

Summary of North Pacific Albacore Harvest Strategy Meeting
April 5, 2022
Virtual

NOAA Fisheries
Pacific Islands Regional Office
And
West Coast Region

Background

On April 5, 2022, NOAA Fisheries Pacific Islands Regional Office and West Coast Region hosted a virtual meeting to gather U.S. stakeholder input on a North Pacific albacore (NPALB) harvest strategy for the Inter-American Tropical Tuna Commission (IATTC) and Western and Central Pacific Fisheries Commission (WCPFC). Additional information on the background and content of the meeting, and slides presented during the webinar are included in Appendices I and II, respectively. In particular, NOAA Fisheries asked the following questions to participants:

Regarding management objectives:

1. Is the current WCPFC interim management objective satisfactory, or do you have any suggested changes?
2. Should the IATTC adopt similar management objectives for NPALB?
3. Are any objectives evaluated in the management strategy evaluation (MSE) more important to you than others?

Regarding limit reference points (LRPs):

1. What are important factors for the United States to consider in reviewing the LRP for NPALB?
2. Do you support retaining the LRP of 20% unfished spawning stock biomass (SSB_0) in the WCPFC? If not, what LRP would you prefer? Based on the candidate LRPs evaluated in the MSE, is there an LRP that you do not support? Do you support the IATTC adopting the same LRP?
3. What level of risk of breaching the LRP would you support?

Regarding target reference points (TRPs):

1. What are important factors for the United States to consider in proposing a TRP for NPALB?
2. Should the United States advocate a TRP for F40, F50, or another level?

Regarding the process and next steps:

1. The NC adopted a stepwise approach to further develop the harvest strategy for North Pacific albacore fisheries. Do you support focusing on adoption of a TRP and review of an LRP for 2022 (adoption of LRP in the IATTC)? Do you still support this schedule? Are there additional elements of the harvest strategy that you would like addressed in 2022 or 2023?
2. Do you have suggestions on how to coordinate approaches on developing harvest strategies in the WCPFC and IATTC?

Comments received on April 5

In general, participants supported the IATTC and WCPFC having comparable harvest strategies, including the same objectives, reference points, and harvest control rules.

On management objectives:

Participants suggested that the WCPFC objective be revised using the objectives identified through the stakeholder process and tested in the MSE (see Slide 12 in Appendix II). The objectives tested in the MSE are:

1. Maintain SSB above the LRP.
2. Maintain depletion of total biomass around historical (2006-2015) average depletion.
3. Maintain catches above average historical (1981-2010) catches.
4. The change in catch between years should be relatively gradual.
5. Maintain fishing intensity at the target value with reasonable variability.

In 2021, NOAA Fisheries hosted a meeting to solicit input on the MSE results and participants had identified three objectives as particularly important. During this April 1, 2022, meeting, participants generally supported those objectives and their order of importance (See Slide 13 in Appendix II):

1. Status: maintaining fishing mortality around the target reference point.
2. Safety: maintaining SSB above the LRP.
3. Changes in total allowable catch between years should be gradual.

Some participants also suggested that objectives could be improved by adding percent likelihoods or probabilities.

On limit reference points:

In general, the majority of participants expressed support for either an LRP of 14%SSB₀ or 20%SSB₀. There was general support that an LRP chosen by the RFMOs should be more conservative than domestic laws to avoid a scenario in which the U.S. fleet is constrained while the remainder of the international fleet is not. Also, while the LRP chosen may be one of those tested in the MSE or somewhere in between and informed by the MSE, a participant noted that

because the information about the reference points tested is strongest, the reference points chosen should be one of those (e.g., 7.7%, 14%, or 20% SSB₀).

In support of an LRP of 20%SSB₀, participants noted that management measures taken as a result of breaching the LRP would affect other countries more because the United States takes approximately 10% of the NPALB harvest; that it would be better to have 20% SSB₀ because the eastern Pacific Ocean (EPO) fisheries fish on recruitment that impacts the SSB; and that unless there is an observed decline in stock recruitment related to decline in biomass, a more conservative reference point may be warranted. On the other hand, participants noted that 20%SSB₀ seems extremely conservative and that fisheries wouldn't want to be unnecessarily constrained as catchability increases, recognizing that the juvenile output for surface fisheries is hard to predict and not well represented by biomass due to catchability issues; and that the assessment shows there is a strong enough recruitment even with an LRP lower than 20%SSB₀. As mentioned above, the majority of participants expressed comfort with an LRP of 14% or 20%SSB₀; one commenter suggested lower reference points such as 10%SSB₀ or 7%SSB₀.

Participants recognized that the risk of breaching the LRP should be low, but noted that the risk level could depend on the threshold reference point chosen. As noted in the background materials (Appendix I), NOAA Fisheries did not focus on the threshold reference point at this meeting.

On target reference points:

Similar to a comment on LRPs, it was suggested that a TRP chosen be one of those tested in the MSE. In particular, either F40 or F50 because both appeared to achieve the conservation target. However, it was recognized that if F50 was chosen, it may be economically threatening to the EPO fisheries because new fishing opportunities may be afforded in the WCPO. A participant noted that F40 would be preferred provided the threshold reference point was appropriately placed to reduce the risk of breaching the LRP.

On process and next steps

Participants supported proposing a harvest strategy at both RFMO's this year, beginning with the IATTC. Additionally, some participants suggested proposing a full harvest strategy, not just objectives, LRP and TRP, because, at a minimum, this would socialize concepts if members are not ready to adopt a HS yet.

NOAA Fisheries is planning to prepare a draft proposal to the IATTC and will be soliciting comments from the Pacific Fishery Management Council at its June 2022 meeting (see https://www.pcouncil.org/council_meeting/june-7-14-2022-council-meeting/), and the upcoming meetings of the General Advisory Committee to the U.S. Section to the IATTC and the Permanent Advisory Committee to the U.S. Section to the WCPFC.

Additional comments received:

Additional comments were received that were not specifically associated with one of the topics above. Participants indicated that effort-based management is best for U.S. EPO fisheries (i.e., troll fisheries). A participant requested information on NPLAB catch by country and, if available, age class of catch. See Table 1 (next page) for NMFS' response.

