



**CONVENTION ON  
MIGRATORY  
SPECIES**

UNEP/CMS/COP14/Doc.32.2.9

25 May 2023

Original: English

14<sup>th</sup> MEETING OF THE CONFERENCE OF THE PARTIES  
Samarkand, Uzbekistan, 12 – 17 February 2024  
Agenda Item 32.2

**REPORT ON THE IMPLEMENTATION OF THE CONCERTED ACTION FOR THE  
COMMON GUITARFISH (*Rhinobatos rhinobatos*) AND THE  
BOTTLENOSE WEDGEFISH (*Rhynchobatus australiae*)\***

*(Submitted by the IUCN SSC Shark Specialist Group)*

Summary:

The International Union for Conservation of Nature IUCN Species Survival Commission's Shark Specialist Group (IUCN SSC SSG) has submitted the attached report on the implementation of the Concerted Action for the Common Guitarfish (*Rhinobatos rhinobatos*) and the Bottlenose Wedgefish (*Rhynchobatus australiae*), UNEP/CMS/Concerted Action 13.9 in conjunction with the proposal to extend the updated Concerted Action provide in the Annex to this document.

\*The geographical designations employed in this document do not imply the expression of any opinion whatsoever on the part of the CMS Secretariat (or the United Nations Environment Programme) concerning the legal status of any country, territory, or area, or concerning the delimitation of its frontiers or boundaries. The responsibility for the contents of the document rests exclusively with its author.

## **REPORT ON THE IMPLEMENTATION OF THE CONCERTED ACTION FOR THE COMMON GUITARFISH (*Rhinobatos rhinobatos*) AND THE BOTTLENOSE WEDGEFISH (*Rhynchobatus australiae*)\***

UNEP/CMS/ CONCERTED ACTION 13.9

### **1. CONCERTED ACTION**

Title: Concerted Action for the for the Common Guitarfish (*Rhinobatos rhinobatos*) and the Bottlenose Wedgefish (*Rhynchobatus australiae*)

Document number: UNEP/CMS/Concerted Action 13.9

Adopted by the Conference of the Parties at its 13th Meeting (Gandhinagar, India, February 2020).

### **2. REPORTING ORGANIZATION: IUCN SSC Shark Specialist Group**

The IUCN SSC SSG has long been a trusted source of science-based information and advice on sharks and their relatives (Class Chondrichthyes: sharks, rays, and chimaeras) and provides leadership for the conservation of threatened species and populations of all chondrichthyan fishes. There are 237 SSG members from 82 countries distributed among nine ocean-region subgroups. The mission of the SSG is to secure the conservation, management and, where necessary, the recovery of the world's sharks, rays and chimaeras by mobilizing global technical and scientific expertise to provide the knowledge that enables action.

The IUCN and the CMS Secretariat signed a Memorandum of Cooperation in 2003, which mentions a number of joint activities, including to:

- provide scientific and technical advice on the status and conservation needs of particular migratory species;
- provide technical assistance to develop and implement action plans for migratory species that are, or are proposed to be, subjects of Agreements or Memoranda of Understanding between or among Range states;
- develop guidelines to assist the implementation of CMS and Agreements or MOUs concluded under its auspices; and
- assist or support in capacity-building, research, training and public awareness matters.

### **3. TARGET SPECIES**

1. Class: Chondrichthyes  
Order: Rhinopristiformes  
Family: Rhinobatidae  
Species: *Rhinobatos rhinobatos* – Common Guitarfish
2. Class: Chondrichthyes  
Order: Rhinopristiformes  
Family: Rhinidae  
Species: *Rhynchobatus australiae* – Bottlenose Wedgefish

As identification to the species level can be difficult, and threats and status are similar within the families Rhinobatidae (guitarfishes), Rhinidae (wedgfishes), and Glaucostegidae (giant guitarfishes), they are all included in this CMS Concerted Action.

“Rhino Ray” is a term used collectively for the five family-level groups of the Rhinopristiformes (Pristidae, Rhinobatidae, Rhinidae, Glaucostegidae, and Trygonorrhinidae). For the purposes of this document, the term Rhino Ray will be used to refer specifically to the three families Rhinobatidae, Rhinidae, and Glaucostegidae.

#### **4. PROGRESS IN ACTIVITIES**

The below table provides an overview of actions that have been taken at the global level and have supported with the implementation of this Concerted Action. Many of these activities have not been directly led by the SSG but rather by a variety of organizations and/or individuals.

Activity	Expected outcomes	Original timeline	Progress	Changes or solutions
<p><b>1. Create a network of researchers and policy makers</b></p>	<ul style="list-style-type: none"> <li>– Data and research are shared and promoted among researchers</li> <li>– Collaboration opportunities are identified and promoted to increase conservation action</li> <li>– Local communities are engaged through citizen science projects</li> <li>– Students are engaged in research projects for long term capacity building</li> </ul>	<p>Has begun and will be ongoing</p>	<p>Over the last three years, the IUCN SSC Shark Specialist Group (SSG) has maintained communication with its members and with various organizations and researchers working on rhino rays through the publication of Shark News (<a href="https://www.iucnssg.org/shark-news.html">https://www.iucnssg.org/shark-news.html</a>), a quarterly newsletter that allows those working on sharks, rays, and chimaeras to inform the global network of scientists of their ongoing research and communicate their findings.</p> <p>A list of over 100 researchers working on rhino rays around the world was developed based on contributions to peer-reviewed publications and the grey literature. Many of these individuals are already members of the SSG and benefit from being part of a growing network of scientists from around the world that can provide support to each other and collaborate on projects. Opportunities for funding, collaborations, and other relevant news are shared via regular email updates and/or social media.</p> <p>In 2022, the Save Our Seas Foundation launched a new grant opportunity through a special call for projects that promote the recovery of sawfishes, wedgefish, and guitarfish. Such support has been fundamental to ensure that</p>	<p>This activity is ongoing and is expected to continue as the network grows.</p>

Activity	Expected outcomes	Original timeline	Progress	Changes or solutions
			<p>opportunities are available to embark on new projects focused on this group.</p> <p>A number of projects around the world now also focus on citizen science reporting of sightings of rhino rays to ensure there is improved understanding of their distribution.</p>	
<p><b>2. Increase data collection and research</b></p>	<ul style="list-style-type: none"> <li>– Improved species-specific estimates of catch and abundance to generate better understanding of the current distribution</li> <li>– Identification of critical habitat including movement pathways and aggregation sites for breeding, nursing, feeding, and mating</li> <li>– Improved understanding of life history characteristics (age, growth, reproduction, etc.)</li> <li>– Improved understanding of drivers of the trade and utilization of various Rhino Ray products (e.g. fins, meat, snout, skin, thorns)</li> </ul>	<p>Open- ended and ongoing</p>	<p>Building on support by various funders and the urgency highlighted from the threatened status of rhino rays, there has been a rapid increase in the number of research projects focused on these species. This was evident during an online <i>Global Wedgefish and Guitarfish Symposium</i> held in November 2021 with presenters from 18 countries. This event was coordinated by Dr. Dave Ebert, Dr. Peter Kyne, and Dr Paula Carlson and supported by the American Elasmobranch Society, Save Our Seas Foundation, Pacific Shark Research Center (Moss Landing Marine Laboratories), Dallas World Aquarium, Charles Darwin University, and the Georgia Aquarium. Overall, 280 people registered from 37 countries. The 10 countries with the most registered people were the United States (84), Australia (31), Brazil (24), Peru (12), United Kingdom (12), South Africa (11), India (9), Thailand (8), Singapore (7), and Sri Lanka (7).</p> <p>Many of the research projects presented during the Symposium are now publishing their findings in a special</p>	<p>This activity is ongoing and is expected to continue as interest in rhino rays increases.</p>

