FIELD TESTS TO EVALUATE THE TARGET CATCH AND BYCATCH REDUCTION EFFECTIVENESS OF SURFACE AND MID-WATER DRIFT GILLNETS IN TRINIDAD

JEFF GEARHART
SCOTT A. ECKERT

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This project is dedicated to the memory of Parks Lewis, a consultant with the North Carolina Division of Marine Fisheries, who was tragically killed shortly after the project was initiated. Traveling to Trinidad and interacting with the people there made a great impression on him, and he on them. He noted it as one of the highlights of his career. His contributions to this and many other projects were vital to their successes.

Parks was a great friend and colleague, and he will be sorely missed by many.

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Jeff Gearhart
Harvesting Systems Team
NOAA Fisheries

Scott A. Eckert, Ph.D.
Director of Science,
WIDECAST

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INTRODUCTION

The single largest threat to the 'Critically Endangered' (cf. IUCN RedList) leatherback sea turtle (*Dermochelys coriacea*) in Trinidad, and arguably throughout the Atlantic Ocean, is the accidental capture of the species in coastal gillnet fisheries. In Trinidad, the entanglement problem also places a severe strain on the ability of fishers to operate economically, to the point where many are unable to fish during the leatherback nesting season. Published estimates suggest that as many as 3,000 entanglements occur each year in Trinidad, and that perhaps 35% of those entanglements result in death to the turtle (Fournillier and Eckert 1998; Eckert and Lien 1999; Lee Lum, 2003, Gass, 2005, Lee Lum, 2006).

In response to this crisis, the U.S. National Marine Fisheries Service, World Wildlife Fund, CGMK Foundation, the Wider Caribbean Sea Turtle Conservation Network (WIDECAST), and the Government of Trinidad and Tobago provided funding toward a National Consultation (16-18 February 2005) co-hosted by WIDECAST and the Ministry of Agriculture, Land and Marine Resources of the Government of the Republic of Trinidad and Tobago. Invited participants included stakeholders from affected fishing communities in Trinidad and Tobago; Government representatives; local non-government conservation organizations (NGOs); and a small number of international fishing and conservation experts.

The objective of the National Consultation was to develop a plan to minimize the interaction of leatherback turtles with the fishery *without* reducing the ability of fishers to support themselves.

The output of the National Consultation was a consensus workplan (Eckert and Eckert, 2005) describing a series of investigations to be undertaken in bycatch reduction, with the aim that one or more of the carefully tested reduction methods could be adopted by the fishery. Among the reduction methods favored by the fishers were the following: the evaluation of new bait types (artificial, dead, and non-traditional) to enhance hook and line fishing as a replacement for nets, the use of new technologies or gear modifications (such as power take-up reels) or alternate net materials, Fish Aggregating Devices (FAD), modifications in net fishing methods (such as adjusting the depth of the net to avoid surface swimming turtles), means to repel turtles from nets (such as the use of sonic pingers which are effective on small cetaceans), and the adding of shark silhouettes to the nets. New regulatory regimes were also considered by participants; specifically the idea that net-fishing might be banned from 1 March to 31 May within a region extending from the southern end of Fishing Pond Beach to the western end of Paria Beach and extending 8 km offshore.

From July to September 2006, the first series of field trials were initiated in partnership with local fishers, fisheries officers, and NGOs. Major funding was provided by the U.S. National Marine Fisheries Service (see Eckert et al., 2007).

GOAL AND OBJECTIVES

The goal was to evaluate whether a modified mid-water-set gillnet could be deployed and fished in Trinidad waters without a reduction in target catch. Specific objectives were to:

- Conduct an experiment testing conventional surface set gillnets and modified mid-water set gillnets to evaluate bycatch of several species groups; and
- Compare the catch rates of target species of finfish for each net type.

METHODS

Fifty-six fishing trips were conducted between 22 July and 15 September 2006 on traditional fishing grounds along the Northern and Eastern coasts of Trinidad, West Indies. Two commercial vessels from the ports of Balandra and Matelot (Figure 1) were contracted to set and retrieve nets daily.

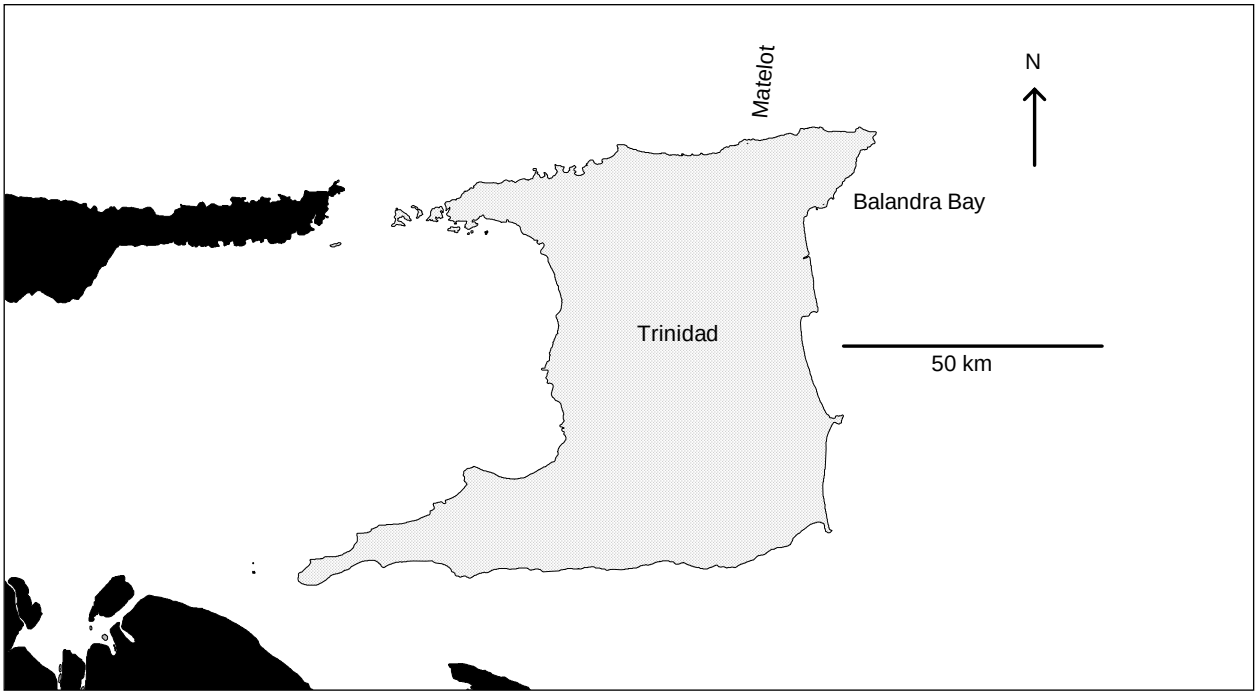

Figure 1. Fisheries experiments were carried out from 2 fishing depots, Matelot on the north coast of Trinidad and Balandra Bay on the east coast.

