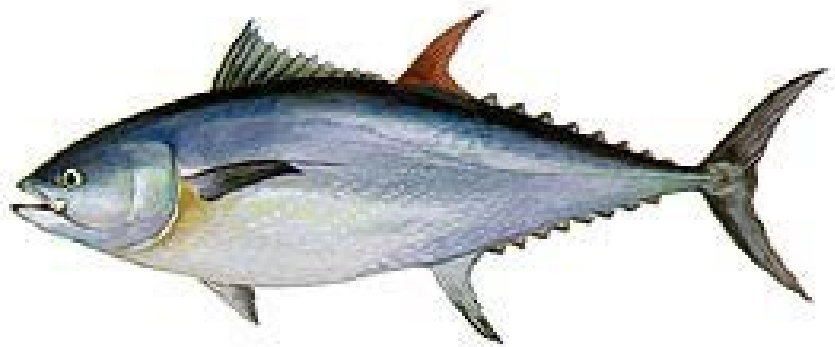
IATTC SAC 17 Agenda 7. a (Document SAC-15 INF-Ha, Hb, Hc)
2025-26 ISC PBFWG activity



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(ISC PBFWG, Japan FRA)

Acknowledgement

❖ All works done by the ISC PBFWG in 2025–26 were team efforts of following members;

- S. Nakatsuka (WG chair)
- S.K. Chang (WG vice chair)
- H.W. Park, J.H. Park (Korea)
- M. Dreyfus-Leon, M. Betancourt (Mexico)
- H.H. Lee, D. Tommasi (U.S.A.)
- N. Takahashi, Y. Tsukahara, K. Nishikawa, H. Fukuda (Japan)
- M. Maunder, R. Bi (IATTC)

The WG appreciated to the IATTC to advance their dedicated scientists to support the assessment works at the ISC.

Topics – 2025-26 ISC PBFWG activity

1. Background information
   - 1.1 Review of the previous PBF assessment
   - 1.2 Review of PBF Management Strategy Evaluation (MSE) and Management Procedure (MP)

2. Scientific works in 2025-26 regarding the MSE and MP
   - 2.1 Revision of TAC-1
   - 2.2 Quick Evaluation on Newly proposed MP candidate (Newport Beach Proposal)
   - 2.3 Criteria for identifying Exceptional Circumstances for PBF MP
   - 2.4 Update of abundance index and recruitment index

3. Peer-review of the 2024 ISC PBF stock assessment

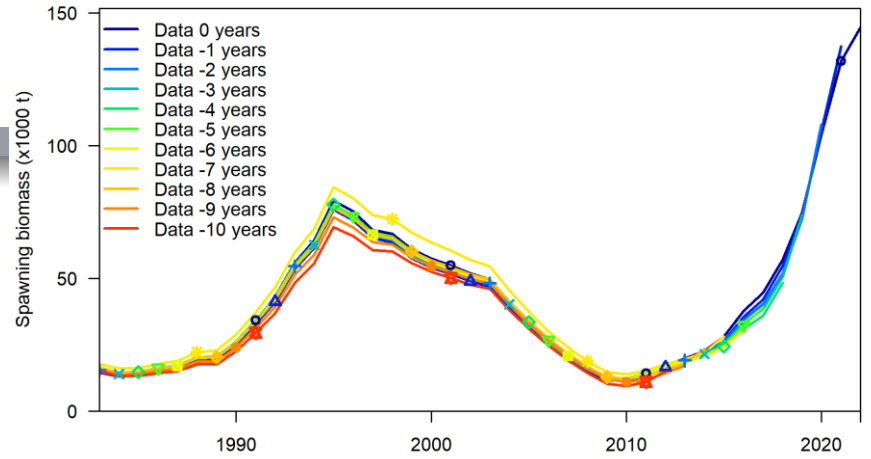
1 Review of PBF stock assessment, MSE, MP

