



Comisión Interamericana del Atún Tropical
Inter-American Tropical Tuna Commission



Actividades de investigación – Research activities SAC-10-01

Temario - Outline

- Informe de actividades mejorado
- Temas de investigación
- Proyectos seleccionados (por tema)
- Cronograma de evaluación de poblaciones
- Planes de trabajo:
 - Evaluaciones de atunes patudo y aleta amarilla
 - Pesquería sobre plantados
 - Recolección de datos y evaluaciones de tiburones:

- Improved staff activities report
- Research Themes
- Select Projects (by theme)
- Stock assessment schedule
- Work plans:
 - Bigeye and yellowfin tuna stock assessments
 - FAD fishery
 - Data collection and stock assessment for sharks



Nueva estructura del Informe de Actividades del Personal

New structure of Staff Activities Report

PROJECT E.5.b: Investigate the spawning ecology of captive yellowfin tuna, using genetic analysis		PROYECTO E.5.c: investigar la estructura poblacional de los atunes barrilete y aleta amarilla en el OPO, usando análisis genéticos
THEME: Life history studies for scientific support of management		THEME: Estudios del ciclo vital en apoyo científico de la ordenación
GOAL: E. Obtain life history and stock structure information for tropical tunas		GOAL: E. Obtener información de ciclo vital y estructura de poblaciones para evaluaciones estructurales de los atunes tropicales
TARGET: E.5. Conduct genetic studies to improve the assumptions about movement, behavior, and habitat utilization in stock assessments		TARGET: E.5. Realizar estudios genéticos para mejorar los supuestos sobre el ciclo vital y estructura de las poblaciones de los atunes tropicales
EXECUTION: Biology and Ecosystem Program		EXECUTION: Programa de Biología y Ecosistemas
OBJECTIVE: E.3. Investigate geographic variation in the movements, behavior, and habitat utilization of yellowfin tuna in the EPO		OBJETIVO: E.3. Estudiar la variación geográfica en los movimientos, comportamiento y utilización del hábitat de los atunes amarillo en el OPO
THEME: Life history studies for scientific support of management		THEME: Estudios del ciclo vital en apoyo científico de la ordenación
GOAL: E. Obtain life history and stock structure information for tropical tunas		GOAL: E. Obtener información de ciclo vital y estructura de poblaciones para evaluaciones estructurales de los atunes tropicales
TARGET: E.3. Analyze historical tagging data to improve the assumptions about movement, behavior, and habitat utilization in stock assessments of tropical tunas		TARGET: E.3. Analizar datos históricos de marcado para mejorar las suposiciones sobre los movimientos, comportamiento y utilización del hábitat en las evaluaciones de stock de los atunes tropicales
EXECUTION: Biology and Ecosystem Program		EXECUTION: Programa de Biología y Ecosistemas
Background	Objectives	Evaluating geographic variation in movements, behavior, and habitat utilization in yellowfin areas of the EPO; via analyses of existing archival tag data sets from 2018 onwards; tagged fish are released back into the ocean.
	Background	• Yellowfin tunas within the EPO • Future projections • Understanding of spatial dynamics and depletion parameters will provide a more accurate basis for the spatially-structured stock assessment.
Relevance for management	Duration	2020
	Work plan and status	• Several existing archival tag data sets from discrete areas will be analyzed and compared to describe geographic variation in movement, behavior, and habitat utilization over 3 years (2019-2021)
External collaborators	Duration	3 años (2019-2021) para la reunión del Comité de Administración y Finanzas en julio de 2017
	Work plan and status	• Historical conventional tag data sets for yellowfin from the EPO will also be included in the evaluations of movements and dispersion for the scientific journal.
PROYECTO E.4.a: Estudio multianual de marcado de atunes		PROYECTO E.4.a: Estudio multianual de marcado de atunes
TEMA: Estudios del ciclo vital en apoyo científico de la ordenación		TEMA: Estudios del ciclo vital en apoyo científico de la ordenación
META: E. Obtener información de ciclo vital y estructura de poblaciones para evaluaciones estructurales de los atunes tropicales		META: E. Obtener información de ciclo vital y estructura de poblaciones para evaluaciones estructurales de los atunes tropicales
OBJETIVO: E.4. Iniciar un programa multianual de marcado de atunes		OBJETIVO: E.4. Iniciar un programa multianual de marcado de atunes
EJECUCIÓN: Programa de Biología y Ecosistemas		EJECUCIÓN: Programa de Biología y Ecosistemas
Objectives	Objetivos	• Obtener datos para evaluar la variabilidad espacial temporal en la edad, crecimiento, madurez, y fecundidad del atún aleta amarilla en el OPO
	Background	• Obtener datos para evaluar la variabilidad espacial temporal en la edad, crecimiento, madurez, y fecundidad del atún aleta amarilla en el OPO
2. ESTUDIOS DEL CICLO VITAL EN APOYO CIENTÍFICO DE LA ORDENACIÓN		2. ESTUDIOS DEL CICLO VITAL EN APOYO CIENTÍFICO DE LA ORDENACIÓN
E.2.a: Investigar la variabilidad espacio temporal en la edad, crecimiento, madurez, y fecundidad del atún aleta amarilla en el OPO		E.2.a: Investigar la variabilidad espacio temporal en la edad, crecimiento, madurez, y fecundidad del atún aleta amarilla en el OPO
E.4.a: Estudio multianual de marcado de atunes		E.4.a: Estudio multianual de marcado de atunes
E.5.c: investigar la estructura poblacional de los atunes barrilete de aleta amarilla en el OPO, usando análisis genéticos		E.5.c: investigar la estructura poblacional de los atunes barrilete de aleta amarilla en el OPO, usando análisis genéticos
Relevance for management	Duration	2020
	Work plan and status	• Se evaluarán las variaciones espaciales y temporales en la edad, crecimiento, madurez y fecundidad de los atunes amarillo en el OPO.
External collaborators	Duration	3 años (2019-2021) para la reunión del Comité de Administración y Finanzas en julio de 2017
	Work plan and status	• Los observadores en buques pesqueros recolectan 100 etiquetas blancas de atunes barrilete y aleta amarilla en cada una de 3 zonas diferentes.
Plan de trabajo y estatus		Plan de trabajo y estatus
2018-2020		2018-2020
• Observadores en buques pesqueros recolectan 100 etiquetas blancas de atunes barrilete y aleta amarilla en cada una de 3 zonas diferentes.		• Observadores en buques pesqueros recolectan 100 etiquetas blancas de atunes barrilete y aleta amarilla en cada una de 3 zonas diferentes.
• Muestras procesadas en CSIRO para extraer y secuenciar ADN		• Muestras procesadas en CSIRO para extraer y secuenciar ADN