Activity	Expected outcomes	Original timeline	Progress	Changes or solutions
	<ul style="list-style-type: none"> <li>- Improved fisheries reporting and data collection</li> <li>- Publish a journal issue focusing on Rhino Rays</li> </ul>		<p>issue of the <i>Endangered Species Research</i> peer-reviewed journal. This is expected to be online by 2023 and, with support from the Save Our Seas Foundation, will allow for publications to be freely accessible.</p>	
<p><b>3. Start an international campaign to gain public support for species protection</b></p>	<p>International Rhino Ray Day is created and promoted, following the example of International Sawfish Day</p>	<p>Open- ended and ongoing</p>	<p>A series of awareness campaigns have been launched by various global organizations. For example, a series of podcast interviews with 29 researchers working on rhino rays was organized through the American Elasmobranch Association <a href="#">Beyond Jaws podcast</a> series. For the 2023 'Shark Awareness Day' on July 14<sup>th</sup>, a series of campaigns will be launched to raise awareness of the biology, threats, utilization, and conservation of these species via various social media channels. coordination will take place with the network of researchers identified as working on this species group as well as various zoos and aquariums that can amplify the message.</p>	<p>Rather than focusing on one day of the year to celebrate Rhino Rays, awareness campaigns have been launched by various partners at various times. This is likely to be the most appropriate approach to ensure that there is ongoing support for these species.</p>
<p><b>4. Develop a Global Rhino Ray Action Plan, using Sawfish: a Global Strategy for Conservation as a template for priority actions</b></p>	<ul style="list-style-type: none"> <li>- Parties respond to a survey to identify gaps in knowledge, conservation, and management</li> <li>- CMS Secretariat support the IUCN with undertaking the survey (e.g., circulating the</li> </ul>	<p>Funding dependent</p>	<p>Discussions have been underway with the CMS Secretariat, the CMS Sharks MoU Advisory Committee, and IUCN Conservation Planning Specialist Group to start planning an initiative to develop a regional strategy and action plan for rhino rays in the Indian Ocean (probably the Coral Triangle).</p> <p>Signatories to the CMS Sharks MOU welcomed this initiative and</p>	<p>Considering that any workshop to undertake conservation planning work would require the gathering of relevant Parties and stakeholders, a survey to identify gaps is not deemed necessary. An analysis of knowledge gaps can be undertaken in preparation of the workshop and finalized during the workshops.</p> <p>Regional workshops will need to be organized as this will allow direct participation of Range States, as well as relevant stakeholders including fishers,</p>

Activity	Expected outcomes	Original timeline	Progress	Changes or solutions
	<p>survey among Focal Points).</p> <ul style="list-style-type: none"> <li>- Parties and Range States (and other relevant stakeholders) consulted during the development of the Action Plan</li> <li>- Global action plan is used as a template for future funding dependent regional action plans</li> </ul>		<p>implementation activities were agreed and included in the Programme of Work (2023-2025).</p> <p>Thanks to a voluntary contribution from the government of Australia, the CMS Secretariat will be able organize and host the first regional workshop to develop a regional action plan for rhino rays for the Indo-West Pacific region.</p>	<p>fisheries officers, and NGOs, and encourage continued growth and active participation of a stakeholder network.</p>
<p><b>5. Produce identification guides and run identification workshops for key groups such as fishers, law enforcement and compliance, fisheries officers, recreational anglers, and fisheries and landings observers</b></p>	<ul style="list-style-type: none"> <li>- Improved ability to identify Rhino Rays to species level</li> <li>- Improved fisheries reporting and data collection</li> <li>- Improved compliance with species protections where they exist</li> </ul>	<p>Ongoing and open-ended</p>	<p>Several identification guides and posters have been created and widely distributed. This has included a focus on those species that were listed on international treaties such as the Convention on the Conservation of Migratory Species of Wild Animals (CMS), Sharks Memorandum of Understanding (Sharks MOU), and Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES).</p> <p>For example, one guide focused on identification of species occurring in West Africa, specifically, in one of these seven Sub-Regional Fisheries Commission (SRFC) countries (Cabo Verde, Guinea, Guinea-Bissau, Mauritania, Senegal, Sierra Leone, and The Gambia. The guide has been</p>	<p>The production of regional identification guides and posters is critical to ensure there is capacity to identify species in fisheries. There has to be additional focus on providing support to those countries where the highest interactions in fisheries have been reported. We recommend increased focus on ensuring that such materials are available and widely distributed.</p>

Activity	Expected outcomes	Original timeline	Progress	Changes or solutions
			<p>prepared in English, French, and Portuguese). Guides were made available online and a total of 650 guides were printed in English, French, and Portuguese. These were distributed during an in-person training of fisheries observers in Senegal and The Gambia within the context of the project 'Minimizing bycatch of seabirds and sea turtles in West African industrial fisheries.' This work was supported by the Government of Germany and the Principality of Monaco.</p> <p>Additional guides to the identification of sharks and rays listed on CITES was developed with support from the Wildlife Conservation Society and Shark Conservation Fund. This included all rhino ray species listed on this convention and focused on the identification of whole animals and their parts. A series of workshops were organized around the world in 2021 and 2022 to train fisheries agents and customs officials in species identification.</p> <p>Two posters were developed by the CMS Secretariat on all species of sharks and rays listed on international conventions in English, French, and Portuguese. One focused on all species listed on these treaties and one was specific to rhino ray species.</p>	



Activity	Expected outcomes	Original timeline	Progress	Changes or solutions
<p><b>6. Research options to reduce fishing mortality</b></p>	<ul style="list-style-type: none"> <li>- Options for reducing mortality are explored (e.g., alternative livelihoods, compensation for fisheries exclusion)</li> <li>- Fishing gear that reduces bycatch (exclusion devices, circular hooks etc.) is researched and adopted</li> </ul>	<p>Funding dependent</p>	<p>Direct research on bycatch reduction has not been undertaken. However, a review of the available literature has been completed and submitted to a peer reviewed journal. The objective was to evaluate fisheries interactions with rhino rays around the world by Pytka et al. (<i>A tangled web: global review of fishing interactions with rhino rays</i>).</p> <p>A draft abstract is provided here:</p> <p>Rhino rays (Order Rhinopristiformes) are one of the most threatened groups of vertebrates in the world. Despite overfishing being recognised as the greatest threat to this species group, a comprehensive assessment of the fisheries and types of fishing gear that rhino rays interact with is lacking. We reviewed both published and grey literature (<math>n = 121</math>) to evaluate interactions between rhino rays and fisheries, determine gear types most responsible for their capture, and species for which most interactions occur by region. Rhino rays are targeted or caught as bycatch across their global range. Fishing interactions were reported from 37 of 88 rhino ray range states, and 51 of 68 known species. Interactions were most frequently reported from trawl and gillnet (<math>n = 73</math>, 60% of the literature). Wedgefishes (Rhinidae) were the most reported family and <i>Rhina ancylostomus</i> (Rhinidae) the most commonly reported</p>	<p>This activity should focus on creating best-practice release guidelines to improve the survival rates of rhino rays that are discarded or released. Now that an overview of current fisheries interactions is available, information and recommendations can be incorporated into actions proposed during regional workshops focused on the development of conservation strategies and action plans.</p>

