

Actividades de Investigación – Research Activities

102ª Reunión de la CIAT - 102nd Meeting of the IATTC
2-6 de septiembre de 2024 – 2-6 September 2024
Ciudad de Panamá, Panama City, Panamá

Antecedentes - Background

- En su 101ª reunión en 2023, la CIAT decidió extender el PCE de 2019-2023 por un año (2024)
- Esta extensión permitiría completar proyectos importantes (evaluaciones de referencia de las poblaciones de YFT, BET y SKJ, y una propuesta de estrategia de captura para BET)
- La Comisión apoyó que se presentara y discutiera una propuesta para el nuevo PCE en 2025.

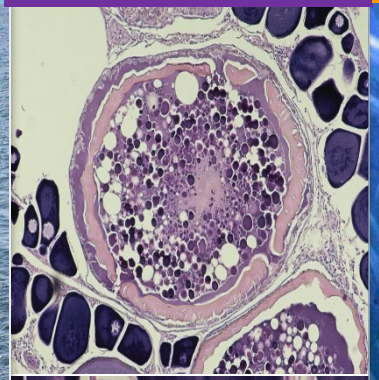
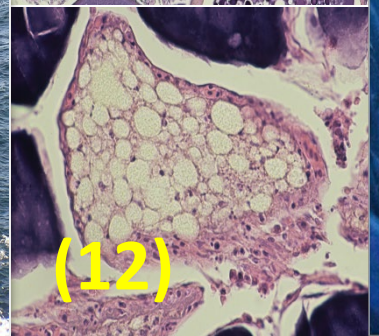
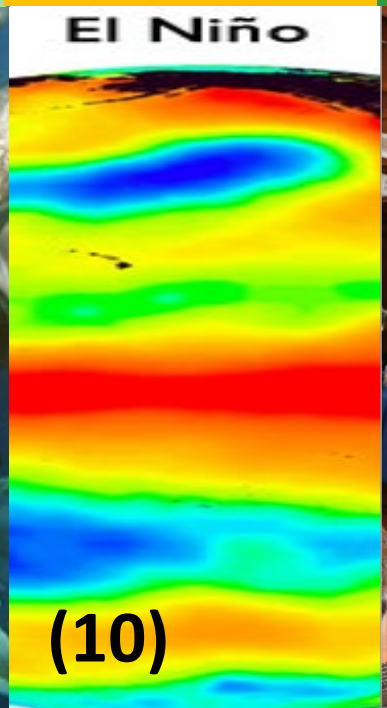
- At its 101st meeting in 2023, the IATTC decided that the 2019-2023 SSP should be extended for one year (2024)
- This extension would allow important projects to be completed (benchmark assessments for YFT, BET, SKJ and proposed harvest strategy for BET)
- The Commission supported that a proposal for the new SSP be presented and discussed in 2025

Temario - Outline

- Una mirada retrospectiva a los logros y deficiencias del PCE de 2019-2024
- Introducir algunas consideraciones sobre posibles actividades de investigación futuras para el próximo PCE

- A retrospective glance at the accomplishments and shortcomings of the 2019-2024 SSP
- Introduce some considerations on future research activities for the next SSP

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
 (11)	  (12)	 (28)	 (18)	 (10)	 (5)	 (4)

Recolección de datos en apoyo científico de la ordenación
Data collection for scientific support of management

1. Data collection for scientific support of management		Start	End
A.1.a	Regular activities of the Bycatch and IDCP Program	Ongoing	
A.3.a	Conversion of all remaining Visual Basic 6 (VB6) computer programs to Visual Basic Net (VB.net)	2014	2021
A.3.b	Develop databases of biological and fisheries parameters to support Ecological Risk Assessment and ecosystem models	2018	2023
A.3.c:	A.3.c: Series of workshops on improvements in data collection and provision to provide recommendations for updating the data provision Resolution C-03-05	2023	2024
B.1.a	Improving smart species identification tools	2022	2023
B.3.a	Pilot study to develop the Enhanced Monitoring Program for BET catches	2022	2023
C.1.a	Purse-seine catch composition bias estimation	2022	2023
C.2.b	Pilot study of electronic monitoring (EM) of the activities and catches of longline vessels	2021	2023
C.4.a	Improving data collection for Central American shark fisheries	2018	2019
C.4.b	Long-term sampling program for shark catches of artisanal fisheries in Central America: Phase 1	2020	2021
C.4.c	Improving the monitoring and assessment of shark stocks in the Eastern Pacific Ocean: expansion to Ecuador, Mexico and Peru	2023	2024
D.1.a	Exploring technologies for remote identification of FADs	2022	2023
D.2.a	Pilot study of electronic monitoring (EM) of the activities and catches of purse-seine vessels	2018	2021



EMP developed (SAC-15 INF-H)



EMS minimum standards (SAC-15 IN-Q)

Proceso de SME - resumen
EMS process - summary

Logros

- 2021-2024: Serie de talleres y finalización de tres proyectos piloto relacionados con ME
- 2022(*2023*): Creación del GTME
- 2024: Propuesta de estándares mínimos

Tareas para el próximo PCE

- Adopción de estándares mínimos de un SME en el OPO
- Definir objetivos y alcance de un SME
- Optimización de tiempo/costos del análisis de ME y mejora de calidad de datos
- Plan de implementación de SME a largo plazo

Achievements

- 2021-2024: Series of workshops and three EM related pilots completed
- 2022(*2023*): Establishment of EMWG
- 2024: Proposed minimum standards

Tasks ahead in next SSP

- Adoption of minimum standards for an EPO EMS
- Define goals and scope of an EPO EMS
- Time/cost optimization of EM analysis and improved data quality
- Long-term EMS implementation plan