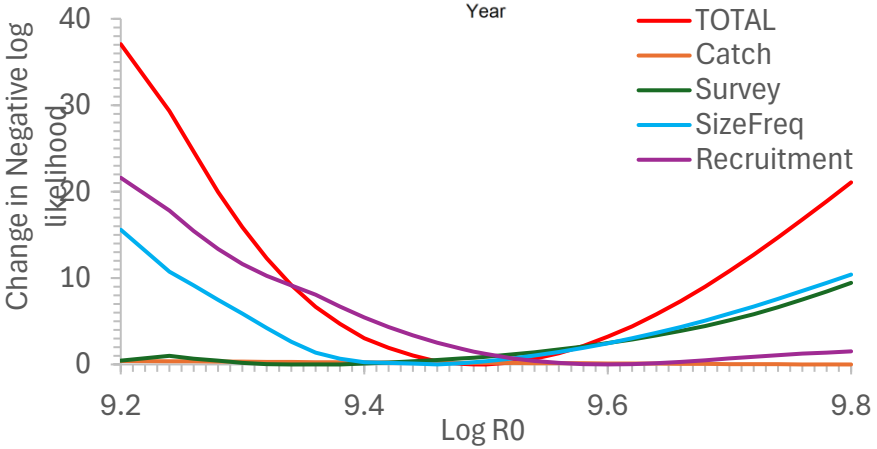
Latest stock assessment of PBF

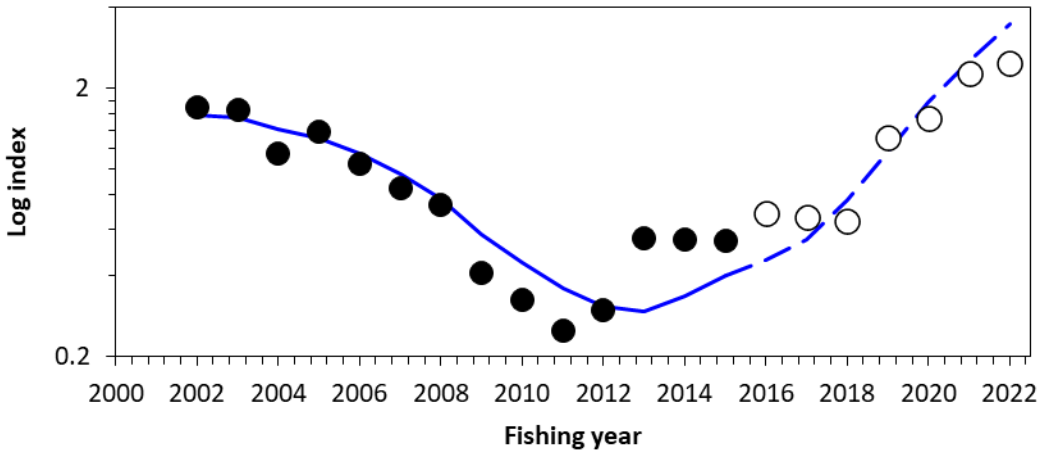
- 2024 PBF stock assessment
  - Benchmark stock assessment
  - Stock Synthesis v 3.30
  - Data period: July 1983 to June 2023
  - Catch, CPUE based index, size comp.

- Highlights of the 2024 PBF stock assessment
  - Improved retrospective pattern
  - Internal consistency
  - High prediction skill

The assessment report was reviewed by ISC24, IATTC SAC15, and WCPFC SC21, and considered by the commissions as a basis of the current conservation and management measures, which were adopted in 2024.



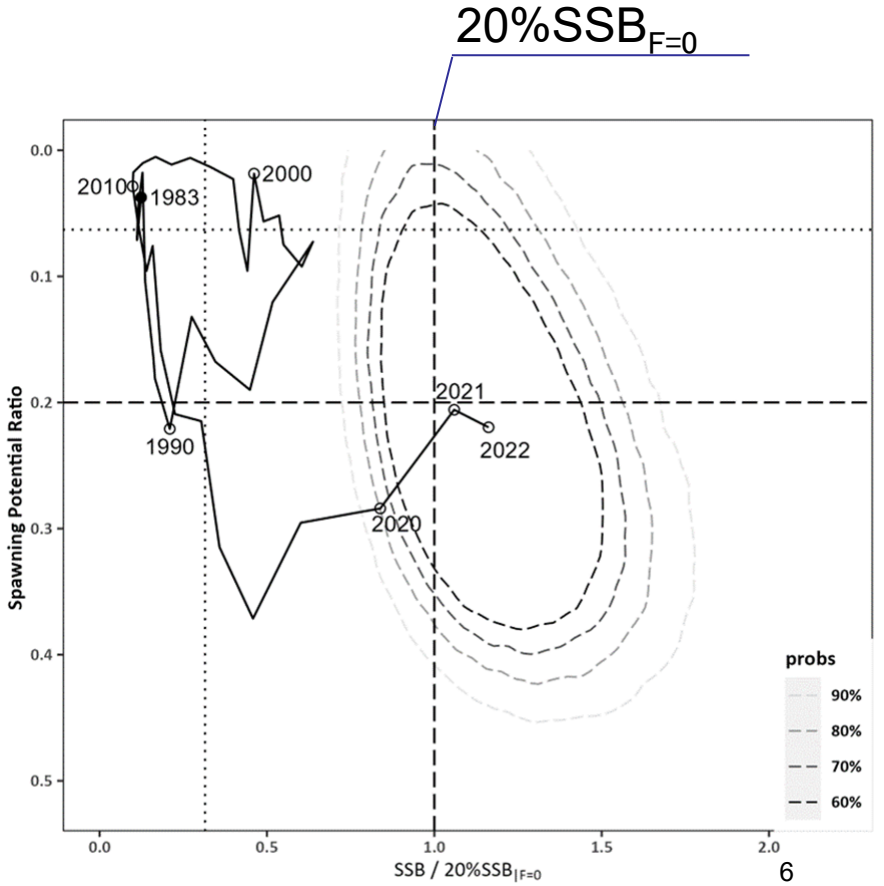




Stock Status

PBF spawning stock biomass (SSB) has increased substantially in the last 12 years. These biomass increases coincide with a decline in fishing mortality, particularly for fish aged 0 to 3, over the last decade. The latest (2022) SSB is estimated to be 23.2% of $SSB_{F=0}$ and the probability to be above $20\%SSB_{F=0}$ is 75.9%. Based on these findings, the following information on the status of the Pacific bluefin tuna stock is provided:

1. No biomass-based limit or target reference points have been adopted for PBF, but the PBF stock is not overfished relative to $20\%SSB_{F=0}$, which has been adopted as a biomass-based reference point for some other tuna species by the IATTC and WCPFC. SSB of PBF reached its initial rebuilding target in 2017, 7 years earlier than originally anticipated by the RFMOs, and its 2nd rebuilding target ($20\%SSB_{F=0}$) in 2021;
2. No fishing mortality-based reference points have been adopted for PBF by the IATTC and WCPFC. The recent (2020-2022) F%SPR is estimated to produce a fishing intensity of 23.6%SPR and thus the PBF stock is not subject to overfishing relative to some of F-based reference points proposed for tuna species, including SPR20%.



PBF Management Strategy Evaluation Package (Tommasi and Lee, 2022)

2024 Stock Assessment Data

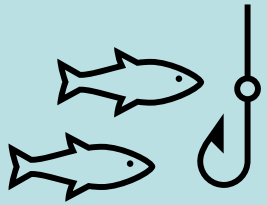
Conditioning

Closed Loop Simulation (SS and R)

- 23 years (3 generations)
  - Recruitment variation

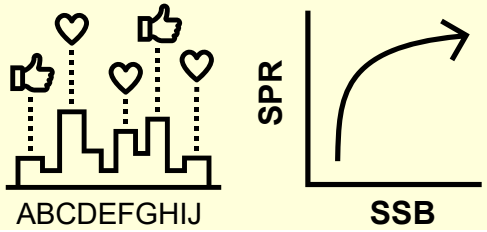
Simulated "True" Population (Fully integrated model)

- Population Dynamics (20 OM)
  - Steepness
  - M
  - Growth
- Fishery Dynamics
  - Fishery removal (TAC)
  - True Discards



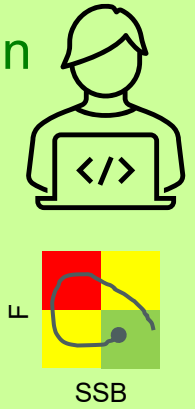
Data generation (Observation error)

TAC and Allocation



Estimation Model (ASPM-R+)

- A single dynamics assumption
  - Same assumption w/ SA
- Fishery Dynamics
  - HCR based TAC
  - Assumed Discards



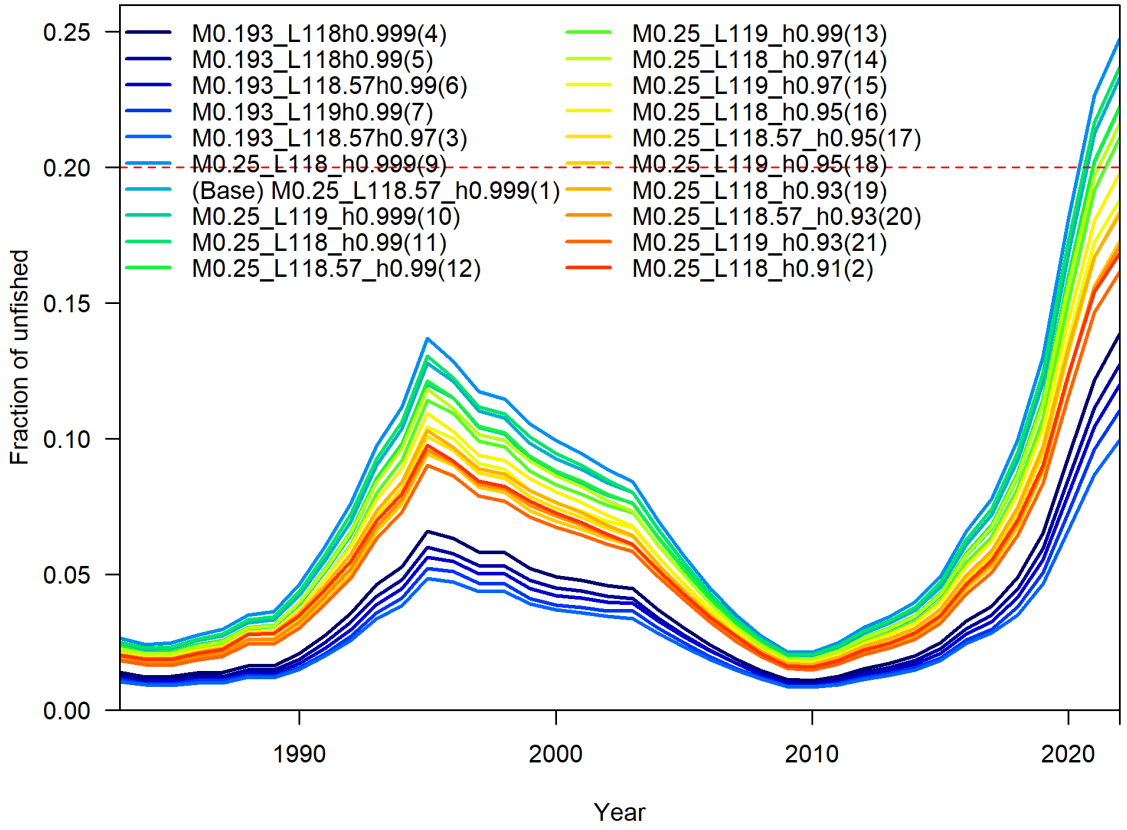
Performance Metrics ⟷ **Management Objective**

