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**SCIENCE ADVICE ON INTERPRETING HISTORICAL IMPACTS OF FLEETS FISHING FOR
NORTH PACIFIC ALBACORE TUNA IN TERMS OF FISHING INTENSITY**

**WCPFC-NC22-2026-IP03
8 July 2026**

ISC¹

¹ International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean



ANNEX 04b/Attachment 5

*26th Meeting of the
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**SCIENCE ADVICE ON INTERPRETING HISTORICAL IMPACTS OF FLEETS
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INTENSITY**

June 2026

Attachment 5

Science advice on interpreting historical impacts of fleets fishing for north Pacific albacore tuna in terms of fishing intensity

BACKGROUND

The Western and Central Pacific Fisheries Commission (WCPFC) Northern Committee (NC) and the Inter-American Tropical Tuna Commission (IATTC) harvest strategies for north Pacific albacore (NPALB; WCPFC NC Harvest Strategy 2023-01; IATTC Resolution C-23-02) include harvest control rules that mandate reductions in fishing intensity ($F_{\%SPR}$) if the female spawning stock biomass (SSB) falls below the adopted reference points. The Albacore Working Group (ALBWG) of the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC) provided scientific advice translating fishing intensity into traditional management controls, such as catch and effort (ISC/25/ANNEX/10). The analyses supporting this advice separated the annual total fishing intensity estimated in the 2023 stock assessment into fleet-specific fishing intensities, and demonstrated strong relationships between fleet-specific fishing intensities and catch, and moderate relationships with effort for some fleet groups, indicating that fishing intensity can be managed by these traditional measures. In order for this advice to be implemented, the ALBWG recognized that allocation rules needed to be provided by the WCPFC and IATTC to guide the calculations of fleet-specific fishing intensities according to the harvest strategies. In response, WCPFC NC members requested that the ISC provide estimates of the historical impact of each fleet group on the North Pacific albacore tuna (NPALB) stock expressed in terms of fishing intensity ($F_{\%SPR}$). Specifically, the NC requested that these estimates be calculated for the historical reference periods: 2002–2004 and 1999–2015. It was also requested by NC that the fleet groupings used in the previous advice for translating fishing intensity into catch and effort be reevaluated and slightly altered to accommodate requests from some countries.

Overall, the purpose of this request is to ensure that, should the NPALB stock decline below the threshold reference point, management bodies have the necessary information to support potential fleet-specific allocation of reductions in fishing intensity, and to inform harvest strategy implementation discussions.

SUMMARY OF ANALYSES

The ALBWG applied analytical methods previously developed to estimate the annual proportional historical impacts of each fleet group on the NPALB stock. The annual fleet-specific spawning potential ratios (SPRs) for each fleet group were first estimated using outputs from the updated 2026 NPALB stock assessment (ALBWG 2026) and applying the methods from Teo et al., 2024 (Table 2). The annual proportional impact of each fleet group was then calculated using the annual fleet-specific SPRs and the annual total SPR from the stock assessment, applying methods in Teo and Kuriyama (2025; Table 3). The average proportional impact of each fleet group during the 2002 – 2004 and 1999 – 2015 time periods was then calculated using the arithmetic means of the fleet-specific SPRs and the total SPR for the two time periods (Tables 4).

SCIENTIFIC ADVICE AND RECOMMENDATIONS

The ALBWG advises that the fleet-specific fishing intensity estimates presented in this document provide a biologically consistent and transparent characterization of the historical impacts of major NPALB fleet groups on the stock. By expressing fleet-specific impacts in terms of spawning potential ratio ($F_{\%SPR}$), these estimates account for differences in selectivity, age composition, and biological contribution to female SSB, allowing impacts across diverse gears and fisheries to be compared on a common scale. These metrics are therefore more appropriate than catch or effort alone for evaluating relative historical fishing impacts and informing harvest strategy implementation.

The average fleet-specific proportional impacts estimated for the requested historical reference periods, 2002–2004 and 1999–2015 (Table 4) represent suitable indicators of each fleet group's relative contribution to total fishing pressure during those periods. These averaged values are particularly appropriate for informing discussions on proportional reductions in fishing intensity, should the harvest control rules be triggered by the stock falling below the threshold reference point. However, the interpretation and use of these estimates should recognize that fleet-specific fishing intensity is conditional on historical stock and fishery conditions, including recruitment, availability, and selectivity patterns.