Informes de proyecto - Project reports

PROJECT A.3.b: Develop databases of biological and fisheries parameters to support Ecological Risk Assessment and ecosystem models	
THEME: Data Collection	
GOAL: A. Database maintenance, preservation, and access	
TARGET: A.3. Standardize and automate data submissions	
EXECUTION: Data Collection and Database Program, Biology and Ecosystem Program	
Objectives	Develop a comprehensive database of best-available biological and fisheries data to provide key parameters for Ecological Risk Assessment (ERA) and ecosystem models
Background	<ul style="list-style-type: none">The Antigua Convention requires the IATTC to ensure the sustainability of target, associated, and dependent species affected by EPO tuna fisheries, and the ecosystem to which they belong.ERA and ecosystem models, used by IATTC staff to assess the ecological impacts of tuna fisheries in the EPO, require information on biological, physiological and trophodynamic characteristics of thousands of species in the EPO ecosystem.A database with the most up-to-date information for impacted species is required to expedite the initial parameterization, or updating, of future models.
Relevance for management	<ul style="list-style-type: none">The database will contain data needed for ERAs and ecosystem models, used to identify and prioritize data collection, mitigation, and/or management measures for vulnerable species.The databases could be shared with scientists of CPCs.
Duration	48 months
Workplan and status	<ul style="list-style-type: none">Jan–Apr 18: Create a basic database structure ready to be populated with biological parameters and associated literature sources.Ongoing: Conduct biological and ecological literature searches for species that interact with EPO fisheriesOngoing: Conduct literature searches for species that interact with EPO fisheries, identify fishery-related susceptibility parameters for bycatch species, create database
External collaborators	Scientists from CPCs interested in contributing to and/
Deliverables	Comprehensive life history and susceptibility database information that can be shared with IATTC CPCs for the for a particular region and/or fishery.