An experimental mid-water drift gillnet was compared to a traditional surface drift gillnet, using a matched pair experimental design. Traditionally set standard surface drift gillnets served as controls, while the experimental nets consisted of identical nets suspended approximately 15 feet below the surface (Table 1). A matched pair experimental design was used to facilitate comparisons between nets. Approximately 125 yards of each net type were fished adjacent to each other during each fishing trip. Nets were connected and were set and fished in the same order during each fishing trip. Nets were set in a traditional manner just before dusk, and retrieved several hours later. Traditional drift net methods were used with the nets attached to the vessel during the entire soak time.

Observers were contracted from the local sea turtle and environmental conservation groups: PAWI provided observers for Matelot trips, while Nature Seekers provided observers in Balandra. Observers were present during each trip and collected location, catch and bycatch information for each net type within each haul.

Catch rates for both target and bycatch species were calculated as CPUE (catch/125 yards of gillnet/ hour soaked). Pair-wise comparisons of CPUEs for each species for control and experimental nets were conducted using paired t-tests to detect significant differences.

Table 1. Summary of net characteristics for the two types of gillnets tested in the northeastern Trinidad ports of Balandra and Matelot during the 2006 fishing season.

Net Characteristics	Control	Experimental
Webbing		
Mesh size (inches)	4 ¼	4 ¼
Material	Nylon	Nylon
Twine diameter	# 15	# 15
Mesh depth	100	100
Floatline	3/8 in. poly with one float/fathom	3/8 in. poly with one float every three fathoms
Leadline	3/8 in. poly with one 8oz. lead every three fathoms	3/8 in. poly with one 8oz. lead every three fathoms
Fishing Depth	Surface to ~30 ft.	Suspended 15ft. to 45ft.
Overall Length per net (yards)	125	125

RESULTS

A total of 30 matched pairs were collected from Matelot, while 26 matched pairs were collected from Balandra. Because of their high value, Serra Spanish mackerel (*Scomberomorus brasiliensis*) and King mackerel (*S. cavalla*) are the primary target species for this fishery, but nearly all other species caught are marketed.

In Matelot, five large stingrays totaling approximately 850 lbs were caught in the control net during two separate trips; these were removed from the data when conducting species group analysis. Also, only weights were collected in Balandra, while both counts and weights for each species were collected in Matelot.

When compared to the control net, total catch in the experimental net was reduced by 36% in Matelot and 22.7% in Balandra (Table 2). Target catch was significantly reduced in both Matelot (76.2%) and Balandra (70.4%), while other species were only reduced by 5.3% in Matelot but increased by 27.9% in Balandra (Table 2).

Table 2. Total catch, target catch (Serra Spanish and King mackerel), and catch of other species by port for control and experimental nets used during testing in northeastern Trinidad during the 2006 fishing season. %Diff = Percent difference ((Exp/Con-1)*100); p values are the results of paired t-tests by catch category with bold numbers indicating significant differences ($P < 0.05$).

		Total Catch				Target (Mackerel)				Other Species			
Port	**N**	**Con**	**Exp**	**%Diff**	**p value**	**Con**	**Exp**	**%Diff**	**p value**	**Con**	**Exp**	**%Diff**	**p value**
Matelot	30	275.5	176.3	-36.0%	0.2228	119.5	28.5	-76.2%	**0.0194**	156.0	147.8	-5.3%	0.9185
Balandra	26	348.4	269.3	-22.7%	**0.0477**	179.28	53.0	-70.4%	**0.0010**	169.1	216.25	27.9%	0.1573

MATELOT

Total catch for the control net was 1,125.5 lbs, while the experimental net only caught 176.25 lbs (Tables 3 and 4). However, this discrepancy is inflated by two large stingray catches in the control net that were not experienced in the experimental net. If these are removed for the dataset (850 lbs), then the total catch difference between nets is 99.25 lbs. Species composition also differed between nets with the control net catching a wide mix of species but favoring pelagics, such as mackerel and Scaled sardines (Table 3). The experimental net caught its share of pelagics, such as Serra Spanish mackerel, but favored more demersal and benthic species, such as sharks and Gafftopsail catfish.

Table 3. Relative biomass (lbs) and number of individuals collected by a standard 125 yd drift gillnet during 30 trips in northeastern Trinidad from the port of Matelot during the 2006 fishing season. All species are ranked by relative biomass (% weight).

Common Name	Scientific Name	Biomass (lbs)	% Biomass	Number	% Number
Stingray	*Dasyatis spp*	850.00	75.52	5	2.96
King mackerel	*Scomberomorus cavalla*	72.00	6.40	19	11.24
Shark	*Carcharhinus spp*	60.00	5.33	28	16.57
Scaled sardine	*Harengula jaguana*	56.00	4.98	75	44.38
Serra Spanish mackerel	*Scomberomorus brasiliensis*	47.50	4.22	18	10.65
Bonito	*Euthynnus alletteratus*	19.00	1.69	5	2.96
Ladyfish	*Elops saurus*	7.50	0.67	2	1.18
Gafftopsail catfish	*Bagre marinus*	5.50	0.49	4	2.37
Atlantic bumper	*Chloroscombrus chrysurus*	4.50	0.40	9	5.33
Florida pompano	*Trachinotus carolinus*	1.50	0.13	1	0.59
Jamaican weakfish	*Cynoscion jamaicensis*	1.00	0.09	2	1.18
Lookdown	*Selene vomer*	1.00	0.09	1	0.59
	Totals	**1,125.50**		**169**	

Table 4. Relative biomass (lbs) and number of individuals collected by an experimental 125 yd suspended drift gillnet, during 30 trips in northeastern Trinidad from the port of Matelot during the 2006 fishing season. All species are ranked by relative biomass (% weight).