The ALBWG therefore notes that the historical fleet-specific proportional impact estimate values are likely to change slightly with updated stock assessment outputs. The ALBWG recommends using the 2026 stock assessment results to inform the upcoming discussions around allocation rules required should the SSB fall below the threshold reference point. The ALBWG does not recommend recalculating the fleet specific proportional impacts for the historical periods for subsequent stock assessments unless there is a specific need related to an identified exceptional circumstance.

The ALBWG reiterates that while this scientific advice provides quantitative estimates of historical fleet-specific fishing intensity, the development and application of explicit allocation rules for translating total fishing intensity targets into fleet-specific fishing intensities remain the responsibility of the RFMOs.

Once allocation rules are agreed upon, the ALBWG's previous scientific advice on interpreting fleet-specific fishing intensity in terms of catch and effort management measures can be applied. The ALBWG is prepared to provide further technical support or updated analyses as requested to facilitate transparent and effective implementation of the NPALB harvest strategy.

ADDITIONAL RESOURCES

In addition, the ALBWG has also developed an online tool to help discussions by the WCPFC NC and IATTC on allocation rules and harvest strategies for north Pacific albacore (https://connect.fisheries.noaa.gov/NPALB_harvest_strategy_tool).

REFERENCES

Teo, S. L. H., H.-H. Lee, D. Tommasi, S. Hawkshaw, Y.-J. Chang, Y. Tsuda, and Y. Kwon. 2024. Relationships between fleet-specific spawning potential ratios and measures of catch and effort for North Pacific albacore tuna. ISC/24/ALBWG-01/07. Working document submitted to the ISC ALBWG, 11-18 March, 2024, Institute of Ocean Sciences, Fisheries and Oceans Canada, Sidney, British Columbia, Canada.

Teo, S. L. H. and Kuriyama, P. 2025. Estimating fleet-specific allocations of spawning potential ratios. ISC/25/ALBWG-01/11. Working document submitted to the ISC ALBWG, 10-14 March 2025, held at the National Taiwan University, Institute of Oceanography in Taipei, Taiwan.

TABLES

Table 1. Fleet groups are from the 2026 North Pacific albacore (NPALB) stock assessment.

Fleet Group	Fleet Group Name	Fleet ID	Units of Effort	Fleet Group Description
1	JPLLalbtgt (NPALB targeting)	F1/F2/F9/F12/F13/F16	Hooks, Vessels, Days	Japan longline; targeting NPALB (A13_Q1/2 & A2_Q1/4)
2	JPLLnontgt (NPALB Non-targeting)	F3 to F8 & F10/F11 & F14/F15 & F17/F18	Hooks, Vessels, Days	Japan longline; all areas; all seasons; (except A13_Q1/2 and A2_Q1/4)
3	JPPL	F19 to F23	Vessels, Days, Poledays, Avg poles, SKJ catch	Japan pole-and-line; all areas; all seasons
4	USLL	F24/F25	Hooks, Vessels, Sets	US longline; all areas; all seasons
5	TWLL	F26/F27	Hooks, Vessels, Days	Taiwan longline; all areas; all seasons
6	KRLL	F28	Hooks	Korea longline; all areas; all seasons
7	CNLL	F29/F30	Hooks	China longline; all areas; all seasons
8	VULL	F31/F32	Hooks	Vanuatu longline; all areas & seasons
9	OTHLL	F33	Hooks	Others longline; all areas & seasons
10	EPOSF	F34	Vessels, Days	EPO Surface fleet (primarily US and Canada); all seasons
11	PSDNMISC	F35	NA	Purse seine and miscellaneous fleets from Japan and Taiwan

Table 2. Estimated fleet-specific spawning potential ratios (SPRs) for each fleet group described in Table 1 using estimates from the 2026 North Pacific albacore (NPALB) stock assessment.