PROJECT A.3.b: Develop databases of biological and fisheries parameters to support Ecological Risk Assessment and ecosystem models
Updated: March 2019
Progress summary for the reporting period
<ul style="list-style-type: none">Life history database is in development for all species reported to have interacted with purse-seine and large-scale longline fisheriesValues for fisheries-related susceptibility parameters have been obtained for many of the bycatch species
Challenges and key lessons learnt
<ul style="list-style-type: none">Database development will be ongoing and parameter values will be updated as new literature and improved data becomes available
Reports/publications/presentations
Two manuscripts that use this life history and susceptibility data have been submitted to scientific journals
Comments:

Informe del proyecto (segunda página)
Project report (second page)

Descripción del proyecto (primera página)
Project description (first page)



Temas - Themes

Recolección de datos en apoyo científico de la ordenación

Data collection for scientific support of management

Estudios del ciclo vital en apoyo científico de la ordenación

Life-history studies for scientific support of management

Pesquerías sostenibles

Sustainable fisheries

Impactos ecológicos de la pesca: evaluación y mitigación

Ecological impacts of fisheries: assessment and mitigation

Interacciones entre el medio ambiente, el ecosistema, y la pesca

Interactions among the environment, the ecosystem and fisheries

Transferencia de conocimientos y fomento de capacidad

Knowledge transfer and capacity building

Excelencia científica

Scientific excellence



(5)

(11)

(14)

(9)

(7)

(4)

(2)

Recolección de datos en apoyo científico de la ordenación

Data collection for scientific support of management

SAC-10 Agenda Items

11.a



1. DATA COLLECTION FOR SCIENTIFIC SUPPORT OF MANAGEMENT

A.1.a: Routine activities of the Bycatch and IDCP Program

A.3.a. Conversion of all remaining Visual Basic 6 (VB6) computer programs to Visual Basic Net (VB.net).

C.4.a: Improving data collection for Central American shark fisheries

D.2.a: Pilot study of electronic monitoring (EM) of the activities and catches of purse-seine vessels

vessels

8.b



Estudios del ciclo vital en apoyo científico de la ordenación Data collection for scientific support of management

SAC-10 Agenda Items

2. LIFE-HISTORY STUDIES FOR SCIENTIFIC SUPPORT OF MANAGEMENT

E.1.a: Evaluate potential improvement of growth model for bigeye in the EPO based on presumed annuli counts from otoliths of large fish

E.2.a: Investigate spatiotemporal variability in the age, growth, maturity, and fecundity of

E.2.b. Workshop to evaluate differences in bigeye tuna age estimation methods and resulting growth models utilized in current stock assessments by the IATTC and WCPFC

E.4.a: Multi-year tuna tagging study

G.1.a: Studies of pre-recruit survival and growth of yellowfin tuna, including expanding studies of early-juvenile life stages

G.2.a: Develop comparative models of pre-recruit survival and reproductive patterns of Pacific tunas

G.3.a: Develop a larval growth index to forecast yellowfin recruitment

G.1.a: Studies of pre-recruit survival and growth of yellowfin tuna, including expanding studies of early-juvenile life stages

G.2.a: Develop comparative models of pre-recruit survival and reproductive patterns of Pacific tunas

G.3.a: Develop a larval growth index to forecast yellowfin recruitment

7.a.i



8.a



12.a



Pesquerías sostenibles Sustainable fisheries

3. SUSTAINABLE FISHERIES

- H.1.a: Improve the bigeye tuna stock assessment
- H.1.b: Improve the yellowfin tuna stock assessment
- H.1.c: Investigate potential changes in the selectivity of the longline fleet resulting from changes in gear configuration

H.1.a: Improve the bigeye tuna stock assessment

H.1.b: Improve the yellowfin tuna stock assessment

H.1.d: Improve indices of abundance based on longline CPUE data

J.2.a: Quantify the relationship between vessel operational characteristics and fishing mortality

H.5.a: Revise trend estimation methods for purse-seine silky shark indices for the EPO

I.3.a: Evaluate potential reference points for dorado in the EPO

H.8.a: Design a survey for dolphins in the eastern tropical Pacific Ocean (ETP)

I.1.a: Conduct a Management Strategy Evaluation (MSE) for tropical tunas in the EPO

