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CAMAC Elasmobranch Action Plan

Part 2 – Priority actions for Future Shark and Ray Research and Management

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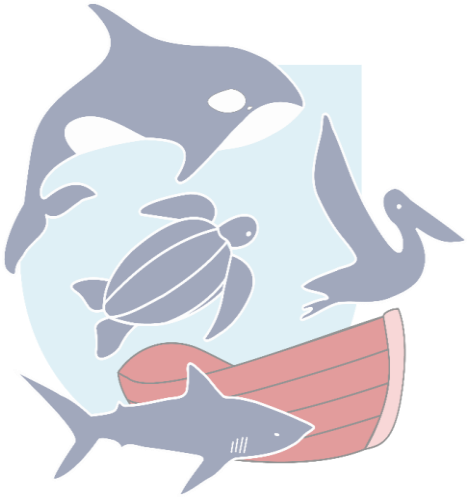

Part 2 – Priority actions for Future Research and Management

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CAMAC project

This report was drafted tin the framework of the CAMAC project. CAMAC stands for CAribbean marine Megafauna and anthropogenic Activities; it is a 4-year project (2023-2027) co-funded by the European Union and led by the Agoa Sanctuary and the SPAW RAC. It aims to enhance regional collaboration and better characterise interactions between marine megafauna and human activities, in order to provide Caribbean governing bodies and environmental stakeholders with recommendations and tools to reduce the negative anthropogenic impacts.

CONTENT

Summary (English)

During the first phase of the CAMAC project's elasmobranch work package, gaps in research on sharks and rays in the Caribbean were identified. These results were then used to identify and prioritise research actions for the future.

Three workshops were organised with shark and ray experts to collaboratively identify and prioritise key research areas in the Caribbean. During these workshops a total of 23 actions were identified which were grouped according to three focus areas: (1) new research efforts; (2) research foundations; and (3) skills and capacity building. Following these workshops, the actions were written up in detail in an action description template. This template covers the same elements for all actions: target species, geographical areas, habitats targeted, priority level of the action, expected results, format of the data, the data gap addressed, a scientific protocol, potential additional contributions to knowledge on other groups of marine megafauna, potential partners, and a detailed budget of the action including the human and material resources required. Finally, the templates were shared with the experts and were discussed during four workshops. Participants were asked to comment on the actions and score them according to what they believed were the highest priorities.

The section **New Research Efforts** has a total of 11 proposed actions. According to the experts, the highest priority actions for this section should focus on (1) sampling of fisheries (by)catches to collect information on species and populations present in the area, (2) the setting up of acoustic telemetry network to study nursery areas / pupping grounds, and (3) doing base-line monitoring through Baited Remote Underwater Video monitoring. The second section, **Research Foundations**, aims to strengthen the research base within the region and make local organisations more independent in their efforts. It has 4 proposed actions. The two highest priority actions focus on enabling data sharing to ensure all relevant parties have access to data on the species in their waters. The last section was defined as **Skills and Capacity building**. This section has 7 actions that all focus on enhancing collaboration between regional conservationists, fisheries managers, fishers and scientific experts. The highest priority action here was the establishment of a collaboration platform through which regional experts could stay informed, share experiences and learn from each other. The already existing Caribbean Shark Coalition was named as a potential starting point for this. Such a platform could function as a focal point for the 2nd high priority action: facilitate data collection training for local NGO's.

The follow up and success of each of these proposed actions is dependent on local and regional engagement. In this respect, the list of potential partners provided for each action can be seen as an indication of who should be involved but is neither exhaustive nor prescriptive. In all cases, those responsible for policy and management of marine resources, conservation, and fisheries, such as local government bodies, should be involved in the actions in some capacity. For the regional focus, it is important to keep the SPAW-RAC engaged in the progress and well informed of the results. The Elasmobranch Working Group of WECAFC is also an important network in the region, in particular in relation to fisheries and bycatch reduction projects.

Resumen (Español)

Durante la primera fase de la línea de trabajo sobre elasmobranquios del proyecto CAMAC, se identificaron las lagunas en la investigación sobre tiburones y rayas en el Caribe. Estos resultados se utilizaron para identificar y priorizar las acciones de investigación para el futuro.

En primer lugar, se organizaron tres talleres con expertos en tiburones del Caribe. En ellos se identificaron 23 acciones agrupadas en tres áreas de interés: (1) nuevos esfuerzos de investigación; (2) base de investigación; y (3) desarrollo de habilidades y capacidades. A continuación, se elaboraron fichas de acción detalladas. Estas fichas contienen todas los mismos elementos: especies objetivo, zonas geográficas, hábitats objetivo, nivel de prioridad de la acción, resultados esperados, formato de los datos, lagunas de datos abordadas, protocolo científico, posibles contribuciones adicionales al conocimiento de otros grupos de megafauna marina, socios potenciales y presupuesto detallado de la acción, incluidos los recursos humanos y materiales necesarios. Por último, las fichas de acción se compartieron con los expertos y se debatieron en cuatro talleres. Se invitó a los participantes a comentar las acciones y clasificarlas según lo que consideraran más prioritario.

La sección "**Nuevos esfuerzos de investigación**" contiene un total de 11 acciones propuestas. Según los expertos, las acciones más prioritarias de esta sección son: (1) muestreo de capturas pesqueras (accidentales y dirigidas) para recabar información sobre las especies y poblaciones presentes en la zona; (2) establecimiento de una red de telemetría acústica para estudiar las zonas de reproducción; y (3) establecimiento de un seguimiento de las poblaciones mediante vídeo submarino con cebo (BRUV). El segundo apartado, "**Bases para la investigación**", pretende reforzar las bases de la investigación en la región y dotar de mayor autonomía a las organizaciones locales. Comprende cuatro acciones propuestas. Las dos acciones más prioritarias pretenden facilitar el intercambio de datos para que todas las partes interesadas de la regióntengan acceso a los datos existentes sobre las especies presentes en sus aguas. La última sección trata del **desarrollo de competencias y capacidades**. Esta sección comprende 7 acciones, todas ellas encaminadas a reforzar la colaboración entre las partes interesadas en la protección del medio ambiente, los gestores de la pesca, los pescadores y los científicos. La acción más prioritaria es la creación de una plataforma de colaboración que permita a las partes interesadas de la región mantenerse informadas, compartir experiencias y aprender unas de otras. La Coalición de Tiburones del Caribe, que ya existe, se citó como posible punto de partida. Esta plataforma podría servir como punto focal para la segunda acción prioritaria de esta sección: facilitar la formación en recopilación de datos a las ONG locales.

El éxito de cada una de estas acciones depende del compromiso local y regional. En este sentido, la lista de socios potenciales proporcionada para cada acción puede considerarse indicativa, pero no es exhaustiva ni prescriptiva. En todos los casos, es necesario implicar a los responsables de la política y la gestión de los recursos marinos, la conservación y la pesca, como las autoridades locales. A escala regional, es importante que el CAR SPAW participe en los avances y esté bien informado de los resultados. El Grupo de Trabajo sobre Elasmobranquios de la COPACO es también un importante centro de coordinación en la región, especialmente en relación con la pesca y los proyectos de reducción de las capturas accesorias.

Résumé (Français)

Au cours de la première phase de l'axe de travail du projet CAMAC portant sur les élasmobranches, les lacunes en matière de recherche sur les requins et les raies dans la Caraïbe ont été identifiées. Ces résultats ont ensuite été utilisés pour identifier puis classer par ordre de priorité les actions de recherche pour l'avenir.

Trois ateliers ont tout d'abord été organisés avec les experts travaillant sur les requins dans la Caraïbe. Ils ont permis d'identifier 23 actions regroupées selon trois domaines d'intérêt : (1) nouveaux efforts de recherche ; (2) fondation pour la recherche ; et (3) renforcement des compétences et des capacités. Des fiches actions détaillées ont ensuite été rédigées. Ces fiches reprennent toutes les mêmes éléments : espèces cibles, zones géographiques, habitats visés, niveau de priorité de l'action, résultats escomptés, format des données, manque de données auquel elle répond, protocole scientifique, contributions supplémentaires potentielles aux connaissances sur d'autres groupes de mégafaune marine, partenaires potentiels, et budget détaillé de l'action, y compris les ressources humaines et matérielles nécessaires. Enfin, les fiches actions ont été partagées avec les experts et ont été discutées au cours de quatre ateliers. Les participants ont été invités à commenter les actions et à les classer en fonction de ce qu'ils estimaient être le plus prioritaire.

La section « **Nouveaux efforts de recherche** » comporte un total de 11 actions proposées. Selon les experts, les actions les plus prioritaires pour cette section sont les suivantes : (1) l'échantillonnage des captures (accidentelles et ciblées) des pêcheries pour collecter des informations sur les espèces et les populations présentes dans la zone ; (2) la mise en place d'un réseau de télémétrie acoustique pour étudier les zones de reproduction ; et (3) la mise en place d'un suivi des populations par vidéo sous-marine appâtée (BRUV). La deuxième section, « **Fondations pour la recherche** », vise à renforcer les bases pour la recherche dans la région et à rendre les organisations locales plus autonomes. Elle comporte quatre propositions d'actions. Les deux actions les plus prioritaires visent à faciliter le partage des données afin que tous les acteurs régionaux aient accès aux données existantes sur les espèces présentes dans leurs eaux. La dernière section concerne le **renforcement des compétences et des capacités**. Cette section comporte 7 actions qui visent toutes à renforcer la collaboration entre les acteurs de la préservation de l'environnement, les gestionnaires de la pêche, les pêcheurs et les scientifiques. L'action la plus prioritaire est la mise en place d'une plateforme de collaboration permettant aux acteurs régionaux de rester informés, de partager leurs expériences et d'apprendre les uns des autres. La Caribbean Shark Coalition, qui existe déjà, a été citée comme point de départ potentiel. Cette plateforme pourrait servir de point de convergence pour la deuxième action prioritaire de cette section : faciliter la formation à la collecte de données pour les ONG locales.

Le succès de chacune de ces actions dépend de l'engagement local et régional. À cet égard, la liste des partenaires potentiels fournie pour chaque action peut être considérée comme indicative, mais elle n'est ni exhaustive ni prescriptive. Dans tous les cas, il est nécessaire d'impliquer les responsables de la politique et de la gestion des ressources marines, de la conservation et de la pêche, telles que les autorités locales. A l'échelle régionale, il est important que le CAR SPAW soit impliqué dans les progrès et bien informé des résultats. Le groupe de travail sur les élasmobranches de la WECAFC est également un point focal important dans la région, en particulier en ce qui concerne les pêcheries et les projets de réduction des prises accidentelles.

I. Priority actions for future research and management

During the first stage of the CAMAC Elasmobranch Action Plan project, the knowledge gaps on shark and ray research were identified. These then served as the input for the second stage in which research priorities for the future were identified. Three workshops were organised in September and October 2023, bringing together researchers, scientists, conservationists, and government agencies from across the Wider Caribbean region. In the workshops, we fostered collaborative discussions to identify and prioritise key research areas. The interactive sessions facilitated the exchange of insights, methodologies and technological advancements, with a specific focus on understanding shark and ray behaviours, movements, and management needs. Furthermore, participants shared knowledge on successful conservation strategies, drawing from global experiences.

The themes of the workshops were:

1. Shark movement and migration (tagging, tracking, telemetry etc.) – 11th September 2023 – online

2. Shark communities and ecosystem role (BRUVs, (E)-DNA, isotopes etc.) - 19th September 2023 - online

3. Innovative Strategies for Shark and Ray Management – 4th October 2023 - hybrid: in person participants in Aruba & online participants

A detailed description of the workshops including participant lists can be found in Annex 2 to this report.

Following these workshops, the actions discussed and identified in the meetings were written up in detail in an action description template. This template covers the same elements for all actions: target species; geographical areas; habitats targeted; priority level of the action; expected results and the format of the data as well as the data gap it addresses; a scientific protocol; potential additional contributions to knowledge on other groups of marine megafauna; potential partners; other considerations; and a detailed budget of the action including the human and material resources required.

A total of 23 actions were identified which were grouped according to three focus areas: (1) new research efforts; (2) research foundations; and (3) skills and capacity building. The templates were shared with the SPAW-RAC shark expert group and other experts and were discussed during three online meetings held on 31st October, 2nd November and the 4th of November as well as a physical round table meeting that also took place on November 4th during the CAMAC workshop in Nassau, Bahamas. Participants were asked to comment on the actions and score them according to what they believed were the highest priorities.

By collectively setting research priorities, these workshops contribute significantly to narrowing knowledge gaps, fostering a more comprehensive understanding of shark and ray dynamics in the Wider Caribbean, and guiding future research efforts towards impactful conservation measures in the region.

New Research Efforts

The section **New Research Efforts** has a total of 11 proposed actions. According to the experts the highest priority actions for this section should focus on (1) sampling of fisheries (by)catches to collect information on species and populations present in the area, (2) the setting up of acoustic telemetry network to study nursery areas / pupping grounds, and (3) doing base-line monitoring through Baited Remote Underwater Video monitoring. Two expansion modules of this action (deep water BRUVs and Pelagic BRUVs) were deemed of medium importance.

	Action Nr	Name	One sentence summary	Time line	Budget estimate	Priority
New research efforts	1	Genetic sampling with local fishers	Work with local fishermen on getting species info and samples (DNA and/or isotope)	3-year project	$80.000 / per location	**High**
	8	Telemetry Networks for Nursery Area Conservation	Setting Up Telemetry Networks for Nursery Area Conservation in the CAMAC Region	5-year project	$ 140.000 / 1 array	**High**
	3	Baseline BRUV work	Baseline BRUV work on easy access (coastal / shallow) locations for a prolonged period	4-year project	$ 77.000 / per location	**High**
	5	Deep water BRUVs	Deep water BRUVs to assess presence of deep-water elasmobranchs	4-year project	$25.000 / per location	**Medium**
	4	Pelagic BRUVs	Pelagic BRUV studies to gather data on pelagic elasmobranch species	4-year project	$50.000 / per location	**Medium**
	6	Deploying cameras around FADs	Deploying cameras around Fish Aggregation Devices (FADs) to explore which elasmobranch species are attracted to those.	2-year project	$ 25.000 / per location	**Medium**
	22	Satellite Telemetry Program and Network	Establishing a Satellite Telemetry Program and Network for the CAMAC Region	4-year project	$ 200.000	**Medium**
	7	FADs as locations for telemetry networks (pilot)	Assess the potential for FADs (Fish Aggregating Devices) as a location for telemetry networks	1 year project	$ 20.000	**Low**
	23	Creating a portfolio of elasmobranch telemetry research areas	Creating a portfolio of one or two-page documents outlining suggested elasmobranch telemetry areas with estimated project costs to secure funding opportunities.	2 years development, 2 years roll out	$ 60.000	**Low**
	2	E-DNA sampling	E-DNA projects to identify presence of endangered and threatened species	1 year project	$16.500 / per location	**Low**

	9	Drones to find suitable locations for acoustic arrays	Investigating the use of drones for aerial surveys to determine suitable locations for acoustic arrays, covering pelagic and coastal/lagoonal areas for elasmobranch research in the CAMAC region	2.5-year project	$ 120.000	**Low**

Research Foundations

The smallest number of actions fell into the section **Research Foundations**, these are actions that would strengthen the research base within the region and make local organisations more independent in their efforts. Here the two highest priority actions were focussed on enabling data sharing to ensure all relevant parties have access to data on the species in their waters. A caveat that should be added to action 11 (establishing a DNA analysis unit) is that several experts felt this was not needed if the bottlenecks around permitting for CITES and other environmental samples permits could not be addressed. In light of the CAMAC project, this is an action that could be addressed jointly with researchers working on marine mammals.

