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Strategic Research Plan: summary of progress since 2007 review and potential directions for future collaborative activities

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Contents

Abstract

The CCSBT initiated a Strategic Research Program (SRP) in 2002 to address priority monitoring and research requirements for the assessment of the stock and management of the fishery. Progress of the SRP was reviewed at the 2007 meeting of the Extended Scientific Committee (ESC): a number of new components were added to the program and the SRP conventional tagging program was discontinued. In this paper we briefly review progress since 2007 as a basis for initial discussions at this year's ESC on the future directions, priorities and collaborative opportunities for the future SRP. It is intended that this discussion will provide the opportunity for the ESC and member scientists to develop more detailed proposals for consideration by the ESC and Commission in 2013.

Introduction

Significant progress has been made in a number of areas of the SRP (Table 1) since the initial 2007 review of the program. Of these, the successful completion of the management procedure (MP) evaluation process and the adoption and implementation of the *Bali Procedure* by the Commission is significant, in that: i) it provides a robust, agreed basis for the setting of the global total allowable catch (TAC); ii) the operating model (OM) reconditioning and MP evaluation process has identified, or reinforced, the key uncertainties in our understanding of the dynamics of the stock and the various fleets, and: iii) it provides the opportunity for member scientists and the ESC to focus on research and monitoring aimed at addressing these uncertainties. The initial consideration of an updated SRP was identified as a priority for the 2012 ESC meeting, with the aim of finalising the plan at the 2013 ESC meeting.

In addition to the work completed by members and the ESC, a number of processes have been completed at the Commission level that are relevant in the context of the developing an updated SRP. These include outcomes of the independent review of the CCSBT (Balton, 2008) and the series of meetings of the Joint Tuna RFMOs. With the exception of the most recent Joint Tuna RFMOs meeting, the outcomes of these processes have been considered by the ESC and where considered appropriate or, as requested by the Commission, they have been incorporated into the ESC's work program.

We provide a summary of the work completed and key outcomes since the 2007 SRP review (Table 2) and suggest areas for consideration by the ESC in identifying priorities and collaborative efforts over the next five years. The intention is to provide a framework for initial discussion and more detailed inter-sessional planning in preparation for more detailed consideration and recommendations to the Commission at the 2013 ESC meeting.

Summary of progress and outcomes since the 2007 SRP review

In 2007, the ESC considered review papers on the 2002-2006 SRP and additional and ongoing research undertaken by members (Anon 2007; Davies et al, 2007; Itoh et al, 2007; Basson et al, 2007, Basson and Evans, 2007). At the conclusion of this review the ESC noted:

"There is still a great deal of uncertainty surrounding key aspects of the SBT stock, in particular, the absolute abundance of the stock, the trends in spawning stock biomass and the trends in recruitment."

In response to the 2007 review, the ESC retained the original structure of the SRP, extended it to include a number of areas that had previously been undertaken independently by members, and identified relative priority of components for 2007-2011 (Table 1, Anon 2007, Attachment 9).

Three components were identified as being *essential*:
- catch amount
- size structure
- information on future changes in longline operations to improve the CPUE standardisation for the longline fleets.

The *essential* priorities reflected the need to reduce the uncertainty in future catch data and to collect the necessary data on potential future changes in the longline fleet dynamics as a result of changes in the management arrangements and reductions in global quota.

A number of components were identified as *high priority* including: all other components of catch characterisation, past information on commercial gear, development of an index for spawning biomass, scientific observer programs, evaluation of PIT and genetic tagging, the scientific aerial survey, direct aging and MP development. The *high* priorities reflected the need to assess the impact of the past unreported catches on the assessment of the status and productivity of the stock, re-initiate the MP evaluation process, continued concern about historically low levels of recruitment, methods for resuming tagging experiments that were not reliant on adequate reporting/estimates of reporting rates and the priority placed on developing more direct indices of abundance for the spawning component of the population.