Activity	Expected outcomes	Original timeline	Progress	Changes or solutions
			<p>species from interactions (10%). Asia accounted for the majority of overall interactions; 68% of literature from the region was reported from unspecified gear (e.g., mixed fishery landings), masking gear-specific interaction data. Data quality was variable, with the highest resolution in countries with lower species diversity and where species are least imperiled (e.g., Australia). Discard mortality and sub-lethal and lethal physiological effects of capture are poorly known with data available for 25% of species (almost exclusively from Australia and the Americas). While additional data are urgently required to quantify the true extent of rhino ray catch in all regions of the world, reducing fisheries mortality is a priority and key to address declining populations. Recommendations to reduce rhino ray interactions with fisheries include prioritizing spatial management in areas critical for their long-term survival (e.g., nursery areas), expansion in the use of proven bycatch reduction devices (especially in trawl fisheries), development of additional technical gear modifications, and addressing drivers of retention and trade.</p>	

Activity	Expected outcomes	Original timeline	Progress	Changes or solutions
<p><b>7. Build regional capacity and encourage local engagement and education to minimize fishing mortality and improve fisheries management</b></p>	<ul style="list-style-type: none"> <li>- Factsheets and educational campaigns/materials are created for general public to increase knowledge of species' biology and status to encourage a reduction in fishing mortality</li> <li>- Local communities and stakeholders are targeted to reduce fishing mortality through awareness of projections, bycatch mitigation, safe handling and release etc.</li> </ul>	<p>Open- ended and ongoing</p>	<p>There has been no progress on this activity.</p>	<p>This activity should be merged with Activity 6 to focus on developing materials on the safe handling and release of rhino rays. This would allow for materials to be translated into multiple languages and made available to various stakeholders.</p>
<p><b>8. Regional workshops</b></p>	<ul style="list-style-type: none"> <li>- Data are compiled and options that will strengthen Funding Range State Parties, Fundraising needed conservation efforts are explored</li> <li>- Regional action plans are produced within the context of global priorities</li> <li>- Rhino Rays are highlighted as priority species in National Plans of Action (NPOAs)</li> </ul>	<p>Funding dependent</p>	<p>Regional workshops on the conservation of rhino rays have not been organized. This was partly due to limited resources and the onset of the COVID19 pandemic.</p>	<p>With a focus on developing regional approaches to conservation planning, this activity can be merged with those workshops that will bring together stakeholders to make decisions on priority actions in terms of research, policy, and communications.</p>

Activity	Expected outcomes	Original timeline	Progress	Changes or solutions
<p><b>9. Increased Rhino Ray policy- based protections</b></p>	<ul style="list-style-type: none"> <li>- Increased number of Range States as Signatories to the Sharks MOU to agree to endeavour to pursue MOU objectives</li> <li>- Range States encouraged to set and enforce zero catch for population recovery through no-take zones, temporal restrictions, or prohibiting certain fishing gear</li> <li>- Parties to develop and implement national legislation for Rhino Ray protection</li> </ul>	<p>Open ended</p>	<p>There have been no new Signatories to the Shark MOU. However, at the 2023 Meeting of Signatories (MOS4) held in Bonn, Germany, Signatories welcomed activities under this Concerted Action and implementation activities were agreed and included in the Programme of Work (2023-2025).</p> <p>In November 2022, new listings of rhino rays (37 species) on Appendix II of the Convention on the International Trade in Endangered Species of Flora and Fauna (CITES) ensured that the majority of rhino ray species were now covered under this treaty. This will support increased information on the trade in these species is available and, over time that this trade becomes traceable.</p>	<p>Actions to develop and implement national legislation for rhino ray protection will be developed with Parties and various stakeholders during conservation planning regional workshops. While these plans are the first step, Parties will then need to commit to implementing actions at national and regional levels.</p>

## 5. CHANGES TO THE CONCERTED ACTION

Most of the Concerted Actions activities proposed are ongoing and will continue as additional interest in the conservation of these species is garnered. We recommend that activities in this Concerted Action are reduced and focus on ensuring that conservation planning approaches are developed and implemented at various regional scales. We note that identification materials and trainings will be critical to ensure additional information on fisheries interactions can be collected by Parties. An updated version of the Concerted Action is provided in Annex 1 to this document.

## 6. REFERENCES

- Ebert DA, Carlson P, Aitchison RM, Huerta-Beltran BL, Kyne PM (Eds) (2021) *Report on the American Elasmobranch Society Global Wedgefish & Guitarfish Symposium 2021*. Moss Landing Marine Laboratories, San Jose State University, USA.
- Global Wedgefish and Guitarfish Symposium:  
[https://www.youtube.com/playlist?list=PLFw1xEujEzA\\_mLGwdixr6nXDTg-YCkHhG](https://www.youtube.com/playlist?list=PLFw1xEujEzA_mLGwdixr6nXDTg-YCkHhG)
- Jabado RW, Abercrombie L. 2022. CITES Sharks and Rays - Implementing and Enforcing Listings: Volume I - Full Carcass ID. Wildlife Conservation Society, New York, United States. 79  
[pp.https://static1.squarespace.com/static/542a662fe4b05344441016db/t/6264ef81b5fcfe71e86ca3d5/1650782981450/ONLINE\\_Jabado\\_and\\_Abercrombie\\_2022\\_VOL+1+-+CARCASS\\_ID\\_CITES\\_guide\\_Secure\\_compressed.pdf](https://static1.squarespace.com/static/542a662fe4b05344441016db/t/6264ef81b5fcfe71e86ca3d5/1650782981450/ONLINE_Jabado_and_Abercrombie_2022_VOL+1+-+CARCASS_ID_CITES_guide_Secure_compressed.pdf)
- Pytka J, Kyne PM, Carlson JK, Wosnick N, Jabado RW. A tangled web: global review of fishing interactions with rhino rays. *Reviews in Fish Biology and Fisheries*. *Submitted*.
- Save Our Seas grants: <https://saveourseas.com/grants/funding-applications/>
- Beyond Jaws podcast: <https://elasmobranch.org/podcast/>

## 7. ACTION

SSG recommends to Parties that they renew the Concerted Action for the Common Guitarfish and Bottlenose Wedgefish as proposed in Annex 1. While progress has been made across most of the activities, the critical work of conservation planning has not begun. As such, the Concerted Action should be extended into the following triennium to accommodate the remaining work that needs to be completed.

**CONCERTED ACTION FOR  
THE COMMON GUITARFISH (*Rhinobatos rhinobatos*)  
AND  
THE BOTTLENOSE WEDGEFISH (*Rhynchobatus australiae*)**

Adopted by the Conference of the Parties at its 13th Meeting  
(Gandhinagar, February 2020)

Updated version proposed for extension until 2025

**(i). Proponent**

International Union for Conservation of Nature - **IUCN Species Survival Commission's Shark Specialist Group (IUCN SSG)**.

The IUCN SSG has long been a trusted source of science-based information and advice on sharks and their relatives (Class Chondrichthyes: sharks, rays, and chimaeras) and provides leadership for the conservation of threatened species and populations of all chondrichthyan fishes. There are 171 SSG members from 55 countries distributed among 12 ocean-region subgroups. The mission of the IUCN SSG is to secure the conservation, management and, where necessary, the recovery of the world's sharks, rays and chimaeras by mobilizing global technical and scientific expertise to provide the knowledge that enables action.

The IUCN and the CMS Secretariat signed a Memorandum of Cooperation in 2003, which mentions a number of joint activities, including to:

- provide scientific and technical advice on the status and conservation needs of particular migratory species;
- provide technical assistance to develop and implement action plans for migratory species that are, or are proposed to be, subjects of Agreements or Memoranda of Understanding between or among Range states;
- develop guidelines to assist the implementation of CMS and Agreements or MOUs concluded under its auspices; and
- assist or support in capacity-building, research, training and public awareness matters.

