SCIENTIFIC COMMITTEE
NINETEENTH REGULAR SESSION

Koror, Palau
16 – 24 August 2023

A Fisheries Science Vessel for the Pacific – A tool to manage and preserve our common resources and ecosystem

WCPFC-SC19-2023/EB-IP-03

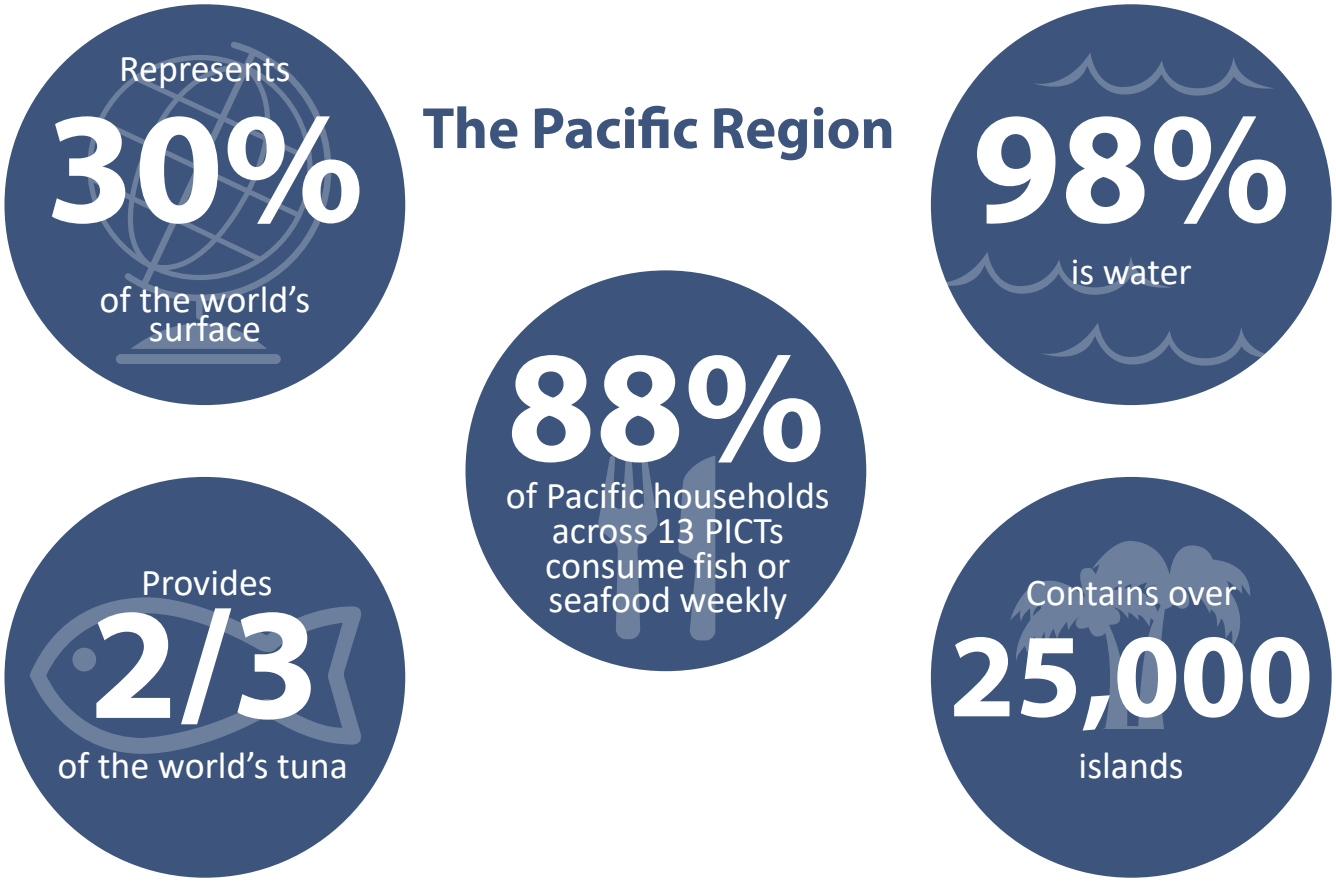
Oceanic Fisheries Programme (OFP)
Pacific Community (SPC)
Noumea, New Caledonia.

A Fisheries Science Vessel for the Pacific

A tool to manage and preserve our common resources and ecosystem

Pacific Community
Communauté du Pacifique

Why do we need a Fisheries Science Vessel for the Pacific?

