Temporal and spatial patterns of Taiwanese, Japanese and Korean Nominal Albacore CPUE distributions in the Indian Ocean

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Summary

At the IOTC 17th WPTT (Working Party on Tropical Tunas), the WPTT NOTED: the updated CPUE analysis and encouraged to continue the analysis as part of the multi-nation collaborative effort to improve CPUE standardizations. While some progress has been made, additional joint analyses of Taiwanese, Japanese, and Korean operational level longline fishery data are needed. Also, at the IOTC 18th SC (Scientific Committee), the SC RECOMMENDED: that it is necessary to develop standardized CPUE series for Albacore including incorporation of changes in species targeting. Taiwanese, Japanese and Korean scientists and an independent scientist have agreed to conduct collaborative work on Albacore CPUE. Thus, the 1st joint meeting of CPUE standardization for Albacore was held in Taipei during April 4-8, 2016.

In the joint meeting, we developed a quick view technique to compare CPUE distributions by year and by area (5X5 degree), which are shown in Fig. 1 to Fig. 36. In the figures, CPUE is calculated by no. of catch/Hooks and divided into 12 classes. Table 1 lists the up and low boundaries of each CPUE class. Data from Taiwan, Japan and Korea are represented by green, red and blue colors, respectively. Frequency of CPUE distributions are in percentage and logarithmic scale are applied. Clear Figures in pdf format which can be zoon in to see details of every cell can be downloaded from: http://myweb.ncku.edu.tw/~yinchang/TW_JP_KR_ALB_CPUE_IOTC.pdf . And please email to: <u>yinchang@mail.ncku.edu.tw</u>, if you have any problem.

By the use of quick view technique, we observed two phenomena which unnoticed before:

- (1). Different fishing area distribution would be the major source of conflicts between Taiwanese, Japanese and Korean CPUE trends.
- (2). Within the same temporal (year) and spatial (5X5 degree) condition, the Nominal Albacore CPUE distribution of Taiwan, Japan and Korea would have a high probability of presenting similar.

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0.01	≥0.005	< 0.015
0.02	≧0.015	< 0.025
0.03	≥0.025	< 0.035
0.04	≥0.035	<0.045
0.05	≧0.045	<0.055
0.06	≥0.055	<0.065
0.07	≧0.065	<0.075
0.08	≧0.075	<0.085
0.09	≧0.085	<0.095
0.10	≥0.095	<0.105
0.11	≧0.105	<0.115

Table 1. Up and low boundaries of CPUE classes in Fig. 1 to Fig. 36.

Scan QR code to download Fig1. to Fig 36. in pdf format



http://myweb.ncku.edu.tw/~yinchang/TW_JP_KR_ALB_CPUE_IOTC.pdf

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Fig. 2. Indian Ocean Nominal Albacore CPUE from Taiwan, Japan and Korea in 1980

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Fig. 4. Indian Ocean Nominal Albacore CPUE from Taiwan, Japan and Korea in 1982

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Fig. 5. Indian Ocean Nominal Albacore CPUE from Taiwan, Japan and Korea in 1983

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Fig. 6. Indian Ocean Nominal Albacore CPUE from Taiwan, Japan and Korea in 1984

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Fig. 7. Indian Ocean Nominal Albacore CPUE from Taiwan, Japan and Korea in 1985

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Fig. 8. Indian Ocean Nominal Albacore CPUE from Taiwan, Japan and Korea in 1986

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Fig. 9. Indian Ocean Nominal Albacore CPUE from Taiwan, Japan and Korea in 1987

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Fig. 10. Indian Ocean Nominal Albacore CPUE from Taiwan, Japan and Korea in 1988

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Fig. 11. Indian Ocean Nominal Albacore CPUE from Taiwan, Japan and Korea in 1989

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Fig. 12. Indian Ocean Nominal Albacore CPUE from Taiwan, Japan and Korea in 1990

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Fig. 13. Indian Ocean Nominal Albacore CPUE from Taiwan, Japan and Korea in 1991

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Fig. 14. Indian Ocean Nominal Albacore CPUE from Taiwan, Japan and Korea in 1992

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Fig. 15. Indian Ocean Nominal Albacore CPUE from Taiwan, Japan and Korea in 1993

	20°E 10	25°E 12	30 [°] E 14	35°E 16	40°E 18	45°E 20	50°E 22	55°E 24	60°E 26	65°E 28	70°E 30	75°E 32	80°E 34	85°E 36	90°E 38	95°E 40	100°E 42	105°E 44	110 ⁻ E 46	115°E 48	120°E 50
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Fig. 16. Indian Ocean Nominal Albacore CPUE from Taiwan, Japan and Korea in 1994