Table 1. Annual estimated female spawning stock biomass (SSB), dynamic unfished SSB ($SSB_{F=0}$), and catches of juvenile and adult albacore by aggregated fleets from the 2020 stock assessment of north Pacific albacore tuna in metric tons for 1999 - 2018. JPLL = Japan longline; JPPL = Japan pole-and-line; USLL = US longline; EPOSF = US and Canada Surface; TWLL = Taiwan Longline ; CNLL = China Longline; VULL = Vanuatu and Others Longline; and OTH = Other fleets and gears. Note that the catches are only approximate due to conversions from estimated catch-at-age in numbers to weight.

Year	$SSB_{F=0}$	SSB	JPLL Adult	JPLL Juvenile	JPPL Adult	JPPL Juvenile	USLL Adult	USLL Juvenile	EPOSF Adult	EPOSF Juvenile	TWLL Adult	TWLL Juvenile	CNLL Adult	CNLL Juvenile	VULL Adult	VULL Juvenile	OTH Adult	OTH Juvenile
1999	155,006	81,895	23,454	10,063	1,698	48,671	1,441	112	1,960	15,161	4,668	3,518	136	6	2	1	148	8,154
2000	148,840	67,893	21,631	8,019	855	20,695	904	52	1,027	15,322	5,060	2,838	26	1	5	4	25	3,332
2001	142,535	61,536	20,398	7,804	1,757	27,659	1,272	33	1,482	17,146	4,402	3,450	214	224	32	38	67	1,616
2002	136,354	55,030	14,708	10,159	448	48,007	511	13	1,144	17,670	3,707	3,348	234	146	859	1,160	118	4,609
2003	130,776	54,971	11,938	9,458	218	35,896	510	15	1,780	21,624	2,989	3,465	624	198	819	1,104	139	1,835
2004	142,070	62,896	10,344	6,523	484	31,771	344	17	2,796	20,316	2,201	1,860	692	154	2,269	2,212	167	8,038
2005	146,584	59,876	12,092	8,052	43	16,090	278	18	840	14,383	2,148	1,842	422	40	1,736	1,482	411	2,009
2006	145,342	59,584	12,439	8,740	617	14,783	251	19	1,547	17,425	1,960	1,888	692	337	1,616	1,672	134	1,142
2007	140,477	58,027	11,794	10,980	1,714	36,054	318	25	965	17,568	1,243	1,222	74	30	1,524	1,716	160	6,477
2008	137,521	57,404	10,715	8,362	89	18,971	322	61	1,380	16,275	1,199	1,290	114	74	1,297	1,555	404	3,036
2009	149,750	71,946	13,032	9,079	3,029	28,143	259	42	2,404	16,628	1,094	772	96	7	873	804	117	2,689
2010	153,638	71,887	14,652	6,681	2,735	16,873	430	45	1,271	17,839	1,314	967	871	39	1,324	1,169	107	1,021
2011	148,095	68,172	14,614	7,114	1,590	24,114	701	108	1,413	14,575	1,651	1,321	2,722	117	2,048	1,576	83	1,060
2012	140,834	64,754	14,438	9,516	4,614	29,159	840	93	1,163	16,708	1,041	1,014	4,943	313	1,312	1,312	173	4,991
2013	138,686	59,904	13,245	7,854	4,378	29,198	334	31	1,473	16,771	1,900	1,936	3,036	219	1,802	1,652	182	2,543
2014	137,901	57,602	13,325	8,262	2,940	26,493	237	24	1,587	17,686	1,193	1,109	1,626	134	1,701	1,615	123	2,432
2015	137,158	55,930	14,473	8,356	260	20,065	289	19	1,563	15,360	1,437	1,192	1,480	243	2,142	1,684	45	1,598
2016	132,183	54,313	10,426	6,398	56	14,379	258	14	938	13,357	1,212	1,184	564	120	833	739	78	3,985
2017	124,349	52,466	10,361	7,081	106	20,785	117	13	752	8,895	959	1,027	841	128	981	1,161	202	1,569
2018	127,867	58,858	9,487	3,844	46	17,554	83	23	1,277	9,347	1,002	861	776	70	1,066	876	124	3,084

Appendix I

Reference Points and the Harvest Strategy for North Pacific Albacore Fisheries

INTRODUCTION

[North Pacific Albacore Stock and Management in the Regional Fishery Management Organizations \(RFMOs\)](#)
[Management Strategy Evaluation](#)

HARVEST STRATEGIES

[What is a Harvest Strategy According to the RFMOs?](#)
[WCPFC](#)
[IATTC](#)

[Harvest Strategy Development in the WCPFC and IATTC](#)

[WCPFC](#)
[IATTC](#)

[Management Objectives](#)

[Reference Points](#)

[General Information](#)

[WCPFC General Information on Reference Points](#)
[IATTC General Information on Reference Points](#)
[Reference Points tested in the NP ALB MSE](#)

[Limit Reference Points](#)

[WCPFC LRP](#)
[IATTC LRP](#)
[International Commission for the Conservation of Atlantic Tunas and Indian Ocean Tuna Commission LRPs](#)
[Fishery Management Plan for U.S. West Coast Fisheries for Highly Migratory Species \(HMS FMP\) and Fishery Ecosystem Plan for Pelagic Fisheries of the Western Pacific Region \(Pelagics FEP\) LRP](#)
[LRPs evaluated in the MSE](#)
[Implications of Different LRPs](#)

[Target Reference Points](#)

[HMS FMP and Pelagics FEP](#)
[Implications of Different TRPs](#)

[Next Steps](#)

[Resources](#)

1. INTRODUCTION

1.1. North Pacific Albacore Stock and Management in the Regional Fishery Management Organizations (RFMOs)

The North Pacific albacore (NP ALB) stock is assessed as a single stock in the Pacific Ocean that crosses the boundary between both the Inter-American Tropical Tuna Commission (IATTC) and Western and Central Pacific Fisheries Commission (WCPFC) Convention Areas. The most recent [NP ALB stock assessment](#) indicates the stock is likely not overfished or subject to overfishing.¹ The WCPFC and IATTC have adopted similar effort controls (WCPFC [CMM 2019-03](#) and IATTC resolutions [C-05-02](#) and [C-18-03](#)).

1.2. Management Strategy Evaluation

The International Scientific Committee for Tuna and Tuna-Like Species (ISC) conducted a management strategy evaluation (MSE) for NP ALB from 2015-2021, which evaluated the performance of various candidate reference points against several management objectives.²

After receiving results of the MSE from the ISC, the WCPFC Northern Committee (NC) revised its work plan in 2021 to further develop components of the harvest strategy for NP ALB fisheries. Specifically, NC tasked itself to consider retention or modification of the limit reference point (LRP) and consider adoption of a target reference point (TRP) based on the MSE results in 2022, and to further development of the harvest strategy including establishment of a harvest control rule and a threshold reference point in 2023. The ISC briefed the IATTC Scientific Advisory Committee on the results of the MSE for the IATTC's consideration.