Uncertainty Considered

Management Strategy Evaluation

- Process error
  - ✓ 20 OM ⇔ 1 EM
    - Natural mortality (2)
    - Steepness (6)
    - Growth (3)
    - Effort Creep in Taiwan LL CPUE (Robustness test)
  - ✓ Random Recruitment variation
  - ✓ Consecutive Recruitment drops for 10 years (Robustness test)
- Observation error
  - ✓ Data generation with random observation error by OM for EM stock assessment.
- Implementation error
  - ✓ True Discard > Assumed Discard (Robustness test)

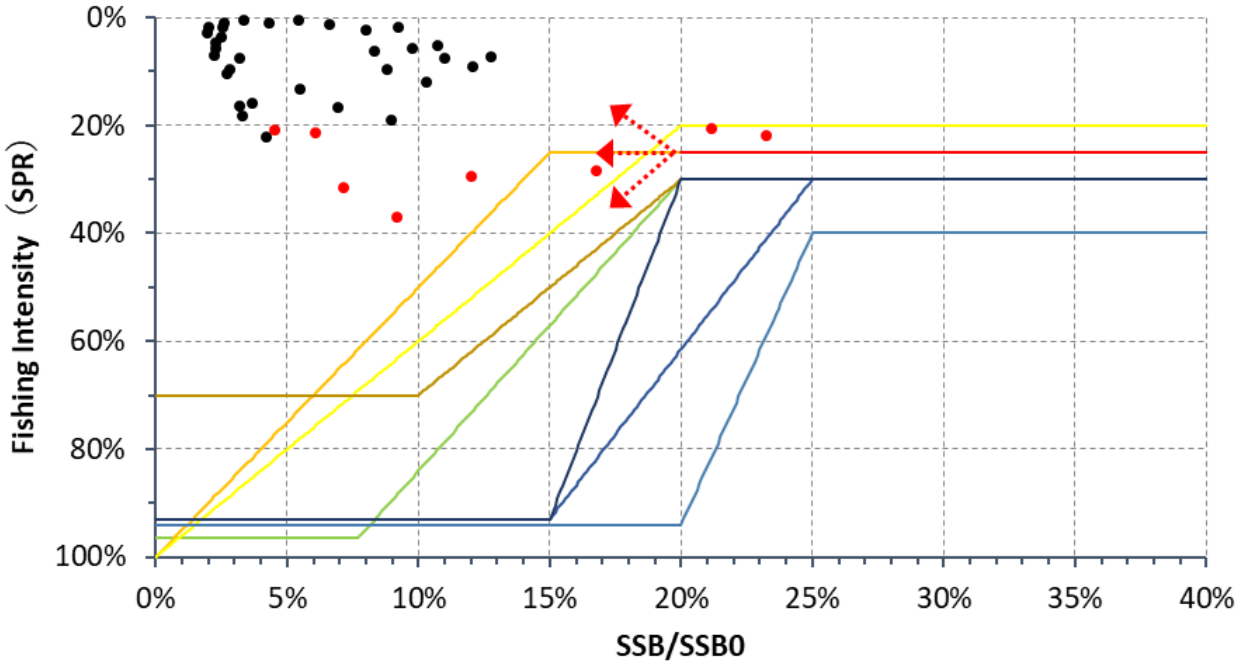
Operating Model (Lee and Tommasi, 2024)

