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Plan of Action for

Protection of Sharks and Rays in the Israeli Mediterranean

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Written by:
Asaf Ariel, Adi Barash

With comments from:
Aviad Scheinin, Oren Sonin, Eric Diamant, Dor Adalist, Danny Golani, Danny Chernov, Menachem Goren, Eran Brokovitch, Tomer Kochen and Ruth Yahel

Translation:
Jennifer Levin

Graphic Design:
Yael Jicchaki-Golan

Photography:
Uri Ferro, Aviram Waldman, Aviad Scheinin, Adi Barash, Haggai Netiv, Shai Milat, Guy Hadash, Hod Ben Hurin, Charles Roffey, Brian Gratwicke

Cover and back jacket photography:
Uri Ferro

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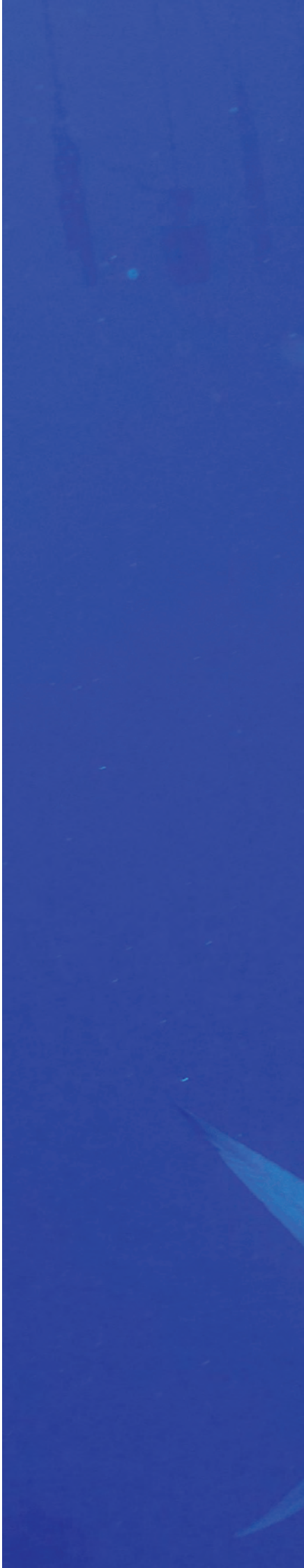

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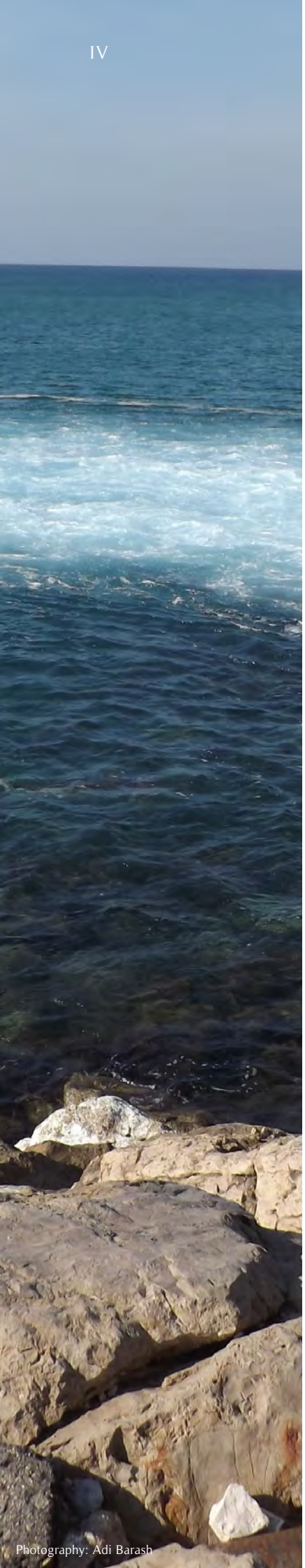

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Executive Summary

Sharks and rays have survived in our world for 450 million years. They thrive in diverse ecosystems all over the world, have developed adaptations for feeding on different types of food, and are characterized by highly developed senses. These and other characteristics contribute to their endurance as extremely successful predators. On the other hand, they are among the species most vulnerable to mass fishing. To further compound this poor outlook, and despite a long life span, sharks and ray come to sexual maturity relatively late; their gestation periods are lengthy and result in few offspring, which means that the two species are struggling to achieve recovery in their population numbers.