A number of these identified priorities were reinforced by the recommendations of the independent review (Balton, 2008) of relevance to the SRP. These were considered at the 2008 ESC meeting (Appendix 1). Perhaps the more important of these, at the time, for the ESC were:

> *"For SBT, the most immediate need in the short term would be to develop the most accurate stock assessment possible in light of the uncertainty caused by the under-reported past catches, then to set catches (i.e. the global TAC) at a level that will allow the stock to rebuild. The CCSBT should take a precautionary approach in this regard: the greater the uncertainty of the stock assessment, the lower the TAC should be set."*

> *"The issue of CDS was discussed at Kobe "with a view to recommending that the tuna RFMOs, including CCSBT, move promptly toward full catch documentation schemes."*

> *"....the CCSBT must move promptly to reduce the impacts of SBT fisheries on ecologically related species, including sharks, seabirds, sea turtles and other tuna species."*

Considerable progress has been made against the *essential* priority components of the SRP and the recommendations from the independent review. However, there are some areas of the SRP where less progress has been made. A summary of progress is provided in Table 2, including cross-references to the most recent relevant working papers and sections of ESC meeting reports.

We consider the following are particularly noteworthy:
- Implementation of new catch monitoring systems for longline and surface fisheries, including the testing and refinement of a stereo-video system for the surface fishery

- Continued refinement of the longline CPUE standardisation and identification of "base-case" and alternative "monitoring" series

- Improved documentation of changes in fishing operations for the longline fleets relevant to the CPUE index
- Improved reporting of and analyses of discarding from observer operations
- Formal institutional support for the Indonesian catch monitoring
- Revision of the OM to account for the uncertainty resulting from the unreported catches
- Development, evaluation and implementation of the MP for setting the global TAC
- Maintenance and refinement of the index of recruitment from the scientific aerial survey
- Completion of the large-scale archival tagging program for juvenile movement
- Research into the development of an independent index of the spawning stock through the close-kin abundance estimation project.

The SRP included elements on the characterisation (size and age composition, temporal patterns) of the historical unreported catches. In the absence of further empirical information on the size composition or temporal variability in these catches, the ESC remains in the situation where catch and CPUE scenarios are used in the OM conditioning; i.e. the model cannot be conditioned to data in the traditional stock assessment sense (Anon 2007). It seems unlikely that this situation will change and, hence, this historical uncertainty will remain. The continued focus on future catch characterisation and verification remains an essential priority.

There has been progress with the implementation of the scientific observer program, with increased coverage in across a number of fleets and greater transparency in the reporting of discards. However, targets for observer coverage are not met in all aspects of all fisheries and the CCSBT SRP conventional tagging program was discontinued in 2007, largely due to the lack of reporting rate estimates from longline fleets.

Areas for future focus and collaboration

A new 5 year SRP is an opportunity to further build on the progress made since 2007, and to develop synergies between research activities, with a renewed emphasis on collaborative programs across the range of the fishery and stock.

Ongoing activities

Many of the priorities identified in 2007 and described above are ongoing, essential monitoring activities and should be reflected in the revised SRP, in particular:

- the inputs to the MP, specifically the longline CPUE and associated relevant information for standardisation and the scientific aerial survey and associated data
- the data used to condition the current OM, including total catches, size frequency distributions and indices of abundance
- stock indicators
- data that have been collected with a view to incorporate them into the OM, in particular the direct catch at age data.

CPUE interpretation and standardisation

This continues to an essential area for the SRP given the central role of longline CPUE in the MP and OM. However, it was noted at the 2007 SRP review that a weakness of the current models is the heavy reliance on the Japanese longline CPUE series (Itoh et al., 2007). The reliability and interpretability of CPUE, particularly as longline fleets contract, have been raised as potentially serious issues, given the reliance of the models on these series (Basson et al., 2007, Basson and Davies, 2008). Consideration of research and development of additional or alternative sources of

information (e.g. abundance, fishing and natural mortality rates) for the 4-9 age classes should continue to be discussed in the context of the SRP.

The primary areas identified by the ESC (Anon 2011) for CPUE interpretation and standardisation relate to:
- The maintenance of the base CPUE series for the MP and further exploration and refinement of the two monitoring series (STWin and Laslett)
- Monitoring and further exploration of changes in fleet operations over time
- Potential environmental correlates for SBT habitats.

Progress is being made in each of these areas (Table 2) and papers on each issue will be considered at ESC17.