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ے ۲ Indian Ocean			T T GALLMAN		(a. f. fermatik)	California de Ca	The Manual I	(and a set	constant.		The second second	terrane.	(1889) #341	(internet)	200000	C. C	93.04.95	
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Fig. 17. Indian Ocean Nominal Albacore CPUE from Taiwan, Japan and Korea in 1995

	20°E 10	25 [°] E 12	30°E 14	35°E 16	40°E 18	45°E 20	50°E 22	55°E 24	60°E 26	65°E 28	70°E 30	75°E 32	80°E 34	85°E 36	90°E 38	95°E 40	100°E 42	105°E 44	110 [°] E 46	115°E 48	120°E 50
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5°S 0' 74		N / Hoo		(BARDON		COStanual		CO. Second	n na stando		(CONTRACTOR)			0.110.00		0.000	0000000			охсн	000000
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35°S 86	1				1		dlhn.			h.	llh.	11h	llu		Hhub.	Nu.			<u> </u> .		
40°S 88	10 MANAGAR					. h.	hill.	Lataren en :			11	COLUMN TO T					Containent?	(laskann, da)	(inclusion)	Goldense and	
45°S 90	U.M.X.(Ph.279	in an			No. or all	0.9,9/25159	- WORKS	interest.	unser.	NOUNCE	400.0	UXER.SF	u.u.e.wi	Carater St.	unere et	Locaset	T U.S. LEP. MI	THE REPORT	Lux Alex, ed.	Colore, R.	UUXI#;41

Fig. 18. Indian Ocean Nominal Albacore CPUE from Taiwan, Japan and Korea in 1996

	20°E 10	25°E 12	30°E 14	35°E 16	40°E 18	45°E 20	50°E 22	55 ⁻ E 24	60°E 26	65°E 28	70°E 30	75°E 32	80°E 34	85 [°] E 36	90°E 38	95°E 40	100°E 42	105°E 44	110 [°] E 46	115°E 48	120°E 50
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5'N 75	1000	ian C)cean			CAXABIRINE T	Tang Kalundo	Contraction of the second seco	1 Die de Stansen de C	I Distance	10.344.04.00	or Kin strand	18.8,899,997	M.F. Terret				2001-25	and the second second		1
0° 13		icore (CPUE		1						and the second sec	U Cress with a					(Arrent)				Constant (
5°S 74		V / Hoo			ETILETS	335563490 ((0011288)	CLASSING.		000120.00		COMPE	00(120)0	000.000		0.000.00	A POLICIE H
10°S 76		Japan	Korea	SXXXXXXXX		3535363635	DIVERSION:	Discussion of the second secon	BORGERS	TRANSCOLOR.		100-32,00,30,2045		Cakles of		(3.5.3er045		alkiesise.		000,000,000	1000 Steelung
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35°S 86	1 CLUMM		111	[]],	h				IIIIII.		illiha				,tllu		I	h	<u> </u> ,		100.00
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45°S 90	161,319655	COLUMNS!		100,000 Miles		BUDGLASSI -	-	LAAN PURC	uunoo.	loounger	V.A.S.V	UNDER OF	UXXUS, S.	Casesmund"	Galanta Angelandi -	LALONAL	18.8,000,02	LULL PLOT	COCHORDS.	isksmini -	0.111-0.00

Fig. 19. Indian Ocean Nominal Albacore CPUE from Taiwan, Japan and Korea in 1997

	20°E 10	25°E 12	30°E 14	35°E 16	40°E 18	45 [°] E 20	50°E 22	55 ⁻ E 24	60°E 26	65°E 28	70°E 30	75°E 32	80°E 34	85°E 36	90°E 38	95°E 40	100°E 42	105°E 44	110 [°] E 46	115°E 48	120°E 50
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10'N 1	1 000	CPUE (N/Hoo	010 000 ks)		Ap. A. And Book	COLUMN AND	U.Co.Coll	State Sec.	-	TAKING T	-	WA HOURI	L'Almontell	Laboration of the second	U.Constant	(LLAND.in.M)	Ultimatel	(Littlewood)	Universit	UL milits	
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73 5	Alba	core (CPUE			0.000.9		autority.	0000.00	0.22.20	den (concept	100.55			1	(Tabletine)	(and the second s				-
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						l II.i					CONTRACTOR IN THE				<u>.</u>					<u>ex.m. 15</u>	00000-05
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45°S 90								h		0.000.05	1	(United and	(acces, et	CALL PLOT ALL	Tiga damant.		Li B. Olim, M.	L.M. M. M.	and a second		