	Action Nr	Name	One sentence summary	Timeline	Budget estimate	Priority
Research foundations	19	Facilitate use of open access data sharing repository	Facilitate use of data sharing repositories for open access data sharing throughout the Wider Caribbean	2-year project	$ 40.000	High
	17	Standardized data sharing agreements	Establish a collaboration and data sharing agreement to maintain data ownership within the Caribbean region	6-month project	$ 15.000	High
	11	Establishment DNA Analysis Unit in the Caribbean	Establishment of an Elasmobranch DNA Analysis Unit in the Caribbean	3-year project	$ 140.000	Medium
	10	Develop an Mou with Ocean Tracking Network (OTN)	Develop an Mou for collaborative efforts with Ocean Tracking Network (OTN) for large-scale elasmobranch telemetry efforts, focusing specifically on nursery areas and data sharing	1 year project	$ 40.000	Low

Skill and Capacity building

The last section was defined as **Skills and Capacity building**. This section has 7 actions that all focus on collaboration between regional conservationists, fisheries managers, fishers and scientific experts. The highest priority actions here were the establishment of a collaboration platform through which regional experts could stay informed, share experiences and learn from each other. The already existing Caribbean Shark Coalition was named as a potential starting point for this. Such a platform could function as a focal point for the 2nd high priority action: facilitation data collection training for local NGO's.

	Action Nr	Name	One sentence summary	Timeline	Budget estimate	Priority
Skills and capacity building	21	Data collection training	Train local NGOs in data collection methods so they can teach that to fishers	1 year project	$ 80.000 per topic	High
	14	Develop collaboration platform	Collaboration platform to continue working together to advance the objectives of the CAMAC project and promote sustainable marine conservation efforts within the Caribbean region.	4-year project	$82.000	High
	12	Develop ID-guides	Develop ID-guides in common, Latin and local languages for all countries	6-month project	$ 29 200	Medium
	15	Fishermen exchanges	Facilitate fishermen exchanges among islands to introduce conservation work and/or shark science	2-year project	$26.000	Medium
	20	Assess the possibility of organising trainings on data analysis	Explore the possibility of organising training workshops or seminars in the region to facilitate data analysis and management, considering budget constraints.	9-month project	$ 12.000 (startup cost)	Medium
	16	Skill sharing workshops	Organise skill sharing workshops for NGOs on how to set up and run stakeholder processes	3-year project	$ 55.500	Medium
	18	Webinar series	Organise a series of webinars on relevant elasmobranch research and conservation topics	2-year project	$16 000	Low
	13	Collaborate on apps for species data	Collaborate with organisations that already have easy to use apps for collecting species data	1 year project	$ 12.000	Low

In all of the sections, there are actions which can be seen as being complementary to each other, in several cases some of the high priority actions can be directly linked to some of the low priority ones. In developing future projects, it can therefore be beneficial to combine actions that are closely linked as this could amplify the impact without adding too much additional cost.

The success of each of these actions is dependent on local and regional engagement. In this respect, the list of potential partners can be seen as an indication of who should be involved but is neither exhaustive nor prescriptive. In all cases, those responsible for policy and management of marine resources, conservation, and fisheries, such as local government bodies, should be involved in the actions in some capacity.

For the regional focus, it is important to keep the SPAW-RAC engaged in the progress and well informed of the results. The Elasmobranch Working Group of WECAFC is also an important network in the region, in particular in relation to fisheries and bycatch reduction projects. Since the WECAFC Secretariat has a leading role in Work package 1 of the 2nd phase of CAMAC, active collaboration with them could be fruitful to address some of the fisheries related actions.

II. Annex 1: Action Descriptions

Action Description 1: Genetic sampling with local fishers

ACTION NAME	Work with local fishermen on getting species info and samples (DNA and/or isotope)		
TARGET SPECIES	Depends on area - focus on SPAW listed species	TOTAL BUDGET	$80.000 / per location
GEOGRAPHI-CAL AREA	CAMAC scope area	PRIORITY LEVEL	**High**

DESCRIPTION

PROJECT SUMMARY & EXPECTED OUTCOME	This project focuses on working with local fishermen to gather data and samples from SPAW-listed shark species. The main goals are to assess species diversity, collect DNA and isotope samples, and utilize the knowledge of fishermen to enhance understanding of the local marine ecosystem. By addressing the knowledge gaps on population structure, size and connections of these shark species and their habitats, the outcomes contribute to informed conservation and sustainable management of marine resources.
BACKGROUND / RATIONALE	To sustainable manage and protect shark and ray populations, a key element is understanding population dynamics and sizes. For the whole of the CAMAC scope area there is a lack of population information on the elasmobranch species present in the area. One of the few available sources of data samples for genetic and isotope research are catches (and landings) from fishers.
SCIENTIFIC PROTOCOL & TIMELINE	Project outline for a 3-year project Year 1 · Agreement on ownership of the data collected through the project · Identify local coordinators · Identify fishermen who will take part in the project · Ensure necessary permitting requirements are met · Identify research laboratory that will analyse samples and agree who will be the focal contact point · Fishermen get hands-on training from experts and receive necessary materials · Fishermen start to collect samples · Samples sent for analysis and results collected in database Year 2 · Continue to identify fishermen who will take part in the project and ensure that they receive necessary training and materials · Fishermen continue to collect samples · Samples sent for analysis and results collected in database · Update workshop to coordinate results across the region Year 3 · Continue to identify fishermen who will take part in the project and ensure that they receive training · Fishermen continue to collect samples · Samples sent for analysis and results collected in database · Analysis of samples and publication of results At the end of the project the data will be made available in a regional database (to be developed)

SPILL OVER	The spillover potential for this project is multifaceted. Firstly, it can lead to improved conservation efforts for SPAW-listed shark species, potentially contributing to their regional conservation. Secondly, the collaboration with local fishermen may strengthen community engagement and support for marine conservation, fostering a sense of stewardship. Additionally, the gathered data and samples could aid in broader scientific research, enhancing our understanding of marine ecosystems beyond the project's focus area. Ultimately, the project may serve as a model for similar initiatives elsewhere, promoting sustainable resource management practices in other regions facing similar challenges.
(POTENTIAL) PARTNERS	• Local NGOs working in coastal communities (within CAMAC network) • Local fishers and/or fishing organisations • Large research institute with genetics / isotope department • National governments
CONSIDERA-TIONS	This action could be combined with action 2 on E-DNA, this would enhance the value of the project and reduce cost.

BUDGET ESTIMATE

PROJECT ELEMENT	DESCRIPTION	COST
Personnel / HR cost	For 1 location: • local (NGO) coordinator who has access to the fishing community (0.4 FTE for 3 years) • compensation for fishermen ($10 per sample)* * compensation should be set at such a level that it does not incentivise fishers to target sharks so can vary per location	$ 36.000 $ 3.000
Materials	• data collection kits	$ 2.000
Laboratory cost	• expert to give training workshop for local liaison & fishers • expert to give 1 short update workshop mid-way through the project • External lab analysis of 300 samples / $50 per sample	$ 5.000 $ 3.000 $ 15.000
Travel & residency	• travel for training workshop (1x) • travel for update workshop (1x) • cost for local liaison to participate in relevant regional meetings (3x)	$ 3.000 $ 3.000 $ 10.000
Facility rental / Boat cost etc.	negligible	
	ESTIMATED TOTAL COST	$ 80.000

Action Description 2: E-DNA Sampling

ACTION NAME	E-DNA projects to identify presence of endangered and threatened species		
TARGET SPECIES	*Depends on area - focus on SPAW listed species*	TOTAL BUDGET	$16.500 / per location
GEOGRAPHI-CAL AREA	*CAMAC scope area*	PRIORITY LEVEL	*Low*

DESCRIPTION

PROJECT SUMMARY & EXPECTED OUTCOME	E-DNA samples are collected and analysed in an effort to identify the presence of specific endangered elasmobranch species within the CAMAC scope. Based on the outcomes of this analysis additional research and conservation efforts can be set up.
BACKGROUND	For many of the countries in the CAMAC scope area there is minimal information available on the endangered and threatened elasmobranch species. E-DNA can help in providing a baseline on presence-absence of endangered and threatened species which can in turn be used to pinpoint areas that need further study to establish their importance for endangered elasmobranch species.
SCIENTIFIC PROTOCOL & TIMELINE	Project outline for a 1-year project Preliminary work • Identify species for which enough information is available (genetic markers) to carry out successful E-DNA analysis • Identify areas of high priority for E-DNA data collection • Agreement on ownership of the data collected through the project Part 1 • Work with local coordinators to obtain samples (make use of existing networks, expeditions etc) • Ensure necessary permitting requirements are met • Identify research laboratory that will analyse samples and agree who will be the focal contact point Part 2 • Samples collected and sent for analysis • Results collected in database • Analysis of samples and publication of results At the end of the project the data will be made available in a regional database (to be developed)
SPILL OVER	Once a successful E-DNA analysis process has been developed this can be duplicated in projects for other species and species groups, providing the relevant genetic markers have been identified.
POTENTIAL PARTNERS	• Local NGOs working in coastal communities (within CAMAC network) • Large research institute with genetics / isotope department

CONSIDERA-TIONS	E-DNA success is dependent on the quality of the control samples and the clarity of the signal obtained from genetic markers. Before starting an E-DNA project it should be confirmed that enough control samples have been collected for the species studied to ensure the results of the study can be meaningful.

BUDGET ESTIMATE

PROJECT ELEMENT	DESCRIPTION	COST
Personnel / HR cost	Local (NGO) staff coordination and data collection (200 hrs)	$ 6.000
Materials	Data collection kits	$ 500
Laboratory cost	• Expert to oversee data collection and analysis (80 hrs total) • Analysis of 10 E-DNA samples (incl shipping)	$ 4.000 $ 4.000
Travel & residency	*negligible*	-
Facility rental / Boat cost etc.	*negligible*	-
	ESTIMATED TOTAL COST	$ 16.500

Action Description 3: Baseline BRUV work on easy access locations

ACTION NAME	Baseline BRUV work on easy access locations for a prolonged period		
TARGET SPECIES	*Depends on area - focus on SPAW listed species*	TOTAL BUDGET	$ 77.000 / per location
GEOGRAPHI-CAL AREA	*CAMAC scope area*	PRIORITY LEVEL	**High**

DESCRIPTION

PROJECT SUMMARY & EXPECTED OUTCOME	A non-invasive and cost-effective technique to obtain extensive and statistically robust baseline data for the diversity, distribution and relative abundances of elasmobranch populations is to make use Baited Remote Underwater Video systems (BRUVs). To get an adequate overview of shark and ray abundance and changes over time the monitoring program should run for at least 4 years with at least 8 samples (4 sites 2 drops) studied per month for the entire period. Once a baseline has been established, changes in distribution and abundance can be confidently monitored over space and time, and additional information such as habitat use and species interactions will be gained. Furthermore, these data can be used to better understand the nature and dynamics of the pressures facing these vulnerable populations, providing a strong knowledge base from which to develop and assess policy and legislation in support of elasmobranch conservation.
BACKGROUND	Within the CAMAC scope area there is very little fisheries independent data on elasmobranchs, fisheries dependent data provides skewed information. For adequate conservation and management independent baseline data on abundance is essential.
SCIENTIFIC PROTOCOL & TIMELINE	Project outline for a 4-year project Preliminary phase • Agreement on ownership of the data collected through the project • Identify priority areas for researchhttps://docs.google.com/document/d/1GdoaPhv0nYFgiwoGrMn783L7l8bdsk6V/edit?disco=AAAA8diWCS8 • Set up arrangements for training and technical support • Ensure necessary permitting requirements are met • Make sampling protocol Year 1 • Identify local coordinators and set up agreements • Purchase materials • Startup training workshop • Coordinators to make arrangements locally for the data collection • Start data collection Year 2 • Continue data collection • Start data analysis • continue tech support Year 3 • Continue data collection • Continue data analysis

	• Mid project workshop to troubleshoot and align work • Continue tech support Year 4 • Continue data collection • Continue data analysis • Continue tech support • Final analysis and report on results
SPILL OVER	Video data collected does not just show elasmobranchs but can also include other species that are relevant for marine management. The BRUV-units on the islands can be used for other research efforts
POTENTIAL PARTNERS	• Local NGOs working in coastal communities (within CAMAC network) • Research labs working on BRUV analysis • Government bodies working on implementation of fisheries and conservation legislation & policy
CONSIDERATIONS	This action could be combined with E-DNA sampling (Action 2) and pelagic BRUV work (Action 4) & Deep Water BRUVs (Action 5) The number of BRUV-drops (8) has been chosen as this is the number considered to be feasible to carry out on a monthly basis for 4 years, if there is capacity the number of drops can be increased. There are efforts in several institutes around the world to digitally analyse BRUV data (machine learning) that could greatly enhance capacity in future. It is important to keep track of these developments. Restrictions imposed by French laws (for the islands of Guadeloupe, Saint-Martin - French part - and Martinique): - an authorization for scientific monitoring is necessary, to obtain it we must use a boat which has a certain type of license (which can result in a non-negligible cost for rental).

