Results of the first NPALB MSE

ISC ALBWG
MSE specialist (D. Tommasi)

NC Management Proposals for NP albacore

2012	NC requested advice from the ISC on reliability of steepness and M, maturity and selectivity estimates to determine the RPs (Attachment E - 8th NC report)
2013	USA concept paper on Precautionary management framework for NPALB (Attachment G – 9th NC report) MSE proposed
2014	Proposal by USA: Evaluation of candidate target and limit reference points and decision framework for NPALB (WCPFC-NC10-WP-01) Proposal by Canada: precautionary management framework for NPALB (WCPFC-NC10-2014/DP-08) **Adopted** limit reference point: **20%SSB$_{current, F=0}$**
2015	Proposal by USA: Evaluation of candidate HCR for NPALB (WCPFC-NC11-2015/DP-01)
2016	NC member's Response to: MSE Template: Information and Instructions (WCPFC-NC12-2016/WP-01)
2017	Proposal by USA and Canada : Interim harvest strategy for NPALB fishery

How does an MSE fit in or why do an MSE?

Because the NC requested to…

- **Evaluate candidate target reference points**
- **Associated harvest control rules**

From the NC13 reports…

71. NC13 recommends that the Commission adopt the attached revision to the title of previously adopted precautionary management framework for North Pacific albacore (**Attachment H**), so that it may be recognized as a harvest strategy. In addition, NC13 recommends that the Commission direct the Secretariat to make this harvest strategy available, as a stand-alone harvest strategy document, on a web page dedicated to this and other harvest strategies, including interim harvest strategies, agreed to by the Commission.

Attachment H (Interim Harvest Strategy for NPALB Fishery)
4. Future work
This framework may be periodically reviewed and revised. To support such revisions, **NC endorses the ongoing development and implementation of an MSE for the stock and fishery**, which would yield new information that would enhance the robustness of this framework.

Attachment I (Work Programme for the NC)
NPALB:
(B) Implement the Interim Harvest Strategy, including: (1) monitor if LRP is breached; **(2) continue to work to establish TRP and other elements of harvest strategies, if appropriate based on MSE**; (3) recommend any changes to CMM 2005-03.

Brief Review on the ISC MSE WS

1st ISC MSE WS (16-17 April 2015) Yokohama, JAPAN

- ✓ **71 participants**
- ✓ **Purpose:** to review the objectives, benefits, and requirements to implement an MSE, as well as recent progress made by tuna RFMOs towards adopting and implementing the MSE process

* ISC-ALBWG chair (Holmes, J.) gave a presentation on MSE for NPALB at the 11th Regular Session of the NC (31 Aug – 3 Sep 2015)

2nd ISC MSE WS (24-25 May 2016) Yokohama, JAPAN

- ✓ **24 participants**
- ✓ **Purpose:** to develop management objectives and performance indicators for those objectives based on input from managers stakeholders and scientists

* Report on outcomes for the NPALB (attachment 5 of **ISC ALB WG Report: Annex8/ISC16 Plenary**)
* NC member's Response to MSE Template: Information and Instructions (**WCPFC-NC12-2016/WP-01**)

3rd ISC MSE WS (17-19 Oct 2017) Vancouver, CANADA

- ✓ **23 participants**
- ✓ **Purpose:** (1) to review management objectives and performance metrics, (2) to identify acceptable level of risk for each objective to be used in evaluating performance of management strategies, (3) to develop a preliminary set of candidate reference points and harvest control rules for testing

* Report on outcomes for the NPALB (**attachment 3 of ISC ALB WG Report: Annex4/ISC18 Plenary**)
* Report of NPALB WG WS (**Annex13/ISCC18 Plenary**)