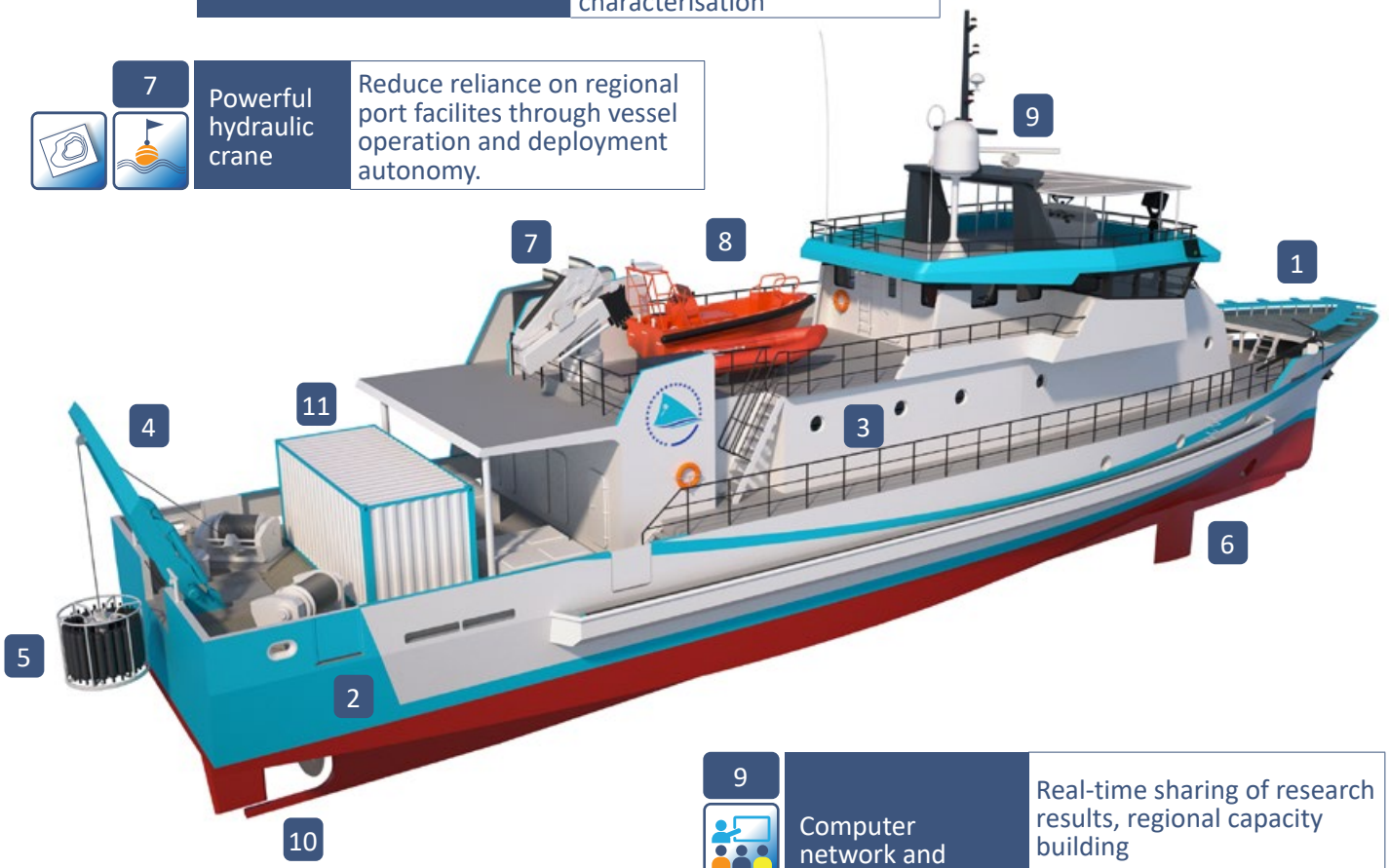


- Managing the sustainability of common marine resources is vital for the Pacific Island countries and territories that rely on them for key ecosystem services.
- Pacific tuna fisheries are of global importance, delivering two-thirds of the world's tuna resources, and it is crucial to maintain the sustainability of regional stocks. Regional fisheries decision making would be greatly weakened without the time series of data provided by continuous scientific experiments conducted onboard a suitable and reliable research vessel. Previously used vessels are in the process of being decommissioned due to their age.
- The largest oceanic region must play a major role in integrated ocean/ climate initiatives.
- Satellite observations need to be complemented by in-situ scientific monitoring to understand the complexity of the planet's largest ecosystem and its response to global warming.
- Properly designed and built for its environment and research goals, an adaptable modern sea-going platform will serve to benefit the Pacific people and the whole planet.

Adaptable, connected and clean

LOA 43m Range >6,000 nm Draft < 3.5m 25 crew	Adapted to the region's scale and geography

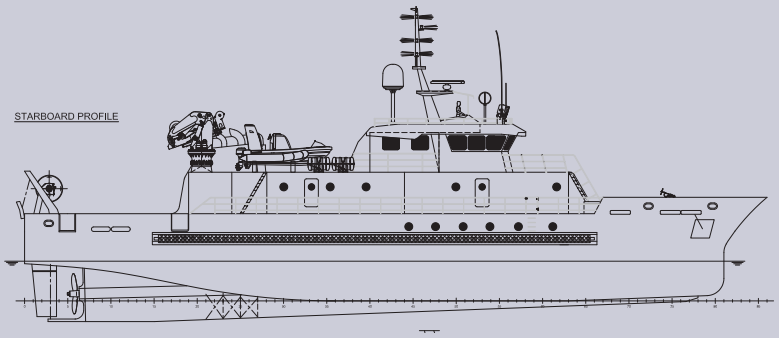
1	Efficient tuna pole and line fishing vessel	Support sustainable stock management through regional tagging programme
2	Efficient and safe pelagic fish capture	Enhance knowledge of tuna and associated species biology
3	Scientific laboratory spaces	Collect and analyse ocean ecosystem data
4	Capacity to operate mid-water trawl nets	Understand of the ocean food web and its responses to climate change
5	Capacity to collect essential physical oceanography parameters	Forecast changes in tuna ecosystems linked to climate variability
6	Scientific acoustic equipment associated with low radiated noise hull design	Understand the link between tuna fisheries and the ecosystem through seafloor mapping, seamount characterisation
7	Powerful hydraulic crane	Reduce reliance on regional port facilites through vessel operation and deployment autonomy.