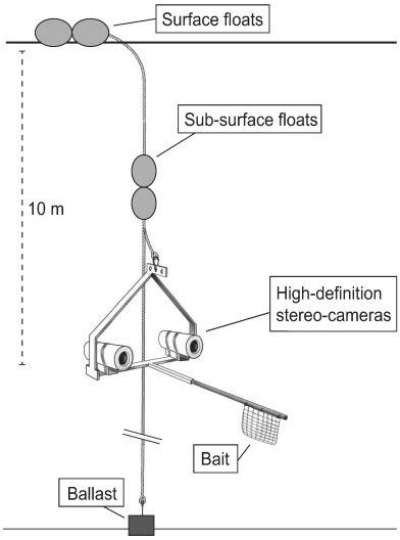
BUDGET ESTIMATE

PROJECT ELEMENT	DESCRIPTION	COST
Personnel / HR cost	For 1 location: • local (NGO) coordinator who can run the data collection on site (0,2 FTE for 4 years • data analyser to assess collected footage (0,1 FTE for 3 years)	$32.000 $15.000
Materials	• *2 BRUV units + spare / replacement parts* • *software, hardware and cloud server space* • *Ongoing cost for cloud server space, updates and technical support for an initial 4-year period*	$ 4.000 $ 2.000 $ 1.500
Laboratory / Tech cost	• *4 years tech support*	$16.000
Travel & residency	• travel for training workshop (1x) • travel for update workshop (1x)	$ 3.000 $ 2.000
Facility rental / Boat cost etc.	*Minimal, should try to use existing boat trips (diving, other research) to get the BRUVs out*	$ 1.500
	ESTIMATED TOTAL COST	$77.000

Action Description 4: Pelagic BRUVs

ACTION NAME	Pelagic BRUV studies to gather data on pelagic elasmobranch species		
TARGET SPECIES	*Pelagic elasmobranch species - focus on SPAW listed species*	TOTAL BUDGET	$50.000 / per location
GEOGRAPHI-CAL AREA	*CAMAC scope area*	PRIORITY LEVEL	**Medium**

DESCRIPTION

PROJECT SUMMARY & EXPECTED OUTCOME	Regular Baited Remote Underwater Video (BRUV) units can only be used in shallow areas with low currents this excludes the pelagic zone where we know many elasmobranchs live. Using a pelagic BRUV set up (free floating, attached to a boat) data can be collected species out in the open ocean.  The project would run for at least 4 years with regular deployments (2 times per month) through a to be developed protocol. At the end of the project there will be increased information about the diversity and abundance of pelagic elasmobranchs in the region with potential hotspots identified.
BACKGROUND	Regular Baited Remote Underwater Video (BRUV) units can only be used in shallow waters with low or no currents; this limits the species that can be detected on them consistently to those that frequent near shore, shallow areas. Many of the more endangered elasmobranch species are known to live out in the pelagic zone, understanding more about their occurrence, abundance and behaviour is essential to aid conservation efforts.
SCIENTIFIC PROTOCOL & TIMELINE	Project outline for a 4-year project Preliminary phase • Agreement on ownership of the data collected through the project • Identify priority areas for research • Set up arrangements for training and technical support • Ensure necessary permitting requirements are met • Make sampling protocol Year 1 • Identify local coordinators and set up agreements

	• Purchase materials • Startup training workshop • Coordinators to make arrangements locally for the data collection • Start data collection Year 2 • Continue data collection • Start data analysis • continue tech support Year 3 • Continue data collection • Continue data analysis • Mid project workshop to troubleshoot and align work • Continue tech support Year 4 • Continue data collection • Continue data analysis • Continue tech support • Final analysis and report on results
SPILL OVER	Video data collected does not just show elasmobranchs but can also include other species that are relevant for marine management. The BRUV-units on the islands can be used for other research efforts
POTENTIAL PARTNERS	• Local NGOs working in coastal communities (within CAMAC network) • Research labs working on BRUV analysis • Government bodies working on implementation of fisheries and conservation legislation & policy
CONSIDERA-TIONS	The success of this study would depend on access to locations and available boat time. Possibly a collaboration with fishermen that go out to deep water sites on a regular basis could be advantageous. This action could be combined with E-DNA sampling (Action 2) and shallow water BRUV work (Action 3) & Deep Water BRUVs (Action 5)

BUDGET ESTIMATE

PROJECT ELEMENT	DESCRIPTION	COST
Personnel / HR cost	As this is an addition to Action 3 (Baseline BRUV work) the budget should be see in the light of that action and not as a standalone action - additional staff time:	$ 20.000
Materials	*Pelagic BRUV unit*	$ 5.000
Laboratory cost	*Cost of (external) laboratory analysis*	
Travel & residency		
Facility rental / Boat cost etc.	*Boat rental 1 day per month for 4 years*	$ 25.000
	ESTIMATED TOTAL COST	$50.000

Action Description 5: Deep water BRUVs

ACTION NAME	*Deep water BRUVs to assess presence of deep-water elasmobranchs*

TARGET SPECIES	*Deep water elasmobranch species*	TOTAL BUDGET	$25.000 / per location
GEOGRAPHI-CAL AREA	*CAMAC scope area*	PRIORITY LEVEL	**Medium**

DESCRIPTION

PROJECT SUMMARY & EXPECTED OUTCOME	Regular Baited Remote Underwater Video (BRUV) units can only be used in shallow waters with good visibility as they depend on ambient light for collecting footage. By adding strong lights and camera housing that can be used in deep water data can be gathered on species composition and abundance in deep water. The project would run for at least 4 years with regular deployments (2 times per month) through a to be developed protocol. At the end of the project there will be increased information about the diversity and abundance of deepwater elasmobranchs in the region with potential hotspots identified.
BACKGROUND	The Caribbean Sea has many deep-water areas and it is known that deep water elasmobranchs are present in the region. However, very little deep-sea research has been done in the area and only few countries have confirmed records of deep-water species. To establish the importance of the Caribbean habitats for deep water elasmobranchs more research will need to be done.
SCIENTIFIC PROTOCOL & TIMELINE	Project outline for a 4-year project Preliminary phase • Agreement on ownership of the data collected through the project • Identify priority areas for research • Set up arrangements for training and technical support • Ensure necessary permitting requirements are met • Make sampling protocol Year 1 • Identify local coordinators and set up agreements • Purchase materials • Startup training workshop • Coordinators to make arrangements locally for the data collection • Start data collection Year 2 • Continue data collection • Start data analysis • continue tech support Year 3 • Continue data collection • Continue data analysis • Mid project workshop to troubleshoot and align work • Continue tech support Year 4 • Continue data collection • Continue data analysis • Continue tech support • Final analysis and report on results
SPILL OVER	Video data collected does not just show elasmobranchs but can also include other species that are relevant for marine management. The BRUV-units on the islands can be used for other research efforts

POTENTIAL PARTNERS	• Local NGOs working in coastal communities (within CAMAC network) • Research labs working on BRUV analysis • Government bodies working on implementation of fisheries and conservation legislation & policy
CONSIDERA-TIONS	The success of this study would depend on access to locations and available boat time. Possibly a collaboration with fishermen that go out to deep water sites on a regular basis could be advantageous. This action could be combined with E-DNA sampling (Action 2), shallow water BRUV work (Action 3) and Pelagic BRUVs (Action 4)

BUDGET ESTIMATE

PROJECT ELEMENT	DESCRIPTION	COST
Personnel / HR cost	*As this is an addition to Action 3 (Baseline BRUV work) the budget should be see in the light of that action and not as a standalone action - additional staff time:*	$ 20.000
Materials	*Deep water BRUV unit*	$ 5.000
Laboratory cost	*Cost of (external) laboratory analysis*	
Travel & residency		
Facility rental / Boat cost etc.	*Rental cost for ship time, rooms & venue etc. including operational cost*	
	ESTIMATED TOTAL COST	$ 25.000

Action Description 6: Deploying cameras around FADs

ACTION NAME	Deploying cameras around Fish Aggregation Devices (FADs) to explore which elasmobranch species are attracted to those.		
TARGET SPECIES	*All shark and ray species present in the area*	TOTAL BUDGET	$ 25 000 / per location
GEOGRAPHI-CAL AREA	*CAMA scope area*	PRIORITY LEVEL	**Medium**

DESCRIPTION

PROJECT SUMMARY & EXPECTED OUTCOME	This action will provide a new source of information on sharks and rays in the CAMAC scope area. Most of the current knowledge is from fisheries landings or BRUVs. Deploying cameras on FADs will give a broader view of the species in the area. The expected outcome is an inventory of species and numbers of individuals as well as the size and sex of individuals which will give further information on the use of the area by the species present, if it is a nursery area for example.
BACKGROUND	It is known that fish aggregating devices (FADs) attract sharks as well as teleosts. Until now no research has been done to determine how many sharks and which species are attracted to FADs. Deploying cameras on FADs will give insight into which species are in the area. Collaboration with fishermen who catch sharks at the FADs will enable the collection of information on size and sex of the sharks and rays.
SCIENTIFIC PROTOCOL & TIMELINE	This will be a 2-year project to be able to take interannual variation into account **Months 1-6** Designate local organisation or group of organisations to run the project Make an inventory of the current distribution of FADs in the CAMAC scope area Create a protocol for deployment of FADs Identify which FADs are suitable for placement of cameras **Months 6 -24** Placing, deployment and maintenance of cameras Ongoing analysis of data and evaluation Data to feed into regional data repository
SPILL OVER	It is possible that turtles will be seen at the FAD locations and these will be included in the inventory
POTENTIAL PARTNERS	• Local NGOs working in coastal communities (within CAMAC network) • Local fishermen and fisheries organisations • Government bodies working on implementation of fisheries and conservation legislation & policy
CONSIDERA-TIONS	This project could link to other actions dealing with underwater video or camera images, such as the action 9 to assess the potential for FADs (Fish Aggregating Devices) as a location for telemetry networks. Data collected can feed into the proposed regional repository

BUDGET ESTIMATE

PROJECT ELEMENT	DESCRIPTION	COST
Personnel / HR cost	*Describe if own staff, external scientist or contractors will carry out the work (or a combination)* *Project coordination 0.1 FTE for two years* *Deployment and maintenance of cameras 0.5 FTE for two years* *Image analysis 0.1 FTE for two years*	 $ 8 000 $ 4 000 $ 8 000
Materials	*List (research) materials that will need to be acquired both consumables and gear* *Cameras and memory cards - $ 750 each* *Image analysis software*	 $ 1 500 $ 1 500
Laboratory cost	*Cost of (external) laboratory analysis* *None*	
Travel & residency	Compensation for time and/or fuel for fishermen	$ 2 000
Facility rental / Boat cost etc.	*Rental cost for ship time, rooms & venue etc. including operational cost* *To be discussed*	
	ESTIMATED TOTAL COST	$ 25 000

Action Description 7: FADs as locations for telemetry networks

ACTION NAME	Pilot project to assess the potential for FADs (Fish Aggregating Devices) as a location for telemetry networks		
TARGET SPECIES	*SPAW species*	TOTAL BUDGET	$ 20 000
GEOGRAPHI-CAL AREA	*CAMAC scope area*	PRIORITY LEVEL	**Low**

DESCRIPTION

PROJECT SUMMARY & EXPECTED OUTCOME	Telemetry networks provide valuable information on shark movement. Using existing structures such as FADs on which to place receivers will increase the potential to follow shark movement throughout the area. The expected outcome is there will be more insight into the migratory patterns of the SPAW species, as well as their life-cycle connectivity, enabling the identification of areas for management.
BACKGROUND	It is known that fish aggregating devices (FADs) attract sharks as well as teleosts. In Action 7 it has been described how the use of cameras on FADs could increase insight into which species are in the area. This current action would focus on tagging the individuals. By placing receivers on FADs in the region it will be possible to follow the movements of individuals throughout the area. However, before this can happen it will be necessary to carry out an assessment of how feasible this is.
SCIENTIFIC PROTOCOL & TIMELINE	This is a pilot project for one year to assess the potential for FADs to be included in a telemetry network **Months 1-3** Background study to identify the practicalities of attaching and deploying receivers on FADs and catching and tagging sharks per location Overview of potential FADs in the CAMAC scope area Choice of one or two trial locations **Months 4-10** Trialling the placing of receivers and catching and tagging sharks **Months 11-12** Evaluation and writing up of protocol for FADs as locations for telemetry network Organise webinar to bring information to wider audience
SPILL OVER	Other migratory species such as sea turtles are known to be attracted to FADs
POTENTIAL PARTNERS	Overview of (regional) partners that could work jointly on this action In first instance this is a feasibility study, but potential partners are SPAW-RAC, research institutes, NGOs
CONSIDERA-TIONS	Liaising with telemetry networks in the region

BUDGET ESTIMATE

PROJECT ELEMENT	DESCRIPTION	COST

Personnel / HR cost	*Describe if own staff, external scientist or contractors will carry out the work (or a combination)* *Consultant - feasibility study, webinar 0,4 FTE*	$ 16 000
Materials	*List (research) materials that will need to be acquired both consumables and gear* *Underwater camera, float and weights*	$ 1 000
Laboratory cost	*Cost of (external) laboratory analysis*	*None*
Travel & residency	Trip to FAD location	$ 2 000
Facility rental / Boat cost etc.	*Rental cost for ship time, rooms & venue etc. including operational cost*	
	ESTIMATED TOTAL COST	$ 20 000

Action Description 8: Telemetry Networks for Nursery Area Conservation

ACTION NAME	Setting Up Telemetry Networks for Nursery Area Conservation in the CAMAC Region		
TARGET SPECIES	*Depends on area - focus on SPAW listed species*	TOTAL BUDGET	$ 140.000 / per unit
GEOGRAPHI-CAL AREA	*Wider Caribbean region*	PRIORITY LEVEL	**High**

DESCRIPTION

PROJECT SUMMARY & EXPECTED OUTCOME	The project aims to establish telemetry networks in and around potential nursery areas located within the CAMAC region. These nursery areas play a vital role in the life cycle of various marine species, and their conservation and sustainable management are essential for maintaining the ecological balance of the region. The project focuses on deploying advanced telemetry technology to gather crucial data about the behavior, movements, and habitat usage of juvenile marine organisms. Project Objectives: • Identification of Nursery Areas: Conduct comprehensive surveys and research to identify potential nursery areas within the CAMAC region for various marine species, including fish, sea turtles, and invertebrates. • Telemetry Network Setup: Deploy state-of-the-art telemetry systems, such as acoustic, satellite and inter-uterine tags, to track and monitor the movements and behaviors of juvenile marine organisms within these nursery areas. • Data Collection and Analysis: Gather data on the movements, environmental conditions, and interactions of juvenile marine organisms in the nursery areas and analyze this information to better understand their habitat usage and migration patterns. • Stakeholder Collaboration: Collaborate with local communities, conservation organizations, and governmental agencies to ensure the project's success and promote awareness of the importance of nursery area conservation. • Policy Recommendations: Develop recommendations and guidelines for the conservation and management of nursery areas in the CAMAC region based on the data and insights obtained from the telemetry networks. Expected Outcomes: • Improved Conservation Knowledge: The telemetry networks will provide invaluable data on the movements and habitat use of juvenile marine organisms. This knowledge will enhance our understanding of nursery areas' significance and allow for more effective conservation measures. • Identification of Critical Habitats: The project will pinpoint specific nursery areas that are crucial for various species, enabling targeted conservation efforts and the establishment of protected zones. • Enhanced Policy Framework: The project's findings will support the development of evidence-based policies and management strategies for the CAMAC region, promoting sustainable practices and protection of nursery areas. • Long-term Conservation: By providing data-driven insights and recommendations, the project will contribute to the long-term conservation and

	sustainable management of nursery areas within the CAMAC region, ensuring the protection of marine biodiversity.
BACKGROUND	The background of the project "Setting Up Telemetry Networks for Nursery Area Conservation in the CAMAC Region" is rooted in the need to protect and sustainably manage nursery areas crucial for various marine species within the CAMAC region. Nursery areas serve as essential habitats for the early stages of marine organisms, such as fish, sea turtles, and invertebrates, and their conservation is vital for maintaining the ecological balance of the region. The project aims to leverage advanced telemetry technology to collect data that will enhance our understanding of these critical ecosystems and facilitate informed conservation efforts.
SCIENTIFIC PROTOCOL & TIMELINE	Setting up telemetry networks for nursery area conservation in the CAMAC region is a complex and multidisciplinary project that involves several phases and requires careful planning and execution. The scientific protocol and timeline for the project can be structured as follows: Phase 1: Project Initiation (Months 1-3) 1.1. Project Team Formation Assemble a multidisciplinary team of marine biologists, ecologists, telemetry experts, and project managers. 1.2. Project Planning Define project objectives and scope. Secure necessary funding and resources. Establish collaboration agreements with stakeholders. 1.3. Site Selection Identify potential study sites within the CAMAC region for nursery area surveys. Phase 2: Nursery Area Identification (Months 4-12) 2.1. Survey and Research Conduct ecological surveys and research to identify potential nursery areas. Study the behavior of juvenile marine organisms to pinpoint locations of significance. 2.2. Data Collection Gather baseline data on the ecological and environmental conditions of nursery areas. Phase 3: Telemetry Network Setup (Months 13-18) 3.1. Telemetry Technology Acquisition Procure state-of-the-art telemetry systems, including acoustic and satellite tags. 3.2. Deployment Deploy telemetry tags on selected marine species in the identified nursery areas. Phase 4: Data Collection and Analysis (Months 19-30) 4.1. Real-time Monitoring Collect real-time data on the movements and behaviors of juvenile marine organisms. 4.2. Data Analysis Analyze telemetry data to gain insights into habitat usage, migration patterns, and behaviors. Phase 5: Stakeholder Collaboration (Months 31-36) 5.1. Engage with Local Communities Collaborate with local communities to raise awareness about nursery area conservation. 5.2. Collaboration with Organizations Work closely with conservation organizations and governmental agencies to share data and insights.