Sharks and rays are top predators in the ecosystem, and the depletion of their populations is disrupting an ecological balance prevalent for millennia in the seas and oceans, modifying the food web and leading to the collapse of populations of marine species. Since the 1950s, the populations of sharks and rays have diminished in many parts of the world – and by as much as 90% in the Mediterranean – and they are considered the group at highest risk of extinction among the vertebrates. Fishing of sharks and rays is illegal in Israel, but their targeted fishing and incidental catch are both still fairly common. In addition, the proliferation of coastal and open-sea infrastructure violates the natural habitat of these animals and exposes them to chemical pollutants which tend to build up over time in the tissues of sharks, given their position at the top of the food chain. On the other hand, as sharks are attracted to off-shore fish cages, they cause losses and damages to the mariculture industry, the eco-environment and, ultimately, to humans.

The serious condition of global populations of elasmobranch (sharks, skates and rays) has led in recent years to public awareness of the need to protect them, placing the issue at the forefront of research and efforts to preserve marine environments. Unfortunately, in Israel, there has been little in the way of shark and ray research, and where it does occur, it has so far been limited in scope, which means that relatively little is known about these unique top predators, which are now under threat.

Once commonly seen in many parts of the Mediterranean, sharks are now only rarely observed or reported from other Mediterranean countries. In Israel, by contrast, reports of shark observation and fishing have become a common occurrence, both along the shores and by fishermen in deeper waters. The increase in the number of shark observations may suggest that our coastal waters now serve as an essential habitat for sharks and rays in the Mediterranean. If indeed this is so, it would support our call for the urgent need for shark and ray conservation and protection in Israel's waters so as to preserve and improve ecosystem vitality and the well-being of the entire Mediterranean.

The Action Plan for protection of sharks and rays in the Mediterranean in Israel covers three main objectives:

1. Improvement of the legislation to protect sharks and rays, and its coordination;
2. Creation of effective law enforcement to protect shark and ray populations in Israel; and
3. Protection of vital shark and ray habitats as part of marine habitat protection.

The Action Plan outlines methods of action for improving legislation as well as the management and interface collaboration required for protecting sharks and rays.

It also includes proposals for actions in research, monitoring and evaluation, advocacy and education activity, and regional and international operations.

Introduction

Photography: Haggai Netiv

1. Introduction

1.1 The Objective of the Proposed Action Plan

The objective of the Action Plan is to outline the range of actions that should be taken to bring about improvement in the ecological status of sharks and rays in the Israeli Mediterranean. The Plan outlines recommended policy for protecting and rehabilitating these marine animals by setting clear goals, methods of operation, potential partners for implementation, and timetables.

1.2 About the Model for the Action Plan

The Biodiversity Action Plan (BAP) is based on the Convention on Biological Diversity (1992)[i][14]. As an outcome of Israel's ratification of the Convention, and the decision of the government to prepare a strategic plan for sustainable development[ii], the Ministry of Environmental Protection, together with the Israel Nature and Parks Authority (INPA), and representatives of the academic world, prepared a national plan to protect biodiversity. This plan provides a framework for drafting detailed BAPs for the protection of habitats and diverse species of plants and animals.