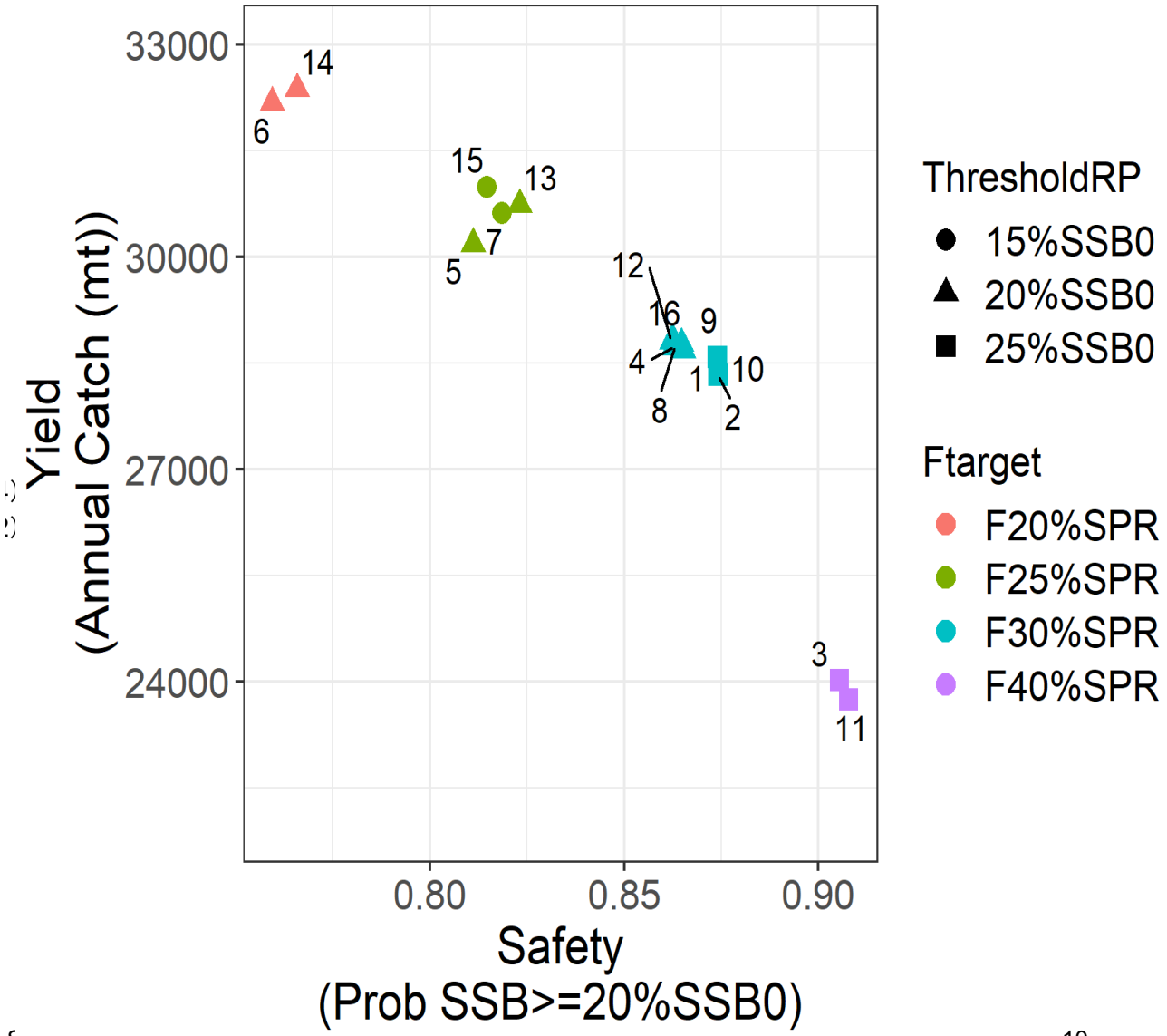


OM	M	Length $_{age3}$	Steepness
1	0.25	118.57	0.999
2	0.25	118	0.91
3	0.193	118.57	0.97
4	0.193	118	0.999
5	0.193	118	0.99
6	0.193	118.57	0.99
7	0.193	119	0.99
8	0.193	118	0.97
9	0.25	118	0.999
10	0.25	119	0.999
11	0.25	118	0.99
12	0.25	118.57	0.99
13	0.25	119	0.99
14	0.25	118	0.97
15	0.25	119	0.97
16	0.25	118	0.95
17	0.25	118.57	0.95
18	0.25	119	0.95
19	0.25	118	0.93
20	0.25	118.57	0.93
21	0.25	119	0.93

HCR and Performance evaluation

HCR	Target F	Threshold RP	Limit RP	F_{min}
1, 9	FSPR30%	$20\%SSB_0$	$15\%SSB_0$	$10\%F_{target}$
2, 10	FSPR30%	$25\%SSB_0$	$15\%SSB_0$	$10\%F_{target}$
3, 11	FSPR40%	$25\%SSB_0$	$20\%SSB_0$	$10\%F_{target}$
4, 12	FSPR30%	$20\%SSB_0$	$10\%SSB_0$	FSPR70%
5, 13	FSPR25%	$20\%SSB_0$	NA	Constant Catch CMM2021-02 C-21-05
6, 14	FSPR20%	$20\%SSB_0$	NA	NA
7, 15	FSPR25%	$15\%SS_0$	NA	NA
8, 16	FSPR30%	$20\%SSB_0$	$7.7\%SSB_0$	$5\%F_{target}$





2 Scientific works in 2025-26 regarding the MSE and Management Procedure

Revision of MP-TAC

MP	Method to obtain Fs to calculate future TACs of each fleet		
	MSE simulation	2025 MP-TAC calculate	Revision this time
MP1-8 (80:20 WCPO: EPO Fishery impact ratio)	Average F during 2015-2022 calculated by the ASPM-R+, which was updated every three years in the simulation.	Average F2015-2022 calculated by the updated ASPM-R+.	No revision
MP9-16 (70:30 WCPO: EPO Fishery impact ratio)	Average F2015–2022 with an additional multiplier from the preliminary analysis to maintain a 70:30 WCPO–EPO fishery impact ratio.	Same F2015–2022 with that used in the MSE simulation	Average F during 2015-2022 calculated by the updated ASPM-R+ with an additional multiplier to maintain a 70:30 WCPO-EPO fishery impact ratio.