Recolección de datos en apoyo científico de la ordenación
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EMP developed
(SAC-15 INF-H)





EMS minimum standards
(SAC-15 IN-Q)

Mejorar la recolección de datos de las pesquerías tiburoneras en Centroamérica
Improving data collection for Central American shark fisheries



2015-2017

CIAT- FAO/GEF ABNJ Project

- Metadata (SAC-07-06b (ii))
- Challenge and Recomendations to improvement SAC-07-06b(iii)
- Capacity building

2018-2019

Pilot study for shark sampling program (SAC-11-13)

- Mapping shark landing sites
- Landing sites characterization
- Catch and effort survey
- Order-of-magnitude estimates
- Catch sampling designs

2020-2021

Long-term Shark Sampling Program (SSP)

- Order of Magnitude (SSP)
- Catch sampling design for artesanal fleet
- Catch sampling design for median and advance fleet
- Pilot tissue sampling (Mobulidae)

Proyecto Océanos Comunes Atún 2 – expansión a Ecuador, México y Perú
Common Oceans Tuna 2 project – expansion to Ecuador Mexico and Peru

- Expand the successful ABNJ Tuna I work in Central America to the remaining three nations where shark fisheries are well developed in EPO (Ecuador, Mexico, and Peru)

- Activities contributing to the development and implementation of a regional shark fishery sampling program in the EPO

- Providing data for various types of shark stock assessments at the IATTC
  - Short term (1-2 years): Ecological Risk Assessments (e.g. EASI-fish)
  - Medium-term (3-5 years): CKMR assessments, morphometric and biological sampling
  - Long-term (10-20 years): Conventional stock assessments



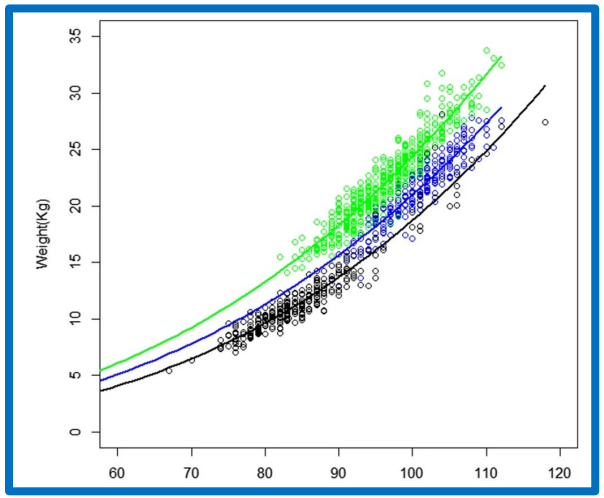
Common Oceans side event:
DATE: Thursday, 5 September 2024
TIME: 13:30-14:30
PLACE: Tejas (lunchroom)
INTERPRETATION: Spanish – English

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

2. Life history studies for scientific support of management		Start	End
E.1.a	Evaluate potential improvement of growth model for bigeye in the EPO based on presumed annuli counts from otoliths of large fish	2017	2019
E.2.a	Investigate spatiotemporal variability in the age, growth, maturity, and fecundity of yellowfin tuna in the EPO	2017	2022
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	2019	2019
E.3.a	Investigate geographic variation in the movements, behavior, and habitat utilization of yellowfin tuna in the EPO	2020	2021
E.4.a	IATTC Regional Tuna Tagging Program (RTTP) - EPO	2019	2023
E.5.a	Evaluate the Pacific-wide population structure of bigeye and skipjack tunas, using genetic analyses	2017	2020
E.5.b	Investigate the spawning ecology of captive yellowfin tuna, using genetic analyses	2018	2019
F.2.a	Investigate the movements, behavior, and habitat utilization of silky sharks in the EPO	2020	2021
F.3.a	Feasibility study to develop a sampling program for updating morphometric relationships and collecting biological samples for priority species in EPO tuna fisheries: Phase 1	2022	2024
G.1.a	Studies of pre-recruit survival and growth of yellowfin tuna, including expanding studies of early-juvenile life stages	2018	2020
G.2.a	Develop comparative models of pre-recruit survival and reproductive patterns of Pacific tunas	2018	2020
G.3.a	Develop a larval growth index to forecast yellowfin recruitment	2018	2023