Interpretation of recruitment indices in the Great Australian Bight (GAB)

The archival tag results from the GSD project show that most juvenile SBT arrive in the GAB before the start of the scientific aerial survey (1 January), and depart from the GAB before the end of the survey (CCSBT-ESC/1208/Info1). This suggests that the timing and duration of the survey is appropriate. The questions relating to the proportion of the total juvenile population that reside in the GAB in any summer has not yet been answered. If the proportion of juveniles in the GAB is highly variable between years and/or there are trends, then the interpretation of the scientific aerial survey index is more complicated than allowed for in the OM and MP. A combination of otolith microchemistry and archival tag data have the potential to provide a direct means for estimating the proportion of juveniles visiting the GAB each summer, including, in the case of microchemistry, retrospective estimates from archived otoliths.

Incorporation of new data series into the OM

The 2012 ESC will be considering the inclusion of new data sources and models with particular reference to:
- results from close-kin analysis (CCSBT-ESC/1208/21);
- direct ageing data (CCSBT-ESC/1208/22);
- results from the global spatial dynamics (GSD) project (CCSBT-ESC/1208/Info1);
- data from the recent SRP tagging program (CCSBT-ESC/1208/23);.

The updated SRP should consider the likely timeframe and potential collaborative work that can be undertaken in future development of the OM.

The outcomes from the GSD project (CCSBT-ESC/1208/Info1: Basson et al, 2012), and evaluation of methods for incorporating the SRP tagging data into the OM (CCSBT-ESC/1208/23: Eveson et al., 2012) indicate the potential information gains from developing spatial operating models, relative to a non-spatial model. The ESC has previously considered the development of a spatial OM, but concluded at the time that reconditioning of the current OM and development of a robust MP were higher priority in the short term (Anon 2009). The spatial resolution expected to be feasible and most appropriate would most likely be large regional groupings. If the SRP included consideration of the development of spatial operating models, archival tag data would be required (Eveson et al., 2012). Available simulation models could be used to explore the trade-off between numbers of tags (conventional and archival) and performance (e.g. estimability, precision, bias).

If the direct aging data is incorporated into the OM, a review of the spatial and temporal coverage of at-sea collections should be undertaken. Regular cross-laboratory comparisons of ageing methods should also be considered. These would ensure representative sampling for catch at age estimation and avoid drift in age estimations occurring over a long period.

Mark-recapture programs

Conventional tag returns from the 2000s SRP releases highlighted potential changes in movement and/or mortality of juveniles (Eveson and Polacheck 2007). These questions were further explored in the GDS project (Basson et al., 2012) with evidence that the movement patterns can change or vary substantially over time.

Movement patterns can affect the interpretation of data series, such as changes in the scientific aerial survey index (noted above), changes in size frequency distributions from different areas. The lack of a (conventional) tagging program since 2008 means that there are no direct data on recent movement patterns nor direct estimates of fishing and natural mortality for the majority of exploited year classes. The direct estimates of mortality have been valuable outputs from previous tagging programs.

The experience of member scientists with a range of forms of electronic tagging has demonstrated the potential for large-scale collaborative archival tag release programs. The reduced cost and increased operating life and reliability of current generation archival tags make tagging programs less costly and more feasible. The revision of the SRP should consider the implementation of a collaborative multi-year archival tagging program focussed on adult and juveniles. This would address the demonstrated changes in movement patterns of juvenile SBT and the desirability of direct observations of spawning migrations and behaviour of adults on the spawning ground (CCSBT-ESC/1208/19).

Gene tagging has been considered by the ESC (Anon 2007, 2008) as a potential fishery independent mark-recapture method, providing data on a broad range of age classes and cohorts over time. A gene-tagging program could potentially provide information on fishing mortality, natural mortality, abundance (CCSBT-ESC/0809/13) and, if combined with archival tagging, also stock structure. In particular, a mark-recapture gene-tagging program has the potential to provide estimates of fishing and natural mortality for the 3+ age classes independent of the OM. It would also potentially improve the information content on these parameters when incorporated into the OM. The development of greater collaboration among existing research programs could provide the basis for initial trials of gene-tagging "release" and "recapture" across the fisheries. This could test and develop techniques and protocols for a future large-scale program.

Close-kin genetics research

The results of the close-kin project will be considered by ESC17 (CCSBT-ESC/1208/19). While there is additional work that needs to be done to more fully address uncertainty, the results demonstrate that it is possible to estimate spawning abundance independently of the main fisheries data series using the parent-offspring-pairs, information on reproductive output and age/size structure of the catches from the spawning ground. The incorporation of the key abundance-related data from the close-kin project into the current OM has also already been identified as an important area of work (Anon, 2011) and an initial exploration of how this might be done is provided in (CCSBT-ESC/08121208/21). The ESC17 will review the methods and results and discuss the most appropriate approach for the inclusion of the close-kin data into the OM. The close-kin data will, potentially, provide valuable information on the spawning stock abundance in recent years, which is not available from any other source. The revised SRP should consider the value of continued tissue sampling, archiving and analyses to extend the times series of information provided through the close-kin project.