Fig. 20. Indian Ocean Nominal Albacore CPUE from Taiwan, Japan and Korea in 1998

20°E 10	25°E 12	30 [°] E 14	35°E 16	40°E 18	45°E 20	50°E 22	55 ⁻ E 24	60°E 26	65°E 28	70°E 30	75°E 32	80°E 34	85°E 36	90°E 38	95°E 40	100°E 42	105°E 44	110°E 46	115°E 48	120°E 50
22 N	999		LUCCHOUSE		(A) the st	arrenter (TAX PARTINE.	Catherine	bijjece										Contraction of the second	
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	g g g g g g g CPUE (N/Hoo	400 000 0ks)		12 Advancem	GERMAN	U.U.S.COM	a a se a de	ULEAS AND		U.A.M.A.M.	(Alternation	Tu Almonte	Likeber	(Lastanea)	(LUCCCAU)	Allemand .	1.444 marchi	(Linnergott	UL-LIC 1	Linkson of the
	ian O	cean			CARDIN M	(And And And And And And And And And And	La abue de	lenne.	The second se	CREEKEN	ULBRAN, M	10.9590.95	3(3,7) ==	00,840.9	199 (m. 1993) 	CONTRACTOR OF	20171020	- Constant	VX-III (H	10818.85
	acore	CPUE		0002255	600559	Constant State	0.000.00	the state of the s	0220.230	Concer	0.000.29	and the second	uinter 5		TAXABLE IN T	المنتسقا		Constant of Constant	at a start of the	
	N / Hoc		. OXXXX	U.X.L.LOP	(BOCCONNA)	COLUMN .	COD5.240)	d'avere		etacorean ((COCNECTION)		0.070136	-	COCCER	0000000	'cocce	010100		000050
s S_01	Japan	Korea		COXADCINI	COLUMN STREET	CRARKER .	00003332360		OC SC Science	COLO YOR OR	00000000		Columnation of the second	(RAJACA)			Milwink	1. ULBroud	OX.mitple	1033/kewp.mp7
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30'S 2 84		-	1	Contraction of		1.	II.	.	U.A.Assessed			1								S CONVERSE
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× 8	in the second				1										Tax, sourced				and the second sec	المحمد الما
45°S 40	111 - 1000.000000	and Li	1111 	COERCEST	Mark Concess		11111111 1019/00/01		T TWODADA	10000	10000000	1111 	a f 1 1 1 1	isa, interest	COLDING T		The action of the second	COLUMNES	Tab.Conjint	Lange and the second se

Fig. 21. Indian Ocean Nominal Albacore CPUE from Taiwan, Japan and Korea in 1999

	20°E 10	25 ⁻ E 12	30°E 14	35°E 16	40°E 18	45°E 20	50°E 22	55°E 24	60°E 26	65°E 28	70°E 30	75 [°] E 32	80°E 34	85°E 36	90°E 38	95°E 40	100°E 42	105°E 44	110 [°] E 46	115°E 48	120°E 50
25'N 83	20	000		LUCERCOR.		Contraction (math	Dr. Contractor	(1) X Ref (14)												in Association	
20°N 81	100			0.0000				00000000	(CODEC)	000000				UDDOUGU					And American	Cture .	
15°N 79	≥ 10		111	RECEIPTION	12004.004		- HACKAGE		CONTRACT		Rooten .		CO Second	(10)(Contain)	(1) Constant			-	0.0344640	(KA Section	(DIREA)
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73		core (CPUE		5 0.000.000	0.0.000.00	- and -	ans.	and the second second	115K.0.7.5	- toorest			California	likin a	(BEALERS)	العرضية فا	and a	(University)		
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10°S 5 76		Japan	Korea	200302361	OCCUPIENT.	DUTALIST	CONTRACTO	0000000	2000026	OCH SCHEND	OK M 20002160	1003030034C	Tak Sanoal	(Allowed and)		-	<u>lh.</u>	At location	(Alles of	O.S. and a	DOMESCING!
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Fig. 22. Indian Ocean Nominal Albacore CPUE from Taiwan, Japan and Korea in 2000

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Fig. 23. Indian Ocean Nominal Albacore CPUE from Taiwan, Japan and Korea in 2001

	20°E 10	25°E 12	30 [°] E 14	35°E 16	40°E 18	45°E 20	50°E 22	55°E 24	60°E 26	65°E 28	70°E 30	75°E 32	80°E 34	85°E 36	90°E 38	95°E 40	100°E 42	105°E 44	110 [°] E 46	115°E 48	120°E 50
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Fig. 24. Indian Ocean Nominal Albacore CPUE from Taiwan, Japan and Korea in 2002