Common Name	Scientific Name	Biomass (lbs)	% Biomass	Number	% Number
Shark	*Carcharhinus spp*	74.00	41.99	48	42.48
Gafftopsail catfish	*Bagre marinus*	44.50	25.25	14	12.39
Serra Spanish mackerel	*Scomberomorus brasiliensis*	23.50	13.33	11	9.73
Atlantic bumper	*Chloroscombrus chrysurus*	13.50	7.66	27	23.89
Crevalle jack	*Caranx hippos*	5.25	2.98	3	2.65
King mackerel	*Scomberomorus cavalla*	5.00	2.84	1	0.88
Ladyfish	*Elops saurus*	4.00	2.27	1	0.88
Scaled sardine	*Harengula jaguana*	3.00	1.70	6	5.31
Jamaican weakfish	*Cynoscion jamaicensis*	2.00	1.13	1	0.88
Florida pompano	*Trachinotus carolinus*	1.50	0.85	1	0.88
	Totals	**176.25**		**113**	

When catch rates are compared by species, the experimental net caught significantly less King mackerel (-93.3%) and bonito (-100%) when compared to the control net (Table 5). Catches of Serra Spanish mackerel, the second most valuable species, were also reduced in the experimental net (-55%) but no significant difference was detected. In contrast, more Gafftopsail catfish were caught by the experimental net.

Table 5. CPUEs (Catch/125 yds/1 hr soak) by species and net type captured during 30 trips in northeastern Trinidad from the port of Matelot during the 2006 fishing season. %Diff = Percent difference ((Exp/Con-1)*100); p values are the results of paired t-tests by catch category with bold numbers indicating significant differences (P < 0.10).

	Weight (lbs)				Number			
Species	**Con**	**Exp**	**%Diff**	**p value**	**Con**	**Exp**	**%Diff**	**p value**
Stingray	3.24	0.00	-100.0%	**0.0083**	0.02	0.00	-100.0%	0.1630
King mackerel	0.28	0.02	-93.3%	0.2579	0.07	0.00	-95.0%	**0.0086**
Shark	0.22	0.29	32.0%	0.6548	0.10	0.20	88.7%	0.3161
Scaled sardine	0.21	0.01	-94.8%	0.3007	0.28	0.02	-92.2%	0.2908
Serra Spanish mackerel	0.19	0.09	-55.0%	0.2236	0.07	0.04	-45.6%	0.3332
Bonito	0.07	0.00	-100.0%	**0.0869**	0.02	0.00	-100.0%	**0.0944**
Ladyfish	0.03	0.02	-44.9%	0.1938	0.01	0.00	-47.6%	0.3278
Gafftopsail catfish	0.02	0.18	691.0%	0.1023	0.02	0.06	254.6%	0.2134
Atlantic bumper	0.02	0.05	172.3%	0.2681	0.04	0.10	172.3%	0.2681
Florida pompano	0.01	0.01	0.0%		0.00	0.00	0.0%	
Jamaican weakfish	0.00	0.01	100.8%	0.3256	0.01	0.00	-49.8%	0.3256
Lookdown	0.00	0.00	-100.0%	0.3256	0.00	0.00	-100.0%	0.3256
Crevalle jack	0.00	0.02		0.2216	0.00	0.01		0.1892

BALANDRA

Total catch for the control net was 348.38 lbs, while the experimental net only caught 269.25 lbs (Tables 6 and 7). Species composition also differed between nets with the control net catching fewer species than the experimental net, but favoring pelagics such as Serra Spanish mackerel, Crevalle jack, leatherjacket, and bonito (Table 6). The experimental net caught a larger mix of species but caught fewer pelagics and more demersal and benthic species, such as Gafftopsail catfish, sharks and whitemouth croaker (Table 7).

Comparisons of catch rates by species reveal that the experimental net caught significantly fewer Serra Spanish mackerel (-72.3%), which were one of the most valuable and primary target species (Table 8). In addition, the experimental net caught fewer bonito (-31.4%) and Crevalle jack (-14.4%) when compared to the control net (Table 8). In contrast, the experimental net caught significantly more Gafftopsail catfish and Whitemouth croakers than the control net (Table 8).

Table 6. Relative biomass (lbs) collected by a standard 125 yd drift gillnet during 26 trips in northeastern Trinidad from the port of Balandra during the 2006 fishing season. All species are ranked by relative biomass (% weight).

Common Name	**Scientific Name**	**Biomass (lbs)**	**% Biomass**
Serra Spanish mackerel	*Scomberomorus brasiliensis*	179.28	51.46
Crevalle jack	*Caranx hippos*	44.60	12.80
Leatherjacket	*Oligoplites saurus*	39.00	11.19
Bonito	*Euthynnus alletteratus*	32.75	9.40
Shark	*Carcharhinus spp*	26.00	7.46
Gafftopsail catfish	*Bagre marinus*	10.75	3.09
Florida pompano	*Trachinotus carolinus*	10.00	2.87
Ladyfish	*Elops saurus*	6.00	1.72
	Total	**348.38**	

Table 7. Relative biomass (lbs) collected by an experimental 125 yd suspended drift gillnet, during 26 trips in northeastern Trinidad from the port of Balandra during the 2006 fishing season. All species are ranked by relative biomass (% weight).

Common Name	Scientific Name	Biomass (lbs)	% Biomass
Leatherjacket	*Oligoplites saurus*	54.25	20.15
Serra Spanish mackerel	*Scomberomorus brasiliensis*	50.75	18.85
Crevalle jack	*Caranx hippos*	44.00	16.34
Gafftopsail catfish	*Bagre marinus*	40.75	15.13
Shark	*Carcharhinus spp*	23.75	8.82
Whitemouth croaker	*Micropogonias furnieri*	23.25	8.64
Bonito	*Euthynnus alletteratus*	19.00	7.06
Swordspine snook	*Centropomus ensiferus*	3.50	1.30
Ladyfish	*Elops saurus*	2.75	1.02
King mackerel	*Scomberomorus cavalla*	2.25	0.84
Anchor tilefish	*Caulolatilus intermedius*	2.00	0.74
Cobia	*Rachycentron canadum*	2.00	0.74
Florida pompano	*Trachinotus carolinus*	1.00	0.37
	Total	**269.25**	

Table 8. CPUEs (Catch/125 yds/1 hr soak) by species and net type (control and experimental) captured during 26 trips in northeastern Trinidad from the port of Balandra during the 2006 fishing season. %Diff = Percent difference ((Exp/Con-1)*100); p values are the results of paired t-tests by catch category with bold numbers indicating significant differences ($P < 0.10$).