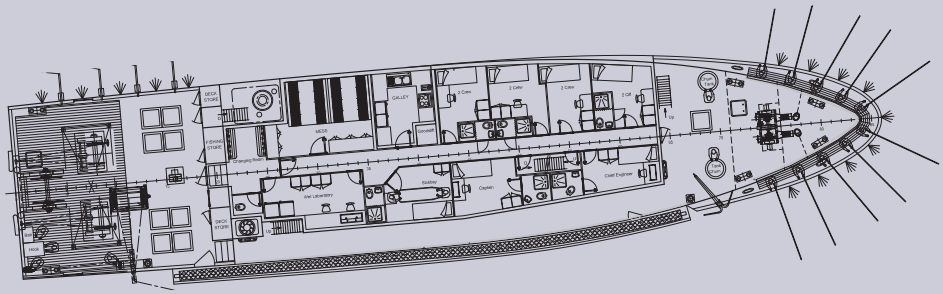


8	Auxiliary boats	Diving surveys, coastal water surveys
9	Computer network and communication	Real-time sharing of research results, regional capacity building First-response capability for disaster relief
10	Efficient and low footprint vessel	Electric-diesel engines compatible with future energy upgrades
11	Removable 20' container	Customisable for specific research needs (Labs, diving) Cargo for disater relief

Mission sheets Inside

The largest ocean needs a Fisheries Science Vessel to support the monitoring of its marine resources and unique ecosystem





To evaluate options for the acquisition, operation and underwriting of operational costs for an adaptable research vessel dedicated to regional marine monitoring needs, a study has been implemented and completed in 2020 by external expert consulting firm F&S (http://fs-marine.fr/en/contact/).

The final report includes a detailed analysis of best vessel flag choice, appropriate management scheme, operating costs, and risk assessment, in addition to a review of the five technical proposals received from the 23 shipyards invited to provide proposals.

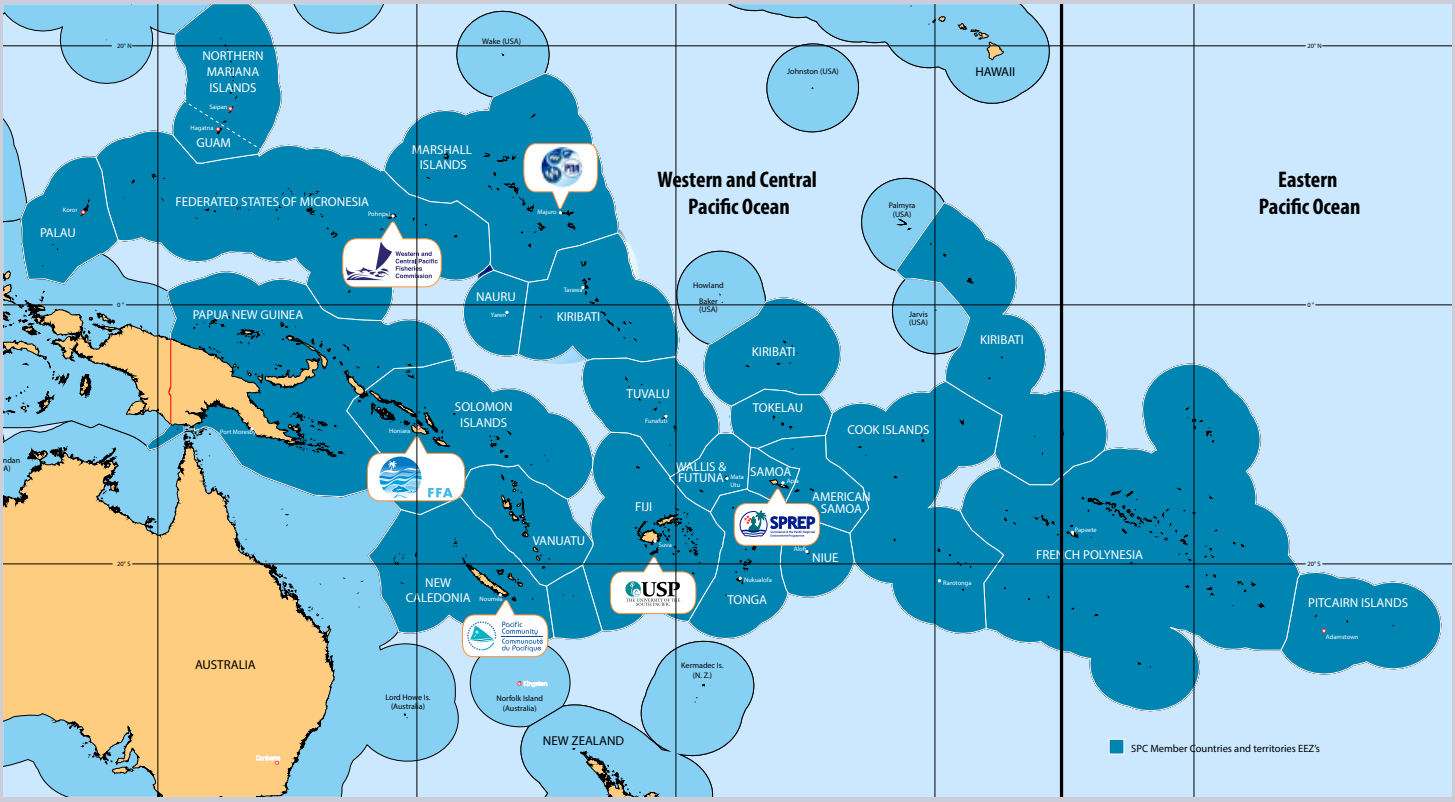
Although in charge of ensuring the sustainability of over half of the world's tuna and the largest oceanic ecosystem on the planet, the countries and territories of the Pacific Islands do not have consistent access of a suitable research vessel to support these vast responsibilities.