I.3.a: Evaluate potential reference points for dorado in the EPO

J.2.a: Quantify the relationship between vessel operational characteristics and fishing mortality

K.1.a: POSEIDON project

SAC-10 Agenda Items

7.a

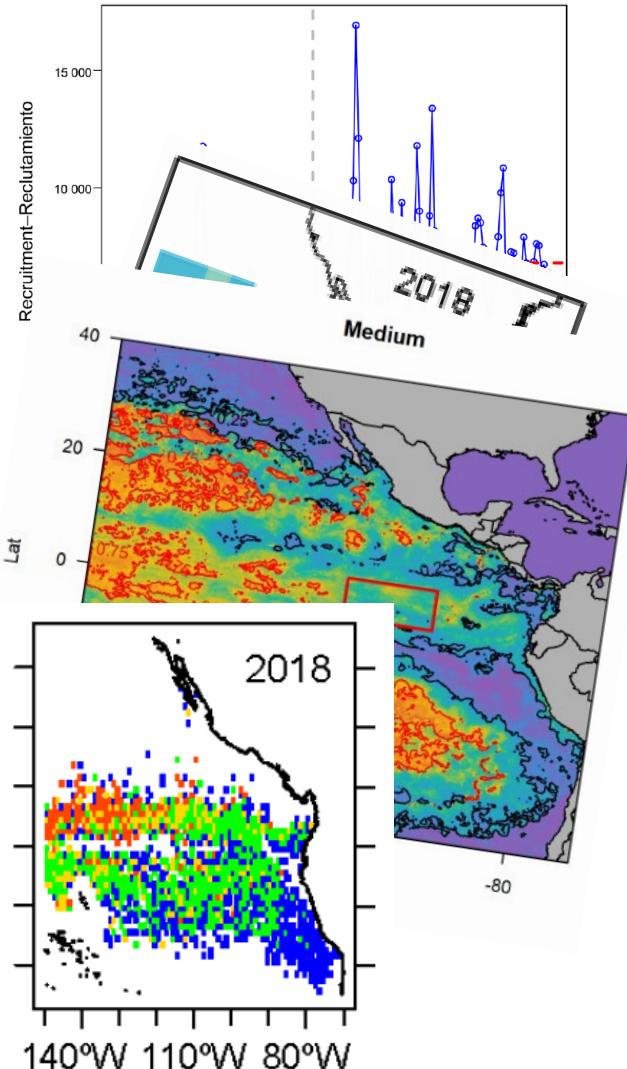
6.b,c

7.a.ii

7.b

11.b

7.c

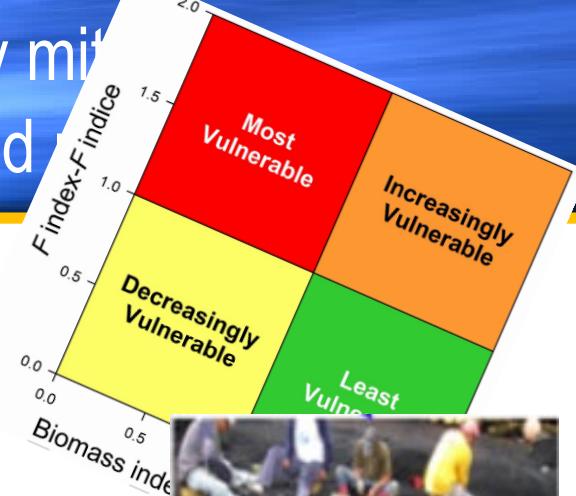


Impactos ecológicos de la pesca: evaluación y mitigación

Ecological impacts of fisheries: assessment and mitigation

SAC-10/BYC-09 Agenda Items

BYC-09 6.a



BYC-09 8.b



11.c



9.a

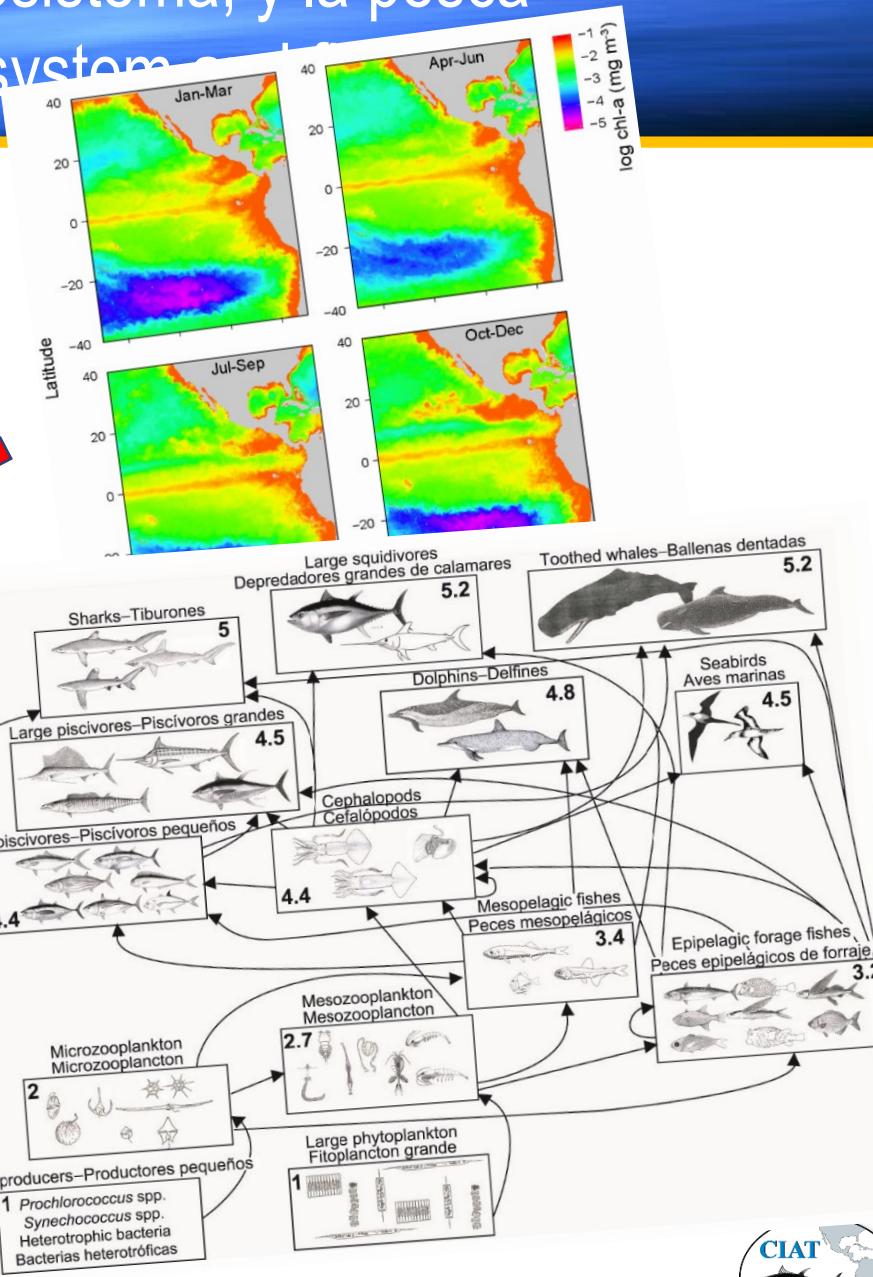
4. ECOLOGICAL IMPACTS OF FISHERIES: ASSESSMENT AND MITIGATION	
L.1.a:	Develop habitat models for bycatch species caught in the EPO to support ecological risk assessments (ERAs)
L.1.b:	Develop a flexible spatially-explicit ERA approach for quantifying the cumulative impact of tuna fisheries on data-limited bycatch species in the EPO
L.1.b:	Develop a flexible spatially-explicit ERA approach for quantifying the cumulative impact of tuna fisheries on data-limited bycatch species in the EPO
M.1.b:	Test sorting grids
M.2.a:	Evaluate the post-release survival of silky sharks captured by longline fishing vessels in the equatorial EPO, using best handling practices
M.5.a:	Develop and test non-entangling and biodegradable FADs
longline fisheries, and identification of silky shark pupping areas for bycatch mitigation	
M.5.a:	Develop and test non-entangling and biodegradable FADs
M.5.b:	Reducing losses, and fostering recovery, of FADs in the purse-seine fishery in the EPO