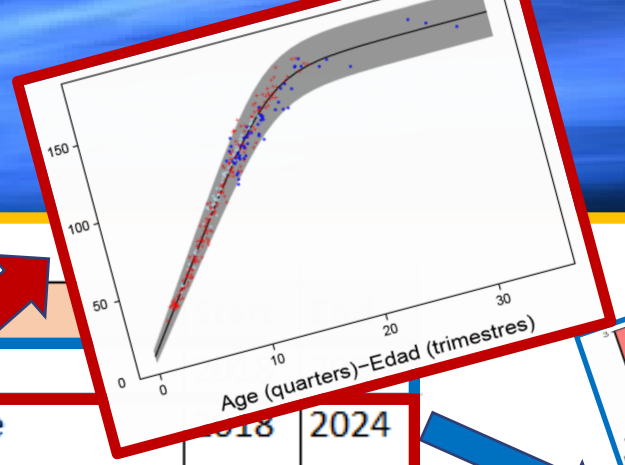


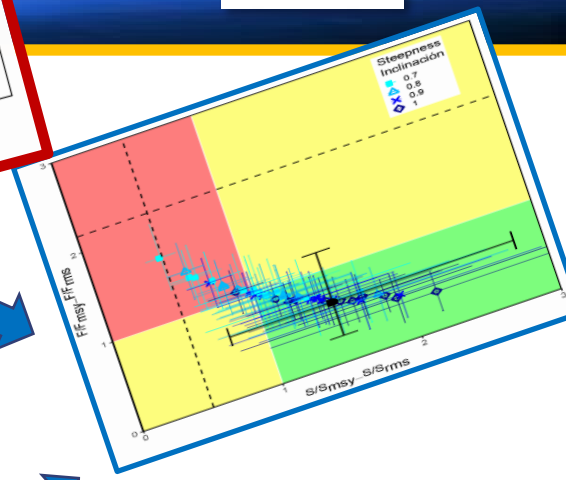
see proposal E.4.b in SAC-15 INF-E.b



SAC-14 INF-J, EMP SAC-15 INF-H, see proposals B.3.b and F.3.a in IATTC-102-02b

Pesquerías sostenibles
Sustainable fisheries





3a. Sustainable fisheries			
H.1.a	Improve the bigeye tuna stock assessment		
H.1.b	Improve the yellowfin tuna stock assessment phase 2: Explore alternative hypotheses of stock structure and life-history for YFT in exploratory stock assessment models	[illegible]	2024
H.1.b-2	Improve the yellowfin tuna stock assessment:Explore alternative hypotheses of stock structure and life-history for YFT in exploratory stock assessment models	2021	2024
H.1.c	Investigate potential changes in the selectivity of the longline fleet resulting from changes in gear configuration	2019	2019
H.1.d	Improve indices of abundance based on longline CPUE data	2018	2019
H.1.d-2	Improve indices of abundance based on longline data (Extension)	2020	2022
H.1.e	Construct indices of abundance and composition data for longline fleets	2019	2020
H.1.f	Improving the methodology of the risk analysis	2021	2024
H.3.a	Analysis of recent skipjack tagging data	2021	2024
H.3.b	Skipjack Stock assessment	2022	2023
H.3.c	Estimate skipjack growth rates from recent tagging data	2023	2024
H.4.a	Conduct regular stock assessments of tropical tunas	Ongoing	
H.5.a	Revise trend estimation methods for purse-seine silky shark indices for the EPO	2018	2019



CIAT IATTC

Plan de trabajo para la evaluación de las poblaciones
Stock assessment workplan

Cronograma de evaluaciones – atunes tropicales
Stock assessment schedule – tropical tuna

Triennial assessment and management cycle (2022-2024)

SPECIES	2021	2022	2023	2024
Tropical Tunas	**Indicators**	**Indicators**	**Indicators**	**Indicators**
SKJ	**Review of assessment methods**	Interim SKJ assessment **Initial results of tagging analysis; External review**		**Benchmark assessment**
YFT		**WS on longline data; WS on improving spatio-temporal methods for CPUE and L-F standardization (Project H.1.f)**	**Exploratory assessment; External review (Nov-Jan)**	**Benchmark assessmer**
BET		**WS on longline data; WS on improving spatio-temporal methods for CPUE and L-F standardization (Project H.1.f)**	**Exploratory assessment; External review (Nov-Jan)**	**Benchmark assessment**
Risk analysis		**WS to improve metrics and scoring in risk analysis (Proposal H.1.g)**		**Risk analysis**
MSE process	**MSE WS, Tech. Work**	**MSE WS, Tech. Work**	**MSE WS, Prelim. results**	**MSE WS, BET HS, Futur Work**



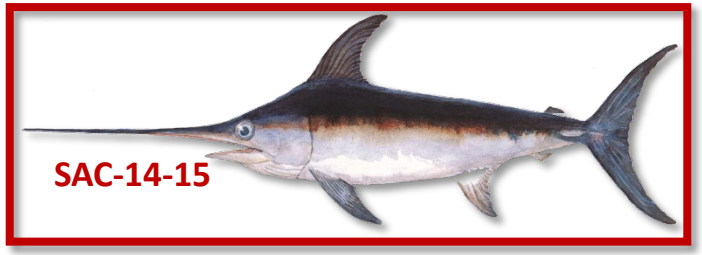
Pesquerías sostenibles
Sustainable fisheries



3b. Sustainable fisheries		Start	End
H.6.a	Participate in assessments of shared species by the International Scientific Committee (ISC)	Ongoing	
H.6.c	Participate in south Pacific albacore assessment	Ongoing	
H.7.a	Pacific-wide exploratory assessment for bigeye tuna	2021	2022
H.7.b	South Pacific swordfish assessment	2019	2022
H.8.a	Design a survey for dolphins in the eastern tropical Pacific Ocean (ETP)	2018	2018
H.8.b	Second trial dolphin survey in the eastern tropical Pacific Ocean (ETP)	2022	2023
H.8.c	Cow-calf separation study	2022	2024
I.1.a	Conduct a Management Strategy Evaluation (MSE) for tropical tunas in the EPO	2018	2024
I.3.a	Evaluate potential reference points for dorado in the EPO	2019	2019
J.1.a	Temporal trends and variability in the spatial distribution of tropical tuna purse-seine fishing	2022	20
J.1.b	Changes in catches and fishing strategies related to the Individual Vessel Threshold (IVT) program	2023	2024
J.2.a	Quantify the relationship between vessel operational characteristics and fishing mortality	2018	2020
J.2.b	Identifying operational characteristics associated with mobulid bycatch in the eastern Pacific Ocean	2022	2023
J.3.a	Developing alternative buoy-derived tuna biomass indexes	2020	202
K.1.a	POSEIDON project	2019	20



SAC-13 INF-S



SAC-14-15



SAC-15 INF-O



SAC-14 INF-K



FAD-08-02

28

IATTC Staff Activities and Research Plan (REVISED)
Actividades y Plan de Trabajo del Personal de la CIAT (REVISADO)

MSE tropical tunas – *EEO atunes tropicales*

DOCUMENT SAC-14-INF-K

GREEN: COMPLETED; BLUE: FUNDED; RED: UNFUNDED, Text ~~struck through~~ indicates completed or terminated projects