The in-country available fisheries research vessels are limited in size and range and could only supplement data for near-shore resources management and provide training for small-scale fishers.

A review of regional research vessel availability and capabilities was implemented in 2019. This demonstrated that there is no fisheries research vessel operating in the Pacific Ocean that possesses the characteristics to meet the specifications required to support sustainable tuna stock management.

The regional research plate-form project will fill this gap, monitoring this part of the world for the next 30 years, providing scientific information at a critical moment in time.

Region, Partners and Collaborators



To inform and preserve the Pacific Ocean, its people and resources, the region is supported by key inter-governmental organisations

Pacific Community
Communauté du Pacifique

The Pacific Community

Based in Noumea, New Caledonia, SPC is an international development organisation owned by its 27 member countries and territories across the Pacific region. It mobilises scientific and technical knowledge to support 20 thematic sectors, including climate, fisheries and geosciences.

About 500 staff

FFA

The Pacific Islands Forum Fisheries Agency

Based in Honiara, Solomon Islands, FFA provides expertise, technical assistance and support so its 17 members can take informed sovereign and regional decisions about their tuna resources and their sustainable management through the WCPFC.

About 80 staff

Western and Central Pacific Fisheries Commission

Western and Central Pacific Commission

Based in Pohnpei, Federated States of Micronesia, the WCPFC is a regional fisheries management organization in charge of ensuring, through effective management, the long-term conservation and sustainable use of highly migratory fish stocks (tunas, billfish, marlin) in the western and central Pacific Ocean.

About 35 staff

PNA

Parties to the Nauru Agreement

Based in Majuro, Marshall Islands, the Parties to the Nauru Agreement comprise FSM, PNG, Kiribati, Palau, Solomon Islands, Marshall Islands, Nauru and Tuvalu, and Tokelau. They control the world's largest sustainable tuna purse seine fishery and work to optimize economic benefits for their members.

About 9 staff

SPREP
Secretariat of the Pacific Regional Environment Programme

Secretariat of the Pacific Regional Enironment Programme

Based in Apia, Samoa, is in charge of protecting and managing the environment and natural resources of the Pacific.

About 100 staff

USP
THE UNIVERSITY OF THE SOUTH PACIFIC

The University of the South Pacific

With its main campus located in Suva, Fiji, USP is a regional university with 12 campuses accross the Pacific, providing higher education and research in the Pacific islands .

Managed by the region for the region's needs

Managers from the region support the Pacific Research Vessel Project

Pamela Maru
Secretary, Ministry of Marine Resources, Cook Islands

"The interest for us here in the Pacific is ensuring that we have sustainable stocks so that in the future we can continue to benefit from these resources, SPC's tuna tagging programme is critical in our understanding of the Western and Central Pacific tuna fisheries."

Dr Manu Tupou-Roosen
Director-General, Pacific Islands Forum Fisheries Agency (FFA), Solomon Islands

"The proposed Pacific fisheries and oceanographic research vessel will be a critical asset for the region to enhance its capability to undertake independent research to manage our valuable tuna resources."

Eugene Pangelinan
Executive director, National Oceanic Resource Management Authority, Federated States of Micronesia

"We are supportive of building-up human capacity and in platforms that support such work to ensure ownership of research data and outcomes are also attributed to the Small Islands and Development States including national and regional organisations."

Dr Tuikolongahau Halafihi
Chief Executive Officer, Ministry of Fisheries, Tonga

"A Pacific fisheries and oceanographic research vessel is a critical asset for the region to build its capacity to understand its own independent research to manage its natural resources".

Glen Joseph
Director, Marshall Island Marine Resources Authority

"The proposed research vessel is a critical asset or the region to continue to collect fishery independent information to assess the status of our tuna stocks, without the capacity to independently collect data and undertake ecosystem research the ability of the region to develop strategies to adapt to climate and other disturbances will be significantly disadvantaged."

Dr Agnes Yeeting
MFMRD, Secretary

"Kiribati support the significance for the region in having its own vessel to conduct fisheries work and collect valuable information related to tuna stocks and other fisheries."

Tilafono David Hunter
Chief Executive Officer

"We see that this research vessel is critical in collecting fisheries independent data and information to improve our knowledge on our tuna fisheries stock which supports our economic development, livelihood and food security."

Justin Ilakini
Managing Director National Fisheries Authority, PNG

"A fisheries and oceanographic research vessel is a critical asset for the region to build its capacity to undertake its own independent research to manage its natural resources."

Samasoni Finikaso
Director of Fisheries

"A dedicated research vessel, owned and operated by our own regional organization SPC, is now a necessity."

Taotasi Archie Soliai
Director

"The vessel can also support research for other stocks such as bottomfish deep snappers that are also culturally and economically important to American Samoa and other south Pacific countries."

G. P. N. Baleinabuli
Permanent Secretary for Fisheries, Fiji

"We welcome this initiative and take pride in this project as it will be owned and operated by the region."

Charleston Deiye
Chief Executive Officer

"A regional fisheries research vessel owned and operated by the Pacific Island countries and territories will give us the capacity to conduct our much needed independent research."

Feleti Tulafono
Director, Tokelau Fisheries Management Agency

"As the region struggles with impacts of climate change, the vessel, as a research platform will play an all too important role in capacity building for the region."

