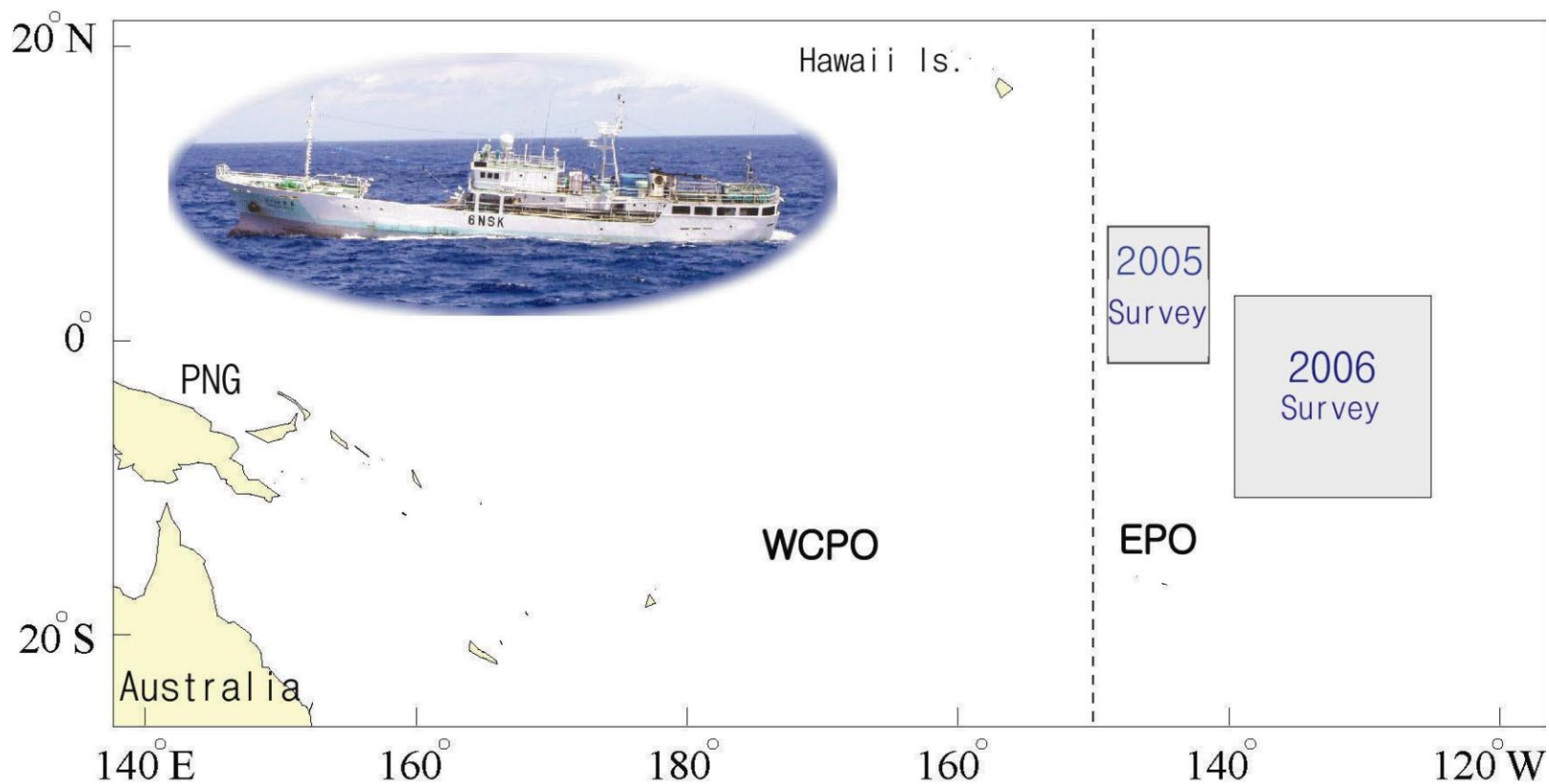


Comparison of circle hook and J hook catch rate for target and bycatch species taken in the Korean tuna longline fishery in 2006

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The survey area

- *9°13'S~1°36'N and 126°00'~138°21'W from September 20 to October 23, 2006*
 - *1°48'S~7°00'N and 142°00'~149°13'W in 2005*



Fishing Method

- **Korean longliner : 416 GRT**
- **Monitoring : 28 set (one set per day)**
- **No. of hooks used : 62,464**
 - **each set : 2,240 (560 of each type)**
- **Set at around 8:30am, finished by 2:00 pm. After about 3 hours of soaking and then hauled until following early morning by 7:00 am**
 - **Hauling started at finished point of setting (26) or starting point (2)**