Interacciones entre el medio ambiente, el ecosistema, y la pesca

Interactions among the environment, the ecosystem, and fisheries

SAC-10 Agenda Items

10.a



10.b

5. INTERACTIONS AMONG THE ENVIRONMENT, THE ECOSYSTEM, AND FISHERIES	
N.1.a: Analyze EPO bycatch data to assess the influence of environmental drivers on catches and vulnerability	
N.1.b: Investigate the effects of wind-induced microturbulence on yellowfin larval survival	
N.1.a: Analyze EPO bycatch data to assess the influence of environmental drivers on catches and vulnerability	
O.2.b: An updated ecosystem model of the eastern tropical Pacific Ocean for providing standardized ecological indicators for monitoring of ecosystem integrity	
ration of pelagic fishes: a precursor to experimental estimation for key predators in eastern Pacific Ocean	
O.2.a: Develop and implement analytical tools for understanding the trophic ecology of apex predators	
O.2.b: An updated ecosystem model of the eastern tropical Pacific Ocean for providing standardized ecological indicators for monitoring of ecosystem integrity	

Transferencia de conocimientos y fomento de capacidad

Knowledge transfer and capacity building

6. KNOWLEDGE TRANSFER AND CAPACITY BUILDING

P.1.a: Fulfil requests for development of database and data processing applications for entities outside the IATTC

P.1.b: Respond to requests for scientific analyses

Q.1.a: Achotines Laboratory support of Yale University's Environmental Leadership Training Initiative (ELTI) in Panama

R.1.a: Workshop on training, communication and evaluation of management strategies for tuna fisheries in the EPO



Excelencia científica Scientific excellence

SAC-10
Agenda
Items

7. SCIENTIFIC EXCELLENCE

T.1.a: External review of bigeye tuna assessment

7.a.iii



Cronograma de evaluación de poblaciones: CIAT

Stock assessment schedule: IATTC

Species	SSP ref.	Last assessed	2018	2019	2020	2021	2022	2023
IATTC								
Yellowfin tuna	H.4.a	2018	Update	Indicators/ Update ² / Exploratory/ Review	Benchmark	Update	Update	Update
Skipjack tuna	H.4.a	2004/2018 Indicators	Indicators	Indicators	Indicators	Indicators	Indicators	Indicators/ Tagging ³
Bigeye tuna (EPO)	H.4.a	2017/2018 Indicators	Indicators/ Update ⁴	Indicators/ Exploratory/ Review	Benchmark	Update	Update	Update
Bigeye tuna (Pacific wide)	H.7.a	2016			Exploratory			
South Pacific albacore tuna	H.7.c						Benchmark	
Striped marlin	H.7	2010						
Swordfish (south EPO)	H.7.b	2011			Benchmark			
Sailfish	H.7	2013						
Black marlin		Never						
Silky shark	H.7	2018 (EPO indicators/ Pacific-wide benchmark)	Indicators	Indicators	Indicators	Indicators	Indicators	Indicators/ Benchmark
Dorado	I.3.a	2016		Candidate RP and HCR				

Cronograma de evaluación de poblaciones: ISC

Stock assessment schedule: ISC

Species	SSP ref.	Last assessed	2018	2019	2020	2021	2022	2023
COLLABORATIONS								
Pacific bluefin tuna	H.6.a	2016 benchmark/ 2018 update	Update	Projections	Benchmark	Projections	Update	Projections
North Pacific albacore tuna	H.6.a	2017			Benchmark			
Blue marlin	H.7	2013 benchmark/ 2016 update						
Blue shark	H.6.a	2017						
Shortfin mako shark	H.6.a	2018	Benchmark					
Swordfish (north Pacific)	H.7	2014						