**(ii). Target species, lower taxon or population, or group of taxa with needs in common**

This Concerted Action involves two species (*Rhinobatos rhinobatos* and *Rhynchobatus australiae*) currently listed on CMS Appendix II, along with three lookalike families (*Rhinobatidae*, *Rhinidae*, and *Glaucostegidae*) which face similar threats. The listed species fall within two of the three families, details are below:

Class: Chondrichthyes  
Order: Rhinopristiformes  
Family: Rhinobatidae  
Species: *Rhinobatos rhinobatos* – Common Guitarfish

Class: Chondrichthyes  
Order: Rhinopristiformes  
Family: Rhinidae  
Species: *Rhynchobatus australiae* – Bottlenose Wedgefish

As identification to the species level can be difficult, and threats and status are similar within the families Rhinobatidae (guitarfishes), Rhinidae (wedgfishes), and Glaucostegidae (giant guitarfishes), they are all included in this CMS Concerted Action.

“Rhino Ray” is a term used collectively for the five family-level groups of the Rhinopristiformes (Pristidae, Rhinobatidae, Rhinidae, Glaucostegidae, and Trygonorrhinidae). For the purposes of this document, the term Rhino Ray will be used to refer specifically to the three families Rhinobatidae, Rhinidae, and Glaucostegidae.

Below we will provide details regarding *R. rhinobatos* and *R. australiae* specifically as they are currently listed on CMS Appendix II, and the three families more generally.

### **(iii). Geographical range**

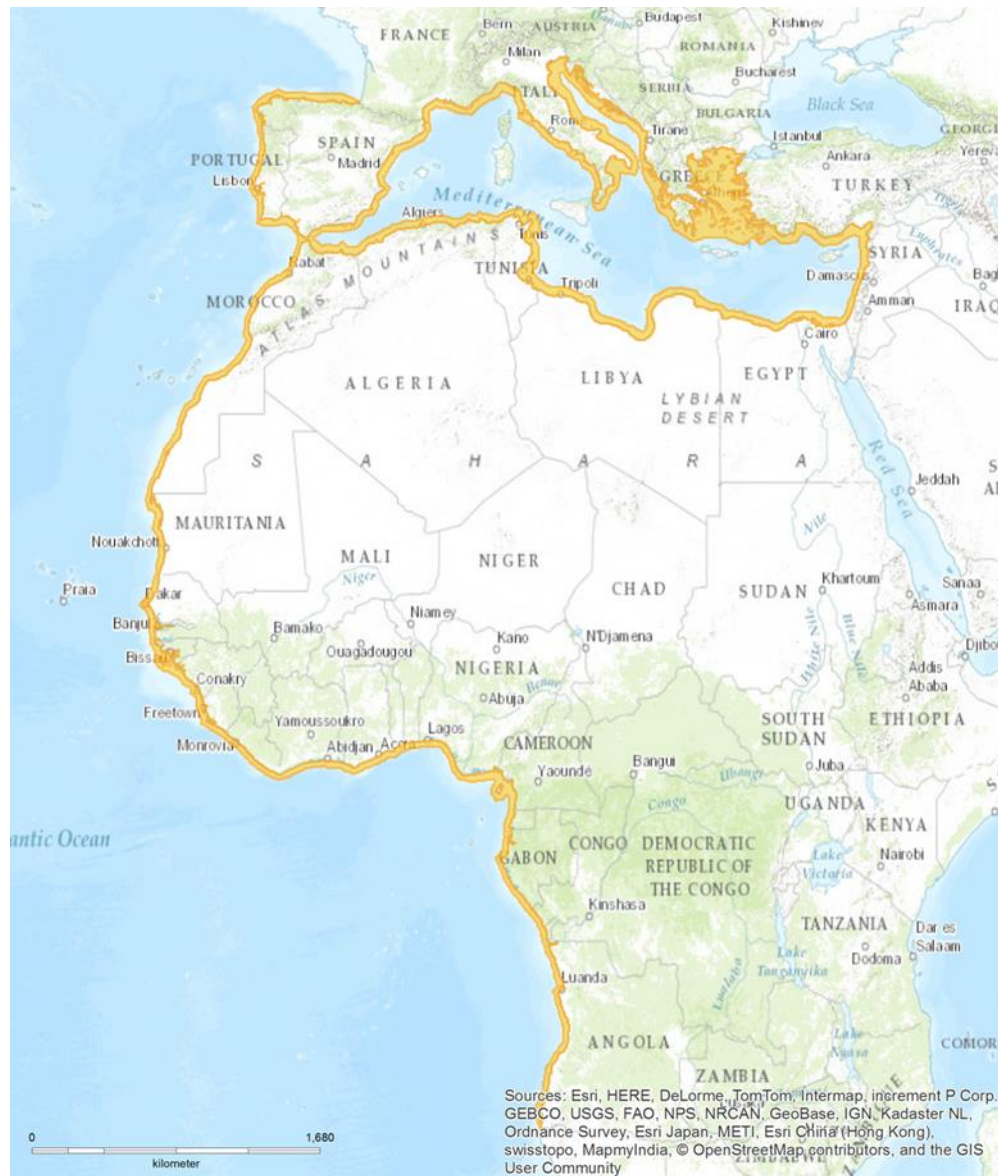
The three families Rhinobatidae, Rhinidae and Glaucostegidae (Rhino Rays) were previously common in soft-bottom habitats of shallow, warm waters worldwide.

The general geographic range of the Rhinobatidae can be broken down into their three genera: species of the genus *Rhinobatos* are present from the western central Pacific to the eastern central Atlantic including the Mediterranean Sea; *Acroteriobatus* spp. are present throughout the Western Indian Ocean and South-eastern Atlantic; and *Pseudobatos* spp. are present in the eastern central and south-east Pacific, and the western central and south-west Atlantic.

Species in the family Rhinidae are found predominantly in the Indo-West Pacific, with two species residing in the eastern central Atlantic along the West African coast.