Feleti P. Teo
Executive Director

"The core work of the WCPFC as the regional fisheries management organization for the western and central Pacific Ocean is to assess accurately the status of the tuna stocks and the proposed research vessel would be a critical asset to enable the WCPFC to continue to undertake its core work."

CONTACTS

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The Pacific Community Centre for Ocean Science

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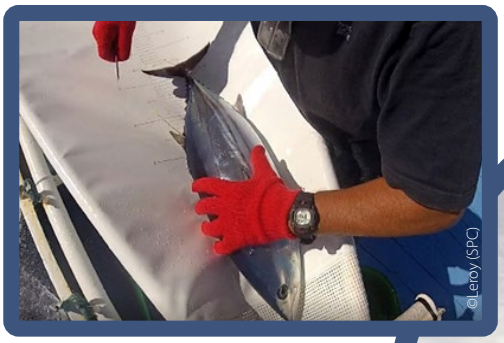
Enhance the sustainability of the biggest tuna fishery

Implementing annual tuna tagging and sampling research cruises

annual schedule of 2 to 3 months

Design features: The research vessel design includes an efficient capability for pole-and-line (P&L) fishing methods to catch, tag and release multiple thousands of tunas per day. The bow areas replicates the Japanese P&L bow design, which has been fine-tuned over the last hundred years for operations in the Pacific Ocean. The vessel will also have the capability to catch and keep alive fish baits that are essential for P&L fishing gear. Additional fishing gears (horizontal longline, hydraulic reels, troll lines) will allow the capture and tagging of the full size range of tropical tuna species in various environments and remote areas when live fish bait is not available.



20,000
tuna tagged

500
biological samples

Enhance the sustainability of the biggest tuna fishery

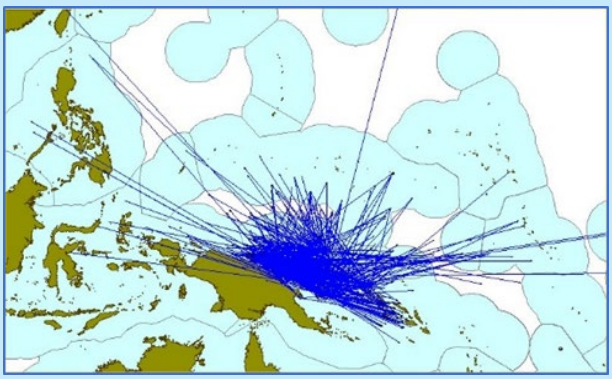
Implementing annual tuna tagging and sampling research cruises

The western and central Pacific tuna fisheries are a natural resource of exceptional importance, representing over 50% of the global tuna catch and investments over USD10 billion, and are crucial for the economic wellbeing and food security of Pacific Island countries and territories (PICTs). For many PICTs, it is the biggest business and employer in town; the licence fees for tuna fishing in their EEZs account more than half of government income and provide over 25,000 jobs for Pacific Islanders across the region.

Tuna tagging is a regularised monitoring programme to keep regional tropical tuna stocks in a healthy and sustainable state. The information derived improves estimation of animal population size, mortality, movement (spatial stock structure) and growth. These data are a critical input to the assessments that are regularly undertaken to determine the status of Pacific stocks. Over the past 15 years the Pacific Community (SPC) has tagged close to half a million tuna across the region.

Releasing a large number of tagged tuna requires the use of a pole-and-line vessel and this is especially important for the skipjack species, which represents 70% of the tuna catch in the Western Pacific. Such suitable tagging boats are becoming increasingly scarce worldwide. In most countries, pole-and-line fleets have been replaced by purse-seine fleets that are not appropriate for tagging.

TARGETED SPECIES PRIORITY	FISHING GEAR	DATA/SAMPLES COLLECTED
Skipjack Yellowfin Bigeye	Pole and line	• Growth • Reproductive status • Contaminants levels • Natural mortality • Fishing mortality • Movements • Behaviour • Fishing gear interactions
Bigeye Yellowfin	Troll lines danglers, hydraulic reels, rods and reels, hand lines, horizontal longline	
Albacore tuna	Troll lines, horizontal longline	
Tuna fishery bycatch species	All fishing gears	



Displacement larger than 300 nautical miles of skipjack tunas tagged in PNG

Tagging experiments are supplying thousands of biological samples to the Pacific Marine Specimen bank. They are used to understand the tuna biology and the oceanic ecosystem functioning and its adaptation to environmental changes.

Monitoring the changes in the largest oceanic ecosystem

Implementing annual pelagic ecosystem monitoring research cruises

Dedicated research cruises that collect information on physical oceanography and the lower levels of the food web, such as plankton and tuna prey (micronekton), to monitor ecosystem change, discover new species, and map the vast ocean biodiversity and its genetic resources.

annual schedule of 2 to 2.5 months

20-30
Pelagic net tows

20
Water sampling stations

1000-1500
nautical miles of acoustic monitoring

Monitoring the changes in the largest oceanic ecosystem

Implementing annual pelagic ecosystem monitoring research cruises

The Pacific Ocean is the world's single largest natural feature, occupying approximately one third of the world's surface area, with the central Pacific as its most remote wilderness. Given the importance of this resource as one of the last natural food production systems on the planet, the scientific advice provided to its managers requires constant monitoring. This involves gathering information on the ecosystem to identify what has happened in the recent past to bring us to the present, and our likely trajectory in the future. These observations are contributing to validate/parameterize models to understand the link between tuna fisheries and their ecosystem, and to forecast changes in tuna linked with short- to medium-term climate variability (e.g. ENSO) and longer-term climate change. Those changes could potentially redistribute some tuna species stock away from the western and central Pacific. This is just one uncertainty in the future of the Pacific island nations and territories, meaning that adaptive management based on the best science available is of the utmost importance to their future economies and resources.