Plan de trabajo para mejorar las evaluaciones del patudo y aleta amarilla

Work plan to improve bigeye and yellowfin assessments



SAC Agenda Items

2017	Collaboration with Japanese scientists on identifying targeting changes	Report, SAC-09
2018	February: CAPAM workshop on the development of spatiotemporal models of fishery catch-per-unit-effort data to derive indices of relative abundance (Special Issue of Fisheries Research)	SAC-09-09
	Developing a spatially structured stock assessment for bigeye tuna and other model improvements	Project I.1.a
	October: CAPAM workshop on spatial stock assessment models focusing on bigeye tuna	Project X.1.a
2019	January: Workshop to evaluate differences in bigeye tuna age estimation methods and resulting growth models utilized in current stock assessments by the IATTC and WCPFC	Project E.2.b
7.a.i.	February: Workshop to improve the longline indices of abundance of bigeye and yellowfin tunas in the EPO	Project H.1.d
7.a.ii.	March: Independent review of bigeye assessment (report)	Project T.1.a
7.a.iii.	May: SAC-10, exploratory bigeye and yellowfin assessments	SAC-10 INF-G
	Oct-Nov: Construct indices of abundance and composition data for longline fleets	Project H.1.e
	Nov-Dec: Yellowfin tuna assessment independent review	Project T.1.b
2020	May: Benchmark bigeye and yellowfin assessments	Report, SAC-11
	July: New management recommendations to the Commission	IATTC annual meeting





Plan de trabajo: evaluación de estrategias de ordenación (EEO)

Work plan: Management strategy evaluation (MSE)

SSP ref.	Target/Project							2018	2019	2020	2021	2022	2023
		1	2	1	2	1	2	1	2	1	2	1	2
	2. Continue technical development of MSE, HCR, MP, outputs (with Project R.1.b)												
	a. Run preliminary MSE based on initial input from managers and stakeholders												
	b. Run final MSE based on revised input from managers and stakeholders												
	c. Propose evaluated HCR/MP to Commission for adoption, plan work for other tropical tunas												
I.2.	Collaborate with ISC in Pacific-wide MSEs for albacore and Pacific bluefin tunas (*dependent on ISC scheduling)	ALB						*	*	*	*	*	*
		PBF				*		*	*	*	*	*	*
I.3	Initiate MSE work to evaluate indicator-based harvest strategies for prioritized species and species of specific interest												

SSP ref.	Target/Project							2018	2019	2020	2021	2022	2023
		1	2	1	2	1	2	1	2	1	2	1	2

2. KNOWLEDGE TRANSFER AND CAPACITY BUILDING

Goal R: Improve communication of scientific advice

R.1.	Improve communication of the staff's scientific work to CPCs												
R.1.a	Workshop on training, communication and evaluation of management strategies for tuna fisheries in the EPO												
	a. Other MSE workshops for scientists-managers (to be planned)												
R.1.b	Technical development, communication and evaluation of MSEs for tropical tuna fisheries in the EPO involving managers, scientists and other stakeholders												
R.2	Participate in global initiatives for the communication of science: t-RFMO MSE working group												

Green: completed; blue: funded; red: unfunded



Plan de trabajo: plantados

Work plan: FADs

SAC
Agenda
Items

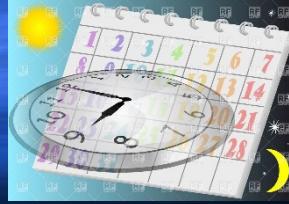
7.b

SSP ref.	Target/Project	Timeframe & status					
		2017	2018	2019	2020	2021	
1. DATA							
Goal B: Identify and prioritize opportunities to improve data quality and expand data types and coverage							
B.2.	Expand on-board data collection to small purse seiners: train observers		 				
Goal C: Facilitate the improvement of data quality, coverage, and reporting by CPC data collection programs							
C.1.	Purse-seine fleet: Improve data reporting and content (Resolutions 16-01 and 17-02; SAC-09 and WG-FADs recommendations)		 	 	 	 	
C.1.a	Develop an effective and reliable floating-object marking scheme to assist scientific advance		 	 	 	 	
Goal D: Investigate the use of new technologies to improve data quality							
D.2.a	Pilot study of electronic monitoring of the activities and catches of purse-seine vessels		 	 	 	 	
Goal Q: Provide training opportunities for scientists and technicians of CPCs							
Q.3	Workshops for vessel crews, industry, and national authorities on requirements of C-16-01 and C-17-02 (WG-FADs Recommendation endorsed by SAC-09)		 	 	 	 	
2. CONSERVATION AND MANAGEMENT							
Goal J: Improve our understanding of the effects of the operational characteristics of the fishery on fishing mortality, stock assessments, and management advice							
J.2.a	Quantification of the relationship between vessel operational characteristics and fishing mortality		 	 	 	 	
Goal M: Mitigate the ecological impacts of tuna fisheries							
M.1.a	Evaluate the effect of the depth of non-entangling FADs on catches of tunas and bycatches of other species in the purse-seine fishery		 	 	 	 	
M.1.b	Test sorting grids (with emphasis on reducing catches of juvenile bigeye)		 	 	 	 	
M.3.a	Estimate bycatch and discard rates at FADs, by species, and identify "hot spots"		 	 	 	 	
M.5.a	Develop and test non-entangling and biodegradable FADs		 	 	 	 	
M.5.b	Reducing losses, and fostering recovery, of FADs in the purse-seine fishery in the EPO		 	 	 	 	