SSP ref.	Target/Project	2018		2019		2020		2021		2022		2023		2024	
		1	2	1	2	1	2	1	2	1	2	1	2	1	2
	1. SUSTAINABLE FISHERIES														
	Goal I: Test harvest strategies using Management Strategy Evaluation (MSE)														
I.1.	Conduct a comprehensive MSE for bigeye tuna and plan MSEs for the other tropical tuna species														
I.1.a	1. Stakeholder and technical MSE workshops														
	a. Technical meetings to agree on overall/revised MSE Plan by IATTC staff and collaborators														
	b. Stakeholder workshops on training and communication on MSE development and results														
	2. Technical development of MSE, HCR, MP, outputs														
	~~a. Improve the bigeye assessment for use as spatial OM~~														
	~~b. Run preliminary simulations with spatial OM~~														
	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. Present evaluated HCR/MP to Commission, plan work for other tropical tunas														

Transition of MSE work to other tropical species (YFT, SKJ) after 2024 to be outlined in the new IATTC Strategic Science Plan (planned in 2023-24)

Transición a EEO de otros atunes tropicales (YFT, SKJ) en 2024 detallado en el nuevo Plan Científico Estratégico de la CIAT (planeado en 2023-24)

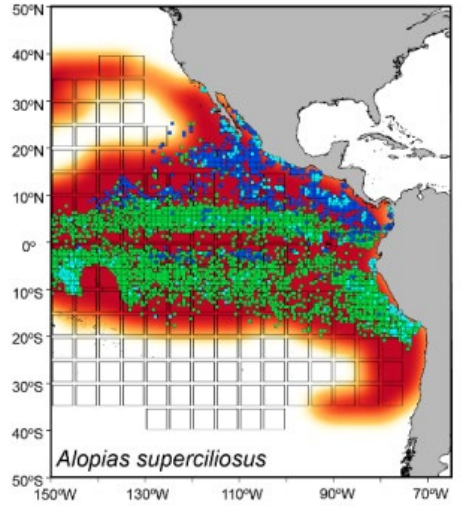
Evaluación de Estrategias de Ordenación para atunes tropicales
Management Strategy Evaluation for tropical tunas

- Cambios sustanciales en modelos de patudo:
  - Nuevos MO para simulaciones de EEO (SAC-15-07)
- Revisión de puntos de referencia para atunes tropicales (SAC-15-05)
- Trabajo de EEO institucionalizado en la CIAT, nueva posición sobre estrategias de ordenación en 2024
  - Continuación de trabajo técnico durante 2024
  - Retroalimentación de partes interesadas (talleres)
  - Presentación de EEO para BET durante 2025
- Recomendaciones del CCA para el establecimiento de un Grupo de Diálogo (IATTC-102 J-1)
- Después de EEO para patudo, planear para los otros atunes tropicales en el próximo PCE quinquenal

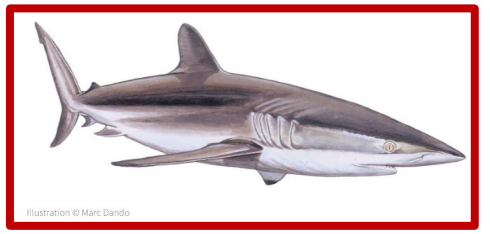
- Substantial changes on BET assessment models:
  - New OMs for MSE simulations (SAC-15-07)
- Revisited Tropical Tuna reference points (SAC-15-05)
- MSE work institutionalized at IATTC by establishing a permanent harvest strategy staff position in 2024
  - Continue technical work on BET MSE for 2024
  - Incorporate stakeholder feedback (workshops)
  - Present BET MSE results during 2025
- SAC recommendations for establishment of a Dialogue Group (IATTC-102 J-1)
- After BET MSE, need plan for other tropical tunas as part of next 5-year SSP

Impactos ecológicos de la pesca: **evaluación** y mitigación
Ecological impacts of fisheries: **assessment** and mitigation

4.a Ecological impacts of fishing: assessment and mitigation		Start	End
L.1.a	Develop habitat models for bycatch species caught in the EPO to support ecological risk assessments (ERAs)	2018	2022
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	2018	2021
L.2.a	Develop and update Productivity-Susceptibility Analyses (PSAs) of tuna fisheries in the EPO	2018	2018
L.2.b	Vulnerability assessment of elasmobranch bycatch in EPO tuna fisheries using the EASI-Fish approach	2021	2022
L.2.c	Assessing the efficacy of potential management options on highly vulnerable shark species in the EPO	2022	2023
L.2.d	Pacific-wide vulnerability assessment of pelagic shark species caught as bycatch in tuna fisheries	2021	2023
L.2.e	Vulnerability assessment and efficacy of potential conservation measures for the east Pacific leatherback turtle stock	2021	2022
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	2015	2018
M.1.b	Test sorting grids	2019	2020



SAC-09-12



SAC-14-12



BYC-10 INF-B

Impactos ecológicos de la pesca: evaluación y **mitigación**
Ecological impacts of fisheries: assessment and **mitigation**

4.b Ecological impacts of fishing: assessment and mitigation		Start	End
M.1.c	Acoustic discrimination to avoid purse seine catches of undersized yellowfin tuna	2020	2023
M.1.d	Developing and testing bycatch release devices in tuna purse seiners	2021	2023
M.2.a	Evaluate the post-release survival of silky sharks captured by longline fishing vessels in the equatorial EPO, using best handling practices	2016	2018
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	2018	2020
M.2.c	Manta and devil ray post-release survival, movement ecology, and genetic population structure	2021	2023
M.2.d	Evaluating knowledge and data gaps to the implementation of best handling and release practices for vulnerable species in IATTC fisheries.	2023	2023
M.2.e	Investigating post release survival of silky sharks captured in class 2-5 purse seine vessels	2023	2024
M.3.b	Spatial and temporal closures and the tradeoff between bycatch and target catches	2020	2021
M.5.a	Develop and test non-entangling and biodegradable FADs	2015	2022
M.5.b	Reducing losses, and fostering recovery of FADs in the purse-seine fishery in the EPO	2021	2023
M.5.c	Definition of guidelines to reduce the impact of lost and abandoned FADs on marine turtles	2020	2022
M.5.d	M.5.d: Evaluation of new FAD biodegradable materials in the tropical marine environment	2023	2024