	Phase 6: Policy Recommendations (Months 37-48) 6.1. Develop Recommendations Develop science-based recommendations and guidelines for the conservation and management of nursery areas. 6.2. Policy Advocacy Advocate for the adoption of evidence-based policies and management strategies. Phase 7: Project Reporting and Dissemination (Months 49-54) 7.1. Final Project Report Compile a comprehensive report summarizing project findings, recommendations, and outcomes. 7.2. Dissemination Share project results through scientific publications, conferences, and public outreach. Phase 8: Project Evaluation and Follow-up (Months 55-60) 8.1. Evaluation Assess the impact of the project on nursery area conservation and biodiversity. 8.2. Long-term Planning Develop a plan for the continuous monitoring and conservation of nursery areas.
SPILL OVER	An acoustic array can serve to analyse the movements of all tagged animals that enter it, for example sea turtles using the same area. Moreover, the individuals tagged in the Caribbean will be recorded wherever there is a compatible acoustic array.
POTENTIAL PARTNERS	• Local and regional NGOs working in coastal communities • Local and regional government bodies working on implementation of fisheries and conservation legislation & policy • Research institutes throughout the Wider Caribbean region
CONSIDERA-TIONS	Throughout the project, it's important to maintain open communication with stakeholders, adapt to unexpected challenges, and ensure data quality and ethical treatment of the studied organisms. Please note that this timeline is a general framework and may vary depending on specific project requirements and external factors. Additionally, local regulations and environmental considerations must be taken into account in each phase of the project. The project doesn't end after 3 years, cost will be ongoing for capacity maintenance, data collection and storage and reporting

BUDGET ESTIMATE

PROJECT ELEMEN. T	DESCRIPTION	COST
Personnel / HR cost	*Project coordinator - 0,2 FTE for 3 years*	$ 20.000
Materials	*Phase 1-6* *Phase 7-8*	$100.000 $20.000
Laboratory cost	*none*	
Travel & residency	*none*	
Facility rental / Boat cost etc.	*none*	
	ESTIMATED TOTAL COST	$140.000

Action Description 9: Drones to find suitable locations for acoustic arrays

ACTION NAME	Investigating the use of drones for aerial surveys to determine suitable locations for acoustic arrays, covering pelagic and coastal/lagoonal areas for elasmobranch research in the CAMAC region		
TARGET SPECIES	*All - focus on SPAW listed species*	TOTAL BUDGET	$ 120.000
GEOGRAPHI-CAL AREA	*Wider Caribbean region*	PRIORITY LEVEL	**Low**

DESCRIPTION

PROJECT SUMMARY & EXPECTED OUTCOME	Project Summary: The project aims to investigate the utilization of drones for conducting aerial surveys to identify appropriate locations for acoustic arrays in both pelagic and coastal/lagoonal areas within the CAMAC region. This research project is primarily focused on elasmobranch (sharks and rays) studies, aiming to enhance our understanding of their behavior, distribution, and ecological roles in these critical marine environments. By employing drone technology, the project seeks to streamline the process of selecting optimal sites for deploying acoustic arrays, which are essential tools for monitoring and studying elasmobranch populations. Expected Outcomes: Enhanced Efficiency in Site Selection: The use of drones will expedite the process of surveying large areas in the CAMAC region, enabling the rapid identification of suitable locations for acoustic arrays. This will significantly reduce the time and resources required for traditional site selection methods. Improved Accuracy in Targeting Elasmobranch Habitats: Drones equipped with various sensors, such as high-resolution cameras and LiDAR technology, will provide detailed and accurate information about the pelagic and coastal/lagoonal areas. This precision will allow researchers to target elasmobranch habitats more effectively. Increased Data Collection: The project will facilitate the collection of a wealth of data on the distribution and behavior of elasmobranchs, as well as their interactions with their environments. This will contribute to a more comprehensive understanding of these species' ecological roles. Cost-Efficiency: The use of drones is expected to reduce the overall cost of site selection and data collection, making it a more cost-effective approach compared to traditional research methods. Enhanced Conservation and Management: The knowledge gained through this project will inform better conservation and management practices for elasmobranch species in the CAMAC region. Effective data collection and site selection will help protect these animals and their habitats. Methodological Advancements: The project's successful implementation will contribute to the advancement of methods for conducting ecological research, particularly in the field of marine biology and conservation. Outreach and Public Awareness:

	The project's findings can be used to raise public awareness about elasmobranch conservation and the importance of preserving marine ecosystems in the CAMAC region.
BACKGROUND	Research Focus: The primary focus of this project is the study of elasmobranchs, which include sharks and rays. Elasmobranchs are a diverse group of fish that are important to marine ecosystems, and understanding their behavior, distribution, and ecological roles is crucial for their conservation.
SCIENTIFIC PROTOCOL & TIMELINE	To implement the project aimed at leveraging drone technology to streamline site selection for acoustic arrays in the CAMAC region, with a specific focus on elasmobranch research, there will be a need for a scientific protocol and a timeline for the project. 1. Project Planning (Month 1-2) • Define Project Objectives: Clearly state the project's goals and expected outcomes, as outlined in the project description. • Identify Stakeholders: Establish collaboration with relevant organizations, institutions, and researchers in the field of marine biology and conservation. • Budget Planning: Determine the budget required for equipment, personnel, and data analysis. 2. Equipment Acquisition and Preparation (Month 3-4) • Procure Drones and Sensors: Acquire suitable drones equipped with sensors for data collection (e.g., hydrophones, cameras, environmental sensors). • Testing and Calibration: Ensure drones are in working condition and calibrate sensors for accurate data collection. 3. Research Site Selection (Month 5-6) • Identify Study Areas: Determine specific marine areas in the CAMAC region for elasmobranch research. • Regulatory Compliance: Obtain necessary permits and permissions for drone flights in these areas. 4. Data Collection (Month 7-12) • Drone Surveys: Conduct drone surveys in selected areas to collect detailed and accurate data on marine ecosystems and elasmobranch species. • Data Management: Establish a data management system to organize and store collected data securely. 5. Data Analysis (Month 13-18) • Data Processing: Analyze drone-acquired data to identify elasmobranch species, habitats, and other relevant ecological parameters. • Statistical Analysis: Apply appropriate statistical methods to draw meaningful conclusions from the data. 6. Conservation and Management Recommendations (Month 19-20) • Develop Conservation Strategies: Based on the data analysis, create recommendations for conservation and management practices for elasmobranch species in the CAMAC region. • Outreach and Engagement: Begin planning outreach and public awareness activities. 7. Dissemination (Month 21-24) • Research Papers: Write scientific papers and reports detailing the project's findings and methodological advancements.

	• Public Engagement: Develop materials and initiatives for raising public awareness about elasmobranch conservation. 8. Evaluation and Future Directions (Month 25-26) • Project Assessment: Evaluate the project's success in terms of meeting its objectives. • Future Research: Identify areas for further research and improvement. Timeline Summary: Months 1-4: Project planning and equipment acquisition Months 5-6: Research site selection Months 7-12: Data collection Months 13-18: Data analysis Months 19-20: Conservation and management recommendations Months 21-24: Dissemination and public engagement Months 25-26: Evaluation and future directions
SPILL OVER	An acoustic array can serve to analyse the movements of all tagged animals that enter it, for example sea turtles using the same area. Moreover, the individuals tagged in the Caribbean will be recorded wherever there is a compatible acoustic array.
POTENTIAL PARTNERS	• Local and regional NGOs working in coastal communities • Local and regional government bodies working on implementation of fisheries and conservation legislation & policy • Research institutes throughout the Wider Caribbean region
CONSIDERA-TIONS	The project doesn't end after 3 years, cost will be ongoing for capacity maintenance, data collection and storage and reporting

BUDGET ESTIMATE

PROJECT ELEMEN. T	DESCRIPTION	COST
Personnel / HR cost	*Project coordinator - 0,2 FTE for 3 years*	$ 20.000
Materials	*Phase 1-5* *Phase 6-8*	$90.000 $10.000
Laboratory cost	*none*	
Travel & residency	*none*	
Facility rental / Boat cost etc.	*none*	
	ESTIMATED TOTAL COST	$120.000

Action Description 10: Develop an Mou with Ocean Tracking Network (OTN)

ACTION NAME	Develop an Mou to Enhance and continue collaborative efforts with Ocean Tracking Network (OTN) for large-scale elasmobranch telemetry efforts, focusing specifically on nursery areas and data sharing		
TARGET SPECIES	*All - with focus on SPAW listed species*	TOTAL BUDGET	$ 40.000
GEOGRAPHI-CAL AREA	*Wider Caribbean region with focus on CAMAC scope area*	PRIORITY LEVEL	**Low**

DESCRIPTION

PROJECT SUMMARY & EXPECTED OUTCOME	The project aims to establish a Memorandum of Understanding (MOU) to enhance and sustain collaborative efforts with the Ocean Tracking Network (OTN) for large-scale elasmobranch telemetry efforts, with a specific focus on nursery areas and data sharing. Elasmobranchs, which include sharks and rays, play a crucial role in marine ecosystems, and understanding their movements and behavior in nursery areas is vital for conservation and resource management. The project will bring together a coalition of stakeholders, including researchers, conservation organizations, and governmental agencies, to facilitate data exchange, research collaboration, and policy development to protect elasmobranch species. Expected Outcome: Enhanced Collaboration: The MOU will formalize and strengthen the collaboration between the project team and the Ocean Tracking Network, fostering a more unified and efficient approach to elasmobranch telemetry research. Data Sharing Platform: A dedicated data-sharing platform will be developed to enable the secure and efficient exchange of telemetry data collected by the project and the OTN. This platform will provide access to a wealth of information about elasmobranch movements in nursery areas. Research Expansion: The project has the potential to result in an expanded research effort focused on elasmobranch telemetry in nursery areas. New research studies can be initiated, and existing ones will be bolstered, leading to a deeper understanding of these critical habitats. Nursery Area Insights: Through the collaborative efforts, the project can yield invaluable new research into the behaviors, migration patterns, and habitat use of elasmobranchs in nursery areas, contributing to the conservation of these species and their critical habitats. Policy Development: The research findings will inform and influence policy and management decisions. This could lead to the establishment of protected areas, conservation measures, and sustainable fisheries practices to safeguard elasmobranch populations. Long-term Sustainability: The MOU will establish a framework for long-term collaborative efforts, ensuring that research and conservation initiatives persist beyond the project's duration, safeguarding elasmobranchs for future generations.

	Scientific Publications: The project is expected to produce a series of scientific publications that will contribute to the global body of knowledge on elasmobranch telemetry in nursery areas. Increased Funding Opportunities: The success of the project and the strengthened collaboration with OTN may attract additional funding opportunities for further research and conservation efforts in elasmobranch telemetry.
BACKGROUND	Elasmobranchs in the CAMAC region face numerous challenges, including habitat degradation, overfishing, and climate change, which threaten their populations. One crucial aspect of their conservation is understanding their movements and behaviors, particularly in nursery areas. Nursery areas are critical for the early life stages of elasmobranchs and serve as vital habitats for their survival and growth. The Ocean Tracking Network (OTN) is a leading organization in the field of marine telemetry, with extensive experience in tracking the movements of various marine species. Given the global decline in elasmobranch populations, there is a pressing need for collaborative efforts to study and protect these species. This project aims to establish a Memorandum of Understanding (MOU) to formalize and enhance collaborative efforts with OTN for the CAMAC region in the domain of large-scale elasmobranch telemetry, with a specific focus on nursery areas.
SCIENTIFIC PROTOCOL & TIMELINE	Year 1: Project Initiation Phase 1: Months 1-3: Project Planning • Assemble a project team. • Develop a project plan, including goals, objectives, and a budget. • Identify key stakeholders and collaborators. Phase 2: Months 4-6: MOU Development • Collaborate with OTN to draft the MOU. • Engage legal experts to review and finalize the MOU. • Ensure alignment with project goals and collaborative efforts. Phase 3: Months 7-12: Secure Funding • Identify funding sources. • Submit grant proposals and secure necessary funding. Year 2: Infrastructure Setup and Data Sharing Phase 1: Months 13-18: Data Sharing Platform • Develop a secure data-sharing platform. • Establish data management protocols and ensure data protection compliance. • Sign MoU Follow up year 2 (after MoU is signed): Initiate Data Collection and Research • Begin telemetry studies in nursery areas. • Collect preliminary data on elasmobranch movements, behaviors, and habitat preferences.
SPILL OVER	Better understanding of migratory routes of elasmobranch species can be used to see overlap in other marine megafauna migrations, which will enhance the understanding of the importance of certain oceanic routes

POTENTIAL PARTNERS	• Local and regional NGOs • Local and regional government bodies working on implementation of fisheries and conservation legislation & policy • Research institutes throughout the Wider Caribbean region
CONSIDERA-TIONS	The project doesn't end after 2 years, cost will be ongoing for capacity maintenance, data collection and storage and reporting

BUDGET ESTIMATE

PROJECT ELEMEN. T	DESCRIPTION	COST
Personnel / HR cost	*Project coordinator - 0,2 FTE for 2 years*	$ 20.000
Materials	*none*	
Laboratory cost	*none*	
Travel & residency	*Year 1* *Year 2*	$10.000 $10.000
Facility rental / Boat cost etc.	*none*	
	ESTIMATED TOTAL COST	$40.000

Action Description 11: Establishment DNA Analysis Unit in the Caribbean

ACTION NAME	Establishment of an Elasmobranch DNA Analysis Unit in the Caribbean		
TARGET SPECIES	*All with focus on SPAW listed species*	TOTAL BUDGET	$ 140.000
GEOGRAPHI-CAL AREA	*Wider Caribbean region*	PRIORITY LEVEL	**Medium**

DESCRIPTION

PROJECT SUMMARY & EXPECTED OUTCOME	The project aims to establish a state-of-the-art Elasmobranch DNA Analysis Unit at a prominent research institute located in the Caribbean. This project seeks to enhance the research capabilities and contribute to the sustainable management of elasmobranch populations in the Caribbean region. By making elasmobranch DNA analysis more cost-effective, the project will allow for a higher volume of research to be conducted with available resources, ultimately benefiting the conservation efforts of elasmobranch species in the region. Project Goals and Objectives: Infrastructure Identification or Setup: The project will involve the design and construction of a dedicated laboratory space equipped with modern molecular biology instruments and equipment necessary for DNA extraction, amplification, and analysis. Capacity Building: Trained personnel will be hired and/or existing staff will be trained to operate the equipment and carry out advanced DNA analysis techniques specific to elasmobranch research. Sample Collection and Management: A streamlined system will be established for the collection, preservation, and storage of elasmobranch tissue samples to ensure sample integrity and traceability. Data Integration: The unit will develop a robust data management system to organize genetic data, including DNA sequences and genotypic information, facilitating data sharing and collaboration with other research institutions and conservation organizations. Cost Reduction: Implementation of cost-effective methodologies and protocols will be a priority, ensuring that elasmobranch DNA analysis becomes more accessible and affordable, allowing for increased research output. Expected Outcome: Enhanced Research Capacity: The establishment of the Elasmobranch DNA Analysis Unit will significantly enhance the research capabilities of the research institute, enabling scientists to conduct more in-depth and comprehensive studies on elasmobranch species in the Caribbean. Conservation and Management: Improved genetic analysis of elasmobranch populations will contribute to better-informed conservation and management strategies. This can aid in the development of evidence-based policies for protecting these species and their habitats.