	Weight (lbs)			
Species	Con	Exp	%Diff	p value
Serra Spanish mackerel	1.29	0.36	-72.3%	**0.0009**
Crevalle jack	0.37	0.32	-14.4%	0.7509
Leatherjacket	0.31	0.46	48.8%	0.4787
Bonito	0.24	0.16	-31.4%	0.6280
Shark	0.20	0.18	-9.6%	0.8626
Gafftopsail catfish	0.09	0.29	209.6%	**0.0944**
Florida pompano	0.09	0.01	-92.1%	0.2354
Ladyfish	0.05	0.02	-59.1%	0.4812
Anchor tilefish	0.00	0.02		0.3269
Cobia	0.00	0.01		0.3269
King mackerel	0.00	0.01		0.3269
Swordspine snook	0.00	0.02		0.3269
Whitemouth croaker	0.00	0.17		**0.0180**

DISCUSSION

Although the experimental net did not catch the target species as well as the control net, some interesting trends were observed. First, most sets were conducted in 60 ft of water and each net had an approximate fishing depth of 30 ft. The experimental net was suspended 15 ft below the surface, which caused it to fish the portion of the water column equivalent to the lower half of the control net and a portion of the water column 15 ft below the control net. As expected, this resulted in different species compositions between nets, with the control net favoring

pelagics and the experimental net favoring demersal and benthic species (Figure 2). However the experimental net did maintain some of the desired mackerel catch, indicating that the bulk of the mackerel catch was occurring in the upper 15 ft of the water column. *This suggests that most of the target catch in the control net is captured in the upper half of the net and that a net that fishes half as deep as the control net could effectively catch as well as a traditional net.*

Reducing the fishing depth or "profile" of the net to a level that targets the most productive portion of the water column, the upper 10 to 15 feet, could reduce gear costs and maximize target catch, while reducing unwanted bycatch of lower value finfish species. Discussions with a local net maker support this theory indicating that most of the mackerel catch occurs in the upper half of their nets (D. Joseph, pers. comm. 2006).

One of the primary objectives of the bycatch reduction program is to reduce sea turtle captures, while at the same time improving economic performance of Trinidad's coastal fisheries. Our results point to a possible solution that should be further evaluated. As noted previously, using a net that is half the depth of a traditional net and fished at the surface should preferentially catch high value species, but at nearly half the cost of materials due to the smaller quantity of net needed. Also, fishermen may be able to handle longer nets and sustain larger catches, because one of the most significant limitations faced with net fishing is how much net can be managed from the relatively small vessels used in the fishery.

Longer but narrower nets facilitate improve efficiency for the same total net soaked, and using such nets may also provide a reduction in sea turtle capture rates. Nets that are half the depth tend to be stiffer – with less billowing, a factor that may reduce turtle entanglement. Turtles tend to bounce off stiffer nets, something that Caribbean turtle fishermen have long known. Several studies in North Carolina's flounder gillnet fishery found that low profile nets significantly reduce the incidence of sea turtle entanglements when compared to traditional gillnets that contained twice as much webbing (Gearhart, 2002; Gearhart and Price 2003; Price and Brown 2005). Thus the next step in our investigations should be an evaluation of half-depth nets tested during the turtle nesting season in April or May.

CONCLUSIONS

This project was very successful in structuring a program where fishermen, turtle management groups and other stakeholders in Trinidad work together to develop and test methods to reduce bycatch of leatherbacks in coastal gillnets. This first experiment showed that setting nets 15 ft below the surface reduced catch of high value target species (Serra Spanish and King mackerel), though due to changes in the composition of the total catch toward more demersal and benthic species meant that total fish catch was only slightly lower. Our results suggest that most of the target species are probably caught in the top 15 ft of water and provides us with a new direction for testing. We propose that in 2007, nets be tested with fishing at half the depth, thus fishing vertically where there is the highest probability of target species being caught. This method also has the potential to reduce turtle capture because such nets are not as entangling, and because they are fishing a smaller part of the water column.