ECOSYSTEM COMPARTMENTS	INSTRUMENTS/GEAR	DATA/SAMPLES COLLECTED
Physical oceanography	Hull instruments/probes (e.g. ADCP) Instruments/probes lowered at depth (e.g. CTD)	Surface and at depth: • temperature • salinity • currents
Chemistry	Instruments/probes lowered at depth (e.g. CTD) Water samplers lowered at depth (e.g. rosette)	Surface and at depth: • oxygen • pH • nutrients (e.g. nitrates, nitrites, phosphates)
Biology of the base of the food web: phytoplankton/microbial loop	Water samplers lowered at depth (e.g. rosette)	Surface and at depth: • primary production • chlorophyll a • pigment profiles • species composition • diversity • particulate organic matter • isotope characterisation…
Biology of the mid-trophic level of the food web: zooplankton and micronekton	Hull-mounted echo sounder (e.g. EK80) Acoustic profilers (e.g. TAPS, WBAT) Zooplankton net Micronekton net DNA sampler	Surface and at depth: • acoustic estimates • biomasses • species composition • diversity • isotope characterisation • contaminants • fatty acids… • tuna larvae sampling • species barcoding

Micronekton net

Micronekton species

Deep sea ecosystem monitoring

Preserving deep coastal resources

To evaluate deep-sea fisheries resource sustainability by acquiring samples and fisheries-independent data (Schedule every other year a 1.5 month cruise, could be combined within ecosystem monitoring missions)

Deepwater fisheries are an important resource in a number of Pacific Island countries and territories. Equipped with hydraulic reels, the vessel fishing capabilities allows fish to be caught and detailed information obtain on the biology of the populations, such as age, growth rates, mortality rates, maturity schedules and stock structure and connectivity throughout the region. The size of the vessel allows the exploration of coastal areas but also remote seamounts that have received little historical fishing pressure.

3 weeks per year

continuous acoustic monitoring

1
fishing survey in priority area

Deep-sea snappers (*Etelis* species)

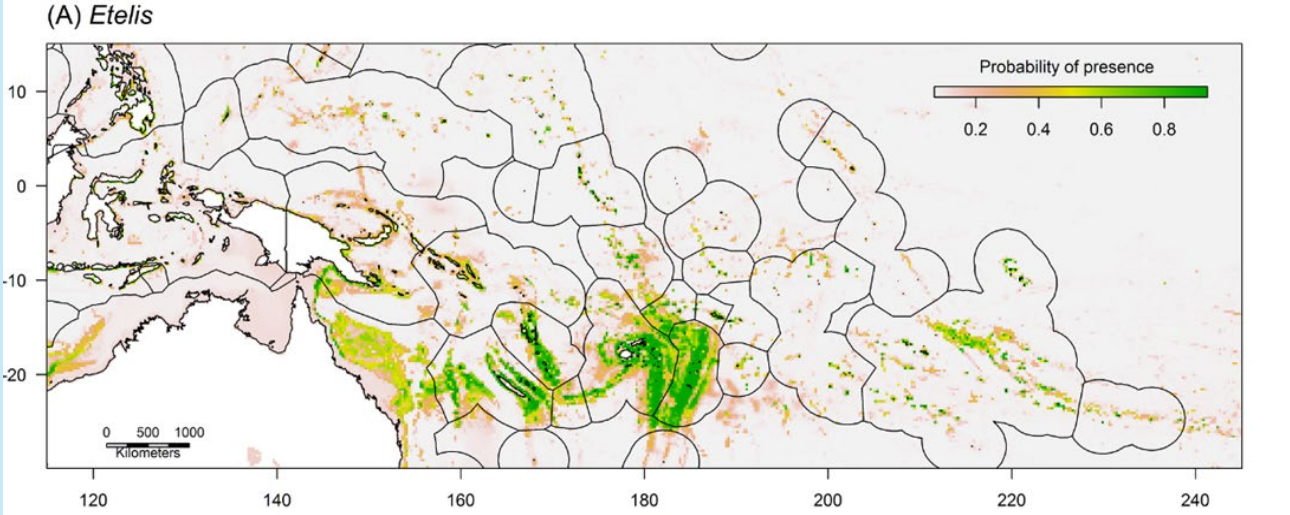
Deep sea ecosystem monitoring

Preserving deep coastal resources

Deepwater fisheries (e.g. snappers) are a significant resource for many Pacific Island countries and territories. However, there is limited information on the extent of suitable habitats, the biology of those species, and fishing data. The fragility of deepwater resources means that potential exploitation needs to be progressed in a precautionary way using the best available science. Current limitation in knowledge have impeded the potential expansion of these fisheries and their sustainable management.

The research vessel equipped with appropriate sounders offer the potential to conduct the comprehensive surveys needed to create detailed maps of deepwater habitat's throughout the Pacific.