2. HARVEST STRATEGIES

2.1. What is a Harvest Strategy According to the RFMOs?

2.1.1. WCPFC

In 2014, the WCPFC adopted [Conservation and Management Measure \(CMM\) 2014-06](#) on establishing a harvest strategy for key fisheries and stocks in the western and central Pacific Ocean. This CMM described general provisions and principles for harvest strategies, identified

¹ The stock is likely not overfished relative to the limit reference point adopted by the Western and Central Pacific Fisheries Commission ($20\%SSB_{current, F=0}$), and no F-based reference points have been adopted to evaluate overfishing. Stock status was evaluated against seven potential reference points. Current fishing intensity ($F_{2015-2017}$) is likely at or below all seven potential reference points.

² [ISC NP ALB MSE Report \(2021\)](#)

six elements harvest strategies should contain, and for NP ALB, tasked the NC to develop and recommend a work plan and harvest strategy for the WCPFC's consideration.

CMM 2014-06 states, "A harvest strategy is a framework that specifies the pre-determined management actions in a fishery for defined species (at the stock or management unit level) necessary to achieve agreed biological, ecological, economic and/or social management objectives."

CMM 2014-06 also describes six elements that should be included in a harvest strategy where appropriate and these elements are as follows:

1. *Defined operational objectives, including timeframes, for the fishery or stock ('management objectives')*
2. *Target and limit reference points for each stock ('reference points')*
3. *Acceptable levels of risk of not breaching limit reference points ('acceptable levels of risk')*
4. *A monitoring strategy using best available information to assess performance against reference points ('monitoring strategy')*
5. *Decision rules that aim to achieve the target reference point and aim to avoid the limit reference point ('harvest control rules')*
6. *An evaluation of the proposed harvest control rules against management objectives, including risk assessment ('management strategy evaluation')*

2.1.2. IATTC

The IATTC has not developed a prescribed approach to harvest strategies. However, it has considered harvest strategies for tropical tunas and this paper includes some information from discussions related to tropical tunas in subsequent sections.

3. Harvest Strategy Development in the WCPFC and IATTC

3.1. WCPFC

Based on recommendations from the 10th Regular Session of the NC (NC10) and NC14, the WCPFC adopted a precautionary management framework for NP ALB in 2014, and renamed the framework as an interim harvest strategy for NP ALB fisheries in 2017 (see <https://www.wcpfc.int/harvest-strategy> for information on harvest strategies adopted by the WCPFC).

While the current interim harvest strategy for NP ALB fisheries does contain several of the six elements outlined in CMM 2014-06, this harvest strategy could be improved through enhancements to existing elements and adoption of other elements that are not currently

included. As mentioned above, the focus for 2022 of the NC Work Programme is to review the LRP and to adopt a TRP for NP ALB (More details on reference points may be found in [Section 5](#)).

3.2. IATTC

The IATTC has not developed a harvest strategy for NP ALB. Resolution C-05-04 establishes effort limits for fisheries that fish for NP ALB.

Consistent with feedback from stakeholders received by NMFS in 2021, the United States supports further development of the harvest strategy for NP ALB fisheries, and in particular would like to see the NC fulfill its tasks for 2022 to review the current LRP and to adopt a TRP.

As the international management of NP ALB is split between the NC of the WCPFC and the IATTC, the United States believes it could be helpful if complementary harvest strategies were adopted in both organizations.

This paper has been developed to provide some background information on harvest strategies with a focus on NP ALB fisheries, options and questions to consider in reviewing the existing LRP and adopting a TRP for NP ALB fisheries, and some general next steps. To date, the IATTC has focused its attention on supporting MSEs to develop interim harvest strategies for its tropical tuna stocks, and has not had any detailed discussions related to the development of harvest strategies for NP ALB. Ergo, this paper focuses mostly on the history and progress in the WCPFC, but recognizes that many of the same issues and decisions are relevant for consideration in the IATTC as well.

4. Management Objectives

While the IATTC has not adopted a management objective for NP ALB, the WCPFC interim management objective for NP ALB in the WCPFC interim harvest strategy for NP ALB fishery states, “*The management objective for the North Pacific albacore fishery is to maintain the biomass, with reasonable variability, around its current level in order to allow recent exploitation levels to continue and with a low risk of breaching the limit reference point.*”

Annex 1 of CMM 2014-06 describes the following related to management objectives.

2. For each harvest strategy, the Commission shall determine agreed conceptual management objectives for that fishery or stock. In determining these objectives, the trade-offs between each objective, as well as trade-offs between objectives for different fisheries or stocks and harvest strategies shall be considered and any contradictions and tensions between competing objectives should be reconciled to the extent possible.

3. The Scientific Committee, and, where appropriate, other relevant subsidiary bodies shall translate these conceptual management objectives into operational objectives that have a direct and practical interpretation in the context of the fishery or stock and against which performance can be evaluated ('operational management objectives'), if needed.

Management objectives are the goals for the fishery, and may cover goals for the status of the stock, including minimizing the risk of falling below a limit reference point, goals for catch rates, catch and/or effort and minimizing catch variability.

The NP ALB MSE process included extensive stakeholder consultation during three international stakeholder workshops to define a set of operational management objectives. The management objectives recommended during the workshops were:

1. Maintain spawning stock biomass (SSB) above the limit reference point;
2. Maintain depletion of total biomass around historical (2006-2015) average depletion;
3. Maintain historical (2006-2015) harvest ratios of each fishery;
4. Maintain catches above average historical (1981-2010) catches;
5. The change in catch between years should be relatively gradual; and,
6. Maintain fishing intensity (F) at the target value with reasonable variability.

The management objectives are not ranked in order of importance. Also, the third management objective was not evaluated in the MSE because there were no allocation rules provided that were specific to each fishery (i.e., members/countries in the RFMOs). Instead, harvest ratios were assumed to be maintained at the average of 1999-2015 as agreed upon at the 3rd ISC NP ALB MSE Workshop. Thus, performance relative to management objective 3 did not vary between the harvest strategies tested in the MSE.

The United States held a stakeholder meeting as a follow up to the ISC MSE workshop in 2021, and while stakeholders indicated general satisfaction with the current interim management objective, some had suggestions for improvements to the objectives: maintaining SSB above the LRP, maintaining F around the TRP, and changes in total allowable catch between years should be gradual.