4th ISC MSE WS (5-7 March 2019) Yokohama, JAPAN

1. **Examine preliminary results of the North Pacific Albacore MSE**
2. **Provide feedback to ALBWG on future improvements**
3. **Develop recommendations on candidate target reference point for the WCPFC-NC and IATTC**
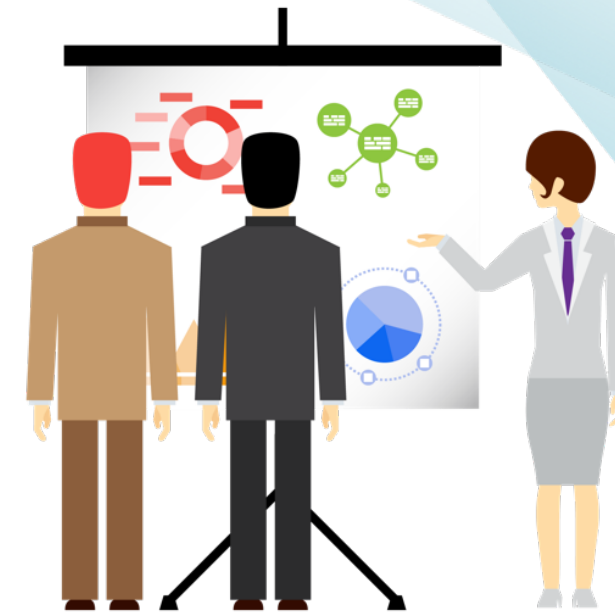
Management objectives for NPALB

1. Maintain spawning biomass above the limit reference point
2. Maintain total biomass, with reasonable variability, around the historical average depletion of total biomass
3. Maintain harvest ratios by fishery (fraction of fishing impact with respect to SSB) at historical average
4. Maintain catches by fishery above average historical catch
5. If a change in total allowable effort and/or total allowable catch occurs, the rate of change should be relatively gradual
6. Maintain F at the target value with reasonable variability

FUTURE WORK

1. Maximize economic returns of existing fisheries
2. Maintain interests of artisanal, subsistence and small-scale fishers, including limiting the regulatory impact on these fisheries

Management Objective and Performance Indicators

Management Objective	Label	Performance Indicator
1. Maintain SSB above the limit reference point (LRP)	Odds of no fishery closure	Probability that SSB in any given year of the MSE forward simulation is above the LRP
2. Maintain depletion of total biomass around historical average depletion	Relative Total Biomass	Probability that depletion in any given year of the MSE forward simulation is above minimum historical (2006-2015) depletion
4. Maintain catches above average historical catch	Relative Total Catch	Probability that catch in any given year of the MSE forward simulation is above average historical (1981-2010) catch
5. Change in total allowable catch between years should be relatively gradual	Catch Stability	Probability that a decrease in TAC between years is < 30%. Calculated excluding years TAC=0.
6. Maintain fishing intensity (F) at the target value with reasonable variability	F_{TARGET}/F	F_{TARGET}/F

Harvest strategy

Framework that specifies the pre-agreed management actions necessary to achieve management objectives and consists of several components such as **management objectives, reference points, harvest control rules and acceptable levels of risk**