ECOSYSTEM COMPARTMENTS	INSTRUMENTS / GEAR	DATA/SAMPLES COLLECTED
Physical oceanography	Hull instruments/probes (e.g. ADCP) Instruments/probes lowered at depth (e.g. CTD)	Detailed bathymetry Surface and at depth: • temperature • salinity • currents
Chemistry	Instruments/probes lowered at depth (e.g. CTD) Water samplers lowered at depth (e.g. rosette)	Surface and at depth: • oxygen • pH • nutrients (e.g. nitrates, nitrites, phosphates
Biology of the base of the food web: phytoplankton/microbial loop	Water samplers lowered at depth (e.g. rosette)	Surface and at depth: • primary production • chlorophyll a • pigment profiles • species composition • diversity • particulate organic matter • isotope characterisation…
Deep-sea fish biology	Hull-mounted echo sounder (e.g. EK60) In situ echo sounder (e.g. WBAT) Baited camera	• biomass acoustic estimates • spatial distribution acoustic estimate
Deep-sea snappers and other species	Vertical longlines, hydraulic reels	• CPUE • biological samples to determine various parameters such as age, reproductive status, isotope levels, fatty acids, contaminants levels • species composition diversity



Example of computerised favourable oceanographic factors used to create a map of predicted deepwater snapper habitat distribution. These predictions need RV surveys to be confirmed.

Instrument deployment for Ocean Observation network

2/3 weeks per year

Objectives: Deployment and maintenance of ocean observation equipment for regional monitoring networks and early warning systems.

There is a growing need in the Pacific for in-situ observations for early warning systems and monitoring of long-term climate impacts.

These observation systems, whether they are moored or drifting, require an ocean-going vessel for deployment and maintenance.

The types of equipment deployed include ocean and weather buoys, floats and ocean gliders, which are components of national, regional or international networks (TPOS, GOOS etc..)

DESCRIPTION	INSTRUMENTS/GEAR	DATA/SAMPLES COLLECTED
Oceanographic systems	Deck space Crane, winches and A-Frame	Depends on system deployed

Following country agenda

Coastal FADs* and open ocean aquaculture sea cage mooring deployments to increase country food security

Objectives: Maintain the benefits of coastal fisheries by increasing access to tuna for small-scale fishers and relieving the pressure on more vulnerable demersal fish species. Develop ocean aquaculture projects in non-lagoonal islands (like Nauru).

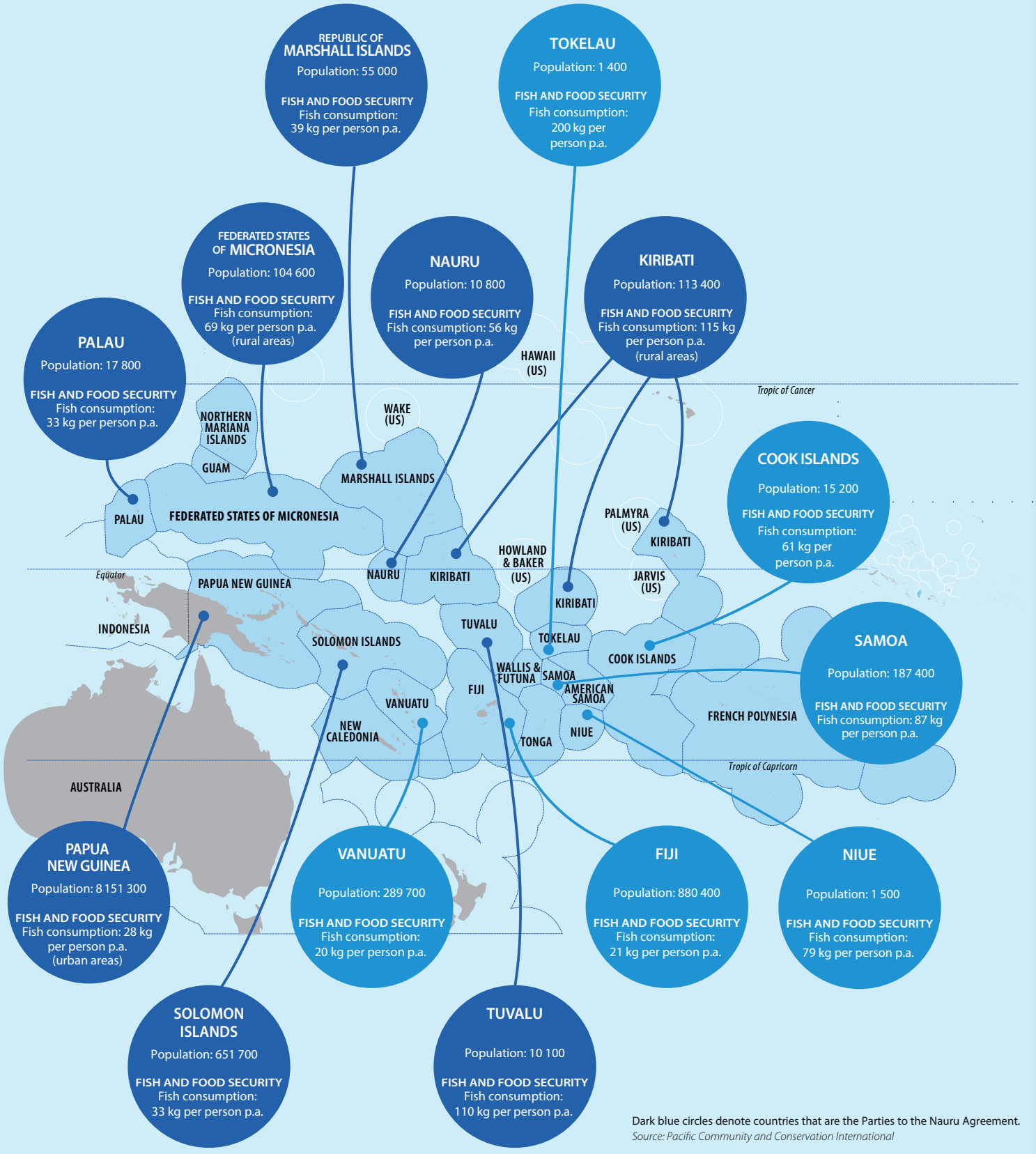
*fish aggregating devices

In many Pacific Island countries, anchor FAD's deployment is often carried out, at risk, on small artisanal fishing boats.