In the process, this work has also identified a number of areas for investigation, which are relevant to the assumptions underpinning both the close-kin estimates and the OM. These include the need for a better understanding of the selectivity of the catches from the spawning grounds and the

residency and spawning behaviour of male and female SBT on the spawning grounds. These highlight the value of archival/electronic tagging program for adult SBT that would provide direct information on the residence times and specific spawning behaviours.

Ecologically related species

The ecologically related species working group (ERSWG) has developed a separate work program (ERSWG9, Appendix 2). In revising the SRP consideration could be given to increased interaction and coordination with the ERSWG work program. In particular, the ESC could contribute to the development of an agreed ERS data exchange, a stock assessment of porbeagle sharks, update of the seabird ecological risk assessment (ERA) and the development of ERAs for other species. These are elements of the ERSWG work program where there is likely to be substantial overlap with expertise of the ESC.

Conclusions

The development and adoption of the MP provides an opportunity for the ESC to develop new research plans for tackling the uncertainties identified through the OM development and consider outcomes of recent research. Catch characterisation, CPUE interpretation and recruitment monitoring remain essential priorities for monitoring, particular in terms of ensuring the robustness of the indexes that are incorporated into the MP and are key elements of the OM.

Consideration of the results of recent research, including the GSD project, close-kin project and how new data may be incorporated into the OM, should be developed within the timeframe of the revised SRP. This could also consider further exploration of need for spatial operating models to effectively capture the changes in the spatial dynamics of the stock and the fisheries.

Mark-recapture approaches, particularly those that do not rely on estimates of reporting rates (e.g. gene-tagging programs), should be considered to address uncertainties in movement patterns and to provide direct estimates of fishing and natural mortality. These should consider both adult and juvenile stages, particularly where changes in these may impact on the interpretation of other data / indices.

Given the collaborative approach to developing the MP and previous research collaboration between member scientists, the revised SRP should continue to develop collaborative initiatives to address the key issues.

Table 1: ESC Priorities for components of the CCSBT Scientific Research Program (Attachment 9, Anon 2009).

Priorities and estimated costs of scientific research program components

Item	Overall	Informs	Annual Cost ($1,000s)	Australia	Korea	Taiwan	New Zealand	Japan	Indonesia
Characterization of catch									
Future									
Catch amount	Essential	S, SSB, M		Essential	Essential	Essential	Essential	Essential	Essential
Size structure	Essential	S, SSB, M		Essential	Essential	Essential	Essential	Essential	Essential
Past									
Catch amount	High	S, SSB							
size structure	High	S, SSB							
Japanese Market Anomaly	High	S, SSB							
Australian Farming anomalies	High	S, SSB							
Australian stereo video	High	S, SSB	$350						
CPUE interpretation									
Future									
Commercial gear	Essential	ST, SSBT, R		low	low	low	Essential	Essential	High
SAPUE (Commercial sightings)	Medium	ST, SSBT, R		Medium/high					
Experimental fishing	Medium	ST, SSBT, R							
Past									
Commercial gear	High	ST, SSBT, R	$100						
Spawning biomass index									
From Indonesian CPUE	high	SSBT, M	$20						
From close kin analysis	high	SSB, SSBT, M	$200						
Experimental fishing	Medium	SSBT, M							
Scientific Observer Program	High	S, SSBT	$945	$260			$250	$435	
SBT Tagging		see fotnote b							
Conventional Tagging	low	R, S	$600						
PIT tagging	high	R, S	$600						
Genetic Tagging	low	R, S	unknown at present						
Archival Tagging	low/medium	see footnote c	$1,000	$500				$200	$300
Recruitment Monitoring									
Aerial survey	high	R	$575	$575					
Piston Line	Medium	R	$200					$200	
Acoustic	low	R	$700					$700	
Direct Aging									
sample collection/aging	high	ST, SSBT	$100	$50				$20	$30
Analysis for stock assessment	high	ST, SSBT							
MP Development	high	M							

Symbols
S=Exploitatable Stock size absolute level
ST=Trend in exploitable stock size
SSB= Spawning stock biomass
SSBT=Trend in spawning stock biomass
R=Trend in recruitment
M=Management TAC setting rules

a Note that potentially all indices will likely contribute to future management decision
b Tagging will provide estimates of recruitment and exploitable stock biomass through estimates of harvest rate and the model structur
c Archival tagging primarily provides information on movement and stock structur

Table 2   Summary of research since the SRP review in 2007 for the priorities set at the 2007 ESC.