INTER-AMERICAN TROPICAL TUNA COMMISSION

ECOSYSTEMS AND BYCATCH WORKING GROUP

2ND MEETING

La Jolla, California (USA)
06-07 June 2024

EB-02-03

WORKPLAN TOWARDS THE ADOPTION OF BEST HANDLING AND RELEASE PRACTICES FOR VULNERABLE SPECIES IN IATTC FISHERIES

INTER-AMERICAN TROPICAL TUNA COMMISSION

SCIENTIFIC ADVISORY COMMITTEE

15TH MEETING

La Jolla, California (USA)
10-14 June 2024

SAC-15-11

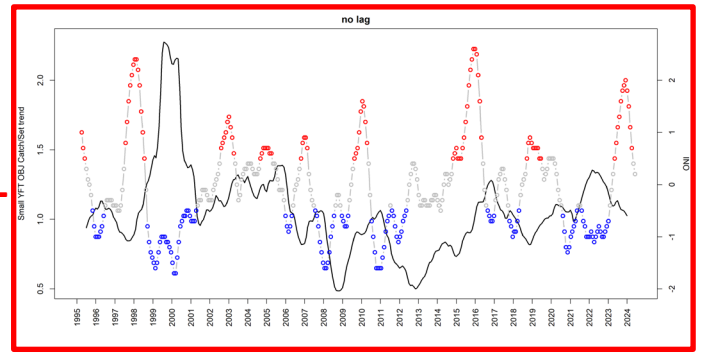
BEST HANDLING AND RELEASE PRACTICE GUIDELINES FOR SHARKS IN IATTC



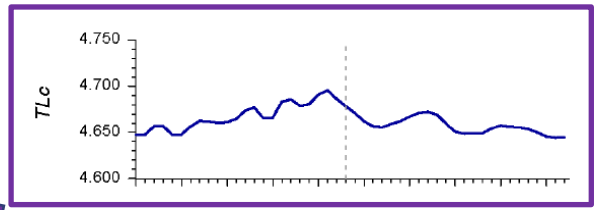
Interacciones entre el medio ambiente, el ecosistema, y la pesca
Interactions among the environment, the ecosystem and fisheries

5. Interactions among the environment, ecosystem, and fisheries		Start	End
N.1.a	Analyze EPO bycatch data to assess the influence of environmental drivers on catches and vulnerability	2018	2018
N.1.b	Investigate the effects of wind-induced microturbulence on yellowfin larval survival	2018	2021
N.1.c	Developing dynamic species distributions models to inform conservation and management of non-target species and communities in the eastern Pacific Ocean	2021	2022
N.1.d	Evaluate link between increased YFT catches environmental change	2023	2024
N.2.a	Develop models of the effects of climate change on pre-recruit life stages of tropical tunas	2018	2022
N.2.b	Supporting climate-ready and sustainable fisheries: using satellite data to conserve and manage life in the ocean and support sustainable fisheries under climate change	2021	2023
O.1.b	Quantifying spatial and ontogenetic variation in the feeding ecology of skipjack tuna in the eastern Pacific Ocean	2019	2020
O.1.c	A review of methods to determine prey consumption rates, gastric evacuation and daily ration of pelagic fishes: a precursor to experimental estimation for key predators in the EPO	2019	2021
O.2.a	Develop and implement analytical tools for understanding the trophic ecology of apex predators	2018	2019
O.2.b	An updated ecosystem model of the tropical EPO for providing standardized ecological indicators for monitoring of ecosystem integrity	2018	2021
O.2.c	Temporal network analysis of bycatch communities caught in purse-seine fisheries	2021	2023
O.2.d	Develop a workplan for restructuring IATTC's Ecosystem Considerations into (1) an indicator-based EcoCard and (2) a complementary Ecosystem Status Assessment for the EPO	2023	2024
O.2.e	Develop a workplan to promote climate resilient fisheries at IATTC	2023	2024