	20°E 25°E 10 12	30°E 14	35°E 16	40°E 18	45°E 20	50°E 22	55 ⁻ E 24	60°E 26	65°E 28	70°E 30	75°E 32	80°E 34	85°E 36	90°E 38	95°E 40	100°E 42	105°E 44	110 [°] E 46	115°E 48	120°E 50
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20'N 81	100						STROP .						(11234.40)				CHEESE			
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Fig. 25. Indian Ocean Nominal Albacore CPUE from Taiwan, Japan and Korea in 2003

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	ndian	Ocean			UCLASSION"	(in a since)	Det di Anno dell'		1		La a ancara a	1	i ikanya at	00,000,00	(UKN) = A1		1999 (1999) 1999 (1999)		VA (N	100x10.41
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35°S 3 86	1,		h.	h .							(Aladohana)	I .		h.,	ha	.		110,100,47		100.00 (A)
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Fig. 26. Indian Ocean Nominal Albacore CPUE from Taiwan, Japan and Korea in 2004

	20 [°] E 10	25°E 12	30°E 14	35°E 16	40°E 18	45°E 20	50°E 22	55⁻E 24	60°E 26	65°E 28	70°E 30	75°E 32	80°E 34	85°E 36	90°E 38	95°E 40	100°E 42	105°E 44	110 [°] E 46	115°E 48	120°E 50
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Fig. 27. Indian Ocean Nominal Albacore CPUE from Taiwan, Japan and Korea in 2005

	20°E 10	25°E 12	30°E 14	35°E 16	40°E 18	45°E 20	50°E 22	55 ⁻ E 24	60°E 26	65°E 28	70°E 30	75°E 32	80°E 34	85°E 36	90°E 38	95°E 40	100°E 42	105°E 44	110°E 46	115°E 48	120°E 50
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73		core	CPUE		0.00.2.5	0.0000	0.00000		0.60.5	0.0.0	uous	100000	(interaction)	Constant of the second of the	Lindon a	"ULBUC N	CONTRACTOR OF		(and the second		
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10°S 76		Japan	Korea						-				COLUMN A	General Contraction	2000000	LICENCE.	Silk Beitek	attaint.	(A k in source)	0330000	addaesaer -
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Fig. 28. Indian Ocean Nominal Albacore CPUE from Taiwan, Japan and Korea in 2006

20	E 25 [°] E 12	30°E 14	35°E 16	40°E 18	45°E 20	50°E 22	55 ⁻ E 24	60°E 26	65°E 28	70°E 30	75 [°] E 32	80°E 34	85°E 36	90°E 38	95°E 40	100°E 42	105°E 44	110°E 46	115°E 48	120°E 50
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~	Albacore	CPUE		100-C*1					ar accessi	eense)	(recent	Link Lannal		Lot Asses		Line and		(Cartinal		
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200	Faiwan Japar	Korea	DECEMBER 1	1,	fr.	(BORMADE)		-		0000000	563530E.BC		Constant of		The second	10h teoretari	Witnesser.	(A) I am Af	000 million	DOOReeuw
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Fig. 29. Indian Ocean Nominal Albacore CPUE from Taiwan, Japan and Korea in 2007

	20°E 10	25°E 12	30 [°] E 14	35°E 16	40°E 18	45°E 20	50°E 22	55 ⁻ E 24	60 [°] E 26	65°E 28	70°E 30	75°E 32	80°E 34	85°E 36	90°E 38	95°E 40	100°E 42	105°E 44	110 ⁻ E 46	115°E 48	120°E 50
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Fig. 30. Indian Ocean Nominal Albacore CPUE from Taiwan, Japan and Korea in 2008

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Fig. 31. Indian Ocean Nominal Albacore CPUE from Taiwan, Japan and Korea in 2009

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Fig. 32. Indian Ocean Nominal Albacore CPUE from Taiwan, Japan and Korea in 2010

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Fig. 33. Indian Ocean Nominal Albacore CPUE from Taiwan, Japan and Korea in 2011

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Fig. 34. Indian Ocean Nominal Albacore CPUE from Taiwan, Japan and Korea in 2012

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Fig. 35. Indian Ocean Nominal Albacore CPUE from Taiwan, Japan and Korea in 2013

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Fig. 36. Indian Ocean Nominal Albacore CPUE from Taiwan, Japan and Korea in 2014