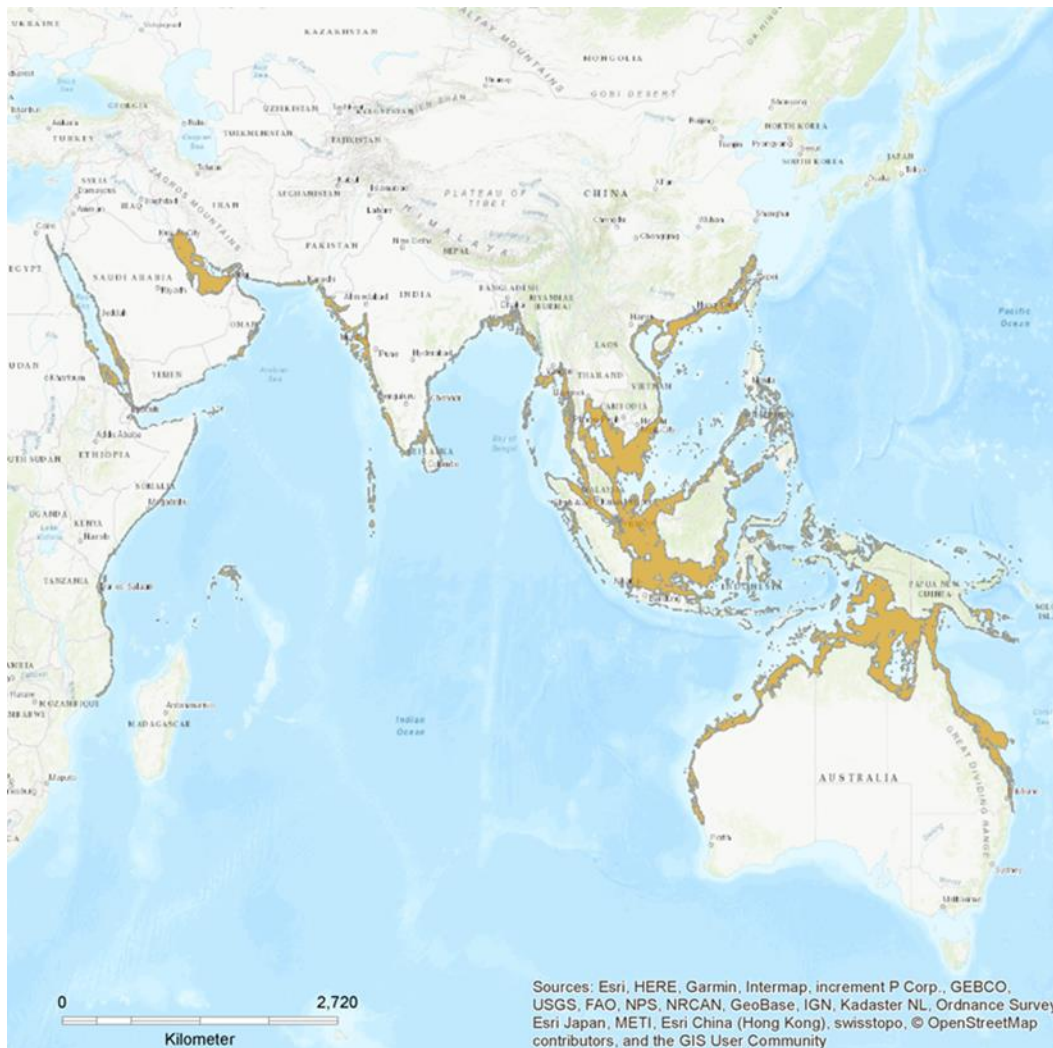
The centre of diversity for the family Glaucostegidae is the Indo-West Pacific, with one species in the Mediterranean Sea and south central eastern Atlantic along the West African coast.

Common Guitarfish (*Rhinobatos rhinobatos*) is distributed from the southern Bay of Biscay (north of Spain) to Angola, including the Mediterranean Sea. Bottlenose Wedgfish (*Rhynchobatus australiae*) is found in the Indo-West Pacific from Mozambique to the Solomon Islands and north to Taiwan, rarely occurring deeper than 60 m.



**Figure 1:** Common Guitarfish (*Rhinobatos rhinobatos*) geographical range (<https://www.iucnredlist.org/species/63131/12620901>)





**Figure 2:** Bottlenose Wedgefish (*Rhynchobatus australiae*) geographical range (<https://www.iucnredlist.org/species/41853/68643043>)

**(iv). Summary of Activities**

The IUCN SSG will continue to undertake activities to improve the conservation status of Rhino Rays. These comprise:

- 1) creating a network of researchers and policy makers;
- 2) increasing data collection and research;
- 3) developing a Global Rhino Ray Strategy and regional Action Plans, using Sawfish: a Global Strategy for Conservation as a template for priority actions;
- 4) producing identification guides and running identification workshops for key groups such as fishers, law enforcement and compliance, fisheries officers, recreational anglers, and fisheries and landings observers;
- 5) researching options to reduce fishing mortality and build regional capacity and encourage local engagement and education to minimize fishing mortality and improve fisheries management;
- 6) increasing Rhino Ray policy-based protections.

**(v). Activities and expected outcomes**

The purpose of this Concerted Action is to outline the actions required to mobilize Rhino Ray conservation on a global level. However, many of these actions can and must be implemented on a regional level. International cooperation in the planning and mitigation of threats are vital to improve the conservation status of Rhino Rays, but while as a group they share similar threats, there are regional differences in threat levels, fisheries activities, regulations and conservation measures, and local species knowledge, highlighting the need for specific regional actions. To ensure effective implementation of conservation strategies for Rhino Rays, Parties are strongly advised to fully include relevant stakeholders in the process including fishers, fisheries officers, and non- governmental organizations (NGO).

**Table 1:** Activities, Outcomes, Timeframe, Responsibility, and Funding

Activity	Outputs / Outcomes	Timeframe	Responsibility	Funding
1. Create a network of researchers and policy makers	<ul style="list-style-type: none"> <li>- Data and research are shared and promoted among researchers</li> <li>- Collaboration opportunities are identified and promoted to increase conservation action</li> <li>- Local communities are engaged through citizen science projects</li> <li>- Students are engaged in research projects for long term capacity building</li> </ul>	Has begun and will be ongoing	IUCN SSG	No funding needed
2. Increase data collection and research	<ul style="list-style-type: none"> <li>- Improved species-specific estimates of catch and abundance to generate better understanding of the current distribution</li> <li>- Identification of critical habitat including movement pathways and aggregation sites for breeding, nursing, feeding, and mating</li> <li>- Improved understanding of life history characteristics (age, growth, reproduction, etc.)</li> <li>- Improved understanding of drivers of the trade and utilization of various Rhino Ray products (e.g. fins, meat, snout, skin, thorns)</li> <li>- Improved fisheries reporting and data collection</li> <li>- Publish a journal issue focusing on Rhino Rays</li> </ul>	Open- ended and ongoing	Range State Parties, NGOs, researchers	Fundraising required
3. Develop a Global Rhino Ray Strategy and regional Action Plans, using <a href="#">Sawfish: a Global Strategy for Conservation</a> as a template for priority actions	<ul style="list-style-type: none"> <li>- Analysis of knowledge, conservation and management gaps undertaken in preparation of and finalized during regional workshops CMS Secretariat support to the IUCN with preparing and holding regional workshops</li> <li>- Parties and Range States (and other relevant stakeholders) consulted during the development of regional Action Plans</li> <li>- Global action plan is used as a template for future regional action plans</li> </ul>	Funding dependent	IUCN SSG, Range State Parties, NGOs, Secretariat, researchers	Fundraising needed for gap analysis, preparation and organization of regional workshops and development of global strategy and regional action plans

Activity	Outputs / Outcomes	Timeframe	Responsibility	Funding
	<ul style="list-style-type: none"> <li>- Regional action plans are produced within the context of global priorities</li> <li>- Rhino Rays are highlighted as priority species in National Plans of Action (NPOAs)</li> </ul>			
<p>4. Produce identification guides and run identification workshops for key groups such as fishers, law enforcement and compliance, fisheries officers, recreational anglers, and fisheries and landings observers</p>	<ul style="list-style-type: none"> <li>- Materials are widely distributed</li> <li>- Improved ability to identify Rhino Rays to species level</li> <li>- Improved fisheries reporting and data collection</li> <li>- Improved compliance with species protections where they exist</li> </ul>	<p>Ongoing and open-ended</p>	<p>Range State Parties, NGOs</p>	<p>Fundraising needed for ID guide production and workshop hosting</p>
<p>5. Research options to reduce fishing mortality and build regional capacity and encourage local engagement and education to minimize fishing mortality and improve fisheries management</p>	<ul style="list-style-type: none"> <li>- Best- practice release guidelines created to improve the survival rates of rhino rays that are discarded or released.</li> <li>- Information and recommendations from Pytka et al. (<i>A tangled web: global review of fishing interactions with rhino rays</i>)<sup>1</sup> incorporated into actions proposed during regional workshops focused on the development of conservation strategies and action plans.</li> <li>- Factsheets and educational campaigns/materials created for general public to increase knowledge of species' biology and status to encourage a reduction in fishing mortality</li> <li>- CMS listings in Appendix II publicised</li> <li>- Range States encouraged to increase fisheries observer coverage where appropriate</li> <li>- Range States encouraged to improve traceability of products</li> </ul>	<ul style="list-style-type: none"> <li>— 2023-2025 (best-practice guidelines)</li> <li>— ongoing throughout conservation planning process</li> </ul>	<p>Range State Parties, NGOs, IUCN SSG</p>	<p>Fundraising needed</p>