Fishing Gear

- J-4 : size 4.0 traditional tuna hooks
- C15, C16, C18 : three sizes of circle hook with 10° degree offset type
- ❖ In 2005: J4 and C15 and C18 (straight type)



Catches in number of tunas and billfishes

Species	Hook type				
	Total (%)	J4	C15	C16	C18
Bigeye tuna	507 (61.6)	120	140	119	128
Yellowfin tuna	78 (9.5)	15	16	21	26
Albacore	87 (10.6)	15	24	25	23
Skipjack	15 (1.8)	5	8	1	1
Swordfish	67 (8.1)	15	18	18	16
Blue marlin	18 (2.2)	7	2	5	4
Striped marlin	8 (1.0)	-	2	2	4
Shortbill spearfish	30 (3.6)	13	7	4	6
Sailfish	13 (1.6)	5	4	-	4
Total	823 (100.0)	195 (23.7)	221 (26.9)	195 (23.7)	212 (25.8)

Catches in number of sharks and other species

Species	Hook type				
	Total (%)	J4	C15	C16	C18
Salmon shark	59 (7.4)	45	4	4	6
Mako shark	3 (0.4)	3	-	-	-
Oceanic white-tip shark	48 (6.0)	44	2	-	2
Bigeye thresher shark	83 (10.4)	16	28	21	18
Blue shark	43 (5.4)	22	4	8	9
Crocodile shark	142(17.8)	16	49	42	35
Smallmouth velvet dogfish	14 (1.8)	1	5	3	5
Scalloped hammerhead shark	14 (1.8)	13	-	1	-
Smooth hammerhead shark	7 (0.9)	7	-	-	-
Palagic stingray	23 (3.4)	7	5	5	6
Manta ray	1 (0.1)	-	-	1	-
Wahoo	28 (4.1)	12	8	5	3
Dolphin fish	3 (0.4)	1	-	-	2
Escolar	114(16.9)	30	26	36	22
Oilfish	10 (1.5)	7	1	1	1
Longnose lancetfish	25 (3.7)	9	3	8	5
Pomfrets	164(24.3)	24	52	41	47
Sharptail mola	2 (0.3)	-	-	2	-
Slender sunfish	2 (0.3)	1	1	-	-
Great barracuda	1 (0.1)	-	-	1	-
Opah	1 (0.1)	-	-	-	1
Rainbow runner	1 (0.1)	1	-	-	-
Olive ridley sea turtle	5 (0.7)	3	2	-	-
Total	797(100.0)	264(33.1)	190(23.8)	179(22.5)	164(20.6)

Results for each pair of hook types

Species group	Hook type				Among and Between	P value	X ² value	Conclusion
	J 4	C15	C16	C18				
Target species	195	221	195	212	J4, C15, C16,C18	2.44	2.44	NS
					J 4 and C15	0.20	1.63	NS
					J 4 and C16	1.00	0.00	NS
					J 4 and C18	0.40	0.71	NS
					C15 and C16	0.20	1.63	NS
					C15 and C18	0.67	0.19	NS
					C16 and C18	0.40	0.71	NS
					J4, C15, C16,C18	0.00	29.80	S
Bycatch species	264	190	179	164	J 4 and C15	0.00	12.06	S
					J 4 and C16	0.00	16.31	S
					J 4 and C18	0.00	23.36	S

Incidental catch information on turtles

Species	Date	Location	Carapace (cm)	Hook type (hook no.)	Portion hooked	Condition
			52	C15 (2nd)	lower jaw	Alive
Olive ridley sea turtle	21 Sept.	2° 7' N 144° 46' W	66	J 4 (13rd)	mouth	Dead
			57	J 4 (16th)	mouth	Dead
			73	C15 (16th)	Front flipper (right)	Alive
Olive ridley sea turtle	22 Sept.	2° 24' N 136° 16' W	72	J 4 (5th)	mouth	Dead