SAC-15-INF-L



SAC-14-11



DOCUMENT WGEB-02-02

REVIEW OF T-RFMO ECOSYSTEM RESEARCH TO INFORM A WORKPLAN ON ECOCARDS FOR THE EPO

DOCUMENT SAC 15-12

A CLIMATE CHANGE WORKPLAN FOR THE IATTC

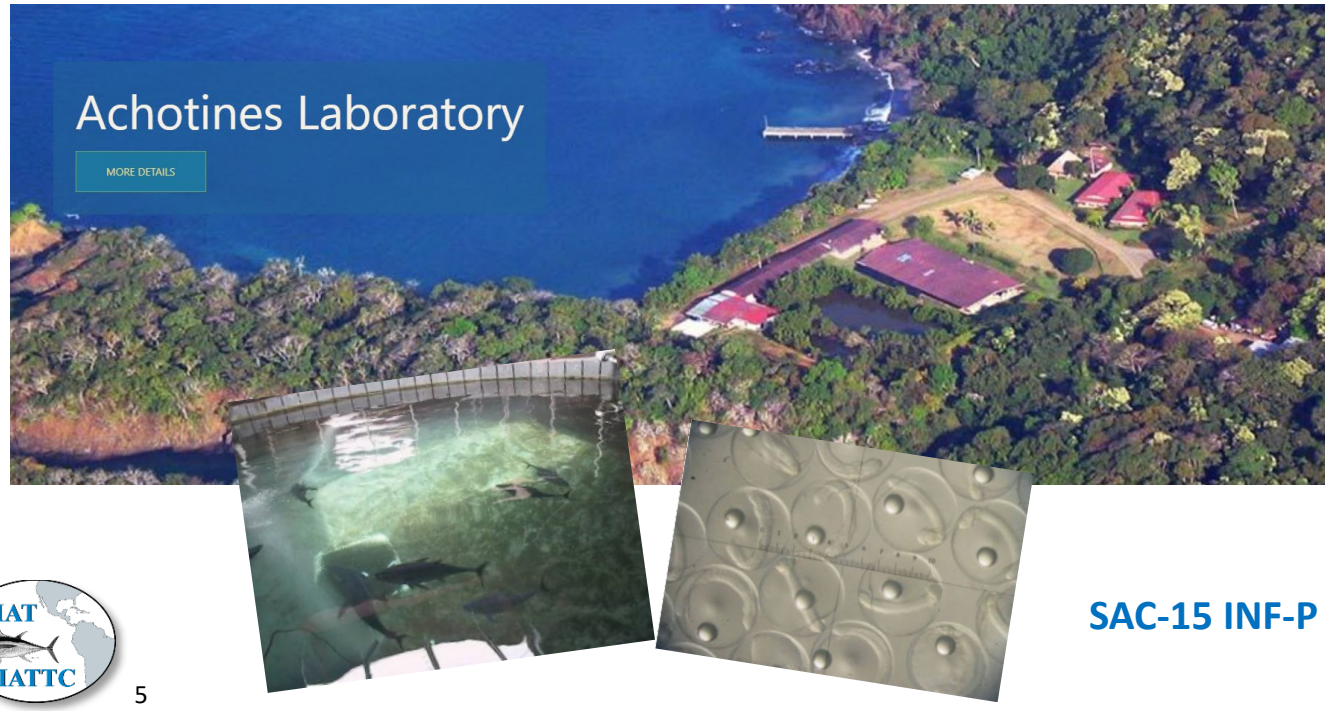
Transferencia de conocimientos y fomento de capacidad
Knowledge transfer and capacity building

6. Knowledge transfer and capacity building		Start	End
P.1.a	Fulfil requests for development of database and data processing applications for entities outside the IATTC	Ongoing	
P.1.b	Respond to requests for scientific analyses	Ongoing	
Q.1.a	Achotines Laboratory support of Yale University's Environmental Leadership Training Initiative (ELTI) in Panama	2018	2022
R.1.a	Workshop on training, communication and evaluation of management strategies for tuna fisheries in the EPO	2018	2018
R.1.b	Development, communication and evaluation of management strategies (MSE) for tropical tuna fisheries in the EPO involving managers, scientists and other stakeholders	2019	2020



Excelencia científica
Scientific excellence

Code	Title	Start	End
T.1.a	External review of bigeye tuna assessment	2019	2019
T.1.b	External review of yellowfin tuna assessment	2019	2019
T.1.c	External review of skipjack tuna assessment	2022	2022
U.1.a	Long-term plan to strengthen research at the Achotines Laboratory	2021	2022
X.1.a	Workshop to advance spatial stock assessments of bigeye tuna in the Pacific Ocean	2021	2022