	Brief description
Harvest Strategy 1	✓based changes in management actions on changes in spawning stock biomass (SSB).
Harvest Strategy 2	✓based on the IATTC HCR for tropical tunas ✓Changes in management actions occur when SSB drops below a biomass-based LRP or fishing intensity is higher than an F-based LRP
Harvest Strategy 3	✓based on Harvest Strategy 1 **but management action when control point is breached is different**
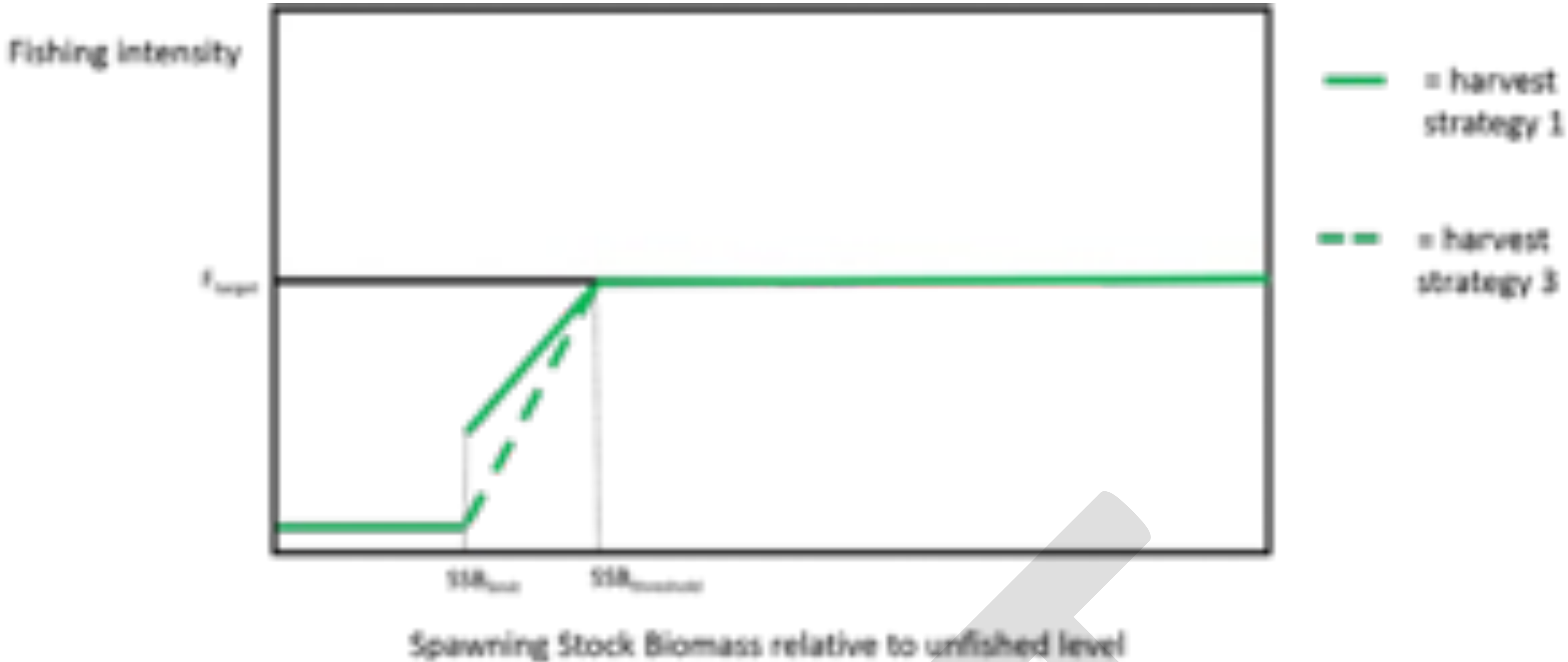
Total of 11 different Harvest Control Rules for HS1 and HS3

Harvest strategy	Output control	Harvest control rule	F_{tgt}	SSB_{thr}	SSB_{lim}
1 or 3	TAC or TAE	1	F50	30%SSB	20%SSB
1 or 3	TAC or TAE	4	F50	20%SSB	14%SSB
1 or 3	TAC or TAE	6	F50	14%SSB	7.7%SSB
1 or 3	TAC or TAE	7	F40	30%SSB	20%SSB
1 or 3	TAC or TAE	10	F40	20%SSB	14%SSB
1 or 3	TAC or TAE	12	F40	14%SSB	7.7%SSB
1 or 3	TAC or TAE	13	F30	20%SSB	14%SSB
1 or 3	TAC or TAE	15	F30	14%SSB	7.7%SSB
1 or 3	TAE	16	F0204	30%SSB	20%SSB
1 or 3	TAE	17	F0204	20%SSB	14%SSB
1 or 3	TAE	18	F0204	14%SSB	7.7%SSB

Conclusions of 1st NPALB MSE

1. *A lower fishing intensity TRP (i.e. F50) maintain the population at a higher level than F40 and F30, requiring less management intervention and resulting in lower catch variability between years. However, lower fishing intensity results in lower overall catch*

2. *HCRs with a TRP of F40 have less closers and higher catch stability as compared to a TRP of F30, resulting in comparable or higher catch despite lower fishing intensity*

3. *An LRP and threshold reference point closer to the TRP results in a higher frequency of management interventions, fishery closures and lower catch stability*