	Scientific Advancement: The project will lead to scientific advancements in the understanding of elasmobranch biology, population genetics, and connectivity, which will have implications for global marine science and contribute to our knowledge of the broader marine ecosystem.
BACKGROUND	The Elasmobranch DNA Analysis Unit project is a significant initiative aimed at advancing scientific research and conservation efforts related to elasmobranch species in the Caribbean region.
SCIENTIFIC PROTOCOL & TIMELINE	Phase 1: Project Planning (Months 1-4) Activities: • Assemble a project management team with expertise in genetics, marine biology, and project management. • Identify and procure laboratory space, molecular biology equipment, and supplies. • Develop a comprehensive project plan outlining roles, responsibilities, and timelines. Phase 2: Infrastructure Setup (Months 5-12) Activities: • Build and configure the laboratory space with safety measures and protocols in place. • Purchase and install molecular biology instruments and equipment, such as DNA sequencers, PCR machines, and centrifuges. • Train staff on laboratory safety and equipment operation. Phase 3: Capacity Building (Months 13-18) Activities: • Recruit and hire qualified laboratory personnel, including geneticists, technicians, and support staff. • Develop and implement training programs for existing staff members to familiarize them with laboratory procedures. • Monitor and evaluate staff performance and provide ongoing training as necessary. Phase 4: Sample Collection and Management (Months 19-24) Activities: • Develop standardized protocols for collecting, preserving, and storing elasmobranch tissue samples. • Begin collecting samples from various locations in the Caribbean region. • Implement a sample tracking and management system to ensure sample integrity and traceability. Phase 5: Data Integration (Months 25-30) Activities: • Design and implement a data management system that allows for secure storage and easy retrieval of genetic data. • Begin organizing and inputting genetic data generated from the laboratory into the system. Phase 6: Cost Reduction and Optimization (Months 31-36) Activities: • Identify opportunities for cost reduction in laboratory procedures and data analysis. • Continuously evaluate the project's efficiency and make necessary adjustments to improve cost-effectiveness.

	Phase 7: Ongoing Operations (Months 37+) Activities: • Maintain ongoing sample collection and analysis activities. • Collaborate with other research institutions and conservation organizations to share data and work together on elasmobranch conservation. • Organize educational and outreach programs for the local community and schools.
SPILL OVER	Having capacity to do all DNA analysis in a cheap and fast way will enhance a species conservation work in the Wider Caribbean
POTENTIAL PARTNERS	• Local and regional NGOs working in coastal communities • Research institutes throughout the Wider Caribbean region as well as outside the region
CONSIDERA-TIONS	Comments from experts point out that the main problem hindering DNA-analysis in many areas is the inability to ship samples off island (out of the country) due to issues with permitting (CITES & otherwise). So instead of establishing a new lab another option could be to work on ways to assist countries in the necessary permitting thus enabling the shipment of samples to already existing labs to be made easy. In this case it is advised to seek partners from relevant government bodies and enforcement agencies.

BUDGET ESTIMATE

PROJECT ELEMEN. T	DESCRIPTION	COST
Personnel / HR cost	*Project coordinator - 0,2 FTE for 3 years*	$ 30.000
Materials	*Phase 1-4* *Phase 5-7*	$80.000 $30.000
Laboratory cost	*none*	
Travel & residency	*none*	
Facility rental / Boat cost etc.	*none*	
	ESTIMATED TOTAL COST	$140.000

Action Description 12: Develop ID-Guides

ACTION NAME	Develop ID-guides in common, Latin and local languages for all countries		
TARGET SPECIES	All shark and ray species with focus on SPAW listed species	TOTAL BUDGET	$ 22 000
GEOGRAPHI-CAL AREA	CAMAC scope area	PRIORITY LEVEL	**Medium**

DESCRIPTION

PROJECT SUMMARY & EXPECTED OUTCOME	An ID-guide will be developed which can be widely used throughout the CAMAC scope area the information in the guide will include general species info as well as the conservation information and the SPAW status this will include legal consideration in the relevant country. Local knowledge will be fundamental to this guide. The work will be carried out by a regional consultant in collaboration with local and regional partners. Outcome will be an easily accessible guide which will improve the quality of data collection in the region.
BACKGROUND	Correct identification of species is fundamental data collection and decision making. Knowing what the local names for the species are and deciding on an agreed nomenclature for the CAMAC scope area would also enable clear communication on the species present. A number of organisations have already provided tools for species identification. For example, the FAO Identification guide to common sharks and rays of the Caribbean: https://www.fao.org/documents/card/en?details=0c784a13-6696-4180-a768-bee7f6976467 which includes Latin and common names in English, French and Spanish. NOAA has made an onboard guide for the nine most common highly migratory species with common names: https://media.fisheries.noaa.gov/2021-09/Caribbean-Shark-Placard-English-1-.pdf However, what is lacking in both cases are the local names for the species. This project will harness the local knowledge across the CAMAC scope area to create a customised guide for the region.
SCIENTIFIC PROTOCOL & TIMELINE	This project will last for 6 months and will be carried out by a regional consultant **Month 1-3** Identify consultant and local experts Make an inventory of available ID guides In online workshop identify how useful these guides are and propose format for the ID-guide desired by the region Decide who will host an online version of the guide **Month 4-6** Prepare ID-Guide Organise webinar to present guide
SPILL OVER	This will not immediately be useful for other marine megafauna, but the webinar could be used to also present the tools available for the ID of marine mammals
POTENTIAL PARTNERS	Local fisheries organisations and NGOs, FAO, NOAA, WECAFC, SPAW-RAC

CONSIDERA-TIONS	Collaboration with local fishermen and local organisations is essential for the success of this project This Action is directly linked to Action 13: ID-apps, which is an add on activity to the development of ID-guides

BUDGET ESTIMATE

PROJECT ELEMENT	DESCRIPTION	COST
Personnel / HR cost	Consultant 0,6 FTE for 6 months Experts (fishermen, local organisations) Graphic designer	$ 12 000 $ 4 000 $ 4 000
Materials	Print ID-guide in relevant (regional) languages Distribution of guides	$ 6 000 $ 1 200
Laboratory cost	None	
Travel & residency	None	
Facility rental / Boat cost etc.	None	
	ESTIMATED TOTAL COST	$ 29 200

Action Description 13: Collaborate on apps for collecting species data

ACTION NAME	*Collaborate with organisations that already have easy to use apps for collecting species data*		
TARGET SPECIES	*All with focus on SPAW listed species*	TOTAL BUDGET	$ 12.000
GEOGRAPHI-CAL AREA	*CAMAC scope area*	PRIORITY LEVEL	**Low**

DESCRIPTION

PROJECT SUMMARY & EXPECTED OUTCOME	This project will enable the widespread use of tested data collection apps and will lead to a more robust collection of data on the sharks and rays in the CAMAC scope area.
BACKGROUND	Data collection apps are widely used in fisheries and there are a number of versions available e.g., NOAA has an electronic reporting app for recreational fisheries: https://www.fisheries.noaa.gov/recreational-fishing-data/recreational-electronic-reporting-glance FAO has Smart Forms https://www.fao.org/fi/static-media/MeetingDocuments/cwp/ReferenceHarmonization/2018/S3_3.pdf There are likely others. This project will gain an overview of those currently being used and will seek cooperation with the relevant organisations in order to either work together or to customise and use the apps in the CAMAC scope area.
SCIENTIFIC PROTOCOL & TIMELINE	This project will run for 4 months and will be carried out by a regional consultant together with local experts **Months 1-4** Identify consultant and local experts Consultant to gain overview of relevant apps and seek cooperation with the current users Organise online meeting with all partners and decide on way forward
SPILL OVER	A data collection app could be useful for turtles and marine mammals insofar this is not yet the case
POTENTIAL PARTNERS	Local and regional fisheries organisations and NGOs; NOAA; FAO
CONSIDERA-TIONS	This Action is an add on Action 12: ID-guides and could fit in with other actions whereby data collection is important, e.g. developing a data repository etc.

BUDGET ESTIMATE

PROJECT ELEMENT	DESCRIPTION	COST

Personnel / HR cost	Describe if own staff, external scientist or contractors will carry out the work (or a combination) Consultant 4 months 0.2 FTE Input local experts - total budget	$ 8 000 $ 4 000
Materials	List (research) materials that will need to be acquired both consumables and gear None envisaged unless new app should be developed	
Laboratory cost	Cost of (external) laboratory analysis None	
Travel & residency	None	
Facility rental / Boat cost etc.	Rental cost for ship time, rooms & venue etc. including operational cost	
	ESTIMATED TOTAL COST	$ 12 000

Action Description 14: Develop collaboration platform

ACTION NAME	Collaboration platform to continue working together to advance the objectives of the CAMAC project and increase collaborative research, promote sustainable marine conservation efforts and sustainable fisheries within the Caribbean regio*n.*		
TARGET SPECIES	*All with focus on SPAW listed species*	TOTAL BUDGET	$82.000
GEOGRAPHI-CAL AREA	*CAMAC scope area + Wider Caribbean region*	PRIORITY LEVEL	**High**

DESCRIPTION

PROJECT SUMMARY & EXPECTED OUTCOME	Set up a regional collaboration platform for shark conservation experts and conservationists to continue sharing expertise, skills using and expanding on existing networks such as the Caribbean Shark Coalition. The network will have a secretary that will facilitate regular (online) meetings, organise a meeting once every 2 years and keep on up to date participant and skills list. The platform can work on increasing collaborative research effort for enhancing knowledge on SPAW listed species as well as promoting regional marine conservation, extinction prevention, and sustainable fisheries.
BACKGROUND	One of the most heard requests from the workshops and interviews conducted as part of the CAMAC shark action plan was the need to have a collaborative platform for researchers, conservationists and other stakeholders to keep in regular contact and to facilitate ways of communication.
SCIENTIFIC PROTOCOL & TIMELINE	4-year project Year 1: • Identify one organisation to take the secretary role • Have calls with potential members to scope interest and identify needs • Develop data base of experts, researchers and skills • Initiative update calls (schedule of 4 calls per year) • 1st in person meeting Year 2: • Keep database up to date • Have update calls (4 per year) Year 3: • Keep database up to date • Have update calls (4 per year) • 2nd in person meeting Year 4: • Keep database up to date • Have update calls (4 per year)
SPILL OVER	Although the basis is to have a stable communication platform, this platform can be expanded with additional tasks like organising skill sharing workshops, scientific symposia or webinars. It also provides an opportunity for members of the network to develop their own ideas and proposals for enhanced collaborative efforts in the region.

POTENTIAL PARTNERS	• Regional research organisations • Local NGOs working in coastal communities (within CAMAC network) • Local fishermen and fisheries organisations • Stakeholders such as government bodies working on implementation of fisheries and conservation legislation & policy • WECAFC and SPAW-RAC
CONSIDERA-TIONS	Can be combined with other action (such as skill sharing or webinars) as the platform can act as an organiser / focal point for such actions

BUDGET ESTIMATE

PROJECT ELEMENT	DESCRIPTION	COST
Personnel / HR cost	*Secretary /coordinator for 4 years*	$32.000
Materials	*List (research) materials that will need to be acquired both consumables and gear*	negligible
Laboratory cost	*Cost of (external) laboratory analysis*	negligible
Travel & residency	2 in-person workshops with 18 participants	$50.000
Facility rental / Boat cost etc.	*Rental cost for ship time, rooms & venue etc. including operational cost*	
	ESTIMATED TOTAL COST	$82.000

Action Description 15: Fishermen exchanges

ACTION NAME	Facilitate fishermen exchanges among islands to introduce conservation work and/or shark science		
TARGET SPECIES	Depends on area - focus on SPAW listed species	TOTAL BUDGET	$26.000
GEOGRAPHI-CAL AREA	CAMAC scope area	PRIORITY LEVEL	**Medium**

DESCRIPTION

PROJECT SUMMARY & EXPECTED OUTCOME	In this project a series of fishermen exchanges are organised, each of them with a clear objective to help develop conservation and/or research skills but also to facilitate dialogue between fishers and learn best practices to minimise elasmobranch bycatch and mortality and to increase awareness of conservation commitments. . The aim is to build strong alliances with fishers throughout the region and to actively involve them in research and conservation efforts in their own country.
BACKGROUND	Especially in areas with little capacity and resources for research, involving fishermen is essential as they are knowledgeable about the ocean and marine life in their area and at sea on a regular basis. They can also, over time prove to be key conservation partners who help protect the resource they depend on for their income and livelihood. This conservation mindset can be enhanced by involving them actively in the work NGOs and researchers do.
SCIENTIFIC PROTOCOL & TIMELINE	Over a period of 2 years 3 fishermen exchanges will be organised, with between 6 and 10 participants. Each of them will focus on a different conservation or research topic and will be a combination of hands-on work in the field as well as roundtable discussions with other stakeholders or experts.
SPILL OVER	Fishers are a key partner in the conservation of all marine megafauna, potential additional exchanges could focus on turtles and mammals/
POTENTIAL PARTNERS	• Local fishermen and fisheries organisations • Local NGOs working in coastal communities (within CAMAC network) • Stakeholders such as government bodies working on implementation of fisheries and conservation legislation & policy
CONSIDERA-TIONS	The SPAW-RAC and WECAFC could also be involved in the project as this is interlinked with the work of both organisations

BUDGET ESTIMATE

PROJECT ELEMENT	DESCRIPTION	COST
Personnel / HR cost	*Coordinator to organise exchanges*	$ 8.000
Materials	*NA*	
Travel & residency	3 exchanges with 6 to 10 participants, including some compensation for the fishers for missed days at sea.	$ 18.000
Facility rental / Boat cost etc.	*NA*	
	ESTIMATED TOTAL COST	$26.000

Action Description 16: Skill sharing workshops

ACTION NAME	Organise skill sharing workshops for NGOs on how to set up and run stakeholder processes