Catch rate (CPUE) of main species caught

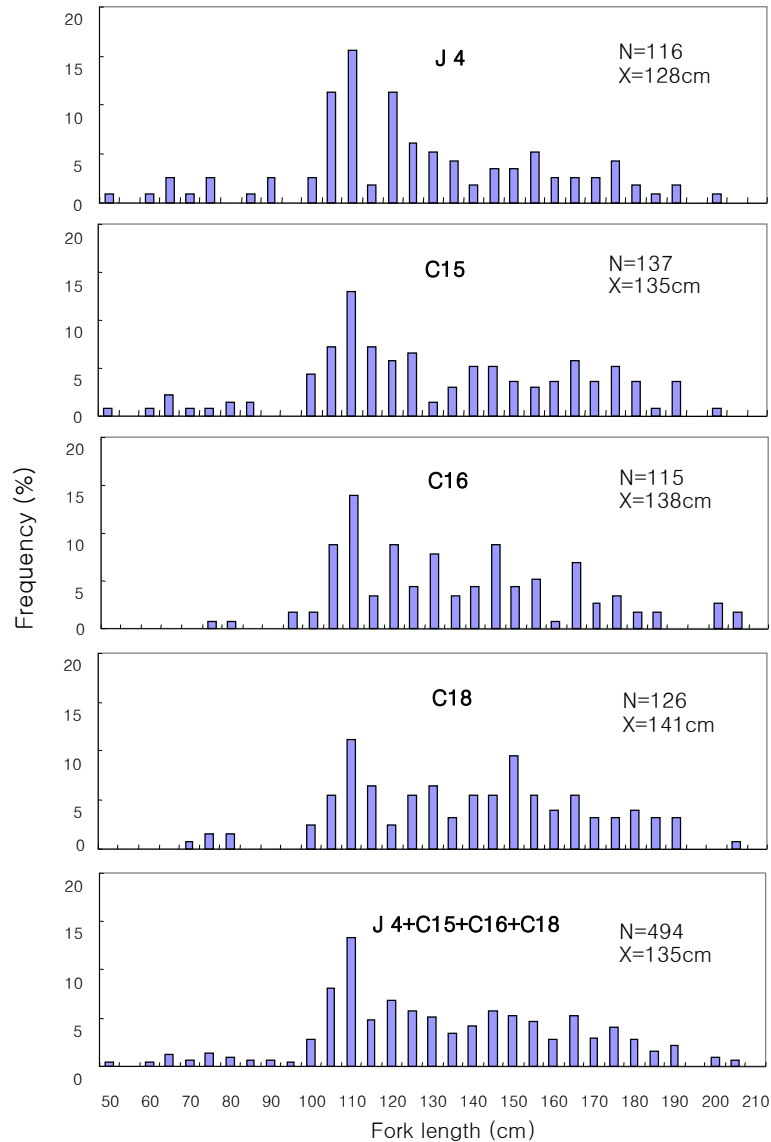
Species	No. of hooks by hook type	CPUE (fishes/1,000hooks)			
		J 4	C15	C16	C18
Bigeye tuna	15,616	7.7	9.06.3	7.6	8.2
Yellowfin tuna	"	1.0	1.0	1.3	1.7
Tunas group	"	10.0	12.0	10.6	11.5
Swordfish	"	1.0	1.2	1.2	1.0
Blue marlin	"	0.4	0.1	0.3	0.3
Billfishes group	"	2.5	2.1	1.9	2.3
Salmon shark	"	2.3	0.3	0.3	0.4
Oceanic white-tip shark	"	2.3	0.1	-	0.1
Bigeye thresher shark	"	0.8	1.8	1.3	1.2
Blue shark	"	1.1	0.3	0.5	0.6
Crocodile shark	"	0.8	3.1	2.7	2.2
Smallmouth velvet dogfish	"	0.1	0.3	0.2	0.3
Sharks group	"	10.7	5.9	5.0	4.8
Escolar	"	1.9	1.7	2.3	1.4
Longnose lancetfish	"	0.6	0.2	0.5	0.3
Pomfrets	"	1.5	3.4	2.6	3.0
Other fishes group	"	6.1	6.3	6.4	5.7
Olive ridley sea turtle	"	0.2	0.1	-	-
Total	15,616	16.9	12.2	11.5	10.5

