Population Structure of IOTC species and sharks of interest in the Indian Ocean

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Aim

Describe the population structure and connectivity of a range of tuna and tuna-like species within the Indian Ocean (and adjacent Pacific and Atlantic waters as appropriate), as well as some of the key shark species that interact with Indian Ocean Tuna Commission (IOTC) fisheries.

Methods

- Genetics using Single-Nucleotide-Polymorphisms (SNPs)
- Otolith/vertebrae microchemistry (elemental &/or isotopes)
- Participation and capacity building with coastal states

Phase 1 study species

Neritic tunas

- Longtail tuna (*Thunnus tongol*)
- Kawakawa (*Euthynnus affinis*)
- Narrow-barred Spanish mackerel (*Scomberomorus commerson*)

Tropical tunas

- Skipjack tuna (*Katsuwonus pelamis*)
- Yellowfin tuna (*Thunnus albacares*)
- Bigeye tuna (*Thunnus obesus*)

Temperate tunas

- Albacore (*Thunnus alalunga*)

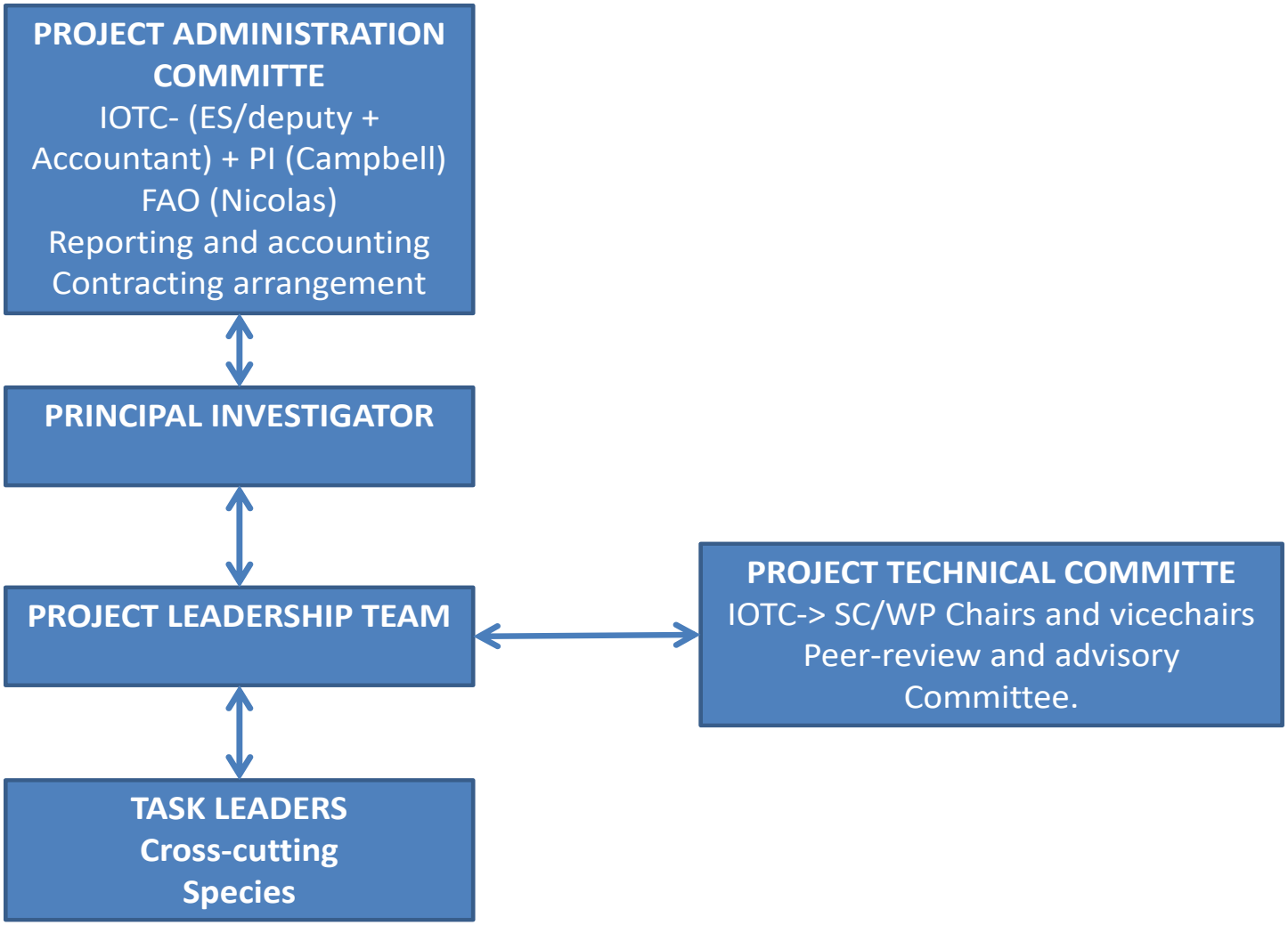
Billfish

- Swordfish (*Xiphias gladius*)
- Striped marlin (*Tetrapturus audax*)
- Indo-Pacific sailfish (*Istiophorus platypterus*)

Sharks

- Scalloped hammerhead shark (*Sphyrna lewini*)
- Blue shark (*Prionace glauca*)