TARGET SPECIES	*All species of sharks and rays*	TOTAL BUDGET	$ 55 500
GEOGRAPHI -CAL AREA	*CAMAC scope area*	PRIORITY LEVEL	**Medium**

DESCRIPTION

PROJECT SUMMARY & EXPECTED OUTCOME	Skill sharing workshops will be held per island by a specialised organisation in collaboration with local NGOS and other relevant organisations. The workshops will connect the full range of stakeholders with an eye to fulfilling existing elasmobranch conservation commitments such as SPAW. Expected outcome is the successful running of stakeholder processes on the island or together with other islands if relevant.
BACKGROUND	Stakeholder processes have been identified as being integral to the success of implementation of national and regional management measures as well as building strong collaborative networks for future work. These workshops will be customised in collaboration with local NGOs and other organisations to meet the specific needs.
SCIENTIFIC PROTOCOL & TIMELINE	Give a stepwise protocol for the project adding, where possible, who will carry them out and a timeline for the project (max 500 words) This project will run for 3-years. The workshops will be carried out in person per island and will be developed in consultation with local NGOS and other organisations, based on a pre-agreed protocol. It is aimed to hold at least 4 workshops per year. Steps needed: <u>Develop protocol</u> Identify organisation responsible for developing the workshops Organisation to develop protocol and tools, incl steps required by the local organisations <u>Organise and carry out workshop</u> Organisation to engage with local NGOs and organise meetings, use of tools and materials Determine time frame per workshop, ideally the preparation and carrying out the workshop will be done on a 3-month cycle. Year 1 6-months - develop workshop protocol 6 months - carry out two workshops Years 2 and 3 Carry out 4 workshops per year

SPILL OVER	The skills developed in these workshops are transferable to stakeholder processes for other taxa such as cetaceans and turtles
POTENTIAL PARTNERS	SPAW-RAC; WECAFC; Caribbean Shark Coalition, local and regional NGOs, fisheries organisations and government agencies
CONSIDERA- TIONS	The contractor responsible for this action should be based in the CAMAC scope area. It might sometimes be relevant to share the process with more than one island

BUDGET ESTIMATE

PROJECT ELEMENT	DESCRIPTION	COST
Personnel / HR cost	*This will be carried out by contractors specialised in carrying out stakeholder processes; the time needed is as follows:* *Develop workshop protocol - 0.2 FTE (in 6 months)* *Carrying out workshops - 0,1 FTE (2.5 years)*	$ 8 000 $ 10 000
Materials	*Workshop materials (printing etc)*	$ 1 500
Laboratory cost	*Cost of (external) laboratory analysis* *not needed*	
Travel & residency	Travel and residency for workshop organisers (10 workshops over 2.5 years)	$ 16 000
Facility rental / Boat cost etc.	*Venue costs per workshop = $ 2 000; for 10 workshops*	$ 20 000
	ESTIMATED TOTAL COST	$ 55 500

Action Description 17: standardized data sharing agreements

ACTION NAME	Establish a collaboration and data sharing agreement to maintain data ownership within the Caribbean region		
TARGET SPECIES	*All*	TOTAL BUDGET	$15.000
GEOGRAPHI- CAL AREA	*Wider Caribbean*	PRIORITY LEVEL	**High**

DESCRIPTION

PROJECT SUMMARY & EXPECTED OUTCOME	In this project we will develop a standardised collaboration and data sharing agreement that ensures the data that is collected within the Caribbean remains available to researchers and organisations that helped collect it and remains accessible for future follow up research. This will enhance the capacity of local operatives and organisations to control the outputs of the work conducted in their country and help them establish their own programs.
BACKGROUND	In past research projects in the Caribbean, it has quite often occurred that at the end of a research project the data collected was transferred to the research institute of the lead researcher of a project who usually came from a US or Europe based research institute. This puts local researchers at a disadvantage as they lose access to data they themselves helped collect and that quite prove vital for future research projects.
SCIENTIFIC PROTOCOL & TIMELINE	Project outline for 6-month project Working closely with existing networks and local researchers to develop requirements for data sharing and cooperation • Make an inventory of existing data sharing agreements comparing the pros and cons • Develop a draft of the agreement • Feedback round from the network before finalising.
SPILL OVER	Such an agreement can function for all other research conduction within the Caribbean region as well
POTENTIAL PARTNERS	• Local and regional NGOs working in coastal communities • Research institutes throughout the Wider Caribbean region as well as outside the region
CONSIDERA- TIONS	Can combined with Action 6 on developing a data sharing repository. Can also combined with the data sharing agreement that will be developed for CAMAC WP2 (stranding networks)

BUDGET ESTIMATE

PROJECT ELEMENT	DESCRIPTION	COST
Personnel / HR cost	*Project coordinator to organise engagement and develop agreement*	$ 15.000
Materials	*NA*	
Laboratory cost	*NA*	
Travel & residency	NA	
Facility rental / Boat cost etc.	*NA*	
	ESTIMATED TOTAL COST	$ 15.000

Action Description 18: Webinar series

ACTION NAME	Organise a series of webinars on relevant elasmobranch research and conservation topics.		
TARGET SPECIES	*All with focus on SPAW listed species*	TOTAL BUDGET	$16 000
GEOGRAPHI-CAL AREA	*NA*	PRIORITY LEVEL	**Low**

DESCRIPTION

PROJECT SUMMARY & EXPECTED OUTCOME	*This project will consist of a total of 8 webinars over 2 years on a variety of topics relevant for elasmobranch research and conservation with topics ranging from latest advances in genetic studies to implementing international treaties to analysing fisheries data. This project seeks to involve all relevant stakeholders including regional governments, NGOs, fisheries and local communities.* *These webinars will help build the knowledge of local NGO operatives with topics relevant for their work.*
BACKGROUND	*Although local operators are incredibly knowledgeable about their own region and all that is relevant for their day-to-day operations many have indicated in the workshops and interviews conducted in the CAMAC shark action plan project that they would welcome the opportunity to learn more about new developments and large-scale perspectives.*
SCIENTIFIC PROTOCOL & TIMELINE	*A series of 8 webinars organised over a period of 2 years, potential topics:* • *Implementation of CITES regulations* • *Implementation of SPAW Protocol* • *What we can learn from ICCAT fisheries data* • *Latest developments in elasmobranch genetics research* • *Latest developments in acoustic telemetry* • *The consequences of the new Global Biodiversity Framework etc*
SPILL OVER	*Depending on the topic these webinars are potentially interesting for those working on turtles, cetaceans and seabirds*
POTENTIAL PARTNERS	*Large research organisations and well-established scientists* *Large NGOs working on implementation of international treaties* *Intergovernmental organisations such as CITES, FAO, ICCAT*
CONSIDERA-TIONS	These webinars have the potential to create a new knowledge base and could become a resource for the SPAW-RAC for future work

BUDGET ESTIMATE

PROJECT ELEMENT	DESCRIPTION	COST
Personnel / HR cost	*Project coordinator to organise webinars*	$ 16.000
Materials / Laboratory cost / Travel etc.	*NA*	
	ESTIMATED TOTAL COST	$16 000

Action Description 19: Facilitate use of open access data sharing repository

ACTION NAME	Facilitate use of data sharing repositories for open access data sharing throughout the Wider Caribbean		
TARGET SPECIES	*All*	TOTAL BUDGET	$ 40.000
GEOGRAPHICAL AREA	*Wider Caribbean region*	PRIORITY LEVEL	**High**

DESCRIPTION

PROJECT SUMMARY & EXPECTED OUTCOME	In this project, existing data repositories will be reviewed with the aim to ensure that information about elasmobranchs is available to all relevant parties (government, NGO's, local researchers etc) in the region. The project consists of 2 phases, in the 1st phase an inventory will be made of the needs and requirements as well as the available options and in the 2nd phase a protocol for uploading data will be developed and existing research and reports will be added. Ideally it will become mandatory for all researchers that carry out projects in the region to commit to making their data available through this repository.
BACKGROUND	It is imperative that we emphasize the primacy of regional databases accessible to authorized stakeholders as the cornerstone for informed and effective management actions. The current landscape reveals a concerning trend: data initiatives focusing on elasmobranchs are typically spearheaded by prominent research institutions in Europe and the United States. These institutions wield significant authority over data collection, processing, and distribution, often withholding raw data from local collaborators and pertinent stakeholders. This practice severely curtails the capacity of local partners to assume stewardship of such projects and harness them as foundational assets for future endeavors. In light of these concerns, it is essential to prioritize the establishment of regional databases as the primary repository for elasmobranch data. These databases should be designed with ease of access and utilization by authorized stakeholders in mind. By affording access to those individuals and organizations who have been granted data permissions, we can foster a collaborative environment that empowers local partners and other relevant stakeholders to actively participate in and contribute to data-driven initiatives. This shift in approach not only ensures equitable access to critical data but also serves as the catalyst for meaningful, inclusive partnerships. When local partners and stakeholders have unhindered access to raw data, they are better equipped to take ownership of these projects and leverage them as the building blocks for future endeavors. This collaborative approach promotes knowledge sharing, capacity-building, and sustainable management practices, ultimately leading to more effective and responsive actions in the conservation and study of elasmobranchs.
SCIENTIFIC PROTOCOL & TIMELINE	The initiative will be divided into Year 1 and Year 2, each with specific objectives, tasks, and a timeline. The following protocol outlines the key steps required for successful project implementation, while designating responsible parties where applicable. **Year 1:**

Collaboration and Requirement Definition (Months 1-5):

- Collaborate with key stakeholders, including the Caribbean Shark Coalition, SPAW RAC experts, WECAFC, and the IUCN Shark Specialist Group, to define data sharing requirements.
- Identify confidentiality guidelines and incorporate them into the project's framework.

Project Lead: [Specify Responsible Individual/Team]
Timeline: Months 1-5

Data Sharing Platforms Assessment (Months 5-10):

- Conduct a thorough evaluation of existing data sharing platforms, assessing their strengths and weaknesses.
- Summarize findings to determine their compatibility with project goals.

Project Lead: [Specify Responsible Individual/Team]
Timeline: Months 5-10

Repository Selection (Months 10-12):

- Develop an outline for the data repository, considering the insights from the platform assessment.
- Decide on which of existing repositories is best suited for the needs identified structure, navigation, and essential features.

Project Lead: [Specify Responsible Individual/Team]
Timeline: Months 10-12

Year 2:

Data Uploading Protocol (Months 1-6):

- Formulate a protocol for researchers and organizations to upload their data into the repository.
- Define data format standards and access procedures.

Project Lead: [Specify Responsible Individual/Team]
Timeline: Months 1-6

Standardized Agreement (Months 7-9):

- Develop a comprehensive agreement for cooperating researchers and organizations that covers data sharing, usage rights, and responsibilities.
- Legal review may be necessary.

Project Lead: [Specify Responsible Individual/Team]
Timeline: Months 7-9

Training and Documentation (Months 10-12):

- Conduct online training sessions for users on how to navigate and utilize the repository.
- Create a user manual for reference.

Project Lead: [Specify Responsible Individual/Team]
Timeline: Months 10-12

Ongoing from Year 1
Establish Agreements (Months 1-24):

- Sign data-sharing agreements with a minimum of 10 research organizations, ensuring commitment to the repository's objectives and protocols.

Project Lead: [Specify Responsible Individual/Team]
Timeline: Months 1-24

SPILL OVER	This repository can be used for all data collected, not just elasmobranchs. Access to data will increase the capacity of local organisations to enhance their research efforts and drive data-centered management decisions.
POTENTIAL PARTNERS	• Local and regional NGOs working in coastal communities • Research institutes throughout the Wider Caribbean region as well as outside the region
CONSIDERA-TIONS	The project doesn't end after 2 years, cost will be ongoing for updates and technical support

BUDGET ESTIMATE

PROJECT ELEMEN. T	DESCRIPTION	COST
Personnel / HR cost	*Project coordinator - 0,2 FTE for 2 years* *Data specialist / programmer - 0,4 FTE for 18 months*	$ 16.000 $ 24.000
Materials	*none*	
Laboratory cost	*none*	
Travel & residency	*none*	
Facility rental / Boat cost etc.	*none*	
	ESTIMATED TOTAL COST	$ 40.000

Action Description 20: Assess the possibility of organising training on data analysis

ACTION NAME	Explore the possibility of organising training workshops or seminars in the region to facilitate data analysis and management, considering budget constraints.		
TARGET SPECIES	*All with focus on SPAW listed species*	TOTAL BUDGET	$ 12.000 (startup cost)
GEOGRAPHI-CAL AREA	*CAMAC scope area*	PRIORITY LEVEL	**Medium**

DESCRIPTION

PROJECT SUMMARY & EXPECTED OUTCOME	Online material on data analysis and current management practices will be developed which will have easy access and low costs. A portal or helpline will be initiated for specific questions which can continue once the project is finished. Outcome will be supported in the region for those working on data analysis and management issues.
BACKGROUND	For those working in fisheries or conservation, it is often necessary to be proficient in a number of tasks and roles. For data analysis and management tasks it is necessary to keep up to date with the latest tools and strategies. For this action it is proposed to set up a series of training workshops or seminars in the region to facilitate data analysis and management. It is the intention that the outcomes of this action are transferable, and within budgets, so emphasis will be on creating online material which can be used at any time or location. However, there will also be a 'helpline' in order to allow specific questions and situations to be addressed. The exact form this takes will be decided during the course of the project
SCIENTIFIC PROTOCOL & TIMELINE	This project will last for 9 months, after which online tools and a helpline will be available. **Months 1-3** Identify a consultant from the region to lead the process and local experts for input Organise online meeting of experts to scope the issue Develop outline for online workshops and seminars **Months 3-8** Trial online workshops and seminars Identify best way forward to ensure wide reach and low costs **Month 9** Decide on way forward, e.g. easily accessible online portal or 'helpline' for specific questions; this could be run by one of the partners
SPILL OVER	List potential additional contributions to knowledge on other groups of marine megafauna (max 100 words) This approach could also be used for work on turtles or marine mammals
POTENTIAL PARTNERS	Overview of (regional) partners that could work jointly on this action SPAW-RAC; WECAFC

CONSIDERA-TIONS	This should be considered together with other initiatives, such as those in the CAMAC project dealing with workshops and seminars, especially if physical meetings are envisaged.