Questions for Stakeholders on Management Objectives:

- 1. Is the current WCPFC interim management objective satisfactory, or do you have any suggested changes?**
- 2. Should the IATTC adopt similar management objectives for NP ALB?**

5. Reference Points

5.1. General Information

5.1.1. WCPFC General Information on Reference Points

Annex I of WCPFC's CMM 2014-06 provides the following information about reference points and acceptable levels of risk for the WCPFC:

Reference Points

4. To achieve the agreed operational management objectives, the Commission shall, taking into account relevant advice from the Scientific Committee and other relevant subsidiary bodies, as appropriate, establish stock-specific reference points that identify:

- i. targets intended to meet management objectives ('target reference points'), and*
- ii. limits intended to constrain harvesting within safe biological limits ('limit reference points')*

5. Where the Commission has already adopted target or limit reference points for particular stocks, those agreed reference points shall be incorporated into the harvest strategy for that fishery, unless the Commission decides otherwise.

Acceptable Levels of Risk - Acceptable Level of Risk of Exceeding the LRP

6. The Commission shall define acceptable levels of risk associated with breaching limit reference points, and if appropriate, with deviating from target reference points, taking into account advice from the Scientific Committee and, where appropriate, other subsidiary bodies. In accordance with Article 6(1)(a) of the Convention, the Commission shall ensure that the risk of exceeding limit reference points is very low.

7. Unless the Commission decides otherwise, target reference points shall be conservative and separated from limit reference points with an appropriate buffer, with a view to ensuring that the target reference points are not so close to the limit reference points that the chance that the limits are exceeded is greater than the agreed level of risk.

WCPFC13 discussed acceptable levels of risk in the context of harvest strategies for the three tropical tuna stocks and South Pacific albacore stock. While this decision on acceptable levels of risk by WCPFC13 does not explicitly cover NP ALB, it may be prudent to consider this agreement in considering acceptable levels of risk for NP ALB. WCPFC13 agreed to:

- i) not specify, at this time, acceptable levels of risk of breaching the limit reference point for each stock;*

ii) consider any risk level greater than 20 percent to be inconsistent with the LRP related principle in UNFSA (as referenced in Article 6 of the Convention) including that the risk of breaching limit reference points be very low; and

iii) determine the acceptability of potential HCRs where the estimated risk of breaching the limit reference point is between 0 and 20%

5.1.2. IATTC General Information on Reference Points

In a presentation on outcomes of the tropical tuna MSE workshop to the Scientific Advisory Committee in 2021, the IATTC staff acknowledged that reference points may be based on a number of variables (e.g., F , biomass), and that “which LRPs are appropriate depends on management action to be applied if the limit is exceeded.”³ In 2016, the IATTC adopted Resolution C-16-02 (*Harvest Control Rules for Tropical Tunas (Yellowfin, Bigeye, and Skipjack)*), which provided an example of the IATTC staff’s views on the functions of reference points at the time:

“A limit reference point is a conservation reference point based on a level of spawning biomass (S_{LIMIT}) or fishing mortality (F_{LIMIT}) that should be avoided because going beyond it could endanger the sustainability of the stock;” and

“A target reference point is a management objective based on a level of spawning biomass (S_{TARGET}) or a fishing mortality rate (F_{TARGET}) that should be achieved and maintained”

Additionally, the [Antigua Convention](#) provides objectives in which the IATTC is tasked “...to maintain or restore the populations of harvested species at levels of abundance which can produce the maximum sustainable yield [MSY]...” The IATTC scientific staff interpreted this objective to mean the target reference points (defined by C-16-02 as levels which should be achieved and maintained) should be F_{MSY} and B_{MSY} .

5.1.3. Reference Points tested in the NP ALB MSE

The harvest strategies tested in the NP ALB MSE specified the risk of breaching the LRP to be either 10% or 20%, depending on the LRP used (Table 1). For each harvest strategy tested, the MSE also estimated the risk of breaching the LRP using a set of computer simulations where a virtual NP ALB stock was managed using each of the harvest strategies under consideration.

³ From IATTC staff presentation:
https://www.iattc.org/Meetings/Meetings2021/WSMSE-02/_English/WSMSE-02-PRES_Reference%20points.pdf

Table 1. List of harvest control rules (HCRs). The TRP is an indicator of fishing intensity based on SPR (spawning potential ratio). SPR is the female spawning stock biomass (SSB) per recruit that would result from the current year's pattern and intensity of F relative to the unfished stock; in other words, the proportion of the unfished reproductive potential left at any given level of fishing pressure. A TRP of F50 would result in the SSB fluctuating around 50% of the unfished SSB. A TRP of F40 implies a higher fishing intensity (i.e., 1-SPR of 0.6) and would result in a SSB of around 40% of the unfished SSB. The threshold and limit reference points, $SSB_{threshold}$ and LRP, are SSB-based and refer to the specified percentage of unfished SSB. The unfished SSB is dynamic and fluctuates depending on changes in recruitment. The threshold reference point is intended to be a point at which management changes would be imposed in order to further reduce the risk of breaching the LRP. Harvest control rules are not required to have a threshold RP, but if a harvest control rule with a threshold RP is chosen, the threshold RP would fall between the TRP and LRP.

HCR	Target reference point (TRP)	Threshold reference point ($SSB_{threshold}$)	Limit reference point (LRP)	Prob SSB > LRP
1	F50	30%	20%	0.8
2	F50	30%	14%	0.9
3	F50	30%	7.7%	0.9
4	F50	20%	14%	0.9
5	F50	20%	7.7%	0.9
6	F40	20%	14%	0.9
7	F40	20%	7.7%	0.9
8	F40	14%	7.7%	0.9
9	F50	30%	20%	0.8
10	F50	30%	14%	0.9
11	F50	30%	7.7%	0.9
12	F50	20%	14%	0.9
13	F50	20%	7.7%	0.9
14	F40	20%	14%	0.9
15	F40	20%	7.7%	0.9
16	F40	14%	7.7%	0.9

5.2. Limit Reference Points

5.2.1. WCPFC LRP

WCPFC8 agreed to a working definition of an LRP that contained the following characteristics:

- *they define a state of the fishery that is considered to be undesirable and which management action should avoid;*
- *the probability of breaching an LRP should be very low;*
- *management actions should be taken before the fishery falls below or is at risk of falling below an LRP.*

WCPFC8 also established a hierarchical approach to identify key LRPs for key target species, and NP ALB has been identified as a Level 2 stock⁴, where appropriate LRPs include $F_{X\%SPR_0}$ and either $X\%SSB_0$ or $X\%SSB_{current, F=0}$.⁵

In 2014, the WCPFC adopted a LRP for NP ALB of $20\%SSB_{current, F=0}$. As the NC intends to review the LRP for NP ALB in 2022, this is an opportunity for NC to either reaffirm the current LRP or recommend modifying the LRP.