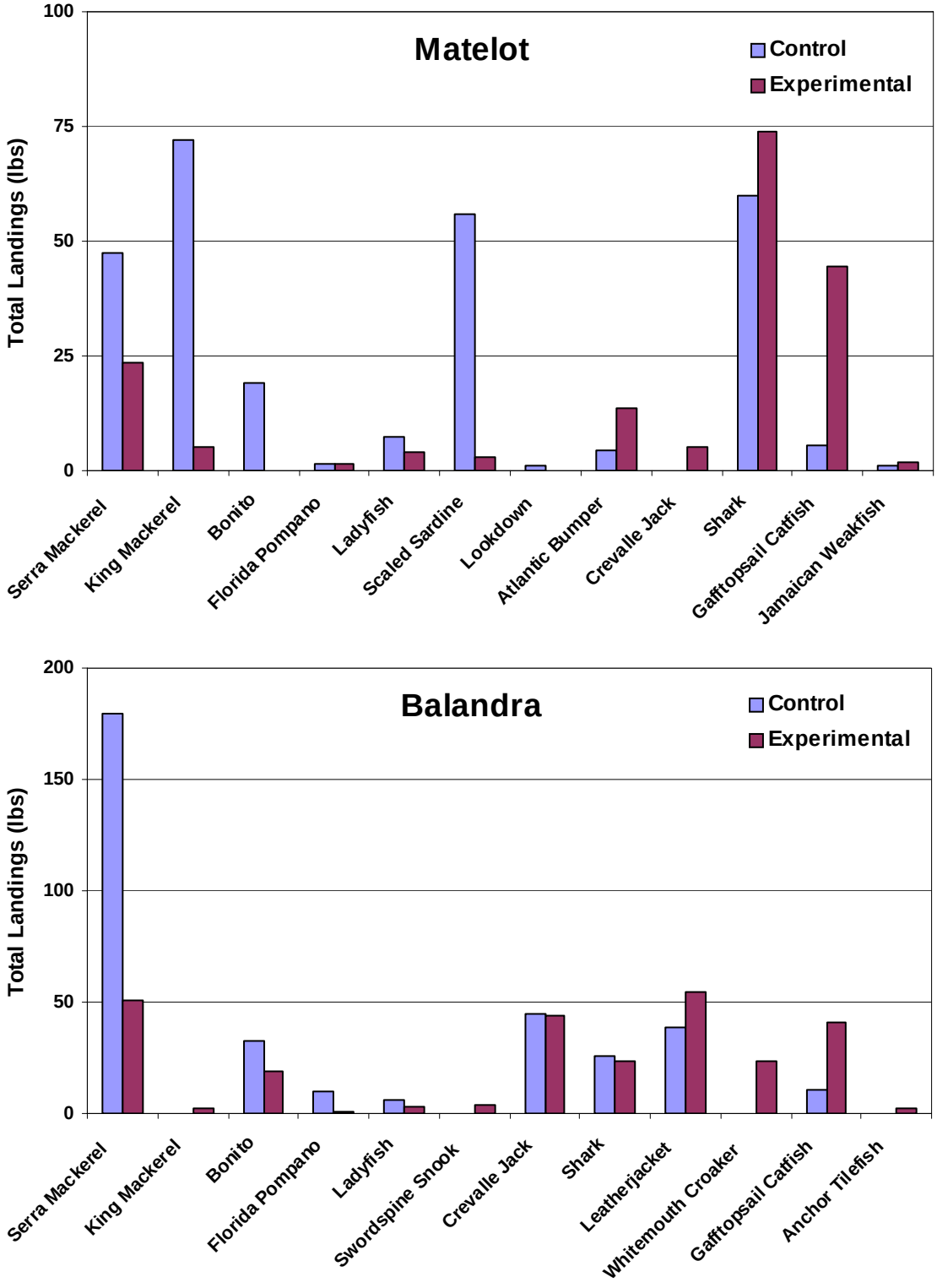

Figure 2. Total catch (lbs) by species and net type for fish collected during 30 trips from Matelot and 26 trips from Balandra in northeastern Trinidad, during the 2006 fishing season. Species are listed left to right by lifestyle, pelagic to benthic.

ACKNOWLEDGEMENTS

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PRINCIPAL INVESTIGATORS

Scott A. Eckert, Ph.D.
Director of Science
WIDECAST
135 Duke Marine Lab Road
Beaufort, North Carolina
28516 USA
seckert@widecast.org

Jeff Gearhart
Harvesting Systems Team
NOAA Fisheries
202 Delmas Ave
Pascagoula, Mississippi
39567 USA
Jeff.Gearhart@noaa.gov

APPENDIX 1

Balandra

Results of control and experimental drift gillnet sets 24 July – 31 August, 2006.

Date	Experimental or Control	Time Set	Set Lat	Set Lon	Time Retrieve	Retrieve Lat	Retrieve Lon	Species	Total Weight (lbs)	Sample Count	Sample Weight (lbs)	Remarks
24/7/06	Control							Carite	10.03	5		No
24/7/06	Control							Cavali	1.54	1		
24/7/06	Experimental	17:42	10 39.418	60 56.668	0:05	10 41.046	60 56.547	Cavali	7.5	1		
25/7/06	Control	17:20	10 41.053	60 58.946	21:40	10 41.793	60 59.050	Cavali	3.31			No
26/7/06	Control							Shark	8			Yes
26/7/06	Control							Cat fish	2.5			
26/7/06	Experimental	17:06	10 39.342	60 56.876	22:27	10 42.745	60 55.790	Cavali	11			
26/7/06	Experimental	17:06	10 39.342	60 56.876	22:27	10 42.745	60 55.790	Zelwan	1			
27/7/06	Control	17:24	10 42.304	60 58.452	22:38	10 45.117	60 56.740	Bonito	4.75			No
27/7/06	Control	17:24	10 42.304	60 58.452	22:38	10 45.117	60 56.740	Carite	3.5			
27/7/06	Experimental							Sapatea	6.25			
30/7/06	Control	18:05	10 36.739	60 57.456	22:45	10 42.897	60 59.165	Carite	12			No
30/7/06	Control	18:05	10 36.739	60 57.456	22:45	10 42.897	60 59.165	Shark	8			
30/7/06	Control	18:05	10 36.739	60 57.456	22:45	10 42.897	60 59.165	Cavali	5			
30/7/06	Experimental							Cavali	6			
30/7/06	Experimental							Shark	10			
30/7/06	Experimental							Cat fish	3			
31/7/06	Control	18:10	10 39.997	61 01.016	23:29	10 39.333	61 01.166	Carite	14.25			No
31/7/06	Control	18:10	10 39.997	61 01.016	23:29	10 39.333	61 01.166	Banan	3			
31/7/06	Control	18:10	10 39.997	61 01.016	23:29	10 39.333	61 01.166	Sapatea	1.5			
1/8/06	Control	17:35	10 40.120	61 00.368	23:48	10 40.073	61 00.628	Carite	21			No
1/8/06	Control	17:35	10 40.120	61 00.368	23:48	10 40.073	61 00.628	Cat fish	1.25			