BUDGET ESTIMATE

PROJECT ELEMENT	DESCRIPTION	COST
Personnel / HR cost	Describe if own staff, external scientist or contractors will carry out the work (or a combination) Consultant 9 months 0.3 FTE Experts from partner organisations - total Possible helpline at one of the partner organisations - to be decided	 $ 9 000 $ 3 000 $ tbd
Materials	*None*	
Laboratory cost	*None*	
Travel & residency	None	
Facility rental / Boat cost etc.	*None*	
	ESTIMATED TOTAL COST	$ 12 000

Action Description 21: Data collection training

ACTION NAME	Train local NGOs in data collection methods so they can teach that to fishers and other stakeholders		
TARGET SPECIES	*All with focus on SPAW listed species*	TOTAL BUDGET	$ 60.000
GEOGRAPHI-CAL AREA	*Wider Caribbean region*	PRIORITY LEVEL	**High**

DESCRIPTION

PROJECT SUMMARY & EXPECTED OUTCOME	Project Summary: The project aims to empower local non-governmental organizations (NGOs) with the knowledge and skills necessary for effective data collection methods in the context of shark and ray conservation. Through comprehensive training, these NGOs will be equipped to educate and engage fishers, transforming them into citizen scientists who contribute vital information for the protection of these vulnerable marine species. This initiative seeks to enhance the understanding of local shark and ray populations, their habitats, and the threats they face, ultimately promoting sustainable practices and safeguarding marine biodiversity. Expected Outcome: Enhanced Data Collection Capacity: Local NGOs will acquire the necessary expertise in data collection methodologies, including proper survey techniques, equipment usage, and data management. This will enable them to effectively gather critical information on shark and ray populations. Community Engagement: Fishers will be educated and trained as citizen scientists, fostering a sense of stewardship and conservation among local communities. This engagement will contribute to long-term data collection efforts and increased awareness of marine conservation. Robust Data Repository: A comprehensive database of shark and ray data will be established, providing a valuable resource for scientists, researchers, and policymakers. This repository will aid in evidence-based decision-making and conservation efforts. Policy Influence: The project will generate data-driven insights into the status and trends of local shark and ray populations, which can be used to advocate for policy changes and management strategies that better protect these species.
BACKGROUND	In data poor regions it is especially important to have a structured and standardised method for data collection to enable collaboration with others in the region. The engagement of fishermen and local communities is essential for good data collection. There are many local experts who have the capacity to collect data and are studying elasmobranchs in their respective region / country, but there is a clear need to have transferable skills and knowledge to aid with developing data collection programmes, including survey techniques, equipment usage, and data management.
SCIENTIFIC PROTOCOL & TIMELINE	Timeline: 2 years **Year 1: Project Initiation and Training** Month 1-2: Project Inception • Assemble project team and stakeholders • Develop a detailed project plan and budget Month 3-5: Needs Assessment • Identify target NGOs and communities

	• Assess their current capacity and resources Month 6-12: Training and Capacity Building • Develop training materials and curriculum • Conduct workshops and training sessions for local NGOs • Establish partnerships with relevant experts and institutions **Year 2: Data Collection and Community Engagement** Month 1-6: Data Collection Initiatives • Implement data collection protocols • Monitor and support NGOs in their data collection efforts • Establish a system for data quality control Month 7-12: Community Engagement • Develop community outreach programs • Engage with fishers and local communities • Educate and train fishers as citizen scientists **Ongoing** • Regular progress assessments and adjustments to the project plan. • Continuous collaboration with local NGOs and stakeholders. • Dissemination of knowledge and findings through workshops, seminars, and publications. • Monitoring and evaluation of project outcomes and impact.
SPILL OVER	This project has the potential to serve as a blueprint for other collaborative data collection initiatives in the region. It will heighten the local and regional involvement in the implementation of management and conservation, as well as regional agreements such as the SPAW protocol.
POTENTIAL PARTNERS	• *Local and regional NGOs working in coastal communities* • *Local fishermen and fisheries organisations* • *Local communities* • *Local and regional government bodies working on implementation of fisheries and conservation legislation & policy*
CONSIDERA-TIONS	The project doesn't end after 3 years, cost will be ongoing for capacity maintenance, data collection and storage and reporting

BUDGET ESTIMATE

PROJECT ELEMEN. T	DESCRIPTION	COST
Personnel / HR cost	*Project coordinator - 0,2 FTE for 2 years*	$ 20.000
Materials	Variable	
Travel & residency	*Organize 4 Training Workshop, $15 000 per workshop*	$60.000
Facility rental / Boat cost etc.	*Variable*	
	ESTIMATED TOTAL COST	$80.000

Action Description 22: Satellite Telemetry Program and Network

ACTION NAME	Establishing a Satellite Telemetry Program and Network for the CAMAC Region		
TARGET SPECIES	*All – focus on SPAW listed species*	TOTAL BUDGET	$ 200.000
GEOGRAPHI-CAL AREA	*Wider Caribbean region*	PRIORITY LEVEL	**Medium**

DESCRIPTION

PROJECT SUMMARY & EXPECTED OUTCOME	**Project Summary:** The project aims to establish a Satellite Telemetry Program for sharks and rays in the CAMAC region. This initiative intends to employ Satellite Telemetry technology to track the movements, behaviors, and habitats of various shark and ray species within the Caribbean waters. The deployment of satellite tags will enable the collection of crucial data that can be used to understand their migration patterns, habitat preferences, and responses to environmental changes. Furthermore, the project will establish a Telemetry Network, which involves collaboration among various stakeholders, including researchers, conservationists, and government agencies, to share and analyze the telemetry data gathered from these tagged animals. The ultimate goal is to improve the conservation efforts and management strategies for the protection of sharks and rays in the CAMAC region. **Expected Outcomes:** • Enhanced Understanding of Migration Patterns: The satellite telemetry program will provide valuable insights into the migration routes and patterns of various shark and ray species, helping researchers and conservationists comprehend their movements and behaviors. • Insight into Habitat Preferences: Data collected from the tagged animals will offer information on preferred habitats and environmental factors influencing the presence of these species, contributing to better habitat conservation and protection efforts. • Environmental Adaptation and Response: Observing the response of sharks and rays to environmental changes, such as temperature variations and human-induced impacts, will provide crucial data for understanding their adaptability and vulnerability. • Conservation Strategies: The telemetry network will aid in developing more effective conservation strategies and policies to protect these marine species, offering data-driven insights for policymakers and conservation organizations. • Regional Collaboration and Data Sharing: Establishing a network for sharing telemetry data among different countries in the CAMAC region will foster collaboration, knowledge sharing, and cooperation in the realm of marine conservation. • Public Awareness and Education: The project can serve as a platform for educating the public about the importance of shark and ray conservation, promoting awareness and understanding among communities. • Policy Recommendations: Data collected from the telemetry program can be used to inform and advocate for policy changes and initiatives aimed at preserving the habitats and populations of sharks and rays in the CAMAC region.
BACKGROUND	Sharks and rays, essential to marine ecosystems, confront threats like overfishing and habitat destruction, sparking scientific interest in understanding their behaviors for conservation. The CAMAC region, hosting diverse shark and ray species, holds global ecological significance. Limited historical data necessitates comprehensive information for effective conservation and policy making. Satellite Telemetry technology revolutionizes tracking marine animals, providing critical data on their movements.

	Collaboration among stakeholders is crucial due to these species' migratory nature, aiming to bridge knowledge gaps across the region. Multifaceted threats demand a holistic conservation approach, focusing on behavior understanding, habitat protection, reducing human impact, and policy advocacy in the region.
SCIENTIFIC PROTOCOL & TIMELINE	Establishing a Satellite Telemetry Program and Network for sharks and rays in the CAMAC region is a multi-faceted project that involves several phases and scientific protocols to ensure success. The project aims to understand the movement patterns, behavior, and habitat use of these species, crucial for their conservation and management. Here is a phased timeline with essential scientific protocols for such a project: Phase 1: Planning and Preparation • Objective: Establish the groundwork for the project, including designing protocols, acquiring equipment, and building partnerships. • Timeline: 6-12 months • Scientific Protocols: • Literature Review: Review existing studies on shark and ray telemetry, focusing on the CAMAC region. • Identify Target Species: Determine the key shark and ray species for the study based on local significance and conservation status. • Funding and Partnerships: Secure funding and establish partnerships with local institutions, NGOs, and governmental bodies. • Ethical Considerations: Obtain necessary ethical permits and ensure animal welfare guidelines compliance. Phase 2: Fieldwork and Tagging • Objective: Capture, tag, and release sharks and rays to gather telemetry data on their movements. • Timeline: 1-2 years • Scientific Protocols: • Tagging Methodology: Develop standardized tagging protocols for various species. • Capture and Tagging: Work with experts to capture, tag, and release sharks and rays equipped with satellite tags. • Data Collection: Collect environmental and biological data during tagging, such as size, sex, and environmental parameters. • Satellite Transmission Testing: Ensure tags are transmitting data effectively before deployment. Phase 3: Data Collection and Analysis • Objective: Gather and analyze telemetry data to understand the movement patterns and behavior of tagged individuals. • Timeline: Ongoing throughout the project • Scientific Protocols: • Data Retrieval: Regularly collect and analyze data transmitted by satellite tags. • Data Validation: Validate and clean the collected data for accuracy and quality. • Statistical Analysis: Use statistical models to analyze movement patterns, habitat use, migration routes, and behavior. • Mapping and Visualization: Create maps and visual representations of the data for easier interpretation. Phase 4: Outreach and Conservation Measures • Objective: Disseminate findings and implement conservation measures based on the study outcomes. • Timeline: Ongoing throughout the project, emphasis post-data analysis • Scientific Protocols:

	• Report Compilation: Compile research findings and produce scientific publications. • Policy Recommendations: Develop policy recommendations based on the study's results to aid in conservation efforts. • Education and Outreach: Conduct workshops, seminars, and educational programs to raise awareness among local communities and stakeholders. • Conservation Measures: Implement measures based on the findings, such as protected areas, fishing regulations, or conservation campaigns. • Throughout the project, regular monitoring, evaluation, and adaptation of protocols will be essential to ensure the project's success and adapt to unforeseen challenges.
SPILL OVER	Better understanding of migratory routes of elasmobranch species can be used to see overlap in other marine megafauna migrations, which will enhance the understanding of the importance of certain oceanic routes
POTENTIAL PARTNERS	• *Local and regional NGOs working in coastal communities* • *Local and regional government bodies working on implementation of fisheries and conservation legislation & policy* • *Research institutes throughout the Wider Caribbean region*
CONSIDERA-TIONS	The project doesn't end after 3 years, cost will be ongoing for capacity maintenance, data collection and storage and reporting

BUDGET ESTIMATE

PROJECT ELEMEN. T	DESCRIPTION	COST
Personnel / HR cost	*Project coordinator - 0,2 FTE for 3 years*	$ 20.000
Materials	*Phase 1-2* *Phase 3-4*	$50.000 $150.000
Laboratory cost	*none*	
Travel & residency	*none*	
Facility rental / Boat cost etc.	*none*	
	ESTIMATED TOTAL COST	$200.000

Action Description 23: Creating a portfolio of telemetry research areas

ACTION NAME	Creating a portfolio of one or two-page documents outlining suggested elasmobranch telemetry areas with estimated project costs to secure funding opportunities.		
TARGET SPECIES	*All - focus on SPAW listed species*	TOTAL BUDGET	$ 60.000
GEOGRAPHI-CAL AREA	*Wider Caribbean region*	PRIORITY LEVEL	**Low**

DESCRIPTION

PROJECT SUMMARY & EXPECTED OUTCOME	**Project Summary:** The project aims to develop a comprehensive portfolio of one or two-page documents highlighting proposed elasmobranch telemetry research areas, accompanied by estimated project costs. This initiative is crucial for securing funding opportunities to advance our understanding of elasmobranchs, such as sharks and rays, by harnessing telemetry technology. The portfolio will provide a concise overview of key research objectives, methodologies, and budgetary requirements to engage potential funding partners and stakeholders. **Expected Outcome:** Identification of Key Research Areas: The project will result in a detailed inventory of elasmobranch telemetry research areas. These will encompass a wide range of topics such as migration patterns, habitat utilization, behavior, and response to environmental changes. Estimated Project Costs: The portfolio will provide well-researched and substantiated estimated costs for each proposed research area. This will include expenses related to equipment, fieldwork, data analysis, and personnel. Enhanced Funding Opportunities: The creation of the portfolio will significantly enhance our ability to secure funding opportunities. By presenting a clear and structured case for the importance of elasmobranch telemetry research, it will attract potential donors, governmental agencies, and research foundations. Stakeholder Engagement: The portfolio will serve as a powerful tool to engage with stakeholders who share an interest in elasmobranch conservation and research. This may include marine conservation organizations, academic institutions, and governmental bodies. Scientific Advancement: Ultimately, the project's success will contribute to the advancement of scientific knowledge about elasmobranchs, potentially leading to informed conservation and management decisions to protect these species and their habitats. Networking and Collaboration: The development of this portfolio may foster collaboration between different research organizations and institutions interested in elasmobranch telemetry. It can serve as a catalyst for partnerships and joint initiatives to maximize research impact.

	Public Awareness and Education: Through funding and research outcomes, the project can facilitate public awareness and education regarding elasmobranchs, their ecological significance, and the importance of their conservation. In summary, the creation of a well-structured portfolio outlining elasmobranch telemetry research areas with estimated project costs will serve as a vital tool in securing the necessary funding to advance our understanding and conservation efforts related to these species. It will not only drive scientific progress but also foster collaboration and awareness for the preservation of these remarkable creatures and their ecosystems.
BACKGROUND	**Background:** Elasmobranchs are a diverse group of marine species, and their conservation is of global importance due to their ecological roles and vulnerability. Understanding their behaviors and movements is crucial for effective conservation. Because many species of elasmobranch are migratory for part or all of their lives research efforts should start from a transboundary perspective comparing areas to assess the level of importance of certain areas over others.
SCIENTIFIC PROTOCOL & TIMELINE	Developing a comprehensive portfolio of one or two-page documents for elasmobranch telemetry research in the CAMAC region is a multi-faceted project that involves various stages. **Project Phases and Timeline:** Phase 1: Project Initiation (Months 1-2): Assemble a project team with expertise in elasmobranch telemetry, conservation, data analysis, and grant writing. Define project roles and responsibilities. Secure necessary approvals and funding for the project. Phase 2: Literature Review and Gap Analysis (Months 2-4): Review existing literature on elasmobranch telemetry research in the CAMAC region. Identify gaps in knowledge and key research areas. Conduct expert interviews and consultations with stakeholders to gather insights. Phase 3: Key Research Area Identification (Months 4-6): Based on the literature review and expert consultations, compile a list of key research areas. Categorize these areas into migration patterns, habitat utilization, behavior, and responses to environmental changes. Phase 4: Estimate Project Costs (Months 6-9): Collaborate with experts to estimate the costs associated with each research area. This includes costs for telemetry equipment, fieldwork, data analysis, and personnel. Develop a detailed budget for the portfolio. Phase 5: Portfolio Document Preparation (Months 9-12): Begin drafting one or two-page documents for each key research area. Include background information, research objectives, estimated costs, and potential benefits. Ensure the documents are well-structured and visually appealing. Phase 6: Funding Research and Stakeholder Engagement (Months 12-18): Identify potential funding sources, such as governmental agencies, research foundations, and marine conservation organizations. Start engaging with stakeholders who share an interest in elasmobranch conservation and research.