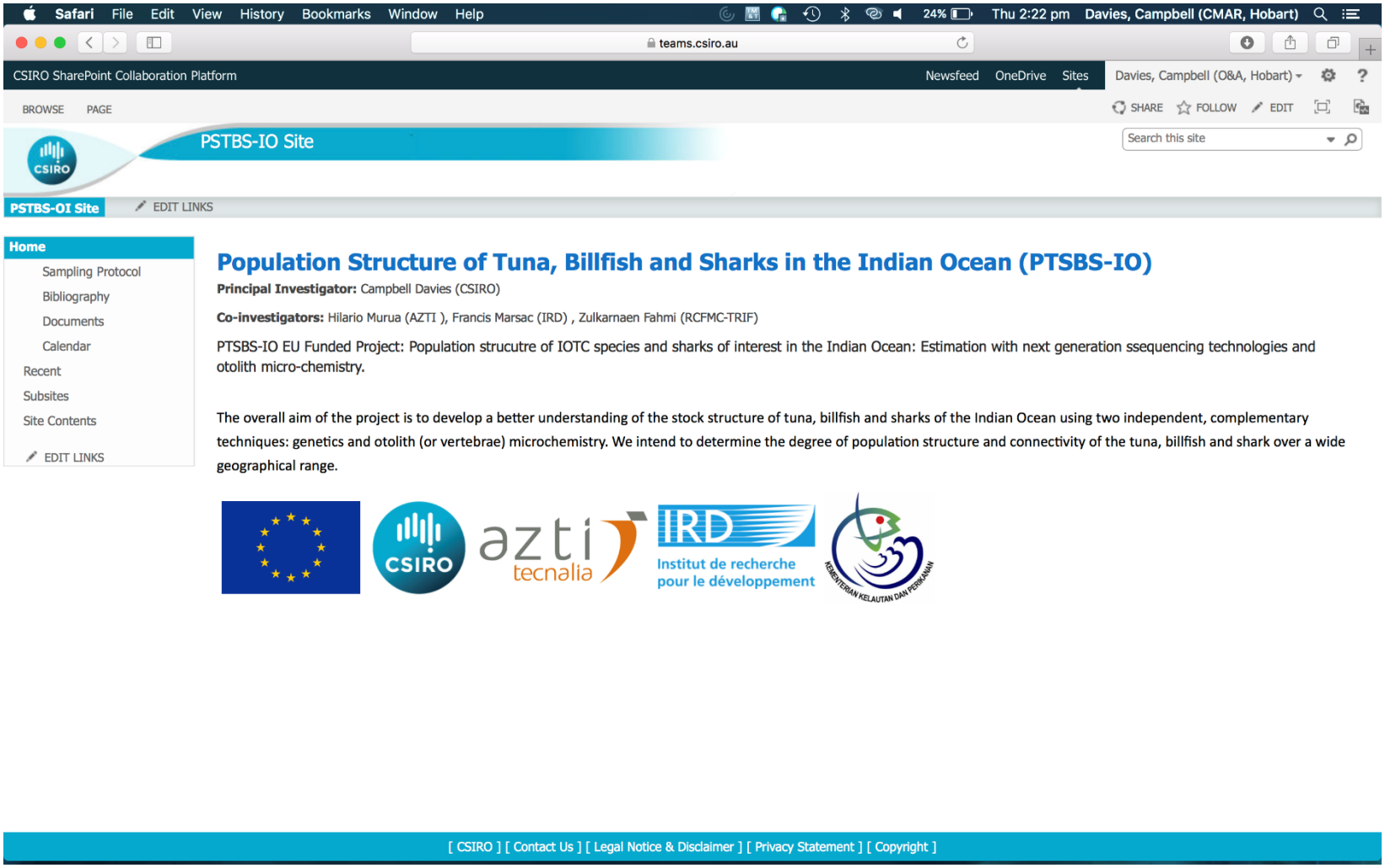
PROJECT MANAGEMENT



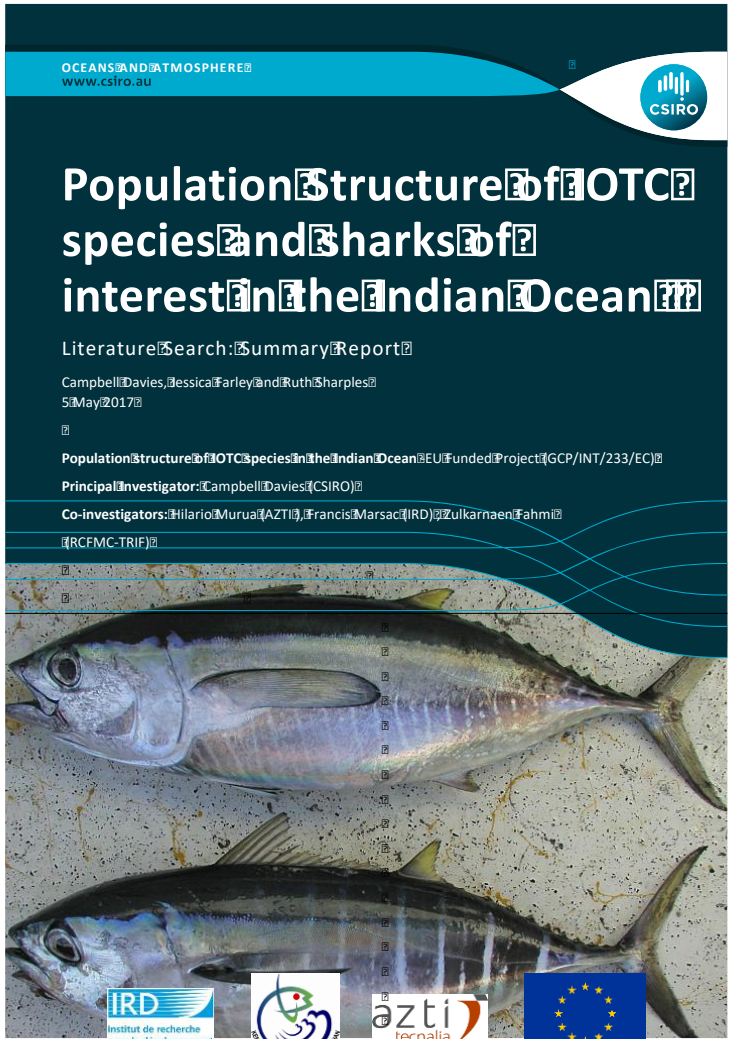
Project schedule and status

Deliverable	Original Schedule	Status
Signed LoA, IOTC/FAO-CSIRO	03-Jan-17	03-Jan-17
Partner contracts	04-Feb-17	2 complete 1 to finalise
Literature search	14-Feb-17	Complete
Draft Standard Operating Procedure (SOP)	04-Mar-17	Complete
Detailed genetic methods comparison plan	03-May-17	Complete
Progress report; initial methods comparison for swordfish (then ongoing updates)	03-Jul-17	In progress
Confirm that 1st round of sampling has been completed	03-Sep-17	Nov 17 – Mar 18
1st round of genetic analysis has been completed (50/species x 5 sites)	03-Jan-18	June 2018

Project SharePoint site



Literature review



- Literature search of peer reviewed and grey literature on population structure:
  - Methods
  - Case studies
- 460 references initially
- Compiled in the freeware, ZOTERO (www.zotero.org)
- “Living bibliography” to be updated throughout the project
- Available through SharePoint site.