1/8/06	Experimental							Carite	6.25			
1/8/06	Experimental							Shark	6.75			
1/8/06	Experimental							Racando	1.5			
2/8/06	Control	17:34	10 39.830	61 00.242	22:48	10 38.899	61 00.536	Carite	13			No
2/8/06	Control	17:34	10 39.830	61 00.242	22:48	10 38.899	61 00.536	Shark	3			
3/8/06	Control	17:46	10 41.112	60 59.800	22:31	10 40.074	61 00.847	Carite	8			No
3/8/06	Control	17:46	10 41.112	60 59.800	22:31	10 40.074	61 00.847	Banan	3			
3/8/06	Control	17:46	10 41.112	60 59.800	22:31	10 40.074	61 00.847	Cat fish	3			
5/8/06	Control	17:49	10 41.292	61 00.718	23:25	10 40.926	61 01.640	Carite	12			
5/8/06	Experimental							Brochea	3.5			
5/8/06	Experimental							Racando	2.25			
5/8/06	Experimental							Cat fish	9			
7/8/06	Control	17:34	10 41.510	60 59.039	21:18	10 42.285	60 59.315	None	None	None	None	No
7/8/06	Experimental							None	None	None	None	
8/8/06	Control	18:13	10 40.063	61 00.902	22:34	10 40.411	61 00.464	Carite	9.75			
8/8/06	Experimental							None	None	None	None	
9/8/06	Control	17:20	10 41.306	60 53.641	22:40	10 41.461	60 54.548	Carite	9			No
9/8/06	Control	17:20	10 41.306	60 53.641	22:40	10 41.461	60 54.548	Shark	7			
9/8/06	Experimental							Racando	4			
9/8/06	Experimental							Cat fish	1.75			
9/8/06	Experimental							Cavali	7			
10/8/06	Control	17:28	10 41.163	60 58.623	22:46	10 42.413	60 58.433	Carite	4.75			No
10/8/06	Control	17:28	10 41.163	60 58.623	22:46	10 42.413	60 58.433	Sapatea	6			
10/8/06	Experimental							Cavali	4.75			
10/8/06	Experimental							Cat fish	6.5			
13/8/06	Control	17:45	10 40.845	61 00.633	22:50	10 41.222	61 00.407	Carite	8			No
13/8/06	Control	17:45	10 40.845	61 00.633	22:50	10 41.222	61 00.407	Cavali	4			
13/8/06	Control	17:45	10 40.845	61 00.633	22:50	10 41.222	61 00.407	Sapatea	5			
13/8/06	Experimental							Cat fish	5			
13/8/06	Experimental							Cro cro	2			

13/8/06	Experimental							Shark	7			
14/8/06	Control	17:10	10 38.803	61 01.362	23:30	10 39.402	61 01.639	Carite	13			No
14/8/06	Experimental							Carite	17.75			
14/8/06	Experimental							Cat fish	2.5			
14/8/06	Experimental							Racando	3.75			
15/8/06	Control	17:05	10 40.057	61 00.164	22:28	10 39.327	61 00.394	Carite	3			
15/8/06	Control	17:05	10 40.057	61 00.164	22:28	10 39.327	61 00.394	Sapatea	4			
15/8/06	Experimental							Carite	2.5			
15/8/06	Experimental							Codfish	2			
15/8/06	Experimental							Cat fish	1.5			
25/8/06	Control	17:13	10 40.211	60 55.379	22:38	10 40.462	60 56.158	Carite	4			No
25/8/06	Control	17:13	10 40.211	60 55.379	22:38	10 40.462	60 56.158	Bonito	9			
25/8/06	Experimental							Cavali	2			
25/8/06	Experimental							Cat fish	2.5			
26/8/06	Control	17:33	10 40.318	60 55.608	23:10	10 40.158	60 56.760	Bonito	11.75			No
26/8/06	Control							Cavali	1.5			
26/8/06	Experimental							Carite	3			
26/8/06	Experimental							Bannan	2.75			
27/8/06	Control	17:14	10 39.381	60 56.245	22:39	10 42.287	60 58.644	Carite	5.75			No
27/8/06	Control	17:14	10 39.381	60 56.245	22:39	10 42.287	60 58.644	Bonito	4			
27/8/06	Experimental							Crocro	3.75			
27/8/06	Experimental							Cat fish	4			
28/8/06	Control	7:40	10 41.419	60 59.198	11:10	10 42.723	60.59.312	Cavali	7			No
28/8/06	Control	7:40	10 41.419	60 59.198	11:10	10 42.723	60.59.312	Cat fish	4			
28/8/06	Experimental							Bonito	5			
28/8/06	Experimental							Sapatea	13			
28/8/06	Control	17:39	10 42.299	60 57.902	21:50	10 42.381	60 58.463	Bonito	3.25			No
28/8/06	Control	17:39	10 42.299	60 57.902	21:50	10 42.381	60 58.463	Zelwan	3			
28/8/06	Control	17:39	10 42.299	60 57.902	21:50	10 42.381	60 58.463	Sapatea	7			
28/8/06	Experimental							Crocro	2			

28/8/06	Experimental							Racando	4			
29/8/06	Control	7:10	10 42.162	60 53.221	11:23	10 41.713	60 55.587	Carite	3			No
29/8/06	Control	7:10	10 42.162	60 53.221	11:23	10 41.713	60 55.587	Zelwan	7			
29/8/06	Control	7:10	10 42.162	60 53.221	11:23	10 41.713	60 55.587	Cavali	2.5			
29/8/06	Experimental							Bonito	5			
29/8/06	Experimental							Anchor	2			
29/8/06	Control	17:07	10 40.162	60 56.336	23:38	10 42.278	60 56.150	Carite	2.75			No
29/8/06	Control	17:07	10 40.162	60 56.336	23:38	10 42.278	60 56.150	Sapatea	1.5			
29/8/06	Experimental							King fish	2.25			
29/8/06	Experimental							Carite	2			
29/8/06	Experimental							Cavali	1.5			
30/8/06	Control	17:07	10 38.089	60 58.104	22:40	10 38.601	60 57.794	Cavali	10			No
30/8/06	Control	17:07	10 38.089	60 58.104	22:40	10 38.601	60 57.794	Carite	14			
30/8/06	Experimental							Bonito	9			
30/8/06	Experimental							Sapatea	13			
30/8/06	Experimental							Cat fish	5			
31/8/06	Control	17:36	10 37.875	60 57.941	22:13	10 37.875	60 57.941	Cavali	9.75			No
31/8/06	Control	17:36	10 37.875	60 57.941	22:13	10 37.875	60 57.941	Carite	8.5			
31/8/06	Control	17:36	10 37.875	60 57.941	22:13	10 37.875	60 57.941	Sapatea	14			
31/8/06	Experimental							Cavali	4.25			
31/8/06	Experimental							Carite	19.25			
31/8/06	Experimental							Sapatea	22			

Matelot

Results of control and experimental drift gillnet sets 22 July – 15 September, 2006.