<sup>1</sup> submitted

Activity	Outputs / Outcomes	Timeframe	Responsibility	Funding
6. Increased Rhino Ray policy- based protections	<ul style="list-style-type: none"> <li>- Increased number of Range States as Signatories to the Sharks MOU to agree to endeavour to pursue MOU objectives</li> <li>- Range States encouraged to set and enforce actions for population recovery through no-take zones, temporal restrictions, or prohibiting certain fishing gear</li> <li>- Parties to develop and implement national legislation for Rhino Ray protection</li> </ul>	Open ended	Range State Parties already Signatories to the Sharks MOU, NGOs	No fundraising needed

**(vi). Associated benefits**

The intention of the proposed activities is to catalyze effective conservation of Rhino Rays. These activities will also provide opportunities for Parties to collaborate and coordinate their conservation actions. Particularly, regional workshops will allow direct participation of Range States and encourage continued growth and active participation of a developing stakeholder network. This capacity building will be invaluable in future activities concerning all wedgefishes and guitarfishes, as well as sawfishes and angel sharks.

Globally, there is strong interest in sawfish research and conservation, but research efforts have been limited by low population numbers making studies challenging. There are five species of sawfish, all of which are now considered Critically Endangered according to the IUCN Red List of Threatened Species. All species of sawfish are included in CMS Appendices I and II (2014) and Annex 1 of the Sharks MOU (2016). There is significant habitat, range, and depth overlap between the three families in this Concerted Action and sawfishes; encouraging research and conservation focus in these areas will benefit sawfish as well.

Similarly, angelsharks (*Squatina* spp.), which suffer from the same threats, inhabit the same regions as many Rhino Rays. Particularly, *Squatina squatina*, *Squatina aculeata*, and *Squatina oculata* will benefit from improved enforcement of regulations in the Mediterranean. *S. squatina* is listed on CMS Appendix I & II (2017), and the Sharks MOU (2018), and was assessed as Critically Endangered by the IUCN Red List (Morey *et al.* 2019).

**(vii). Timeframe**

Please refer to table 1 above for details.

**(viii). Relationship to other CMS actions**

In listing *R. rhinobatos* on Appendix I (Mediterranean Sea population) and Appendix II (global population), and *R. australiae* on Appendix II of the Convention, CMS Parties have already agreed that these species would benefit from a Concerted Action and international cooperation.

*Rhinobatos rhinobatos* and *R. australiae* are also listed in the Sharks MOU (2018). This MOU aims to guide international cooperation to maintain and achieve a sustainable conservation status for migratory sharks and rays included in its Annex 1. The Concerted Actions would support the overall implementation of the Sharks MOU, particularly in improving the understanding of migratory shark populations and enhancing national, regional, and international cooperation.

**(ix). Conservation priority**

*Rhinobatos rhinobatos* and *R. australiae* share common threats: (1) they possess some of the highest value fins on the international market resulting in targeted catch and retained bycatch (Notarbartolo di Sciara *et al.* 2007, Dulvy *et al.* 2014, Jabado 2018, Kyne *et al.* 2019a); (2) their morphology makes them highly susceptible to being caught as bycatch in many types of fishing gear (Moore 2017); and, (3) their dependence on inshore habitats makes them highly exposed to intensive fisheries, as well as habitat loss and degradation (Jabado *et al.* 2018).

*Rhinobatos rhinobatos* is listed globally on CMS Appendix II (2017), CMS Appendix I and II (2017) for the Mediterranean Sea Population, and in the CMS Sharks MOU (2018). It is classified as Critically Endangered on the IUCN Red List on the basis of past and suspected future declines (Jabado *et al.* 20212).

Historically, *R. rhinobatos* ranged from shallow coastal waters down to 180 m depth throughout the Mediterranean and sub-tropical regions of the eastern Atlantic from the Bay of Biscay to Angola (Notarbartolo di Sciara *et al.* 2007). Currently, *R. rhinobatos* is locally extinct from much of the

2 <https://www.iucnredlist.org/species/63131/124461877#assessment-information>

northern Mediterranean and is no longer recorded from the Atlantic coast of Europe due to long-term intensive fishing pressure (Fowler *et al.* 2005, Jabado *et al.* 2021).

Fishing pressure is the largest threat facing *R. rhinobatos*, followed by habitat loss and destruction. *R. rhinobatos* migrate seasonally from deep water into shallow coastal areas to give birth and mate, during this time they are targeted by coastal fisheries for meat and fins and are also taken as bycatch in net and trawl fisheries (Newell 2017, Moore *et al.* 2019). Little is known about how *R. rhinobatos* moves along coastal and marine habitats. However, given that seasonal migration takes place in shallow water, breeding guitarfish are particularly susceptible to coastal gillnet and trawl fishing activities.

*Rhynchobatus australiae*, is listed on CMS Appendix II (2017), the CMS Sharks MOU (2018), and is assessed as Critically Endangered on the IUCN Red List as it is inferred that the species has undergone a >80 per cent population reduction over the last three generations (Kyne *et al.* 2019a, 2019b).

*Rhynchobatus australiae* is subject to overfishing in artisanal and commercial fisheries; they are caught as target species and as bycatch primarily for their internationally valuable fins. Their use of inshore habitat, susceptibility to multiple gear types, and range located in some of the world's most heavily fished coastal regions makes them particularly susceptible, and their population has been locally reduced throughout their range (Giles *et al.* 2016, Kyne *et al.* 2019b). While species-specific catch and landings data are lacking, *R. australiae* has suffered significant population declines, and it is inferred that it has undergone a >80 per cent global population decline over the last three generations (45 years) (Kyne *et al.* 2019b).

Both *R. rhinobatos* and *R. australiae* have an unfavourable conservation status as defined under the Convention as they do not meet the conditions outlined in subparagraph 1 C of the [Convention Text](#).

The December 2022 IUCN Red List Update identifies Rhinidae and Glaucostegidae as the most threatened group of all marine fishes. Cumulatively, 95 per cent of species comprising these two families face an 'extremely high risk of extinction' according to the most recent IUCN Red List Assessments. The reassessment of Red List status for the Rhinobatidae is not yet complete, but currently over 70 per cent are assessed as threatened with extinction. As identification to the species level can be difficult and threats are similar within the three families (Rhinobatidae, Rhinidae, and Glaucostegidae), it is intended that they all be included in the CMS Concerted Action.

Coordinated and comprehensive management and conservation measures are urgently needed to prevent further population declines and both regional and global extinctions of Rhino Rays. Cooperation between Range States to mitigate obstacles to migration, conserve the species' habitat, and protect the species through international cooperation to regulate target and bycatch fisheries (particularly those associated with seasonal breeding migrations) is desperately needed. Ensuring that catches are sustainable and legal will help prevent the extinction of Rhino Rays. It is likely that without trade regulation, the high value of fins will drive continued overfishing and global declines. This is a serious threat to the survival of wild populations and is similar to the fate of sawfishes which have been eliminated from almost all of their historic range (Moore 2017).

#### **(x). Relevance**

*Rhinobatos rhinobatos* exhibits seasonal migration based on its reproductive cycle, with females visiting shallow waters for parturition (Newell 2017). During this predictable movement, breeding adults can easily be targeted by fisheries or taken as incidental bycatch. *Rhinobatos rhinobatos* experiences unregulated target fisheries in southern and eastern Mediterranean waters and is one of the main targets of specialized shark fishing teams in its West African range. As there is still significant uncertainty about how *R. rhinobatos* migrates in shallow waters, the species would benefit from coordinated international management structures to obtain more data and a better understanding of existing populations.