Increase country food security

Coastal FADs and open ocean aquaculture sea cage mooring deployments to increase country food security

Key features of selected PICTs and the contributions of fisheries to food security



Dark blue circles denote countries that are the Parties to the Nauru Agreement.

Source: Pacific Community and Conservation International

Improve navigation safety

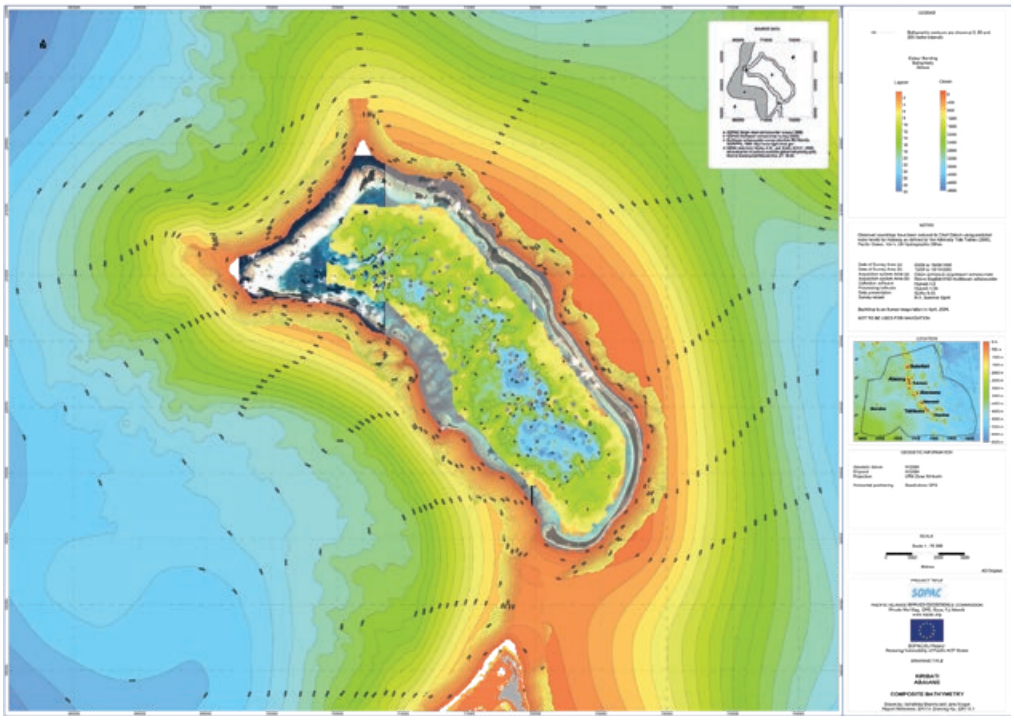
Following country agenda

Implementing bathymetry surveys

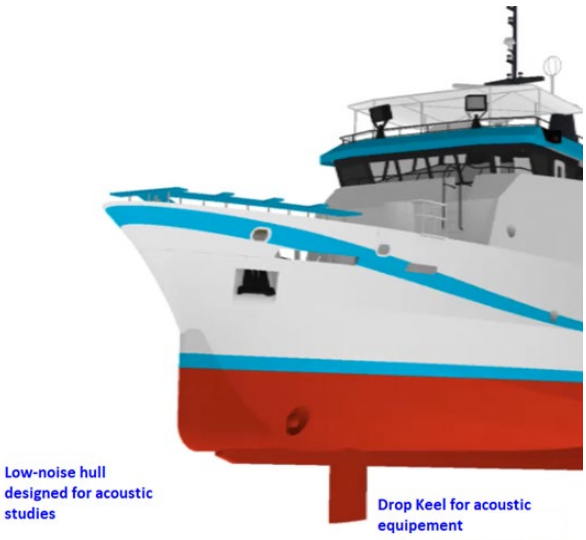
Objectives: Update regional chart bathymetry, improve navigation safety in identified coastal areas

The boat will be equipped with multibeam scientific echosounders and an auxiliary boat capable of coastal survey operations in shallow areas.

To navigate safely between islands, appropriate navigation charts are necessary. Bathymetric surveys are needed to create new charts and to update charts created with inaccurate and/or old bathymetric data.



DESCRIPTION	INSTRUMENTS/GEAR	DATA/SAMPLES COLLECTED
Bathymetry for chart updates	-Shallow/mid-depth (300m) multibeam sonar on ships and auxiliary boat with shallow multibeam sonar. -Precise location instrumentation	Seabed bathymetry data



Following country agenda

Promote and participate in Pacific country and territories capacity building

Objectives: Build capacity for fishery management and integrated approaches to climate change adaptation.

There is a need for capacity building in the Pacific and a growing effort to increase the level of ocean expertise of Pacific Islanders.

Research cruises will have the capacity to include students and instructors, with a mix of ship operations training and regular classroom work. This "floating university" concept is compatible with, and can be complementary to other activities such as ecosystem research cruises and bathymetric surveys. These floating university cruises fit well within the existing Ocean Teacher Global Academy (OTGA), and the Early Career Ocean Professional (ECOP) programmes currently in development at SPC.

Crewing on this regional vessel could also be included within regional maritime academies that train professionals.