Date	Experimental or Control	Time Set	Set Lat	Set Lon	Time Retrieve	Retrieve Lat	Retrieve Lon	Species	Total Weight (lbs)	Sample Count	Sample Weight (lbs)	Remarks
22/7/06	Control	18:05	10 49.165	61 11.395	2:16	10 49.800	61 11	Puppy shark	5	2	4	
22/7/06	Control	18:05	10 49.165	61 11.395	2:16	10 49.800	61 11	Plateau	3	1	0.5	
22/7/06	Control	18:05	10 49.165	61 11.395	2:16	10 49.800	61 11	Cat fish	2	2	2	
22/7/06	Control	18:05	10 49.165	61 11.395	2:16	10 49.800	61 11	King fish	6	1	6	
22/7/06	Control	18:05	10 49.165	61 11.395	2:16	10 49.800	61 11	Carite	13	1	3	
22/7/06	Experimental							No catch	No catch	No catch	No catch	
26/7/06	Control	18:20	10 49.198	61 07.217	3:14	10 50.176	61 09.139	Puppy shark	3	1	1.5	
26/7/06	Experimental							King fish	5	1	5	
26/7/06	Experimental							Carite	1.5	1	1.5	
26/7/06	Experimental							Puppy shark	17	4	8	
26/7/06	Experimental							Cavali	1.25	1	1.25	
26/7/06	Experimental							Cat fish	2.5	1	2.5	
27/7/06	Control	17:22	10 49.345	61 07.576	2:36	10 49.276		No Catch	No catch	No catch	No catch	
27/7/06	Experimental							No catch	No catch	No catch	No catch	
28/7/06	Control	17:15	10 50.173	61 09.056	2:16	10 49.506	61 09.626	Carite	2	1	2	
28/7/06	Control	17:15	10 50.173	61 09.056	2:16	10 49.506	61 09.626	Plateau	1	1	0.5	
28/7/06	Experimental							Puppy shark	4	1	2	
28/7/06	Experimental							Plateau	6	3	1.5	
28/7/06	Experimental							Cat fish	4	1	4	
28/7/06	Experimental							Herring	3	2	1	
29/7/06	Control	17:18	10 50.447	61 05.882	2:27	10 50.687	61 06.177	Puppy shark	2	1	2	
29/7/06	Experimental							Plateau	1	1	0.5	
31/7/06	Control	17:05	10 49.479	61 11.012	3:03	10 49.311	61 10.825	Moon Shine	1	1	1	
31/7/06	Control	17:05	10 49.479	61 11.012	3:03	10 49.311	61 10.825	Pampano	1.5	1	1.5	

31/7/06	Experimental							Plateau	4	2	1	
31/7/06	Experimental							Puppy shark	5	3	3.5	
31/7/06	Experimental							Pompano	1.5	1	1.5	
3/8/06	Control	17:59	10 48.152	61 13.554	2:49		61 13.451	Carite	3	1	3	
3/8/06	Control	17:59	10 48.152	61 13.554	2:49		61 13.451	Herring	6	3	1.5	
3/8/06	Experimental							Puppy shark	2	1	2	
5/8/06	Control	17:16	10 49.121	61 12.130	2:16	10 49.211	61 11.548	Carite	3	1	3	Yes
5/8/06	Control	17:16	10 49.121	61 12.130	2:16	10 49.211	61 11.548	King fish	4	1	4	
5/8/06	Experimental	17:28	10 49.110	61 12.169	2:38	10 49.194	61 11.633	No catch	No catch	No catch	No catch	
6/8/06	Control	17:53	10 49.140	61 10.667	1:56	10 49.697	61 09.020	King fish	11	1	3	Yes
6/8/06	Experimental	18:18	10 49.139	61 10.672	2:27	10 49.581	61 09.273	No catch	No catch	No catch	No catch	
8/8/06	Control	17:15	10 51.072	61 11.570	21:58	10 51.397	61 11.968	King fish	4	1	4	Yes
8/8/06	Control	17:15	10 51.072	61 11.570	21:58	10 51.397	61 11.968	Carite	4	1	2	
8/8/06	Experimental	17:48	10 51.103	61 11.637	21:20	10 51.383	61 11.902	Puppy shark	4	2	2	
8/8/06	Experimental	17:48	10 51.103	61 11.637	21:20	10 51.383	61 11.902	Cat fish	2	1	2	
8/9/06	Control	17:23	10 51.852	61 07.954	2:10	10 51.858	61 11.596	King fish	9	2	6	Yes
8/9/06	Control	17:23	10 51.852	61 07.954	2:10	10 51.858	61 11.596	Carite	4	1	4	
8/9/06	Experimental	17:47	10 51.865	61 07.611	2:31	10 51.869	61 11.596	Puppy shark	19	6	12	
8/9/06	Experimental	17:47	10 51.865	61 07.611	2:31	10 51.869	61 11.596	Cat fish	21	4	12	
10/8/06	Control	17:18	10 51.068	61 11.521	3:15	10 51.526	61 11.485	King fish	13	2	8	Yes
10/8/06	Experimental	17:47	10 51.209	61 11.654	3:46	10 51.517	61 11.496	Cat fish	10	2	6	
10/8/06	Experimental	17:47	10 51.209	61 11.654	3:46	10 51.517	61 11.496	Puppy shark	4	1	2	
13/8/06	Control	18:01	10 48.973	61 13.642	2:15	10 48.969	61 13.630	Bannan	5	1	5	Yes
13/8/06	Control	18:01	10 48.973	61 13.642	2:15	10 48.969	61 13.630	Cat fish	3.5	1	1.5	
13/8/06	Control	18:01	10 48.973	61 13.642	2:15	10 48.969	61 13.630	Puppy shark	3	1	1.5	
13/8/06	Control	18:01	10 48.973	61 13.642	2:15	10 48.969	61 13.630	Silver Salmon	1	1	0.5	
13/8/06	Experimental	18:29	10 48.972	61 13.039	2:41	10 48.623	61 13.628	Cavali	4	1	2	
13/8/06	Experimental	18:29	10 48.972	61 13.039	2:41	10 48.623	61 13.628	Salmon	2	1	2	
13/8/06	Experimental	18:29	10 48.972	61 13.039	2:41	10 48.623	61 13.628	Bannan	4	1	4	
14/8/06	Control	17:28	10 48.970	61 13.177	2:27	10 49.599	61 10.166	King fish	6	1	3	Yes