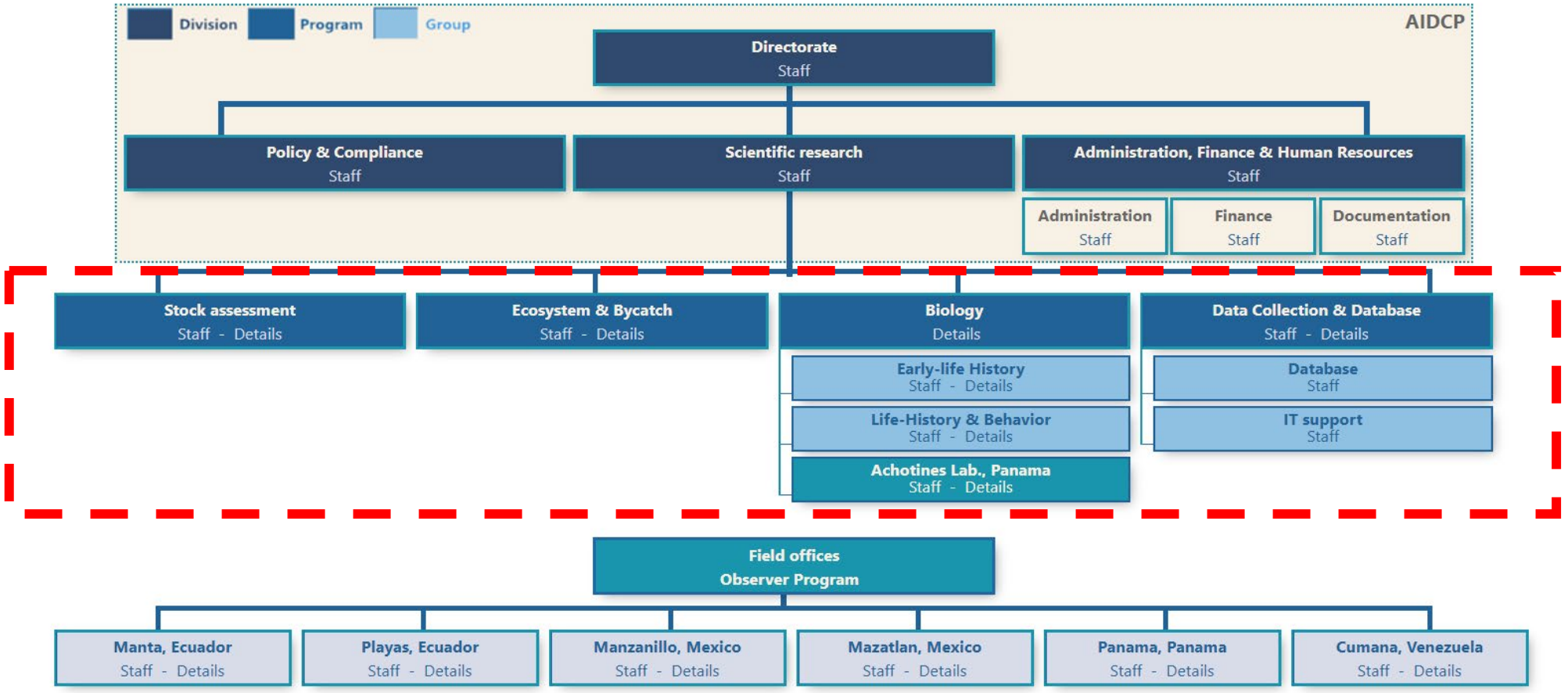


Center for the Advancement of Population Assessment Methodology

SAC-15 INF-P

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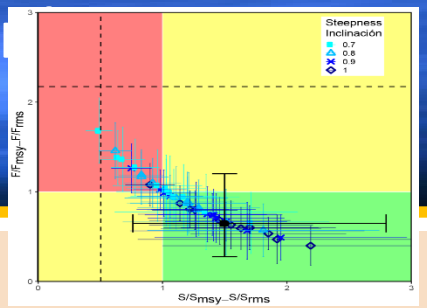


Programa de Recolección de Datos y Bases de Datos: tareas previstas para el próximo PCE
Data Collection and Database Program: planned tasks for next SSP

- Agilizar la recolección de datos de manera oportuna utilizando tecnologías modernas (aplicaciones basadas en la nube)
- Mejorar la difusión de los datos (página web con informes automatizados, etc…)
- Aumentar la gama de conjuntos de datos basados en las resoluciones más recientes

- Streamline data collection in a timely manner using modern technologies (e.g. cloud base applications)
- Improve dissemination of data (CPC based website with automated reports, etc…)
- Increase range of datasets based on latest resolutions

Programa de Evaluación de Poblaciones: tareas previstas para el pr
Stock Assessment Program: planned tasks for next SSP



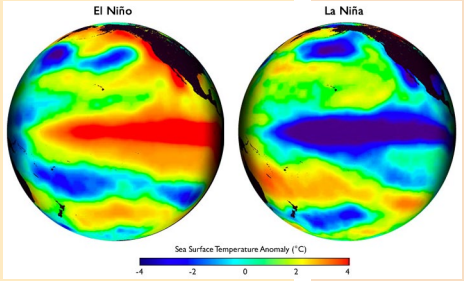
- Terminar la evaluación de referencia del YFT en 2025
- Nueva evaluación de referencia y análisis de riesgos para YFT, SKJ y BET
- Continuar el trabajo de desarrollo de EEO para YFT, SKJ y BET
- Investigación sobre evaluación de poblaciones
  - Mejorar el análisis de marcado y aplicarlo a YFT, SKJ y BET
  - Mejorar el índice de abundancia de LL combinando los datos de todos los CPC

- Finish YFT benchmark in 2025
- New benchmark and risk analysis for YFT, SKJ and BET
- Continue MSE HS development work for YFT, SKJ and BET
- Stock assessment research
  - Improve tagging analysis and apply it for YFT, SKJ and BET
  - Improve LL index of abundance by combing data for all CPCs

Programa de Ecosistema y Captura Incidental: tareas previstas pa o PCE
Ecosystem and Bycatch Program: planned tasks for next SSP



- **Planes de trabajo**
  - Desarrollo de MPML para todos los taxones vulnerables (EB-02-03)
  - Evaluación y mitigación de los efectos del cambio climático: hacia pesquerías resilientes al clima (SAC-15-12)
  - Desarrollo de productos para apoyar el EEOP: transición a las *Ecocards* e indicadores ecológicos(EB-02-02)



- **Workplans**
  - Developing BHRPs for all vulnerable taxa (EB-02-03)
  - Assessment and mitigation of Climate change impacts: towards climate-resilient fisheries (SAC-15-12)
  - Developing products for supporting EAFM: transitioning to *Ecocards* and ecological indicators (EB-02-02)

Programa de Ecosistema y Captura Incidental: tareas previstas pa[illegible]o PCE
Ecosystem and Bycatch Program: planned tasks for next SSP



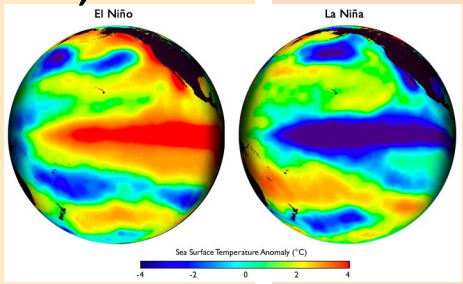
- **Trabajo en curso**
  - Talleres sobre la mejora de los datos
  - Mejora de las evaluaciones de tiburones: desarrollo de un programa de muestreo para pesquerías de pequeña escala (es decir, ABNJ) y CKMR
  - EASI-Fish: revisión externa y aplicación a diferentes taxones. Reanudar el grupo técnico de tiburones de la CIAT

- **Continuing work**
  - Data improvement workshops
  - Improving shark assessments: developing a sampling program for small-scale fisheries (i.e., ABNJ) and CKMR
  - EASI-Fish: external review and application to different taxa. Resume IATTC's technical shark group