Data are lacking on the migratory behaviours of *R. australiae*. However, other Rhino Ray species are generally migratory (e.g. those in families Pristidae, Rhinobatidae, and Glaucostegidae; Lessa and Vooren 2007, Márquez-Farías 2007, Blanco-Parra *et al.* 2009, Fowler 2014). As well, recent data show that there is probably episodic migration between Indonesia and Australia (Giles *et al.* 2016). Coordinated and comprehensive management and conservation measures are urgently needed to prevent further population declines and localized, regional, or even global extinctions throughout its range, particularly as migrations probably happen at a scale spanning national boundaries.

In general, the large size, motility, and morphology of many Rhino Rays suggest they are likely to cross national boundaries. Any national conservation initiatives aimed at preventing Rhino Rays from further population declines are unlikely to be successful if the animals are not protected during seasonal migrations in waters beyond national jurisdictions. Therefore, Parties need to work together in developing effective conservation measures.

The activities outlined in this document will also contribute to the implementation of Resolutions 11.20 on the [Conservation of Migratory Sharks and Rays](#); and 12.22 on Bycatch.

#### **(xi). Absence of better remedies**

This Concerted Action directly addresses the need for range-wide coordination and will enable strategic collaboration among Parties to work together on developing and implementing activities. The CMS Network is the ideal platform for improving knowledge of Rhino Rays and developing a Global Rhino Ray Action Plan. Partners to CMS, such as engaged researchers and NGOs, are able to support these actions once they have been adopted by governments through the existing linkages that CMS has created. While national protections are a much needed remedy, given the migratory nature of Rhino Rays, a Concerted Action is appropriate

*Rhinobatos rhinobatos* is not listed under CITES, but *R. australiae*, Glaucostegidae spp. and Rhinidae spp. are now listed on CITES Appendix II (2019). New listings on CITES will enable regulation of the trade of these species, however CMS will be critical in order for parties to collaborate in the conservation of Rhino Rays.

#### **(xii). Readiness and feasibility**

Israel, Mauritania, Senegal and Togo have already taken the lead on the listing proposal of *R. rhinobatos* in CMS Appendix II (Appendix I for the Mediterranean Sea population). The Government of the Philippines successfully proposed the listing of *R. australiae* on CMS Appendix II.

The IUCN SSG has taken the lead in establishing a Rhino Ray Network to enable effective sharing of data and information. The IUCN SSG has experience producing global conservation strategies and will lead on the publication of the Global Rhino Ray Action Plan which will support range state countries in planning, implementation, and management for the conservation of Rhino Rays.

The Save Our Seas Foundation (SOSF) released special calls for keystone grant applications aimed at supporting projects that promote the recovery of Rhino Rays, specifically sawfishes, wedgefishes, and guitarfishes. As well, the Shark Conservation Fund (SCF) is supportive of projects focusing on the most imperilled endemic species and endangered families of sharks and rays such as sawfish, angelsharks, wedgefish, and guitarfish. These funding opportunities are likely to provide much needed support in advancing Rhino Ray conservation efforts.

See Actions Table above for further details.



**(xiii). Likelihood of success**

A Global Strategy for Conservation was created for sawfish following a workshop led by the IUCN SSG in 2012. A group of 29 experts representing 48 countries around the world gathered and developed a focused global action plan to bring these iconic species back from the brink of extinction. At the same time, the IUCN SSG created a Sawfish Network and tri-annual newsletter to foster collaboration and encourage research on this group of species. These methods were very successful in building regional capacity and putting the plight of sawfish in the spotlight. Following the same methods, the IUCN SSG can now build upon previous sawfish work and existing networks to expand its coverage to include Rhino Rays. An online Rhino Ray network has already been established and has been merged with the existing sawfish newsletter. Members of this network will be the basis for continued expansion and a source of future collaboration in the proposed Rhino Ray Action Plan and will help us identify regional experts to champion conservation in their range states.

There is a strong foundation and organizational experience to build upon to successfully implement the Concerted Actions. The Sharks MOU Signatories and Cooperating Partners will be invited to support the development and implementation of the action plans to further increase the likelihood of success.

There are some risk factors associated with the Concerted Action; there is a general lack of capacity in species identification, catch and abundance information, and commitment from national agencies. However, by working with Parties the IUCN SSG can bring global actions into on the ground regional and national planning.

**(xiv). Magnitude of likely impact**

There is a total of 45 Rhino Ray species covered in this Concerted Action, of which 33 are in the family Rhinobatidae, 10 in the family Rhinidae, and 6 in the family Glaucostegidae. Combined, nearly half (22/45, or 48.9 per cent) are currently threatened with an elevated risk of extinction: 17 (37.8 per cent) Critically Endangered, 1 (2.2 per cent) Endangered, and 4 (8.9 per cent) Vulnerable. A further 10 (22.2 per cent) are Data Deficient. Many species in this group have suffered steep and ongoing population declines (Kyne *et al.* 2019a). A full list of countries where these species occur can be found on the IUCN Red List website (<https://www.iucnredlist.org/>).

While the specific role of Rhino Rays in the ecosystem is poorly understood, members of the Rhinobatidae family have been shown to occupy intermediate trophic levels. As predators are likely to exert direct pressure on all trophic levels (Navia *et al.* 2016). Furthermore, Rhino Rays can act as an important prey item for apex predators vital to ecosystem functioning (Moore, 2017). Demographic analysis of nine species of Rhino Rays has shown that most species have a moderate or high capacity to recover quickly from population declines when fishing mortality is reduced to low levels (D'Alberto *et al.* 2019). This demonstrates that this Concerted Action will have significant benefits to Rhino Ray populations.

The range of many Rhinobatidae, Rhinidae, and Glaucostegidae overlaps with another imperilled Rhino Ray family; the Pristidae (comprised of five species of sawfish). Thus, conservation actions targeting these families may also be beneficial to the wider Rhinopristiformes as a whole. Rhino rays will also act as a flagship species for a wider group of coastal fisheries and bycatch issues, specifically actions and activities undertaken for this group will benefit sawfish monitoring and implementation.

In addition, successful implementation could result in:

- Benefits to science through increased data and information
- Improved communication and expanded research network with increased knowledge and technique sharing
- Increase in political will and resourcing with greater commitment from Range States
- Increased local and regional capacity to address bycatch

**(xv). Cost-effectiveness**

Funding required is outlined in the Activities Table above.

No funding is needed to create a network of researchers, start an international campaign to gain public support for species protection, or increase policy-based protections (activities 1 and 9 respectively).

Activity 2, increased data collection and research, requires funding. If funding is acquired and data collection and research are increased, the results could directly feed into future action plans, and activity 5 (minimize fishing mortality). Activities requires funding, however much of the research costs overlap, thus increasing the impact and reach of activity 2.

Approximately US\$40k of funding will be required to develop and produce a Global Rhino Strategy (activity 3). The production of this document will catalyze future regional action plans and as it can be used as a template, will enable them to be produced much more cost effectively and efficiently. The promotion of this Action Plan will also help foster public support for species protection.

Activity 4, the production of identification guides and identification workshops will require fundraising. By creating a network of researchers, it is our hope that actions such as this can be replicated and shared among Range States so as to keep the activity as cost effective and reproducible as possible.

Approximately \$75k of funding will be required for each regional workshop (activity 3). However, these are a cost-effective approach to reach multiple stakeholders and accomplish species- and region-specific actions. As well, the IUCN SSG is experienced in hosting successful workshops. Thus, if involved in regional workshops, there would be cost savings associated with existing collective knowledge and efficiency. Funding acquired for regional workshops will also result in increased regional capacity and planning.