Year	Fleet Group Name										PSDN Misc
	JPLL albtgt	JPLL nontgt	JPPL	USLL	TWLL	KRLL	CNLL	VULL	OTHLL	EPOSF	
1994	0.861	0.867	0.814	0.994	0.999	1.000	1.000	1.000	1.000	0.903	0.985
1995	0.866	0.878	0.866	0.993	0.963	1.000	1.000	1.000	1.000	0.921	0.978
1996	0.849	0.874	0.827	0.991	0.931	0.999	1.000	1.000	1.000	0.875	0.990
1997	0.801	0.862	0.750	0.989	0.918	0.997	1.000	1.000	1.000	0.859	0.982
1998	0.817	0.861	0.833	0.993	0.916	0.998	1.000	1.000	1.000	0.861	0.977
1999	0.840	0.844	0.557	0.989	0.910	0.999	0.998	1.000	1.000	0.839	0.955
2000	0.819	0.882	0.835	0.993	0.900	1.000	1.000	1.000	1.000	0.848	0.972
2001	0.831	0.868	0.746	0.990	0.902	0.999	0.994	1.000	0.999	0.866	0.988
2002	0.817	0.904	0.666	0.996	0.902	0.999	0.995	0.979	0.993	0.862	0.974
2003	0.833	0.927	0.694	0.996	0.914	0.998	0.989	0.975	0.998	0.800	0.984
2004	0.866	0.920	0.611	0.997	0.934	0.999	0.988	0.936	1.000	0.742	0.924
2005	0.807	0.916	0.834	0.997	0.933	0.995	0.992	0.946	1.000	0.807	0.977
2006	0.807	0.895	0.786	0.998	0.933	0.998	0.981	0.942	1.000	0.864	0.992
2007	0.806	0.881	0.661	0.997	0.957	0.998	0.998	0.947	0.999	0.836	0.962
2008	0.844	0.896	0.843	0.996	0.956	0.994	0.997	0.957	0.999	0.842	0.975
2009	0.822	0.886	0.667	0.997	0.964	0.999	0.998	0.976	0.999	0.828	0.977
2010	0.820	0.893	0.786	0.995	0.958	0.998	0.986	0.962	0.998	0.820	0.992
2011	0.841	0.875	0.761	0.991	0.951	0.999	0.956	0.942	0.999	0.857	0.993
2012	0.800	0.899	0.727	0.990	0.963	0.998	0.921	0.967	0.993	0.864	0.966
2013	0.848	0.889	0.734	0.996	0.940	0.998	0.952	0.956	0.992	0.824	0.984
2014	0.854	0.884	0.745	0.997	0.964	0.998	0.975	0.959	0.996	0.792	0.978
2015	0.806	0.899	0.744	0.997	0.955	0.999	0.974	0.951	0.996	0.823	0.983
2016	0.843	0.917	0.767	0.997	0.949	0.999	0.988	0.978	0.997	0.818	0.962
2017	0.813	0.929	0.725	0.998	0.939	0.997	0.981	0.965	0.994	0.839	0.979
2018	0.855	0.925	0.691	0.999	0.931	0.999	0.981	0.965	0.992	0.886	0.965
2019	0.871	0.920	0.890	0.999	0.922	0.999	0.969	0.961	0.994	0.933	0.990
2020	0.880	0.928	0.762	0.998	0.946	0.999	0.976	0.970	0.998	0.913	0.967
2021	0.839	0.920	0.931	0.997	0.921	0.996	0.990	0.958	0.997	0.952	0.993
2022	0.928	0.945	0.944	0.998	0.944	0.998	0.989	0.962	0.995	0.915	0.995
2023	0.908	0.941	0.920	0.995	0.934	0.999	0.992	0.979	0.998	0.956	0.969
2024	0.904	0.951	0.962	0.998	0.922	0.996	0.997	0.983	0.995	0.954	0.994

Table 3. Estimated annual historical fleet-specific proportional impact (%) on North Pacific albacore (NPALB) stock using estimates from the 2026 North Pacific albacore (NPALB) stock assessment. Fleet groups described in Table 1. The proportional impact can also be thought of as the fleet-specific share of the SPR shown in Table 2. Each row sums to approximately 100%.