Inconsistency

Consistent

Same

Revision of MP-TAC

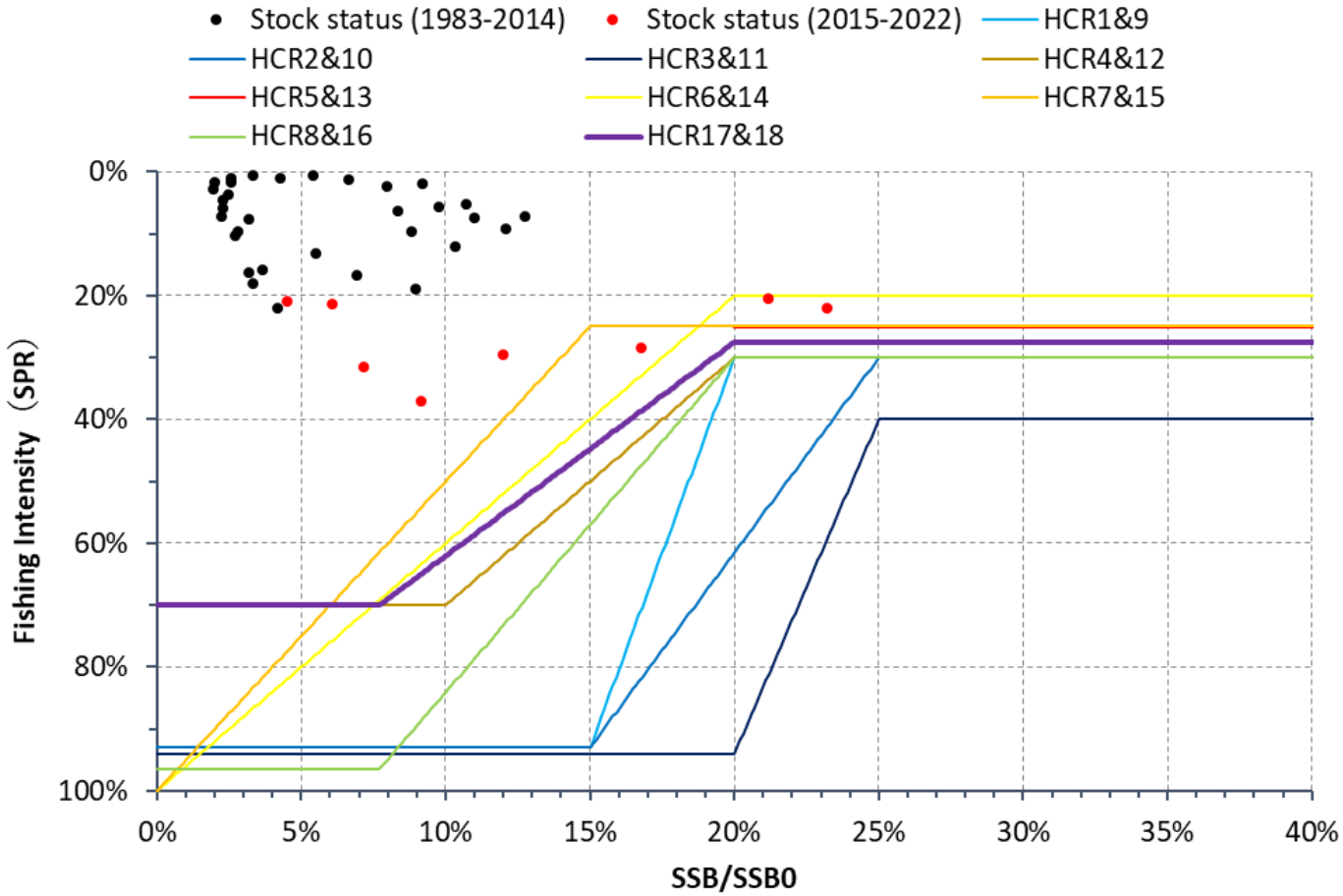
Performance Indicators

Reference Set

	Prob SSB => LRP	Prob SSB => 20%SSBo	Prob F <= Ftarget	Prob SSB => SSBtarget	% change TAC +	% change TAC -	EPO Impact	Median annual catch	Median years 5-10 annual catch	Median years 11-23 annual catch	Median WCPO large fish annual TAC	Median WCPO small fish annual TAC	Median EPO annual TAC	2026 TAC	2026 TAC WCPO large fish	2026 TAC WCPO small fish	2026 TAC EPO
1	93	87	81	62	-14	-11	23	28685	26744	31094	16174	4093	6794	25868	14836	4512	6520
2	94	87	84	64	-15	-14	23	28330	26054	30691	15618	4069	6794	25868	14836	4512	6520
3	91	91	85	56	-17	-9	24	24026	21135	26361	13472	3346	5971	24366	14836	3844	5686
4	99	86	80	61	-13	-11	23	28722	26745	31124	16221	4102	6794	25868	14836	4512	6520
5	100	81	78	66	-13	-12	22	30183	28894	32227	16965	4617	7054	27485	14836	5161	7488
6	99	76	79	76	-14	-14	22	32174	31286	34249	18243	5063	7609	29437	14836	5939	8662
7	100	82	79	67	-13	-11	23	30616	28940	32814	17330	4557	7192	27485	14836	5161	7488
8	100	86	80	61	-14	-11	23	28741	26746	31127	16222	4101	6794	25868	14836	4512	6520
9	93	86	83	63	-13	-10	32	28773	26503	30537	13378	3722	10528	28156	14836	3844	9476
10	93	87	85	65	-16	-12	32	28582	25973	30368	13242	3722	10433	28156	14836	3844	9476
11	91	91	86	56	-16	-8	32	23748	21378	26147	10877	3023	8632	25451	13031	3844	8576
12	99	86	82	62	-12	-10	33	28812	26505	30572	13414	3722	10568	28156	14836	3844	9476
13	100	82	81	68	-13	-12	30	30735	29380	31768	14567	4160	11175	28674	14836	4362	9476
14	99	77	81	77	-15	-13	31	32369	32077	33617	15040	4592	11323	29335	14836	5023	9476
15	100	81	80	67	-12	-10	32	30988	29413	32137	14567	4108	11323	28674	14836	4362	9476
16	100	86	82	62	-12	-10	33	28826	26507	30582	13413	3722	10565	28156	14836	3844	9476