Item	2007ESC Priority	Informs	Papers CCSBT-ESC/#	Results/Outcome
Characterization of catch				
Future				
Catch amount	Essential	S, SSB, M	Country reports, 1107/32	Estimates of recreational fishing and releases and discards
			1107/27	Japan's market monitoring
			1107/26	Back calculation of age and total catch in weight in farm data
			1107/22	New approach for analysis of market data
Size structure	Essential	S, SSB, M	CCSBT-CC/1110/11	Stereo video trials complete, implementation in surface fishery 2012
			1107/18	Indonesian size monitoring – key trends in size/age structure spawning population, spawning capacity. Benoa Tuna Research and Monitoring station given formal status as research institute.
Past				
Catch amount	High	S, SSB		
Size structure	High	S, SSB		
Japanese market anomaly	High	S, SSB	0809/40	Lag in calculations refined.
Australian farming anomaly	High	S, SSB	1107/26	Back calculation of age in farm data
Australian SV	High	S, SSB		Stereo video trials complete, implementation in surface fishery 2012
CPUE interpretation				
Future				
Commercial gear	Essential	ST, SSBT, R	1107/31	Operational changes Japanese longline fleet.
SAPUE	Medium	ST, SSBT, R	1107/16	Supports trends seen in the scientific aerial survey
Spawning/Feeding ground	Medium	ST, SSBT, R	0808/15	Not feasible because of costs. ESC states not a priority because other

Item	2007ESC Priority	Informs	Papers CCSBT-ESC/#	Results/Outcome
longline suveys				data sets are being developed.
Past				
Commercial gear	High	ST, SSBT, R	1107/30, CPUE WG reports and papers	Standardised CPUE for MP, monitoring series defined for MP and OM
Spawning biomass index				
Indonesian CPUE	High	SSBT, M		
Close kin	High	SSB, SSBT, M	0709/18, 1107/19, 1208/19	Sampling designs and genotyping, detection parent-off-spring pairs. Biomass index calculated, spawning behaviours (skip spawning younger mature fish)
Spawning/feeding ground surveys	Medium	SSBT, M		
Scientific observer program				
	High	S, SSB	Country reports	Reporting of observer coverage, observed and unobserved discard rates.
SBT tagging		Footnote b		
Conventional tagging	Low	R, S	0709/21	Reporting rates through tag seeding
			0909/26 – 1107/24	Tagging 1 yr olds during trolling survey
PIT tagging	High	R, S	0809/14	Not feasible because of food safety regulations Japan
Genetic tagging	Low	R, S	0808/13	Feasible – no costs for rewards (~25-35% of conventional tagging budget), costs for genetic processing decreasing dramatically, marker development for SBT now done through close-kin project
Archival tagging	Low/Medium	Movement and stock structure	1208/info 1	Global spatial dynamics project complete, key questions on spatial distribution and behaviours juveniles answered, significant large-scale changes in movement demonstrated

Item	2007ESC Priority	Informs	Papers CCSBT-ESC/#	Results/Outcome
			0909/26 – 1107/24	Archival tags on 1 yr old fish and new mini-PAT and x-tags on small fish.
Recruitment monitoring				
Scientific Aerial survey	High	R	1107/15	Calibration for move from 2 spotters to use of 1 spotter/plane
			1208/12	X year series of 2-4 year old relative abundance in GAB; 1 of 2 indices in MP
Piston line	Medium	R	1107/29	Monitoring survey age 1 fish; consistent approach over X years; future design improvements identified (Anon 2008)
Acoustic	Low	R	0709/43, 44	Residence times in WA, movement migration 1yr old fish
Direct ageing				
Sample collection/ageing	High	ST, SSBT	Country reports,1107/17, 1208/25, 1107/25	Collection continuing in Indonesian, Japanese, Taiwanese, Korean, Australian fisheries
Analysis for stock assessment	High	ST, SSBT	1107/17	Estimates of age frequency for surface fishery for use in OM using a variety of methods
			1107/18	Indonesian Direct age data used in OM
			1107/21	Initial exploration of potential for fine-scale otolith micro-chemistry to examine movement and stock structure; in particular, fidelity to the GAB as a summer feeding ground.
MP development				
	High	M	MP WG technical meeting reports and papers, 1107/12,13,34	Adopted MP – Bali procedure uses methods from MP1 and MP2