14/8/06	Control	17:28	10 48.970	61 13.177	2:27	10 49.599	61 10.166	Carite	4	1	2	
14/8/06	Control	17:28	10 48.970	61 13.177	2:27	10 49.599	61 10.166	Bonito	6	1	3	
14/8/06	Experimental	17:46	10 48.993	61 13.196	2:46	10 49.649	61 10.171	Carite	4	1	2	
15/8/06	Control	17:20	10 49.946	61 09.171	1:49	10 50.142	61 09.238	King fish	4	1	4	Yes
15/8/06	Control	17:20	10 49.946	61 09.171	1:49	10 50.142	61 09.238	Puppy shark	2	1	2	
15/8/06	Experimental	17:53	10 50.012	61 09.206	2:14	10 50.157	61 09.263	Carite	6	1	3	
15/8/06	Experimental	17:53	10 50.012	61 09.206	2:14	10 50.157	61 09.263	Cat fish	5	1	5	
16/8/06	Control	17:17	10 51.068	61 11.521	2:56	10 51.209	61 11.654	Carite	4	1	2	Yes
16/8/06	Control	17:17	10 51.068	61 11.521	2:56	10 51.209	61 11.654	King fish	15	2	10	
16/8/06	Control	17:17	10 51.068	61 11.521	2:56	10 51.209	61 11.654	Bonito	8	1	4	
16/8/06	Experimental	17:45	10 51.204	61 11.648	3:26	10 51.270	61 11.714	No catch	No catch	No catch	No catch	
17/8/06	Control	18:01	10 50.685	61 05.744	3:02	10 49.722	61 06.557	Carite	6.5	1	3	Yes
17/8/06	Experimental	18:18	10 49.677	61 05.388	3:48	10 50.346	61 06.302	Puppy shark	17	9	10	
20/8/06	Control	17:25	10 51.072	61 11.571	2:15	10 51.095	61 07.845	No catch	No catch	No catch	No catch	Yes
20/8/06	Experimental	17:53	10 51.103	61 11.637	2:56	10 51.148	61 07.978	No catch	No catch	No catch	No catch	
22/8/06	Control	5:15	10 49.766	61 06.870	12:36	10 50.117	61 05.034	Sting ray	100	1	50	Yes
22/8/06	Experimental	5:43	10 49.774	61 06.910	13:15	10 50.152	61 05.840	Puppy shark	2	1	2	
28/8/06	Control	6:30	10 49.616	61 07.173	14:41	10 49.501	61 07.245	No catch	No catch	No catch	No catch	Yes
28/8/06	Experimental	6:53	10 49.620	61 07.193	15:14	10 49.494	61 07.137	No catch	No catch	No catch	No catch	
29/8/06	Control	6:08	10 49.723	61 07.317	14:03	10 49.597	61 07.067	No catch	No catch	No catch	No catch	Yes
29/8/06	Experimental	6:31	10 49.717	61 07.376	14:41	10 49.665	61 07.937	Plateau	0.5	1	0.5	
30/8/06	Control	6:08	10 49.746	61 07.158	14:53	10 49.982	61 07.938	Bonito	5	1	5	Yes
30/8/06	Experimental	6:26	10 49.752	61 07.248	15:28	10 49.968	61 07.921	No catch	No catch	No catch	No catch	
31/8/06	Control	6:07	10 49.708	61 07.822	15:06	10 49.620	61 07.662	Bannan	2.5	1	2.5	Yes
31/8/06	Control	6:07	10 49.708	61 07.822	15:06	10 49.620	61 07.662	Plateau	0.5	1	0.5	
31/8/06	Control	6:07	10 49.708	61 07.822	15:06	10 49.620	61 07.662	Jab	750	1	250	
31/8/06	Experimental	6:27	10 49.785	61 07.931	15:48	10 49.657	61 07.617	No catch	No catch	No catch	No catch	
4/9/06	Control	18:15	10 48.962	61 11.800	2:33	10 49.917	61 09.697	Chapo shark	4	1	4	Yes
4/9/06	Control	18:15	10 48.962	61 11.800	2:33	10 49.917	61 09.697	Puppy shark	3	1	1.5	
4/9/06	Experimental	18:43	10 48.947	61 11.808	3:09	10 49.906	61 09.714	No catch	No catch	No catch	No catch	

5/9/06	Control	17:18	10 53.386	61 01.784	2:54	10 53.602	61 01.024	Carite	2	1	2	Yes
5/9/06	Control	17:18	10 53.386	61 01.784	2:54	10 53.602	61 01.024	Puppy shark	3	1	1.5	
5/9/06	Experimental	17:41	10 54.726	61 01.671	3:38	10 53.971	61 00.937	No catch	No catch	No catch	No catch	
11/9/06	Control	17:29	10 50.229	61 04.865	2:17	10 49.941	61 04.286	Herring	50	20	16	Yes
11/9/06	Experimental	17:54	10 50.517	61 04.874	2:57	10 49.977	61 04.337	No catch	No catch	No catch	No catch	
12/9/06	Control	17:27	10 52.098	61 11.259	1:58	10 53.019	61 12.259	Carite	2	1	2	Yes
12/9/06	Control	17:27	10 52.098	61 11.259	1:58	10 53.019	61 12.259	Puppy shark	3	1	1.5	
12/9/06	Experimental	17:53	10 52.797	61 11.378	2:36	10 52.931	61 12.185	No catch	No catch	No catch	No catch	
13/9/06	Control	17:53	10 50.043	61 05.522	3:01	10 50.386	61 05.784	Blackfin Shark	12	2	6	Yes
13/9/06	Control	17:53	10 50.043	61 05.522	3:01	10 50.386	61 05.784	Hammerhead Shark	5	1	5	
13/9/06	Control	17:53	10 50.043	61 05.522	3:01	10 50.386	61 05.784	Puppy shark	8	2	4	
13/9/06	Experimental	18:26	10 50.971	61 05.149	3:46	10 50.099	61 05.607	Carite	12	2	4	
13/9/06	Experimental	18:26	10 50.971	61 05.149	3:46	10 50.099	61 05.607	Plateau	2	1	0.5	
14/9/06	Control	17:07	10 52.368	61 00.466	3:17	10 51.404	61 00.862	Chapo shark	4	1	4	Yes
14/9/06	Control	17:07	10 52.368	61 00.466	3:17	10 51.404	61 00.862	Puppy shark	3	1	1.5	
14/9/06	Experimental	17:36	10 52.167	61 00.780	3:45	10 52.432	61 00.888	No catch	No catch	No catch	No catch	
15/9/06	Control	17:27	10 49.637	61 07.106	3:19	10 49.595	61 06.958	No catch	No catch	No catch	No catch	Yes
15/9/06	Experimental	17:53	10 49.603	61 07.209	3:57	10 49.578	61 06.962	No catch	No catch	No catch	No catch	