In the WCPFC, LRPs for the other tropical tunas and for SP albacore are $20\%SSB_{current, F=0}$. For all these stocks $20\%SSB_{current, F=0}$ is greater than the B_{MSY} level for the stock, so the LRPs are considered very conservative. If NP ALB were considered a Level 1 stock in WCPFC, the default LRP would be either F_{MSY} or B_{MSY} . B_{MSY} for NP ALB roughly equates to $14\%SSB_0$.

5.2.2. IATTC LRP

As mentioned, the IATTC does not currently have a LRP limit for NP ALB, but has adopted the following limit reference point for tropical tunas in the IATTC Convention Area: $F_{0.5R_0}$ (fishing mortality that causes spawning biomass to be reduced to $S_{0.5R_0}$ with steepness of 0.75) and $B_{0.5R_0}$ (spawning biomass corresponding to that which produces a 50% reduction in recruitment as calculated in a Beverton-Holt spawner-recruit model with steepness of 0.75). This limit translates to a depletion of $0.077B_0$, or $7.7\%SSB_0$.

5.2.3. International Commission for the Conservation of Atlantic Tunas and Indian Ocean Tuna Commission LRPs

Two other tuna RFMOS have adopted LRPs for albacore tuna. The LRP for albacore tuna in the Indian Ocean Tuna Commission (IOTC) is $1.4 \cdot F_{MSY}$ and $0.4 \cdot B_{MSY}$, and the interim LRP for albacore tuna in the International Commission for the Conservation of Atlantic Tunas (ICCAT) is $0.4 \cdot B_{MSY}$. For illustrative purposes for NP ALB, an LRP of $0.4 \cdot B_{MSY}$ would approximately translate to a depletion level of $0.057B_0$ or $5.7\%SSB_0$.

⁴ See <https://www.wcpfc.int/harvest-strategy> for more information on WCPFC's hierarchical approach for identifying LRPs for key target species.

⁵ SSB_0 is a static or equilibrium B_0 , it's the average unfished spawning biomass under equilibrium population assumptions (e.g., average recruitment from the S/R relationship). By contrast, $SSB_{current, F=0}$ is dynamic B_0 , which is the spawning biomass at any point in time had fishing not occurred. The dynamic B_0 fluctuates over time with changes in recruitment or any other time varying parameter (e.g., growth).

5.2.4. Fishery Management Plan for U.S. West Coast Fisheries for Highly Migratory Species (HMS FMP) and Fishery Ecosystem Plan for Pelagic Fisheries of the Western Pacific Region (Pelagics FEP) LRP

These plans use the concept of minimum stock size threshold (MSST) corresponding to the level of biomass below which the stock is considered to be overfished. MSST is calculated as the greater of:

$$B_{MSST} = (1-M)B_{MSY} \text{ when } M \text{ (natural mortality)} \leq 0.5, \text{ or } B_{MSST} = 0.5B_{MSY} \text{ when } M > 0.5.$$

For NP ALB, the adult female M is assumed to be 0.48 y^{-1} in the stock assessment, which would result in a B_{MSST} of $0.52 \cdot B_{MSY}$ and translate to a depletion of $0.074SSB_0$ or $7.4\%SSB_0$.

5.2.5. LRPs evaluated in the MSE

In the NP ALB MSE, the ISC evaluated three candidate LRPs:

- 20% SSB_{0_d} (equivalent to the current WCPFC LRP for NP ALB),
- 14% SSB_{0_d} (approximately the level equivalent to B_{MSY}),
- 7.7% SSB_{0_d} (equivalent to the IATTC LRPs for tropical tunas but using dynamic rather than equilibrium B_0).

5.2.6. Implications of Different LRPs

In addition to choosing an LRP, an acceptable level of risk of breaching the LRP may be associated. As noted above, WCPFC13 agreed that the acceptable level of risk should be no greater than 20%. In general, when the LRP is more conservative, higher levels of risk may be more acceptable. The MSE tested a 20% risk of breaching an LRP of 20% SSB_0 , whereas it used a risk of 10% for 14% SSB_0 and 7.7% SSB_0 . All harvest strategy scenarios performed well in the MSE such that there was a high probability that SSB was maintained above the LRPs. However, there were differences in performance in considering LRPs with other components such as a threshold reference point. While threshold RPs are beyond the intended scope of this paper at this time, NMFS understands comments surrounding the LRP and TRP may include qualitative considerations of the threshold RP.

While not currently the case, there could be conflicting interpretations of the status of the stock if there were different LRPs adopted by the IATTC and WCPFC, as well as potential conflicts when compared to MSA metrics (MSST and MFMT). Currently, the WCPFC LRP (i.e., 20% SSB_0) is much higher than would be considered overfished under MSA (i.e., 7.4% SSB_0). An LRP adopted by the RFMOs that uses the LRP for stock status that is more conservative than MSA's MSST may be beneficial to U.S. stakeholders because the opposite could require the United States to take action to rebuild the stock under MSA while the RFMO is not obligated to take action.

Questions for stakeholders regarding LRPs:

1. What are important factors for the United States to consider in reviewing the LRP for NP ALB?
2. Do you support retaining the LRP of 20% SSB_0 in the WCPFC? If not, what LRP would you prefer? Based on the candidate LRPs evaluated in the MSE, is there an LRP that you do not support? Do you support the IATTC adopting the same LRP?
3. What level of risk of breaching the LRP would you support?

5.3. Target Reference Points

Neither the WCPFC nor the IATTC have adopted target reference points for NP ALB. The WCPFC interim harvest strategy for NP ALB does include the following language related to development of a TRP.

“The target reference point (TRP) for this stock will be determined following a comprehensive analysis under a management strategy evaluation (MSE) approach as outlined in section 4 on “Future Work”. Historical fishing activity, anticipated fishing activity, and the source of increased fishing mortality will also be considered when evaluating a suitable TRP. Socioeconomic factors, as per UNFSA Article 6.3.c., will be further considered. The existing conservation and management measure (CMM) for the stock (WCPFC 2005-03) establishes through limits on current effort an overall management regime for the stock.”