Item	2007ESC Priority	Informs	Papers CCSBT-ESC/#	Results/Outcome
			1107/30	Standardised CPUE for MP
OM development				
			0909/40, OMMP working group reports and papers, ESC meeting reports	Exploration of correlation between M, h and SSB and revision of mortality schedule and OM grid
			1107/9	Incorporation of new age-length cut-points, and growth estimates
			1107/11, 1107/14	MSY, replacement yield, SPR

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Appendix 1: Excerpts from 2008 independent review of CCSBT (Balton 2008) of relevance to the CCSBT SRP

- "For SBT, the most immediate need in the short term would be to develop the most accurate stock assessment possible in light of the uncertainty caused by the under-reported past catches, then to set catches (i.e. the global TAC) at a level that will allow the stock to rebuild. The CCSBT should take a precautionary approach in this regard: the greater the uncertainty of the stock assessment, the lower the TAC should be set."

- "The self assessment indicates little if any attention paid to the issue of managing fishing capacity, which is certainly a problem that other RFMOs are trying to address. Since excess capacity, among other things, creates pressure to disregard scientific advice in setting a global TAC, the CCSBT should at the very least implement the recommendations set forth in the FAO International Plan of Action on the management of fishing capacity."

- "....the CCSBT must move promptly to reduce the impacts of SBT fisheries on ecologically related species, including sharks, seabirds, sea turtles and other tuna species."

- "....as discussed at the Kobe meeting of the five tuna RFMOs, there is a need for all of those RFMOs to harmonize their data collection and sharing regimes. The CCSBT should certainly participate in this effort."

- The issue of CDS was discussed at Kobe "with a view to recommending that the tuna RFMOs, including CCSBT, move promptly toward full catch documentation schemes."

Appendix 2: Elements of the 2012 ERSWG work program of relevance to the CCSBT SRP

Mitigate the impact of fishing for SBT on ERS

- Secretariat to obtain new information on seabirds likely to be caught in fisheries from ACAP and Birdlife International (including population status summaries and reviews of mitigation measures) in advance of ERSWG meetings.
- New Zealand to update the CCSBT seabird ERA to include global tracking data from Birdlife International prior to the next ERSWG meeting.
- Members were encouraged to develop papers on ERA for non seabird species (in particular sharks) caught in SBT fisheries prior to next ERSWG meeting.
- Japan, New Zealand and Australia to work together on a stock assessment for porbeagle sharks in advance of the next ERSWG meeting.
- The Secretariat to contact IOSEA-Turtles with a view to assessing what data it holds and how it might assist any future work of the ERSWG.

Data provision requirements

- Members to report ERS catches to the next ERSWG meeting with appropriate stratification and in accordance with new standardised format agreed at ERSWG9.
- Members will undertake intersessional discussion to develop an agreement concerning the exchange of ERS data by CCSBT 19. The Secretariat will coordinate the discussion.
- Develop a set of minimum requirements for observer data, taking into account the potential for harmonisation across RFMOs. It recommended that this work be performed intersessionally. The Secretariat will facilitate the intersessional discussion Birdlife International and ACAP to collaborate with Members and Cooperating Non-Members to develop protocols for the improved identification of seabirds.
- Members to provide further details on electronic monitoring systems in advance of the next ERSWG meeting.

Identify and adopt additional mitigation measures

- To review information on mitigation measures as they become available.
- Members are encouraged to conduct experiments to identify new mitigation measures or improve existing mitigation measures that may be effective in reducing bycatch of ERS.
- Secretariat to update its paper on ERS mitigation measures of other tuna RFMOs in advance of future ERSWG meetings.
- Members are encouraged to exchange information and collaborate between Members and with NGOs for effective and smooth implementation of mitigation measures.

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