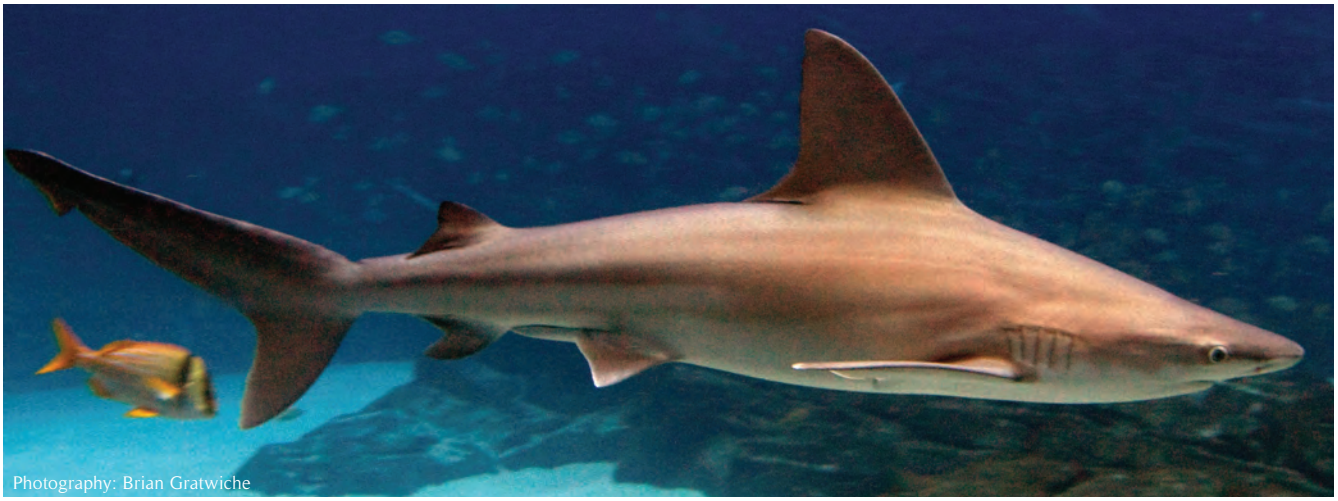
BAPs of this type deal with rehabilitation of endangered plant and animal species, and their conservation, providing ecological information about the species and habitats, and information on the status of their legal protection, as well as setting out goals for rehabilitation and conservation.

The Model includes six stages:

1. Identification and classification of a habitat or species of ecological importance;
2. Assessment of the ecological status of specific species or habitats;
3. Identification and definition of obstacles, solutions and goals for rehabilitation and conservation;
4. Identification of stakeholders and potential partners and their enlistment to action;
5. Setting a budget, allocating tasks, and setting timetables; and
6. Application and evaluation.

Maintaining biological diversity requires actions to be taken across different domains, thus calling for collaboration of the relevant governmental and non-governmental entities so as to create cooperation and synergetic activity among them.

In the matter of sharks and rays, the International Plan of Action for Conservation and Management of Sharks (IPOA-SHARKS)[iii][19] of the Food and Agriculture Organization (FAO) of the United Nations, serves as the most important framework for national and regional action plans on the subject.



Photography: Brian Gratwiche

[i] The Convention on Biological Diversity (CBD), signed in Rio de Janeiro on 5 June 1992, took effect on 29 December 1993. Its objective is to protect biodiversityworldwide, sustainable use of its elements, and fair and equal distribution of the benefit arising from exploitation of the biological resources of the planet. Israel signed the Convention in 1992 and ratified it in 1995.

[ii] Decision number 246 of the Government of Israel on 14.05.2003 on the issue of a strategic plan for sustainable development in Israel.

[iii] International Plan of Action for Conservation and Management of Sharks (IPOA-SHARKS)

Background

Photography: Aviram Valdman, www.thetower.org/article/photos-worlds-beneath-the-sacred-waters,'Tower Magazine'

2. Background

2.1 Sharks and rays and their ecological importance

Sharks and rays belong to the Chondrichthyes[iv] class (cartilaginous fishes). This class of marine vertebrates has been in existence for approximately 450 million years and has remained virtually unchanged for more than 150 million years from the Cretaceous Period to the present. Sharks and rays survive and thrive in diverse ecosystems and are represented in almost every aquatic habitat around the globe, including rivers, lakes, lagoons, open seas and deep seas, stretching from tropical equatorial waters to the far colder Antarctic Circle. The reason for their almost universal distribution lies in their being highly successful predators that have developed adaptations to different types of food over time. Among their number are fish predators, scavengers, and even several species that filter plankton[45].

Sharks and rays have a cartilaginous skeleton, jaws, fins and between five and seven pairs of gill clefts. They do not have lungs or swim bladders and so must remain in motion if they are to stay afloat in the water. Also, they have no flexible bony cover over their gills (as bony fish have), so most of the species must swim to let the water flow over their gills in order to breathe[31].