9.a

Plan de trabajo: mejorar recolección de datos y evaluaciones de tiburones

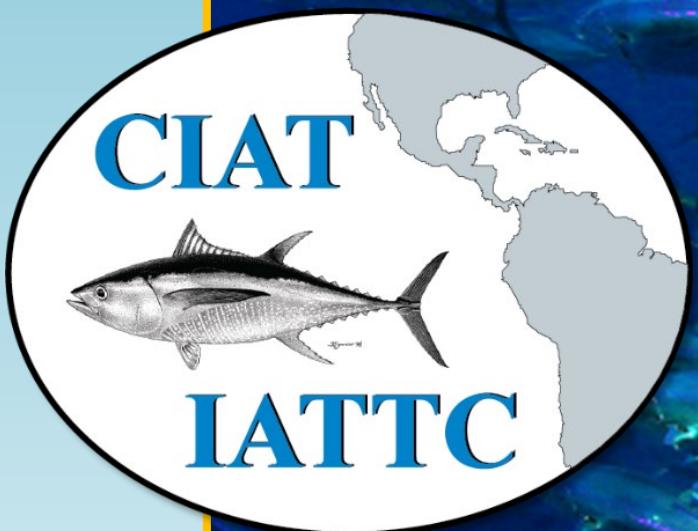
Work plan: Improve shark data collection and stock assessments



SAC
Agenda
Item

11.a

SSP ref.	Target/Project	Timeframe & status						
		2018	2019	2020	2021	2022	2023	
1. DATA								
Goal C: Facilitate the improvement of data quality, coverage, and reporting by CPC data collection programs								
C.4	Artisanal fisheries (coastal developing CPCs)							
C.4.a	Improving data collection for Central American shark fisheries: develop sampling protocols for catch and effort estimation (FAO-GEF ABNJ project)							
	a. Identify all unloading sites and obtain order-of-magnitude estimates of total catch and effort							
	b. Design and test sampling protocols for species and size composition sampling							
C.4.b	Long-term sampling program for shark catches of artisanal fisheries in Central America							
2. LIFE HISTORY DATA								
F.2.a	Investigate the movements, behavior, and habitat utilization of silky sharks in the EPO							
3. MONITORING POPULATION STATUS AND MANAGEMENT ADVICE								
Goal H: Improve and implement stock assessments, based on the best available science								
H.5	Undertake the research necessary to develop and conduct data-limited assessments for prioritized species (Assessments of silky and hammerhead sharks in the EPO)							
H.5.a	Revise trend estimation methods for purse-seine silky shark indices for the EPO							
Goal L: Evaluate the ecological impacts of tuna fisheries								
L.1.a	Develop habitat models for bycatch species caught in the EPO to support ecological risk assessments (ERAs)							
L.1.b	Develop a flexible spatially-explicit ERA approach for quantifying the cumulative impact of tuna fisheries on data-limited bycatch species in the EPO							
L.2.a	Develop and update Productivity-Susceptibility Analyses (PSAs) of tuna fisheries in the EPO							
Goal N: Improve our understanding of the interactions among environmental drivers, climate, and fisheries								
N.1.a	Analyze EPO bycatch data to assess the influence of environmental drivers on catches and vulnerability							
4. BYCATCH MITIGATION								
Goal M: Mitigate the ecological impacts of tuna fisheries								
M.1.a	Evaluate the effect of the depth of non-entangling FADs on catches of tunas and bycatches of other species in the purse-seine fishery							
M.2.a	Evaluate the post-release survival of silky sharks captured by longline fishing vessels in the equatorial EPO, using best handling practices							
M.2.b	Evaluate best handling practices for maximizing post-release survival of silky sharks in longline fisheries, and identification of silky shark pupping areas for bycatch mitigation							
M.3.a	Estimate bycatch and discard rates at FADs, by species, and identify "hot spots"							



¿Preguntas?
Questions?