	Present the project and its objectives to potential funders and partners. Phase 7: Portfolio Finalization and Distribution (Months 18-24): Review and finalize the portfolio documents. Prepare a comprehensive report that summarizes the project, its objectives, and outcomes. Distribute the portfolio to potential funding partners and stakeholders. Follow up - keep working toward the roll out of the projects in the portfolio: Phase 8 &9: Scientific Collaboration (Months 18-22): Promote collaboration and networking with research organizations and institutions interested in elasmobranch telemetry. Encourage joint initiatives and partnerships to maximize research impact. Public Awareness and Education (Months 24-30): Phase 8: Develop a plan for public awareness and education initiatives. Use funding and research outcomes to raise awareness about elasmobranchs and their conservation. Implement public outreach and educational programs. Phase 10: Monitoring and Evaluation (Months 36-48): Continuously monitor progress on funded research projects. Assess the impact of the portfolio on securing funding, advancing scientific knowledge, and promoting conservation efforts. Make necessary adjustments to the project's strategies and objectives.
SPILL OVER	Better understanding of migratory routes of elasmobranch species can be used to see overlap in other marine megafauna migrations, which will enhance the understanding of the importance of certain oceanic routes.
POTENTIAL PARTNERS	• Local and regional NGOs working in coastal communities • Local and regional government bodies working on implementation of fisheries and conservation legislation & policy • Research institutes throughout the Wider Caribbean region
CONSIDERA-TIONS	The project doesn't end after 3 years, cost will be ongoing for capacity maintenance, data collection and storage and reporting

BUDGET ESTIMATE

PROJECT ELEMENT	DESCRIPTION	COST
Personnel / HR cost	*Project coordinator - 0,4 FTE for 2 years (drafting phase)* *Project coordinator - 02 FTE for 2 years (roll out phase)*	$ 40.000 $ 20.000
Materials	*negligible*	
Travel & residency	*none*	
Facility rental / Boat cost etc.	*none*	
	ESTIMATED TOTAL COST	$60.000

III. Annex 2: Overview of Workshops and Round table session

Expert Workshops

We conducted three expert workshops to list possible actions that can be taken to fill the knowledge gaps identified in the first phase of the CAMAC Shark Action Plan project. We invited the experts from already involved in the CAMAC projects as well as experts identified in stage 1 of the project.

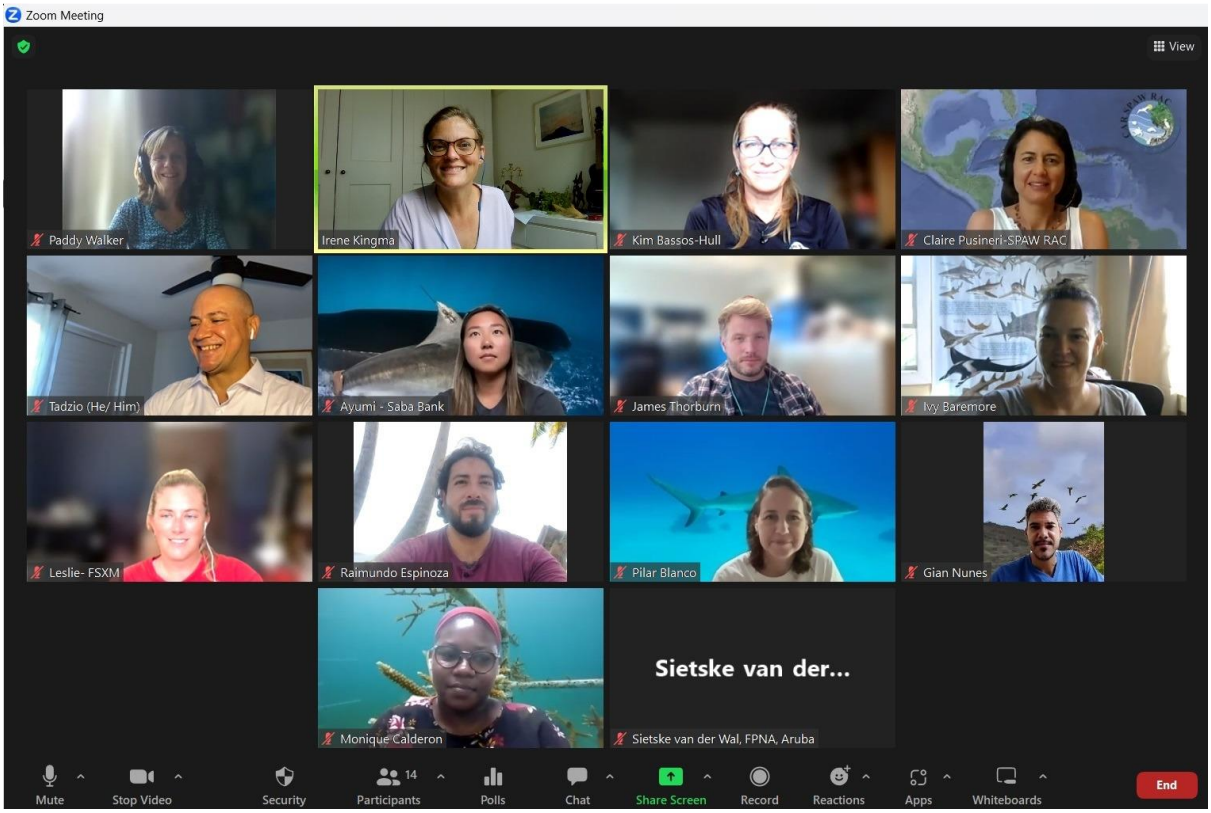
CAMAC Shark Action Plan Workshop 1

Shark communities and ecosystem role (BRUVs, (E)-DNA, isotopes etc.)

11 September 2023 (Online)

Hosts: Tadzio Bervoets, Paddy Walker, Guido Leurs and Irene Kingma

Participants: Kim Bassos-Hull (Mote Marine Lab, US); Claire Pusineri (SPAW-RAC, France); Ayumi Kuraeme (SCF, Saba); Ivy Baremore (Maralliance, Belize); Raimundo Espinoza (Puerto Rico); Pilar Blanco (Mexico); Gian Nunes (Aruba); Leslie Hickeron (Sint Maarten); Monique Calderon (Sint Lucia); Sietske van der Wal (Aruba); Charlie Prospere (Sint Lucia); James Thorburn (UK); Rafael Tavares (Venezuela)



Picture of participants in the September 11th Expert Workshop

Agenda:

10:00 – 10:15: Opening and introduction

10:15 – 10:40: presentation of literature review

10:40 – 11:00: latest advances in population and ecosystem studies

11:00 – 11:30: discussion on research priorities

Actions identified from the workshop:

In the first part of the meeting, we concentrated on actions to gather more population data by doing DNA and isotopes studies

- Work with local fishermen on getting species info and samples (DNA & isotope)
- Train local NGOs in data collection methods so they can teach that to fishers
- Set up E-DNA projects to identify presence of endangered and threatened species
- Establish a DNA analysis unit at a research institute in the Caribbean to make the processing and analysis of samples easier and more cost effective

In the 2nd part of the workshop, we discussed options for camera and video studies

- Conduct baseline BRUV work on easy access locations
- Citizen science program with schools and other local operators to analyse BRUV data
- Work with research already in the process of developing an Artificial Intelligence tool to analyse BRUV data
- Deep water BRUV (just a regular BRUV with lights) studies to gather data on deep water elasmobranch species (just a regular BRUV with lights)
- Pelagic BRUV studies to gather data on pelagic elasmobranch species
- Deploying cameras around Fish Aggregation Devices (FADs) to explore which elasmobranch species are attracted to those.

CAMAC Shark Action Plan Workshop 2

Shark movement and migration (tagging, tracking, telemetry etc.)

19 September 2023 (Online)

Host: Tadzio Bervoets & Irene Kingma

Participants: Kim Bassos-Hull & Atlantine Boggio-Pasqua (Mote Marine Lab, US); Rachel Graham (Maralliance, Belize), Pilar Blanco (Mexico); Raimundo Espinoza (Puerto Rico); Leslie Hickerson (Sint Maarten); Rafael Tavarez (Venezuela); Farahnaz

Solomon (Trinidad and Tobago); A. McKenzie (Jamaica); Monique Calderon (Sint Lucia); Claire Pusineri (SPAW-RAC, France)

Agenda:

10:00 – 10:15: Opening and introduction

10:15 – 10:30: short presentation of literature review

10:30 – 11:00: tagging and telemetry in the CAMAC scope area

11:00 – 11:30: discussion on research priorities

Actions identified from the workshop:

- Create a portfolio of one or two-page documents outlining suggested telemetry areas with estimated project costs to secure funding opportunities.
- Set up telemetry networks around (potential) nursery areas as those are a priority for conservation and management, as suggested by Kim Bassos-Hull
- Investigate the use of drones for aerial surveys to determine suitable locations for acoustic arrays, covering pelagic and coastal/lagoonal areas.
- Assess the potential for Fads (Fish Aggregating Devices) as a location for telemetry networks, as suggested by Raimundo Espinoza.
- Establish a data sharing agreement and collaborative efforts to maintain data ownership within the Caribbean region, addressing concerns raised by Nature Foundation Sint Maarten.
- Explore the possibility of organising training workshops or seminars in the region to facilitate data analysis and management, considering budget constraints.
- Continue collaborative efforts with Ocean Tracking Network (OTN) for big telemetry efforts, focusing specifically on nursery areas and data sharing as part of the deal.
- Ensure continuity of knowledge and build capacity on the islands for sustainable research initiatives, as emphasised by Irene Kingma.
- Ensure that there is a sustainable platform to continue working together to advance the objectives of the CAMAC project and promote sustainable marine conservation efforts within the Caribbean region.

CAMAC Shark Action Plan Workshop 3

Innovative Strategies for Shark and Ray Management

04 October 2023 (hybrid - in person participants on Aruba & online participants

Host: Tadzio Bervoets, Irene Kingma and Paddy Walker

Participants online: Ron Bahran; Oceane Beaufort; Pusineri Claire (SPAW-RAC); Chantal Curtis; Verna de Groes (NL); Giselle Deane; Raimundo Espinoza (Puerto Rico); Regina Hepburn; Lehron Rolle; Rafael Tavares (Venezuela)

Participants in person: Faisal Dilrosun (Curacao); Dianne Dubois (Center for Biological Diversity); Sonja Fordham (Shark Advocates); Kisten Haanraads (WWF-NL); Georgia Hancock (Animal Welfare Institute); Olga Koubrak (SeaLife Law); Stacey MacDonald (WWF-NL); Deandra Roberts; Nikola Simpson; Sietske van de Wal (FPNA); Oriana Wouters (DNM Aruba)

As this was a hybrid workshop we opted for a different format where we invited 4 regional experts to present on their work:

Speakers:

1. Ms. Jamie Aquino – Haïti Ocean Project: Working with local communities is grassroots conservation

2. https://drive.google.com/file/d/1_HtBxs9bDnMqPg8lmEnsSPt99-dUtISb/view?usp=sharing

3. Mr. Raimundo Espinoza – Conservación ConCiencia: Involving fishers in shark research and management in Puerto Rico

Presentation available upon request

4. Sietske van der Wal – Fundacion Parke Nacional Aruba: Co-creation for Marine Protected Area (MPA) management

   https://drive.google.com/file/d/1XAP8IqJk-DuJM3VUfRmazWpDE4COWOFd/view?usp=sharing

5. Mr Tadzio Bervoets – Caribbean Shark Coalition: Capacity building and international cooperation

   https://drive.google.com/file/d/1tgEs-lmOxOmAP-qq3F97uwF8p3dSDqle/view?usp=sharing

Picture of Aruba workshop participants taken at Surfside Marina in Oranjestad

Actions identified from the workshop:

- Facilitate fishermen exchanges among islands to introduce them to conservation work and/or shark science
- Develop ID-guides in common, latin and local languages for all countries
- Collaborate with organisations that already have essay to use apps for collecting data
- Organise skill sharing workshops for NGOs on how to set up and run stakeholder processes
- Organise seminars for stakeholders in order to increase understanding of conservation legislation

Round Table Sessions

The proposed actions were discussed in detail with experts during four round table sessions in which the participants had the opportunity to comment on the actions. Afterwards they were asked to assign priorities for future work.

CAMAC Shark Action Plan Roundtable 1 - 31st October – online

Prioritising actions for shark and ray management

Host: Tadzio Bervoets, Irene Kingma and Paddy Walker

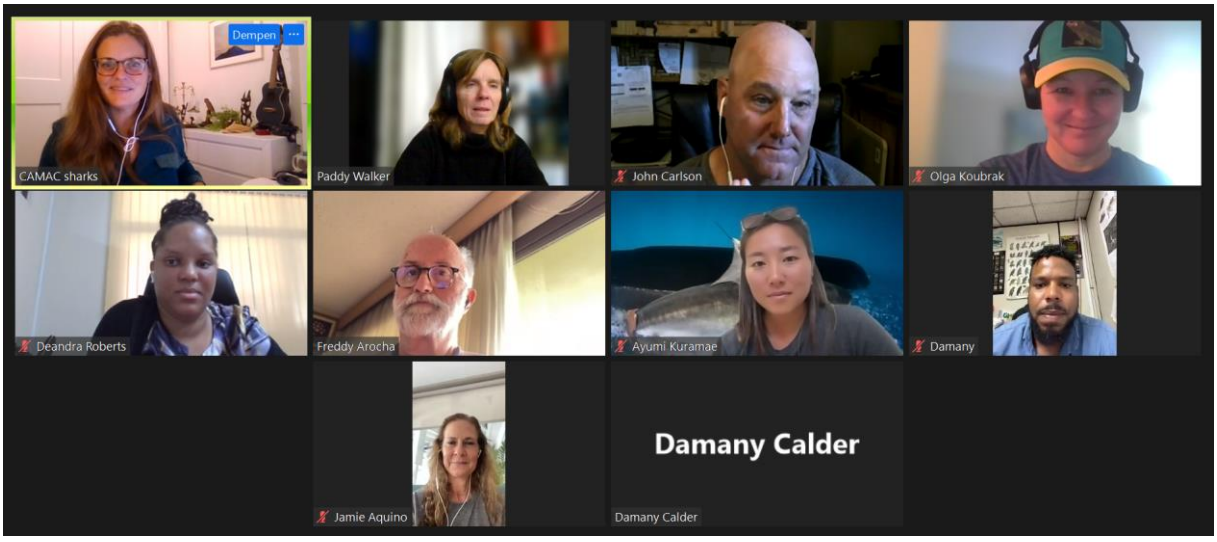
Participants: Anna Venma (NFSXM), Austin Gallagher, Ayumi Kuramae (SCF), Deandra Roberts, Demany Calder, Kelly Kingon, Oceane Beaufort, Olga Koubrak, Pilar Blanco, Raimundo Espinoza, Sonja Fordham

CAMAC Shark Action Plan Roundtable 2 - 2nd November – online

Prioritising actions for shark and ray management

Hosts: Tadzio Bervoets, Irene Kingma and Paddy Walker

Participants: John Carslon, Olga Koubrak, Deandra Roberts, Freddy Arocha, Ayumi Kuramae, Demany Calder, Jamie Aquino



Picture of participants in the November 2nd Priority Actions meeting

CAMAC Shark Action Plan Roundtable 3 - 4th November – online

Prioritising actions for shark and ray management

Hosts: Irene Kingma, Paddy Walker & Tadzio Bervoets

Participants: Jeffrey Bernus, Natascha Wosnick, Yvette Diei Ouadi (WECAFC)

CAMAC Shark Action Plan Roundtable

Prioritising actions for shark and ray management

4th November – in person

Hosts: Irene Kingma & Tadzio Bervoets

Participants: in person participants at the CAMAC meeting in the Bahamas

Picture of the 4th round table session at comfort suites in Nassau Bahamas

Contact

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