In 2018, WCPFC agreed on an interim TRP for South Pacific albacore of 56% of spawning stock biomass in the absence of fishing ($0.56SB_{F=0}$) with the objective of achieving an 8% increase in catch per unit effort for the southern longline fishery as compared to 2013 levels. The IOTC has a provisional TRP for albacore of F_{MSY} and B_{MSY} . For reference, F_{MSY} for NP ALB corresponds to approximately F17 according to the 2020 stock assessment. ICCAT does not currently have a TRP for albacore.

The ISC evaluated two potential target reference points in its MSE, F40 and F50⁶.

From the 2020 stock assessment, the terminal period (2015-2017) average fishing intensity was F50 and $SSB_{2018}/SSB_0 = 0.43$; in 2018, fishing intensity was F52.5. Therefore, F40 would allow for greater exploitation than what the stock is experiencing currently. According to the 2020 stock assessment, SPR has ranged from F29 to F60 since 1994, and was on average F46 (Fig. 1). A TRP of F50 might require management restrictions to achieve that level. For reference, according to the 2020 assessment the 2002-2004 average fishing intensity was F39.

⁶ F[X] represents a fishing intensity (F; calculated in terms of spawning potential ratio) that leads to a SSB that fluctuates around X% of the unfished SSB (e.g., F40 would result in a fishing mortality that would remove about 60% of the SSB)

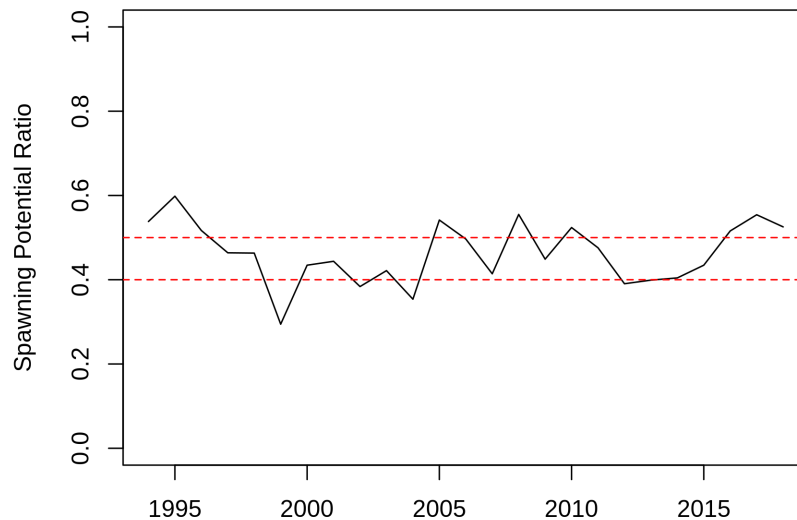


Fig. 1 Past trends in spawning potential ratio (SPR, spawning potential as fraction of unfished spawning potential) from the 2020 stock assessment. The red dotted line at 0.40 represents the SPR one wants to achieve under a target reference point (TRP) of F40, the red dotted line at F50 represents the SPR one wants to achieve under an F50 TRP.

5.3.1. HMS FMP and Pelagics FEP

Under the HMS FMP and Pelagics FEP, *overfishing* occurs when the F or a reasonable proxy for one or more years is greater than the maximum fishing mortality threshold (MFMT). MFMT is the fishing mortality rate that produces maximum sustainable yield (F_{MSY}). As noted earlier, F_{MSY} for NP ALB corresponds to approximately F17 for the 2020 stock assessment. Although the IATTC scientific staff has indicated that they interpret the Antigua Convention to determine that the TRP is F_{MSY} , this is ultimately a policy decision based on best available information (e.g., results of the MSE).

Similar to a comment above regarding LRPs under MSA and RFMOs, a TRP that is more conservative than MFMT (e.g., F40 is more conservative than F17) may be beneficial because the opposite could require the United States to take action to end overfishing under MSA while the RFMO is not obligated to take action.

5.3.2. Implications of Different TRPs

A TRP that allows for greater exploitation, such as F40, would not only potentially impact the U.S. ability to fish, but also potentially allow other countries to have the same expanded opportunities. A TRP of F50, would likely limit fishing effort compared to recent levels.

The MSE showed that F40 performs best in terms of the catch-based objectives (i.e., maintain catches above historical catches, changes in catch between years should be gradual, and maintain fishing intensity at the target value with reasonable variability), but worse in terms of the biomass being above the current WCPFC LRP.

Under Total Allowable Catch (TAC) control the F40 rules also had higher management intervention, and thus it performed worse for the catch-based objectives. Recognizing that the discussion on TAC and Total Allowable Effort (TAE) controls is important in the context of the entire harvest strategy, that is beyond the intended scope of this meeting.

Questions for stakeholders regarding TRP:

- 1) What are important factors for the United States to consider in proposing a TRP for NP ALB?**
- 2) Should the United States advocate a TRP for F40, F50, or another level?**

6. Next Steps

Input from this workshop will be summarized, and feedback will also be solicited from the General Advisory Committee (GAC) and the Permanent Advisory Committee (PAC), the two advisory groups to the U.S. sections to the IATTC and WCPFC, respectively, as well as the Pacific Fishery Management Council (PFMC) at its June 2022 meeting. The United States will consider developing a paper or proposal for submission to either or both the IATTC and WCPFC NC for consideration, and may also conduct some outreach to other members ahead of those meetings.

Based on the NC Work Programme, NC has tasked itself to adopt a harvest control rule and threshold reference point, if needed, by 2023.

NMFS understands that this is an iterative process and the topics discussed at this meeting will continue to be discussed in the future.

Questions for stakeholders


- 1. The NC adopted a stepwise approach to further develop the harvest strategy for North Pacific albacore fisheries. Do you support focusing on adoption of a TRP and review of an LRP for 2022 (adoption of LRP in the IATTC)? Do you still support this schedule? Are there additional elements of the harvest strategy that you would like addressed in 2022 or 2023?**
- 2. Do you have suggestions on how to coordinate approaches on developing harvest strategies in the WCPFC and IATTC?**

7. Resources

- Summary of [2021 NP ALB U.S. Stakeholder Meeting](#) Hosted by NMFS
- [2021 ISC ALBWG MSE Workshop and Summary Report](#)
- [Shiny web application](#) Developed by Jessica Watson (Oregon Department of Fish and Wildlife), Dr. Desiree Tommasi (NMFS Southwest Fisheries Science Center) and Dr.