Year	Fleet Group Name										PSDN Misc
	JPLL albtgt	JPLL nontgt	JPPL	USLL	TWLL	KRLL	CNLL	VULL	OTHLL	EPOSF	
1994	24.1	23.0	33.0	0.9	0.1	0.0	0.0	0.0	0.0	16.5	2.4
1995	25.3	22.8	25.4	1.3	6.8	0.0	0.0	0.0	0.0	14.5	3.9
1996	22.9	18.9	26.5	1.2	10.1	0.2	0.0	0.0	0.0	18.8	1.4
1997	23.8	16.0	30.8	1.2	9.3	0.4	0.0	0.0	0.0	16.4	2.0
1998	25.1	18.6	22.7	0.9	11.0	0.2	0.0	0.0	0.0	18.5	2.9
1999	14.1	13.8	45.4	0.9	7.7	0.1	0.1	0.0	0.0	14.2	3.8
2000	24.5	15.5	22.2	0.9	13.0	0.0	0.0	0.0	0.0	20.3	3.5
2001	20.7	15.8	32.4	1.1	11.6	0.1	0.7	0.0	0.1	16.1	1.4
2002	19.7	9.9	39.1	0.4	10.2	0.1	0.5	2.1	0.7	14.6	2.6
2003	18.4	7.7	36.2	0.4	9.1	0.2	1.1	2.5	0.2	22.5	1.7
2004	11.7	6.9	38.7	0.2	5.6	0.1	1.0	5.4	0.0	23.9	6.5
2005	24.8	10.3	21.1	0.3	8.1	0.6	0.9	6.5	0.0	24.8	2.7
2006	24.5	12.8	27.4	0.3	8.0	0.2	2.3	6.9	0.0	16.8	1.0
2007	20.1	11.8	37.8	0.3	4.1	0.2	0.2	5.1	0.1	16.6	3.7
2008	22.6	14.7	22.7	0.6	6.0	0.8	0.4	5.9	0.1	22.9	3.4
2009	19.7	12.2	39.9	0.3	3.7	0.1	0.2	2.5	0.1	18.9	2.4
2010	22.9	13.1	27.8	0.6	5.0	0.2	1.7	4.6	0.2	22.9	0.9
2011	19.0	14.8	29.9	1.0	5.6	0.1	5.0	6.6	0.1	17.0	0.8
2012	22.2	10.7	31.5	1.0	3.8	0.2	8.3	3.4	0.7	14.7	3.5
2013	17.0	12.2	31.5	0.4	6.5	0.3	5.1	4.6	0.8	19.9	1.7
2014	16.8	13.1	31.0	0.3	3.9	0.2	2.8	4.5	0.4	24.7	2.4
2015	22.4	11.2	30.5	0.3	4.8	0.1	2.8	5.2	0.4	20.3	1.9
2016	20.0	10.2	30.8	0.3	6.2	0.1	1.5	2.6	0.3	23.4	4.6
2017	22.3	8.0	34.4	0.2	6.9	0.3	2.1	3.9	0.7	19.0	2.3
2018	17.5	8.8	40.7	0.2	8.1	0.2	2.1	4.0	1.0	13.6	4.0
2019	23.9	14.4	20.1	0.2	14.0	0.2	5.4	7.0	1.1	12.0	1.7
2020	17.9	10.5	37.9	0.3	7.8	0.1	3.4	4.4	0.3	12.8	4.7
2021	32.8	15.7	13.5	0.5	15.5	0.8	2.0	8.0	0.5	9.3	1.4
2022	18.8	14.1	14.5	0.6	14.3	0.6	2.8	9.7	1.1	22.2	1.3
2023	22.7	14.4	19.8	1.1	16.0	0.3	1.9	5.1	0.4	10.7	7.5
2024	28.4	14.3	11.0	0.6	22.8	1.2	1.0	4.7	1.3	13.1	1.6

Table 4. Estimated average historical fleet-specific spawning potential ratio (SPR) and proportional impact (%) on North Pacific albacore (NPALB) stock for the requested historical time periods 2002-2004 and 1999-2015. Estimates are from the 2026 stock assessment and fleet groups are described in Table 1. The proportional impact can also be thought of as the fleet-specific share of the SPRs. The total SPR is the product of the fleet-specific SPRs.

Fleet Group	Average SPR 2002-2004	Average proportion of SPR 2002-2004 (%)	Average SPR 1999-2015	Average proportion of SPR 1999-2015 (%)
JPLLalbtgt	0.839	16.3	0.827	19.8
JPLLnontgt	0.917	8.1	0.892	12.0
JPPL	0.657	38.1	0.729	32.6
USLL	0.996	0.4	0.995	0.6
TWLL	0.917	8.1	0.938	6.8
KRLL	0.999	0.1	0.998	0.2
CNLL	0.990	0.9	0.982	1.9
VULL	0.964	3.5	0.965	3.8
OTHLL	0.997	0.3	0.998	0.2
EPOSF	0.801	20.5	0.830	19.4
PSDNMisc	0.961	3.8	0.975	2.7
Total	0.337	100.0	0.383	100.0