Standard Operating Procedures for field sampling

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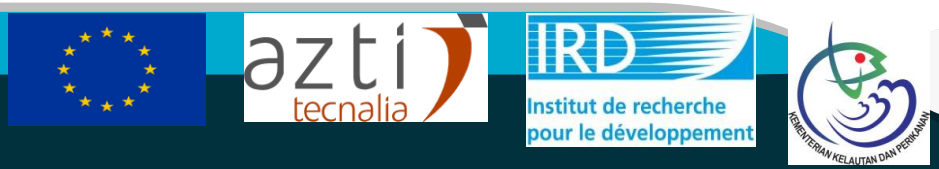
Estimation with Next Generation Sequencing Technologies and Otolith Micro-chemistry

SAMPLING PROTOCOLS
FOR POPULATION STRUCTURE STUDY

- Overview of sampling plan for field sampling of young of the year and spawning adults of target species
- Standard methods for planning, data recording, collection, preserving and transporting of tissue samples and otoliths/vert.
- Detailed descriptions for each target species
- Sampling kits distributed to partners



Detailed plan for genotyping methods comparison

- Objective: To provide direct comparison of two main genotyping-by-sequencing approaches
- Radseq and ddRAD
- SWO, LOT, SKJ
- SWO dependent on quality of samples from historical study

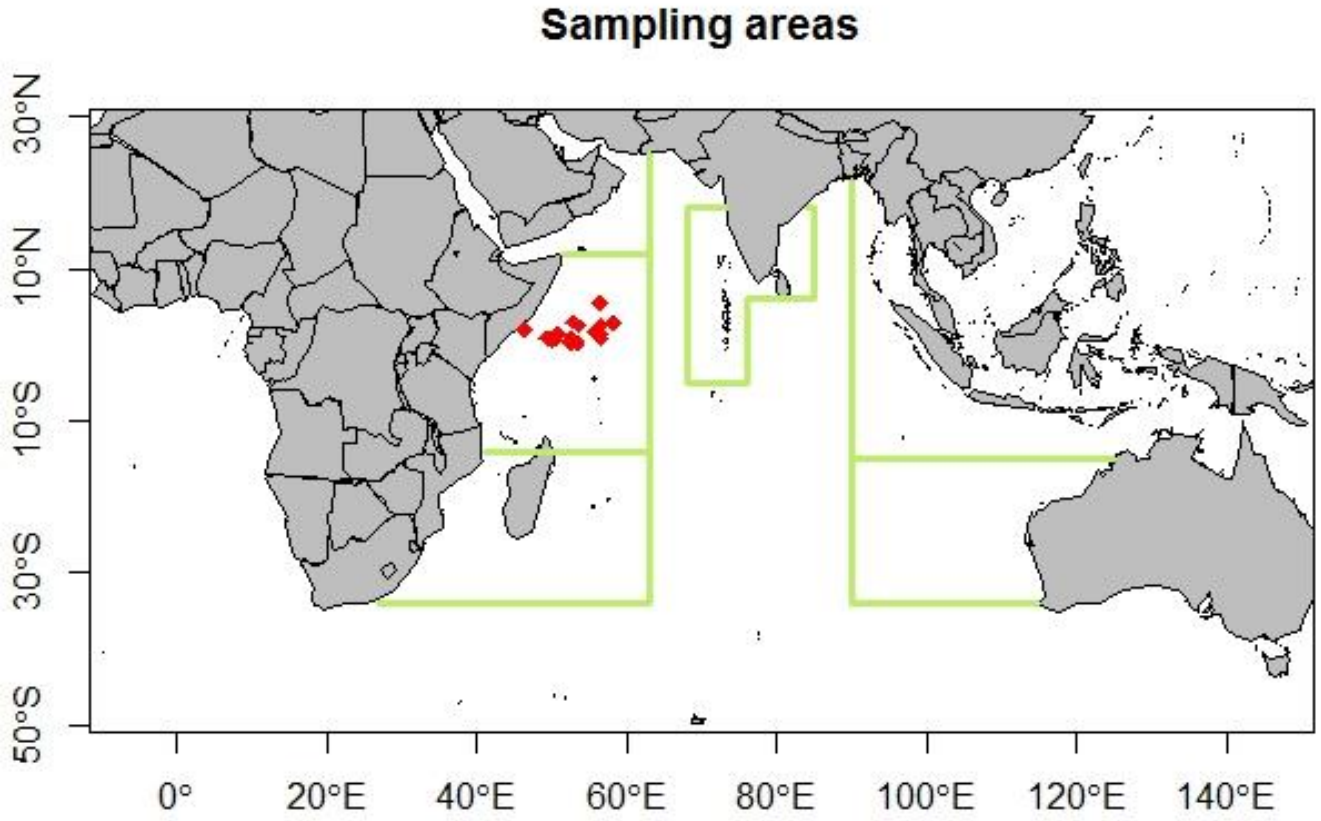
Factor	No levels	Description
Sequencing method (RADseq, ddRAD)	2	DArT(94), RADseq (94)
Species	3	SWO (?), SKJ, LOT
Location	2	2 distant locations/species
n	24	24 fish/location
Total	288	