By encouraging cooperation between Range States through this Concerted Action, any conservation successes can be replicated, and best practices encouraged through collaboration, which will be more cost-effective than for Range States to work in solitude.

**(xvi). Consultations-Planned/Undertaken**

The IUCN SSG has already circulated a survey to the Rhino Ray Network and the CMS Secretariat has supported the IUCN SSG in this undertaking by circulating the survey amongst Focal Points. Through existing various Red Listing and Important Shark and Ray Areas project workshops, the IUCN SSG has consulted with regional experts to determine potential interest levels and has further promoted the survey.

Furthermore, the Rhino Ray network was advertised to all IUCN SSG members from 82 countries through Shark News. For progress on implementation please refer to [CMS/COP14/Doc.32.2.9](#).

**References**

- D'Alberto, B.M., Carlson, J.K., Pardo, S.A. and Simpfendorfer, C.A. 2019. Population productivity of wedgefishes, guitarfishes, and banjo rays: inferring the potential for recovery. Preprint available at: <https://www.biorxiv.org/content/10.1101/584557v2>
- Dulvy, N.K., Fowler, S.L., Musick, J.A., Cavanagh, R.D., Kyne, P.M., Harrison, L.R., Carlson J.K., Davidson, L.N.K., Fordham S.V., Francis, M.P., Pollock, C.M., Simpfendorfer, C.A., Burgess, G.H., Carpenter, K.E., Compagno, L.J.V., Ebert, D.A., Gibson C., Heupel, M.R., Livingstone, S.R., Sanciangco, J.C., Stevens, J.D., Valenti, S. and White W.T. 2014. Extinction risk and conservation of the world's sharks and rays. *eLife* 2014(3): e00590.
- Fowler, S., Cavanagh, R., Camhi, M., Burgess, G., Cailliet, G., Fordham, S., Simpfendorfer, C. and Musick, J. 2005. *Sharks, Rays and Chimaeras: the Status of the Chondrichthyan Fishes*. IUCN Publication Services Unit, Cambridge, UK. Pp. 461.

- Fowler, S. 2014. The Conservation Status of Migratory Sharks. UNEP /CMS Secretariat, Bonn, Germany.
- Giles, J. L., Riginos, C., Naylor, G.J.P., Dharmadi, and Ovenden, J.R. 2016. Genetic and phenotypic diversity in the wedgetfish *Rhynchobatus australiae*, a threatened ray of high value in the shark fin trade. *Marine Ecology Progress Series* 548: 165–180.
- Jabado, R.W., Pacoureau, N., Diop, M., Dia, M., Ba, A., Williams, A.B., Dossa, J., Badji, L., Seidu, I., Chartrain, E., Leurs, G.H.L., Tamo, A., Porriños, G., VanderWright, W.J., Derrick, D., Doherty, P., Soares, A., De Bruyne, G. & Metcalfe, K. 2021. *Rhinobatos rhinobatos*. The IUCN Red List of Threatened Species 2021: e.T63131A124461877. <https://dx.doi.org/10.2305/IUCN.UK.2021-1.RLTS.T63131A124461877.en>. Accessed on 13 June 2023.
- Jabado, R.W., Kyne, P.M., Pollom, R.A., Ebert, D.A., Simpfendorfer, C.A., Ralph, G.M., Al Dhaheeri, S.S., Akhilesh, K.V., Ali, K., Ali, M.H., Al Mamari, T.M., Bineesh, K.K., El Hassan I.S., Fernando, D., Grandcourt, E.M., Moazzam Khan, M., Moore, A.B.M., Owfi, F., Robinson, D.P., Romanov, E., Soares, A.-L., Spaet, J.L.Y., Tesfamichael, D., Valinassab, T. and Dulvy, N.K. 2018: Troubled waters: Threats and extinction risk of the sharks, rays and chimaeras of the Arabian Sea and adjacent waters. *Fish and Fisheries* 19(6): 1043–1062.
- Jabado, R.W. 2018. The fate of the most threatened order of elasmobranchs: shark-like batoids (Rhinopristiformes) in the Arabian Sea and adjacent waters. *Fisheries Research* 204: 448-457.
- Jabado, R. W., Kyne, P.M., Pollom, R.A., Ebert, D.A., Simpfendorfer, C.A., Ralph, G.M. and Dulvy, N.K. 2017. The conservation status of sharks, rays, and chimaeras in the Arabian sea and adjacent waters. Environment Agency-Abu Dhabi, UAE and IUCN Species Survival Commission Shark Specialist Group. Vancouver, Canada. 236pp.
- Kyne, P.M., Jabado R.W., Rigby C.L., Dharmadi, Gore M.A., Pollock C.M., Herman K.B., Cheek J., Ebert D.A., Simpfendorfer C.A. and Dulvy, N.K. 2019a. The thin edge of the wedge: extremely high extinction risk in wedgetfishes and giant guitarfishes. *bioRxiv* 595462.
- Kyne, P.M., Rigby, C.L., Dharmadi and Jabado, R.W. 2019b. *Rhynchobatus australiae*. The IUCN Red List of Threatened Species 2019: e.T41853A68643043. <http://dx.doi.org/10.2305/IUCN.UK.2019-2.RLTS.T41853A68643043.en>
- Lessa, R. and Vooren, C.M. 2007. *Rhinobatos horkelii*. The IUCN Red List of Threatened Species 2007: e.T41064A10396152. <http://dx.doi.org/10.2305/IUCN.UK.2007.RLTS.T41064A10396152.en>
- Márquez-Farías, J.F. 2007 Reproductive biology of shovelnose guitarfish *Rhinobatos productus* from the eastern Gulf of California México. *Marine Biology* 151: 1445–1454.
- Moore, A.B.N. 2017. Are guitarfishes the next sawfishes? Extinction risk and an urgent call for conservation action. *Endangered Species Research* 34: 75–88.
- Moore, A.B.M., Séret, B. and Armstrong, R. 2019. Risks to biodiversity and coastal livelihoods from artisanal elasmobranch fisheries in a Least Developed Country: The Gambia (West Africa). *Biodiversity and Conservation*. 28: 1431–1450
- Morey, G., Barker, J., Hood, A., Gordon, C., Bartolí, A., Meyers, E.K.M., Ellis, J., Sharp, R., Jimenez-Alvarado, D. and Pollom, R. 2019. *Squatina squatina*. The IUCN Red List of Threatened Species 2019: e.T39332A117498371. <http://dx.doi.org/10.2305/IUCN.UK.2019-1.RLTS.T39332A117498371.en>.
- Navia, A.F., Mejía-Falla, P.A., López-García, J., Giraldo, A. and Cruz-Escalona, V.H. 2016. How many trophic roles can elasmobranchs play in a marine tropical network? *Marine and Freshwater Research*. 68: 1–12.
- Newell, B.M. 2017. Status Review Report of Two Species of Guitarfish: *Rhinobatos rhinobatos* and *Rhinobatos cemiculus*. Report to National Marine Fisheries Service, Office of Protected Resources. 62 pp.
- Notarbartolo di Sciarra, G., Bradai, M.N., Morey, G., Marshall, A.D., Compagno, L.J.V., Mouni, A., Hicham, M., Bucal, D., Dulvy, N., Heenan, A. and Rui Coelho. 2007. *Rhinobatos rhinobatos*. The IUCN Red List of Threatened Species 2007: e.T63131A12620901. <http://dx.doi.org/10.2305/IUCN.UK.2007.RLTS.T63131A12620901>