Newport beach proposal (NPB proposal)

- March 2026 IATTC-WCPFC NC PBF JWG intersessional meeting 03
  - Joint proposal on New MP candidate
    - TRP: F27.5%SPR
    - Control point 1: 20%$SSB_{F=0}$
    - Control point 2: 7.7%$SSB_{F=0}$
    - Fmin: F70%SPR
    - MP update cycle: 2 years
    - WCPO:EPO impact ratio
      - ✓ 80:20 (MP 17)
      - ✓ 70:30 (MP 18)
- Evaluation of performance
  - No formal MSE for the NPB proposal yet.
  - Performance metrics may fall between those of MP7 and MP8.
  - Upon adoption of the MP, ISC will conduct the formal MSE.



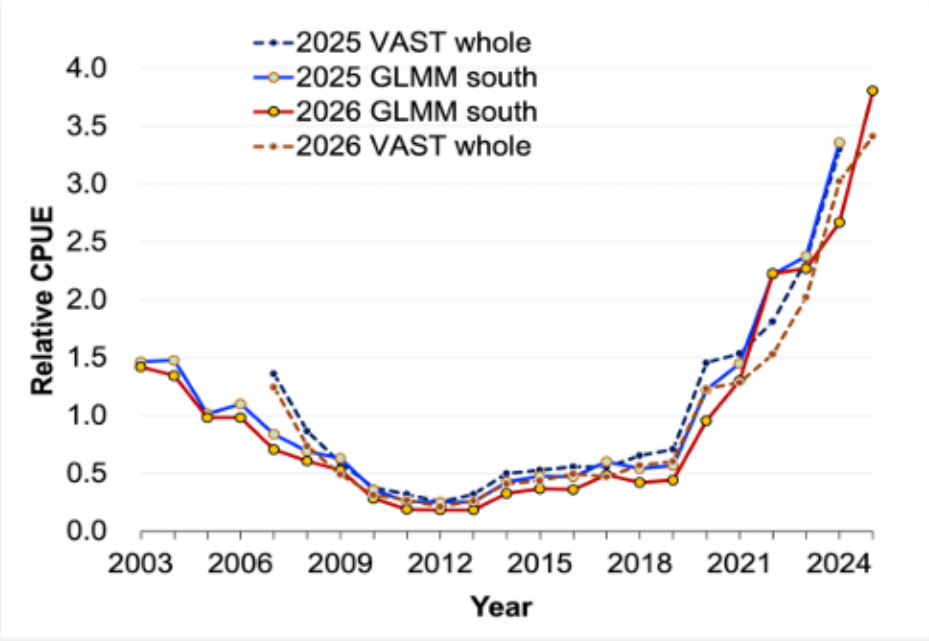
Exceptional circumstance protocol

Element	Indicator	Range	Evaluation Schedule
Stock and Fleet Dynamics	Depletion of stock biomass	In any year estimates fall outside the range of uncertainty simulated by the operating models (OMs) used in the MSE.	EM update or stock assessment
	Fishing intensity ($F_{\%SPR}$) where SPR is the spawning potential ratio		
	Longline CPUE	In any year estimates fall outside the range of uncertainty simulated by the MSE.	Every year when CPUE is updated.
	Changes in fleet dynamics or selectivity	Any substantial differences from the structure and parameterization used in the OMs of the most recent MSE	As new evidence and research is presented and accepted by the PBFWG
	Biological parameters		
	Recruitment drop	Recruitment index shows low trend persistently.	Every year when CPUE is updated.
Application	EM or Stock assessment	EM or Stock assessment is not producible or estimates are unreliable.	EM update or stock assessment
Implementation	Realized catch or effort	If there is evidence that catch or effort outside of management, such as discard mortality or by new fleets, is greater than assumed in the MSE.	As new evidence and research is presented and accepted by the PBFWG

