from March 2023 to January 2024

	2023	2024	Total
Jaffna	58	66	124
PB	58	66	124

121 individual turtles have been entangled in fishing nets during the period of March 2023 to June, 2024 (Table 2). Table 2 presents the data of individual turtles caught by each village throughout this time period.

Table 2 The number of individual turtles observed from March 2023 to 2024

	2023	2024	Total
Jaffna	126	98	224
PB	126	98	224

The turtle species that have been recorded were Olive ridley turtle, green turtle, loggerhead turtle and leatherback turtle. 111 individuals out of 224 were green turtles which is 50% of the total (Table 3). There were individuals, that the species type have not been identified by the fishermen.

Table 3 The number of individuals that have been entangled in different types of fishing nets

Species	No.	%
Jaffna	224	
<i>Green turtle</i>	111	50%
<i>Olive ridley turtle</i>	44	20%
<i>Loggerhead turtle</i>	33	15%
<i>Leatherback turtle</i>	29	13%
<i>Unidentified turtle</i>	7	3%
PB	224	

According to the analysis, the main types of recorded fishing gears that turtles have been entangles were trawling nets and fish drifting nets in Nedunthivu (Delft). The largest number of species have been entangled into trawling nets, *i.e.* 64 individuals and 33 turtle individuals in fish nets (Table 4). 23 and 10 number of individuals have been entangled in BSC net and BSC drifting net respectively (Table 4).

The dead individuals have been recorded from trawling net was 32% of the total dead individuals recorded in Jaffna District. It was 26% for fish nets, 15% for BSC Nets and 8% for BSC drifting nets (Table 4). 84% of the total individuals entangled in trawling nets have been died and it was 73%, 63% and 82% respectively for fish net, BSC net and BSC drifting net (Table 5). Trawl nets are an internationally recognised as a threat to turtles. Trawl net fishing is illegal in Sri Lanka. 100% of the turtles entangled in BSC drifting nets have been died.

Table 4 The number of individuals dead and alive according to the different types of fishing nets

	Observation	No.	%	Alive			Dead		
				No.	% Net Type	% District	No.	% Net Type	% District
Jaffna	124	224		55		25%	167		75%
<i>Bottom Trawling Net</i>	34	64	29%	10	16%	4%	54	84%	32%
<i>Fish Net</i>	33	59	26%	16	27%	7%	43	73%	26%
<i>BSC Net</i>	23	40	18%	15	38%	7%	25	63%	15%
<i>BSC Drifting Net</i>	10	17	8%	3	18%	1%	14	82%	8%
<i>Ray Net</i>	9	17	8%	4	24%	2%	13	76%	8%
<i>Queenfish Net</i>	7	13	6%	5	38%	2%	8	62%	5%
<i>Stake Net</i>	4	8	4%	1	13%	0%	7	88%	4%
<i>Deep Water Stake Net</i>	1	2	1%				2	100%	1%
<i>Trammel Net</i>	3	4	2%	1	25%		1	25%	1%
PB	124	224		55	25%		167	75%	

Table 5 presents the type of species that have been caught bottom trawling net, fish net, BSC net, BSC drifting net, ray net and queenfish net. Four different types of identified turtle species have been entangled in bottom set trawling nets and fish nets. Those are green, leatherback, loggerhead and olive ridley. Green and leatherback have been caught in BSC nets and BSC drifting net. Further, olive ridley turtles in BSC net and loggerhead turtles in BSC drifting net.

Table 5 Types of species entangled into different types of fishing gears

Observation	Observation	No.	Alive	Dead
Bottom Trawling Net	25	34	64	10
<i>Green turtle</i>	9	15	35	7
<i>Leatherback turtle</i>	7	8	13	1
<i>Loggerhead turtle</i>	5	6	9	1
<i>Olive ridley turtle</i>	3	4	6	1
<i>Unidentified turtle</i>	1	1	1	
Fish Net	20	33	59	13
<i>Green turtle</i>	13	20	38	7
<i>Leatherback turtle</i>	2	2	3	
<i>Loggerhead turtle</i>	3	6	11	3
<i>Olive ridley turtle</i>	2	5	7	3
BSC Net	13	23	40	11
<i>Green turtle</i>	9	12	21	4
<i>Leatherback turtle</i>		1	1	1
<i>Olive ridley turtle</i>	4	10	18	6
BSC Drifting Net	7	10	17	3
<i>Green turtle</i>	2	3	4	1
<i>Leatherback turtle</i>	2	2	5	
<i>Loggerhead turtle</i>	3	5	8	2
Ray Net	6	9	17	3
<i>Green turtle</i>	1	1	2	
<i>Leatherback turtle</i>	2	2	4	
<i>Loggerhead turtle</i>	1	1	2	
<i>Olive ridley turtle</i>	1	4	6	3
<i>Unidentified turtle</i>	1	1	3	
Queenfish Net	5	7	13	2
<i>Green turtle</i>	3	4	6	1
<i>Loggerhead turtle</i>	1	1	3	
<i>Olive ridley turtle</i>	1	2	4	1

Table 6 presents the number of individuals has caught into fishing nets according to the different mesh sizes of fishing nets. The missing data on ply has been indicated as 'N/A'. 23% of the total dead individuals have been died entangling in 5-inch mesh size nets and 8% of the total dead individuals have been died due to 4½-inch mesh size (Table 6).

Table 6 Number of individuals entangled according to the different mesh sizes

	Observations	No.	Alive	Dead	Dead %
Jaffna	124	224	56	167	
<i>N/A</i>	78	144	39	105	63%
5"	16	31	5	26	16%
4½"	7	14		14	8%
4"	6	10	3	7	4%
4¾"	3	4		4	2%
7"	4	9	5	4	2%
7½"	3	4		4	2%
3"	2	2		2	1%
5½"	1	1		1	1%
2½"	1	1	1		
3"	1	1	1		
3½"	1	2	1		
7¾"	1	1	1		
PB	124	224	56	167	

Table 9 presents the number of individuals has caught into nets according to the different ply of the fishing nets. Here the missing data on ply has been indicated as 'N/A'. The available data available only for the 21 ply. 5% of the total dead turtles have been died due to this ply (Table 70) but 62% of the total individuals (13) entangled in to 21 ply net have been died.

Table 7 Number of individuals entangled according to the different ply of the nets

	Observations	No.	Alive	Dead	Dead %
Jaffna	124	224	56	167	
<i>N/A</i>	117	211	51	159	95%
21	7	13	5	8	5%
PB	13	224	56	167	