Catch rate of species group by bait

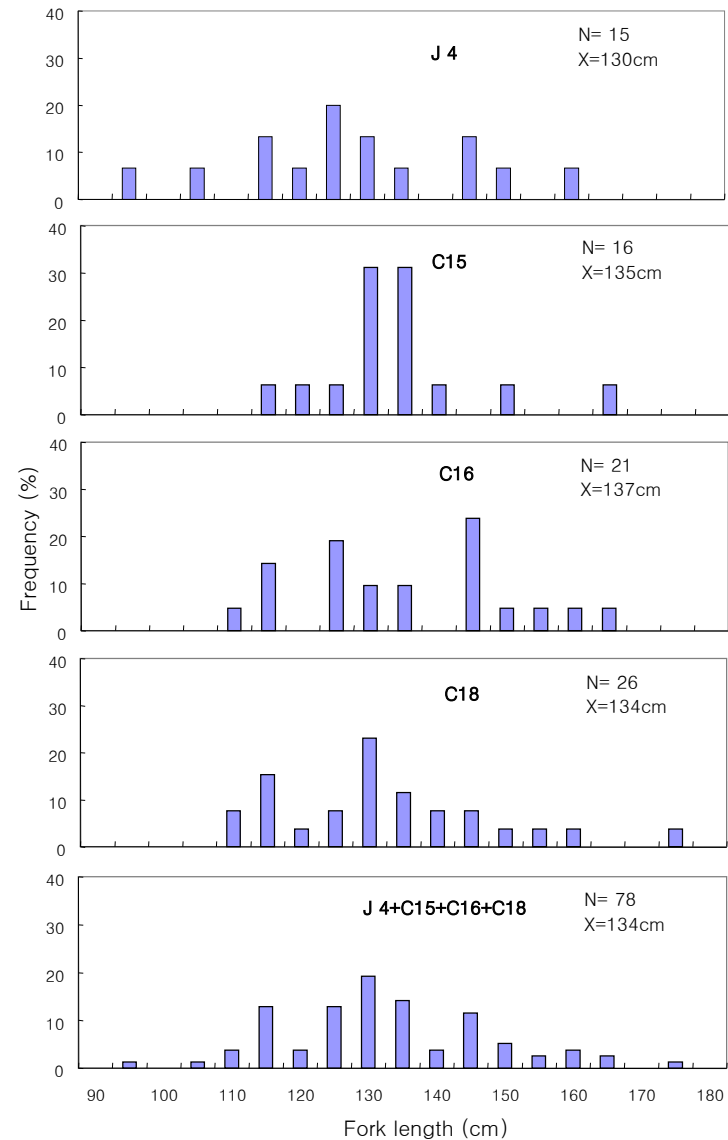
Species caught	CPUE (fishes/1,000hooks) by bait				
	Chub mackerel	Sardine	Squid	Jack mackerel	Milk-fish
Bigeye tuna (501)	4.4	5.8	11.9	12.7	7.2
Tuna group (681)	8.4	8.5	14.5	15.8	8.6
Billfishes group (180)	3.8	1.4	1.9	2.6	0.8
Sharks group (413)	5.0	5.4	5.4	4.2	2.0
Otherfishes group (380)	5.4	6.0	7.2	6.7	4.6
Olive ridley sea tuetle (5)	0.1	-	0.1	0.1	-
All species (1,497)	22.9	21.3	29.1	29.3	16.0