4. *HS3 showed lower catch stability than HS1, but had less fishery closers*

5. *Harvest strategies with Total Allowable Effort (TAE) had a lower frequency of fisheries closers and higher catch stability than ones with Total Allowable Catch (TAC) control*

Limitations of 1st NPALB MSE

- Effort is not explicitly modeled, but implicitly via a fishing intensity

- TAE control may be more effective in the simulation than in the real world and is assumed to be implemented as effectively as TAC control

- TAE/TAC control can be effectively achieved for all fleets – targeting and not targeting

- TAE/TAC is always achievable – no limits on fleet capacity

- Allocation constant to 1999-2015 average
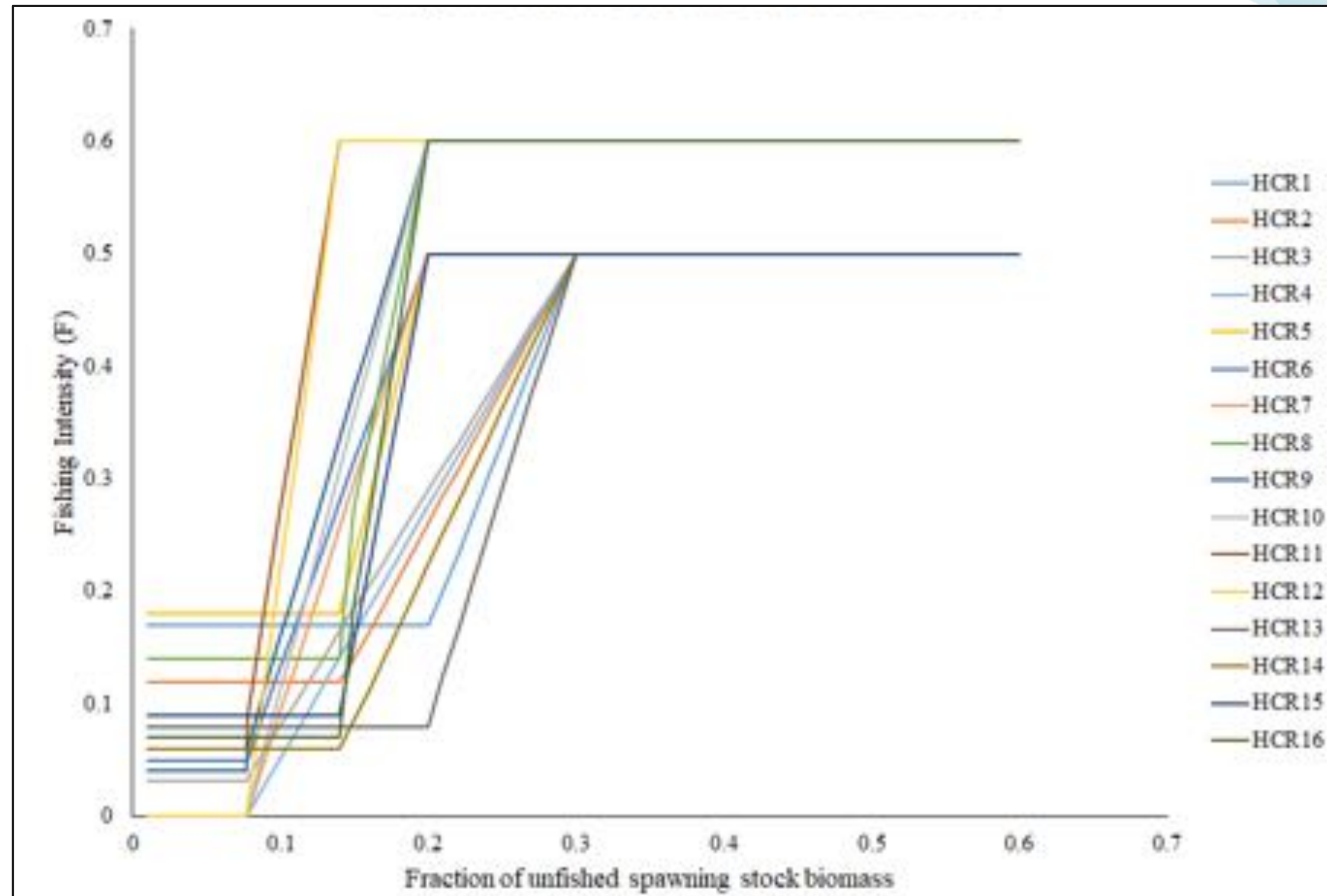
Limitations of 1st NPALB MSE