Kit Dahl (PFMC staff officer) to provide an interactive method of exploring the results of the NP ALB MSE.

Appendix II



**NOAA
FISHERIES**

U.S. Stakeholder Meeting - Reference Points and Harvest Strategy for North Pacific Albacore

April 5, 2022

Meeting Outline

- Meeting Logistics
- Background
- Meeting Objectives
- Harvest Strategy
- Management Objectives
- Reference Points
- Next Steps

Meeting Logistics

- Please mute when not speaking
- Raise your hand if you would like to speak
- Please state your name and affiliation when speaking
- We will solicit comment after specific sections

Background - International Management of NP ALB

International management of North Pacific albacore (NP ALB) shared between
Inter-American Tropical Tuna Commission (IATTC)
&
Western and Central Pacific Fisheries Commission (WCPFC) Northern Committee (NC)



Background timeline

2005

WCPFC and IATTC adopted effort limits for fisheries fishing for NP ALB

2012

WCPFC agrees on a working definition of LRP and the hierarchical approach to identify LRPs for key species including NP ALB

2014

NC adopts precautionary management framework for NP albacore

WCPFC adopts CMM 2014-06 on establishing harvest strategies for key fisheries and stocks

IATTC memorializes in meeting minutes support for an NPALB MSE



Background timeline

2015

ISC begins a management strategy evaluation (MSE) for NP ALB

2017

WCPFC renames framework as harvest strategy for NP ALB fisheries

2021

ISC concludes MSE for NP ALB

WCPFC NC tasked itself to

- review the limit reference point (LRP)
- consider adoption of a target reference point (TRP) in 2022, and
- adopt a harvest control rule and a threshold reference point in 2023



Meeting Objective

Gather U.S. stakeholder input on:

- Management objectives
- LRP
- TRP



Harvest Strategies in WCPFC and IATTC

WCPFC CMM 2014-06

- Harvest Strategy Elements
 - **Management objectives**
 - **Limit and Target Reference Points**
 - **Acceptable Levels of Risk**
 - Monitoring Strategy
 - Harvest Control Rules
 - Management Strategy Evaluation

IATTC does not have a prescribed approach to harvest strategies.



Harvest Strategies for NP Albacore

WCPFC Interim Harvest Strategy for NP ALB

- Interim management objectives
- LRP
- Decision Rule if LRP is breached
- Management Strategy Evaluation

IATTC has not to date developed a harvest strategy for NP albacore

Page 9

U.S. Department of Commerce | National Oceanic and Atmospheric Administration | National Marine Fisheries Service



Questions for this section

- 1. Is the current WCPFC interim management objective satisfactory, or do you have any suggested changes?**
- 1. Should the IATTC adopt similar management objectives for NPALB?**
- 1. Are any objectives evaluated in the MSE more important to you than others?**

Page 10

U.S. Department of Commerce | National Oceanic and Atmospheric Administration | National Marine Fisheries Service



Management Objectives for NP Albacore

WCPFC Interim Management Objective

“The management objective for the North Pacific albacore fishery is to maintain the biomass, with reasonable variability, around its current level in order to allow recent exploitation levels to continue and with a low risk of breaching the limit reference point.”

IATTC has not to date developed a management objective for NP ALB



NP ALB MSE Management Objectives

1. Maintain SSB above the limit reference point;
2. Maintain depletion of total biomass around historical (2006-2015) average depletion;
3. Maintain historical (2006-2015) harvest ratios of each fishery;*
4. Maintain catches above average historical (1981-2010) catches;
5. The change in catch between years should be relatively gradual;
6. Maintain fishing intensity at the target value with reasonable variability.



Priority Objectives from 2021 U.S. Stakeholders Meeting

Maintaining SSB above the LRP

- *“with a low risk of breaching the limit reference point”*

Maintaining fishing mortality (F) around the TRP

- *“maintain the biomass...around its current level in order to allow recent exploitation levels to continue”*

Changes in total allowable catch between years should be gradual.

Questions

- 1. Is the current WCPFC interim management objective satisfactory, or do you have any suggested changes?**
- 1. Should the IATTC adopt similar management objectives for NPALB?**
- 1. Are any objectives evaluated in the MSE more important to you than others?**

GENERAL INFORMATION - REFERENCE POINTS AND ACCEPTABLE LEVELS OF RISK

Page 15 U.S. Department of Commerce | National Oceanic and Atmospheric Administration | National Marine Fisheries Service



Reference Points - WCPFC CMM 2014-06

4. To achieve the agreed operational management objectives, the Commission shall, taking into account relevant advice from the Scientific Committee and other relevant subsidiary bodies, as appropriate, establish stock-specific reference points that identify:

- i. targets intended to meet management objectives ('target reference points'), and*
- ii. limits intended to constrain harvesting within safe biological limits ('limit reference points')*

Page 16 U.S. Department of Commerce | National Oceanic and Atmospheric Administration | National Marine Fisheries Service



Acceptable Levels of Risk - WCPFC - CMM 2014-06

6. The Commission shall define acceptable levels of risk associated with breaching LRPs, and if appropriate, with deviating from TRPs...the Commission shall ensure that the risk of exceeding limit reference points is very low.

7. ...TRPs shall be conservative and separated from LRPs with an appropriate buffer...[so] that the chance that the limits are exceeded is greater than the agreed level of risk.

Acceptable Levels of Risk - Agreement from WCPFC13

i) not specify, at this time, acceptable levels of risk of breaching the limit reference point for each stock;

ii) consider any risk level greater than 20 percent to be inconsistent with the LRP related principle in UNFSA...including that the risk of breaching limit reference points be very low; and

iii) determine the acceptability of potential HCRs where the estimated risk of breaching the limit reference point is between 0 and 20%

Reference Points - IATTC

IATTC Resolution C-16-02

"A[n] LRP is...based on a level of spawning biomass...or fishing mortality...that should be avoided because going beyond it could endanger the sustainability of the stock;"

"A TRP is a management objective based on a level of spawning biomass...or a fishing mortality rate...that should be achieved and maintained"

Antigua Convention tasks IATTC to "to maintain or restore the populations of harvested species at levels of abundance which can produce the maximum sustainable yield..."



LIMIT REFERENCE POINTS - Consider these questions:

1. What are important factors for the United State to consider in reviewing the LRP for NP ALB?

1. Do you support retaining the LRP of 20% SSB0 in the WCPFC? If not, what LRP would you prefer? Based on the candidate LRPs evaluated in the MSE, is there an LRP that you do not support? Do you support the IATTC adopting the same LRP?