Length frequency by hook type

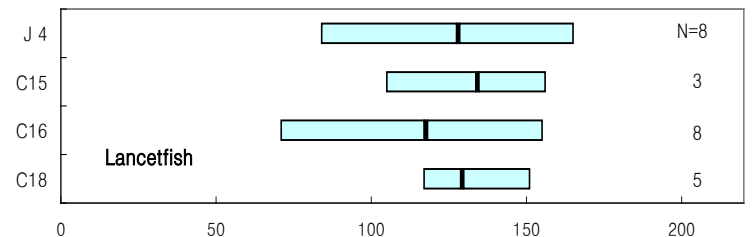
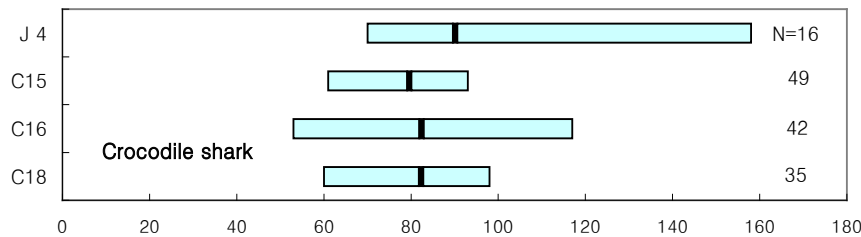
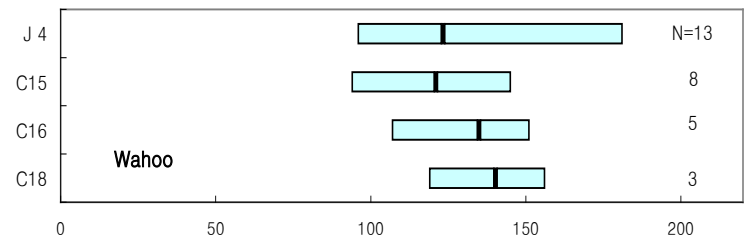
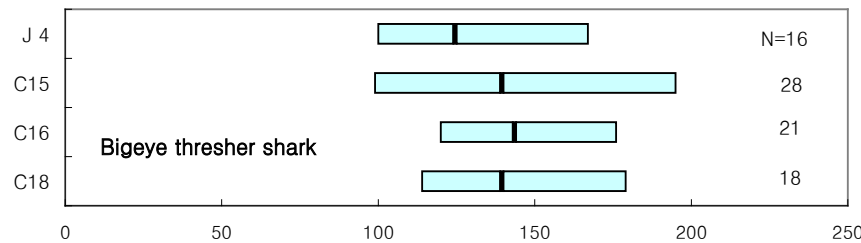
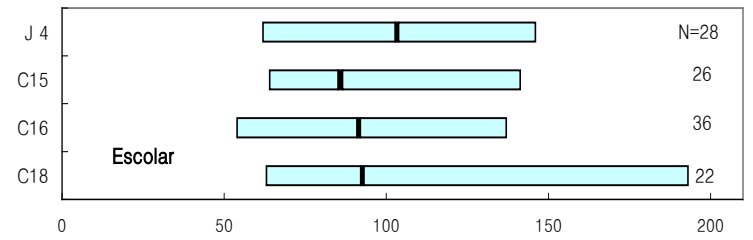
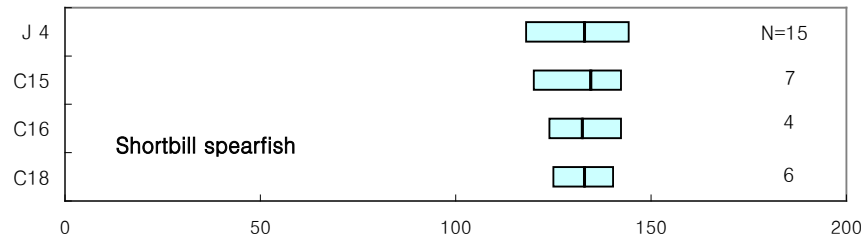
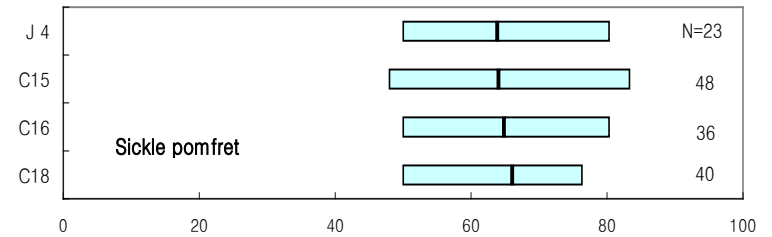
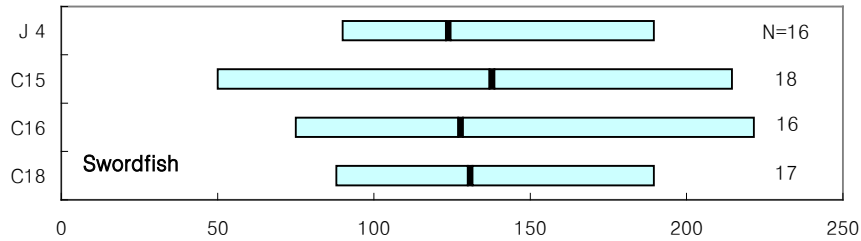
Bigeye tuna



Yellowfin tuna



Ranges and mean length of other species



Results

- **In the target species group no significant differences in catch rate among 4 types hook**
 - **In 2005 the catch rate of C18 was lower than those of the others hooks J4 and C15**
- **In the bycatch species group significant differences were found among 4 types and between J-4 and C15, C16, C18, respectively.**
- **Sea turtles caught by J hooks were dead condition but caught by circle were alive**

Results Cont'd

- **Squid and jack mackerel baits: tuna and other fishes, chub mackerel bait: billfishes and sharks**
 - **milkfish bait had low catch rate for all groups except tuna group**
- **The length distributions for bigeye and yellowfin tunas are very similar by the hook types**
- **There were very slight differences in length size between hook types in the bycatch species**
- ❖ **The results in 2005 and 2006 have some differences each other. At this point it is hard to decide the efficiency of catch rate by hook type and size.**



Future plan

- **A similar experimental survey will be conducted in the western central Pacific Ocean during May-July 2007**
 - **analyze the results come together to draw the conclusion on the efficiency of the using circle hook**