Participation and capacity building

Opportunities for participation and capacity building:

- **Field sampling** (design, sampling and preservation methods etc)
- Collaboration and/or training in **genetics lab and population genetics analysis methods**
- Collaboration and/or training in **otolith microchemistry lab and population discrimination methods**
- Collaboration and training in **scientific writing** (reports and peer review articles)

Participation



Kawakawa (Euthynnus affinis, KAW)

Target Size = Young of year <25 cm, Adults >40 cm

Area	Spawning Adult/ Juvenile	Country	Source – Fishery, Port Sampling	Contact for sample collection
SW		-Mozambique	Port sampling [TBC with José]	Mr José Halafo -Fisheries Research Institute of Mozambique
W	J/A	-Seychelles	Purse Seine Oct-Nov, Apr-May	Iñigo Krug, -AZTI Anaïs Médieu -IRD
	J/A	-Kenya	Artisanal Fishers, Kenyan LL, Sports Fishing	Mr Ndegwa Stephen -Kenya Fisheries Service
	A	-Tanzania	35-84 cm	Dr Johnson Grayson -Department of Animal, Aquaculture and Ranges Sciences
NW	J/A?	-Iran		Dr Farhad Kaymaram -Iranian Fisheries Research Organization
	A	Spanish?	Purse Seine bycatch 47-70 cm	
N/Central		-India		
	A	-Maldives	25-55 cm FL	

List of people and addresses to send samples to:

Species	Muscle tissue	Otolith/vertebrae
Longtail	CSIRO	CSIRO
Narrow-barred Spanish mackerel	CSIRO	CSIRO
Kawakawa	Indonesia?	Indonesia
Skipjack	Naiara Rodríguez-Ezpeleta (AZTI)	Igaratza Fraile (AZTI)
Yellowfin	Jessica Farley (CSIRO)	Igaratza Fraile (AZTI)
Bigeye	Naiara Rodríguez-Ezpeleta (AZTI)	Jessica Farley (CSIRO)
Albacore	Natacha Nikolic (IRFEMER)	Mayliss Labonne / Audrey Darnaude (IRD)
Swordfish	Jessica Farley (CSIRO)	Mayliss Labonne / Audrey Darnaude (IRD)
Blue shark	Sophie Arnaud-Haond (IFREMER)	Jessica Farley (CSIRO)
Scalloped hammerhead	Jessica Farley (CSIRO)	Jessica Farley (CSIRO)
Striped marlin	CSIRO	NA
Indo-Pacific sailfish	CSIRO	NA

Key Contacts

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