1. What level of risk of breaching the LRP would you support?



LRP - WCPFC

LRP Working Definition from WCPFC8

- state of the fishery that is considered to be undesirable and which management action should avoid;
- the probability of breaching an LRP should be very low;
- management actions should be taken before the fishery falls below or is at risk of falling below an LRP.

WCPFC Hierarchical Approach to LRPs for Key Species

Level	Condition	LRPs
Level 1	A reliable estimate of steepness is available	F_{MSY} and B_{MSY}
Level 2	Steepness is not known well, if at all, but the key biological (natural mortality, maturity) and fishery (selectivity) variables are reasonably well estimated. Applied species: bigeye, yellowfin and South Pacific albacore	$F_{X\%SPR_0}$ and either $X\%SB_0$ or $X\%SB_{current, F=0}$
Level 3	The key biological and fishery variables are not well estimated or understood. Applied species: skipjack	$X\%SB_0$ or $X\%SB_{current, F=0}$

LRP - IATTC

IATTC Resolution C-16-02:

"A[n] LRP is...based on a level of spawning biomass...or fishing mortality...that should be avoided because going beyond it could endanger the sustainability of the stock;

Albacore Tuna LRPs

RFMO Stock	LRP
WCPFC NP Albacore	$20\%SSB_{\text{current}, F=0}$
WCPFC SP Albacore	$20\%SSB_{\text{current}, F=0}$
ICCAT Albacore	$0.4*B_{MSY}^+$
IOTC Albacore	$1.4*F_{MSY}$ and $0.4*B_{MSY}$

+For example: an LRP of $0.4*B_{MSY}$ = approx. a depletion level of 5.7% SSB_0

IATTC tropical tuna LRPs: $F_{0.5R0}$ and $B_{0.5R0}$ with steepness of 0.75 = a depletion level of 7.7% SSB_0 .

LRP - Magnuson-Stevens Act

Minimum stock size threshold (MSST): level of biomass below which the stock is considered to be overfished.

MSST is calculated as the greater of:

BMSST = $(1-M)BMSY$ when M (natural mortality) ≤ 0.5 ,

or

BMSST = $0.5BMSY$ when $M > 0.5$.

For NP ALB, the adult female M is assumed to be 0.48 y⁻¹ in the stock assessment →

BMSST of $0.52 \times SSBMSY$ and a depletion of $7.4\% SSB_0$.

LRPs and risk evaluated in the NP ALB MSE

In the NP ALB MSE, the ISC evaluated three candidate limit reference points:

- 20% $SSB0_d$ (the current WCPFC LRP); risk = 20%
- 14% $SSB0_d$ (approximately B_{MSY}); risk = 10%
- 7.7% $SSB0_d$ (IATTC LRPs for tropical tunas); risk = 10%

LRP Issues for Consideration

- Tradeoff between LRPs and Acceptable Levels of Risk
- Uncertain political will to change LRP in WCPFC
- Potential conflicts with domestic stock status or between RFMOs if different LRPs are selected

Page 27

U.S. Department of Commerce | National Oceanic and Atmospheric Administration | National Marine Fisheries Service



Questions

1. What are important factors for the United State to consider in reviewing the LRP for NP ALB?
1. Do you support retaining the LRP of 20% SSB0 in the WCPFC? If not, what LRP would you prefer? Based on the candidate LRPs evaluated in the MSE, is there an LRP that you do not support? Do you support the IATTC adopting the same LRP?
1. What level of risk of breaching the LRP would you support?

Page 28

U.S. Department of Commerce | National Oceanic and Atmospheric Administration | National Marine Fisheries Service



TARGET REFERENCE POINTS - Consider these questions:

1. **What are important factors for the United States to consider in proposing a TRP for NP ALB?**
1. **Should the United States advocate a TRP for F40, F50, or another level?**



Target Reference Point

No TRP for NPALB in IATTC or WCPFC

From WCPFC NP ALB Interim Harvest Strategy:

...(TRP) for this stock will be determined following... a management strategy evaluation (MSE)... and

Consider:

- Historical fishing activity
- anticipated fishing activity
- the source of increased fishing mortality
- socioeconomic factors.

IATTC Resolution C-16-08

"A TRP is a management objective based on a level of spawning biomass...or a fishing mortality rate...that should be achieved and maintained"



TRPs for other albacore stocks

RFMO Stock	TRP
WCPFC SP Albacore	56%SSB _{current, F=0} with objective of achieving an 8% increase in CPUE for the southern longline fishery as compared to 2013 levels
IOTC Albacore	F_{MSY} *and B_{MSY}

* For reference, F_{MSY} for NP ALB corresponds to approximately F17 according to the 2020 stock assessment.

TRPs evaluated in NP ALB MSE & Stock Assessment

Two candidate TRPs: F40 and F50

F from the 2020 stock assessment

- The terminal period (2015-2017) average F was F50
- 2018 F = F52.5
- Since 1994 ranges F29 to F60; average F46
- 2002-2004 average fishing intensity was F39

TRP Issues for Consideration

A TRP that would allow expanded fishing opportunities (e.g., F40) for the United States would also allow for expanded fishing opportunities for other members

F40 performed best in terms of the catch-based objectives, but worse in terms of the biomass being above the current WCPFC LRP.

MSE showed tradeoffs between fishing intensity and frequency of management intervention (dependent on whether TAC, TAE or mixed).

MSA F-based limit is F_{msy} and triggers Council to evaluate US role in overfishing.

Questions

1. What are important factors for the United States to consider in proposing a TRP for NP ALB?
1. Should the United States advocate a TRP for F40, F50, or another level?

Next Steps

Solicit Feedback and Advice from

- Pacific Fishery Management Council - June 2022
- PAC Meeting - June 8, 2022
- GAC Meeting - TBD Aug 4-5, 2022

Potentially submit a proposal/white paper to IATTC/NC



Questions on Next Steps

1. The NC adopted a stepwise approach to further develop the harvest strategy for North Pacific albacore fisheries.
 - a. Do you support the schedule of focusing on adoption of a TRP and review of an LRP for 2022 (adoption of LRP in the IATTC)?
 - b. Are there additional elements of the harvest strategy that you would like addressed in 2022 or 2023?

1. Do you have suggestions on how to coordinate approaches on developing harvest strategies in the WCPFC and IATTC?



Thank you!