- Only one rebuilding plan (fishery is closed) was tested

- When determining stock status, only the probability of SSB being higher than the LRP or threshold reference point at a 50% level was tested

- Movement processes are not explicitly modeled

- Simulations are conditioned on data from 1993 onwards. Therefore, they may not include the full range of uncertainty in the population dynamics of NPALB going back to the 1960's.

Main Recommendations: 4ᵗʰ MSE Workshop (Yokohama)

- **No management recommendations for WCPFC and IATTC**

- **Results from 2ⁿᵈ MSE to be presented at 5ᵗʰ MSE Workshop in late 2020 – early 2021**

- **Smaller, more focused list of RPs and HCRs**

- **Stricter risk level (80 or 90%) used to evaluate risk of breaching candidate LRPs**

- **Evaluate 2 candidate levels of control if LRP breached**

- **Evaluate option where fleets not under control if $SSB \geq SSB_{THRESHOLD}$**

- **Use historical (1997 – 2015) fishing intensity or mortality levels to represent available fishing effort**

Candidate Harvest Control Rules for 2nd NPALB MSE

Control	Harvest Control Rule Label	Target reference point (F_{target})	Threshold reference point ($SSB_{threshold}$)	Limit reference point (SSB_{limit})	Action if SSB > $SSB_{threshold}$
All Fleets under TAC	1	F50	30%	20%	
All Fleets under TAC	2	F50	30%	14%	
All Fleets under TAC	3	F50	30%	7.7%	
All Fleets under TAC	4	F50	20%	14%	
All Fleets under TAC	5	F50	20%	7.7%	
All Fleets under TAC	6	F40	20%	14%	
All Fleets under TAC	7	F40	20%	7.7%	
All Fleets under TAC	8	F40	14%	7.7%	
All Fleets under TAE	9	F40	30%	20%	F = TRP
All Fleets under TAE	10	F50	30%	14%	or
All Fleets under TAE	11	F50	30%	7.7%	No harvest control (F sampled from historical distribution)
All Fleets under TAE	12	F50	20%	14%	
All Fleets under TAE	13	F50	20%	7.7%	
All Fleets under TAE	14	F40	20%	14%	
All Fleets under TAE	15	F40	20%	7.7%	
All Fleets under TAE	16	F40	14%	7.7%	
Mixed	17	F50	30%	20%	
Mixed	18	F50	30%	14%	
Mixed	19	F50	30%	7.7%	
Mixed	20	F50	20%	14%	
Mixed	21	F50	20%	7.7%	
Mixed	22	F40	20%	14%	
Mixed	23	F40	20%	7.7%	
Mixed	24	F40	14%	7.7%	

Proposed Workplan for ISC ALBWG
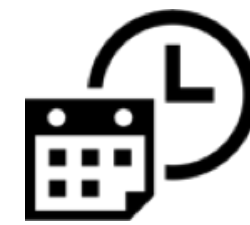
Dates	Task/Event
13 - 17 May 2019	Preliminary 1st NPLB MSE results presented to IATTC Science Advisory Committee
11 – 15 Jul 2019	ISC Plenary reviews 1st NPALB MSE results
August 2019	1st NPALB MSE results presented to WCPFC Scientific Committee
2 – 6 Sep 2019	**1st NPALB MSE results presented to WCPFC NC**
12 – 18 Nov 2019	Data preparation for NPALB stock assessment (Shimizu, Japan)
16 – 23 March 2020	NPALB stock assessment (La Jolla, USA)
Late 2020 – early 2021	5th ISC MSE workshop to examine results of 2nd NPALB MSE (location to be determined)

THANK YOU!

ANY QUESTIONS?