Programa de Ecosistema y Captura Incidental: tareas previstas pa[illegible]o PCE
Ecosystem and Bycatch Program: planned tasks for next SSP



- **Trabajo en curso**
  - Plantados: evaluación y mitigación de impactos (p. ej., programas de recuperación)
  - Apoyar la implementación de un SME en el OPO
- **Trabajo nuevo:**
  - Investigación sobre opciones de ordenación espacial (p. ej., BBNJ, 30x30)

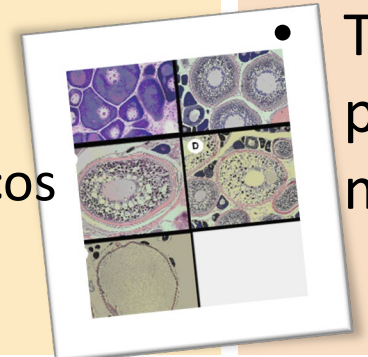


- **Continuing work**
  - FADs: assessment and mitigation of impacts (e.g., recovery programs)
  - Support the implementation of an EPO EMS
- **New work**:
  - Research on spatial management options (e.g., BBNJ, 30x30)

Programa de Biología: Grupo del Ciclo Vital y Comportamiento
Biology Program: Life history & Behavior Group



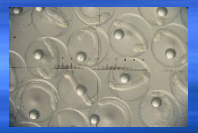
- Planificar e implementar la próxima fase de marcado de atunes en el OPO (en colaboración con los CPC y la industria)
- Investigar los datos de marcado, recaptura y marcas archivadoras de YFT y SJK para comprender mejor la estructura espacial para uso en la evaluación de las poblaciones
- Continuar las investigaciones sobre edad, crecimiento y biología reproductiva para evaluar la variabilidad espacial de las poblaciones de atunes
- A través de la continuación del PRM, recolectar y analizar datos morfométricos de YFT, SJK y BET



- Planning and implementation of the next phase of tuna tagging in EPO (partnering with CPC's and industry)
- Investigate YFT and SKJ mark-recapture and archival tag data to gain insights into spatial structure for use in stock assessment
- Continue investigations of age, growth, and reproductive biology to assess spatial variability in tuna stocks
- Through the continuation of the EMP program, collect and analyze morphometric data of YFT, SKJ and BET

Grupo de Ciclo Vital Temprano: Futuros objetivos de investigación a 5 años

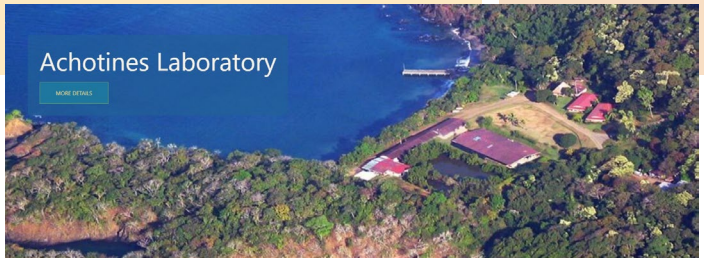
Early Life History Group : Future 5-Year Research Objectives





- **Pronóstico del reclutamiento**
  - ¿Puede utilizarse un índice de crecimiento larvario/juvenil o un índice de velocidad óptima del viento para predecir el reclutamiento del YFT? (en curso)
  - ¿Cómo influyen los procesos de densidad durante las etapas vitales pre-recluta en el reclutamiento del YFT? (en curso)
  - Estudios comparativos de los ciclos vitales tempranos del YFT y el PBF - con la Universidad de Kindai, Japón (en curso)
- **Estudios sobre el cambio climático**
  - ¿Cuáles son los efectos interactivos de la acidificación, la anoxia y el calentamiento de los océanos sobre la supervivencia de las etapas pre-recluta del YFT y el PBF? (en curso)

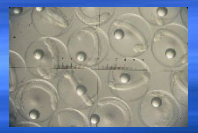
- **Recruitment Forecasting**
  - Can a larval/juvenile growth index or optimal wind speed index be used to predict YFT recruitment? (Ongoing)
  - How do density processes during pre-recruit life stages influence YFT recruitment? (Ongoing)
  - Comparative studies of YFT and PBF early life histories – with Kindai University, Japan (Ongoing)
- **Climate Change Studies**
  - What are the interactive effects of ocean warming, acidification and anoxia on survival of pre-recruit stages of YFT and PBF? (Ongoing)



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Grupo de Ciclo Vital Temprano: Futuros objetivos de investigación a 5 años

Early Life History Group: Future 5-Year Research Objectives





- **Mayor enfoque en las etapas juveniles tempranas del YFT en el Laboratorio de Achotines:**
  - ¿Se produce un crecimiento dependiente de la densidad durante las etapas juveniles tempranas (1 - 6 meses de edad)?
  - Objetivo principal: Completar el ciclo vital completo del YFT en cautiverio en el Laboratorio de Achotines (**por primera vez en el mundo**)
- **Investigación sobre la biología y el comportamiento de los atunes en el Laboratorio de Achotines:**
  - Continuación de los estudios sobre el desove en cautiverio y el crecimiento del YFT adulto
  - Continuación de los análisis genéticos para la determinación del sexo del YFT adulto

- **Expanded Focus on Early-Juvenile Life Stages of YFT at Achotines Laboratory:**
  - Does density dependent growth occur during the early-juvenile stages (1 – 6 months of age)?
  - Primary objective: Complete the full life-cycle of YFT in captivity at the Achotines Laboratory (**World first**)
- **Tuna Biology and Behavior Research at Achotines Laboratory:**
  - Continued studies of captive spawning and growth of adult YFT
  - Continued genetic analysis for sex determination of adult YFT

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Preguntas - Questions