Update of abundance index

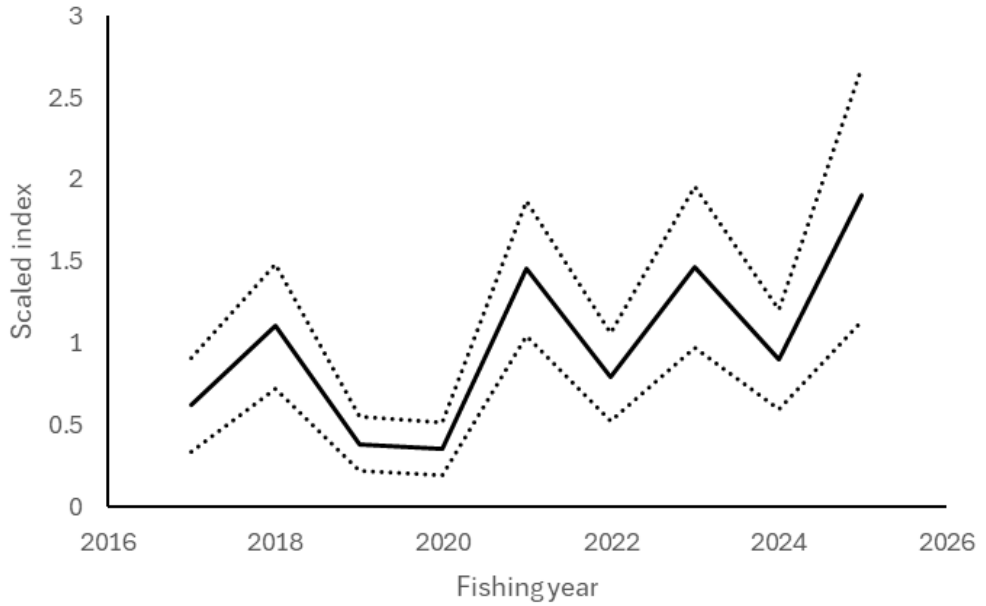
Large adult abundance index

- ✓ Standardized Taiwanese longline CPUE.
- ✓ 200 cm or larger PBF was caught.
- ✓ Both GLMM and VAST models showed a good recovery of PBF, as expected in the projection.



Recruitment monitoring index

- ✓ Real-time monitoring of troll vessel.
- ✓ About 300 commercial and chartered operations per year.
- ✓ Spatial and temporal standardization.
- ✓ No indication of serious recruitment decline in recent years.



3 External peer review on the ISC PBF stock assessment

External peer review on the ISC PBF stock assessment

- In-person review meeting (open-public)
  - March 2026 at Hokkaido university (Japan)
- Main objective
  - Review the 2024 benchmark assessment and making advices to improve future assessments.
- Review panel team
  - R. Ahrens (Review meeting chair)
  - A. Hicks (Halibut commission)
  - S.P. Wang (National Taiwan Ocean Univ.)
  - T. Shimose (Iwate Univ.)
- TOR
  - Biological assumption, Data, Model configuration, Model diagnostics and result, Future research priority, Reporting and transparency.
- Peer review process
  - The ISC received peer-review report in April 2026.
  - We acknowledge that funding for this peer review process was provided by the United States.

Recommendation from the review panel

❖ Overall conclusions

The Panel finds that the assessment is generally well-constructed, employs appropriate diagnostic tools with significantly improved retrospective patterns, and provides a defensible characterization of recent stock trends. The hindcasting skill of the model is commendable, and the transparency with which the PBFWG has documented methodological decisions and identified unresolved issues is appreciated.

❖ Two major topics to improve the future PBF assessments

- Improving the characterization of growth, including variability of length-at-age.
- The development of a recruitment index would greatly benefit the PBF assessment.

❖ Other recommendations

- Re-examine weight-length relationship, More explicit *M* uncertainty, Environmental effect on Recruitment.
- Twn LL index and management effect, Re-evaluation of data quality, Improve discard assumption.
- Multi-recruitment settlement framework, Optimize the selectivity parameter and fleet structure.
- One-step ahead (OSA) residuals, A comprehensive and rigorous formal sensitivity analysis.
- Recruitment monitoring and Fishery-independent surveys, CKMR, VAST, Pan-Pacific biological sampling.
- Reduce purely technical presentation for decision-oriented audiences.

Those recommendations will be considered and addressed as part of the 2027 and 2030 stock assessment processes.