Life expectancy, the age of attaining sexual maturity, and the number of offspring differ from species to species, but in general sharks and rays are characterized by a relatively long life expectancy, late onset of sexual maturity, and a small number of offspring. In certain species, the gestation period can last for two years. These characteristics mean they are extremely vulnerable to large-scale fishing operations and make population recovery extremely slow and difficult.

The males are differentiated from the females by a pair of long external sperm tubes, called claspers, that have developed from the shark's pelvic fins. While fertilization is internal, methods of reproduction are diverse and are commonly divided into three types: the laying of eggs, spawning (aplacental development of eggs in the female body) and pregnancy (embryos develop within a placenta in the body of the female). Visual and sensory senses are very well developed in cartilaginous fishes, which are also equipped with a sensory organ on the side of the body, enabling them to sense light movements in the water. Cartilaginous fishes are also equipped with

Photography: Charles Roffey

Ampullae of Lorenzini, a sensory organ sensitive to changes in the electromagnetic field and thus likely to assist them in navigating through the water and finding prey. Very little is known about the sense of hearing in cartilaginous fishes[15,34].

Sharks and rays are predators with some of the species being top predators. As a result, they are of extremely high importance to the ecosystem as their disappearance could cause collapse in the balance essential to the marine food web. Such a collapse could be caused by a significant rise in the number of species that would normally be the prey of sharks and rays, and thus to a depletion in the number of species downstream in the food web, which could lead to the collapse of many populations[32,48].

In the 1950s, the thinning of shark populations in many areas in the world resulted in population decline of about 90 percent[21]. In spite of the drastic fall, very few research studies were conducted on the ecology of sharks and rays, and almost no data was collected before the decade of the '90s. As a result, and taking into consideration the long life expectancy

[iv] The cartilaginous fishes form one of the three classes of fish: bony fish, cartilaginous fishes and the round-mouth class. The class has 1,173 species, of which 1,144 are species of sharks and rays[36].

of sharks and rays, which itself requires long-term research, the status of most populations of these animals in the world is still not known, and as of today, conservation definitions are based mainly on estimates. In fact, out of the 1,042 species of sharks and rays examined by IUCN (the Union for Conservation of Nature), data to evaluate the present status of the populations is deficient for about half of the total number of species. For 83% of the species there is not even an estimate on the change that has occurred in the status of the populations (Table 1). According to research published in 2014, and based on mathematical models, a quarter of all cartilaginous fishes in the world is endangered, a fact which positions it as the group among the vertebrates at highest risk of extinction. The groups considered to be most endangered are the sawfish, angel sharks, guitar fish, and the thresher sharks[18].

2.2 Sharks and rays in the Mediterranean and in the coastal waters of Israel

The population of sharks and rays in the Mediterranean includes about 80 species, of which 49 are shark species belonging to 17 families, 34 are rays belonging to nine families, and one is a species of Chimaera (ghost shark)[45].

Table No. 1: Ecological Status and Trends in Shark and Ray Populations in the World (Source: IUCN Red List)

Conservation status	**Sharks** (477)		**Rays** (565)		**Total** (1042)	
Data Deficient	214	45%	267	47%	**481**	**46%**
Least Concern	121	25%	136	24%	**257**	**25%**
Near Threatened	69	14%	58	10%	**127**	**12%**
Vulnerable	48	10%	68	12%	**116**	**11%**
Endangered	15	3%	28	5%	**43**	**4%**
Critically Endangered	10	2%	8	1%	**18**	**2%**
Population trend	**Sharks** (477)		**Rays** (565)		**Total** (1042)	
Unknown	391	82%	445	85%	**836**	**83%**
Decreasing	59	12%	67	13%	**126**	**13%**
Stable	24	5%	13	2%	**37**	**4%**
Increasing	3	1%	0	0%	**3**	**0%**

Scientists and the IUCN have defined the Mediterranean as 'the most dangerous place on earth for cartilaginous fishes[5,13]. According to IUCN estimates, more than 42% of the species of cartilaginous fishes in the Mediterranean are in danger[9] and certain species of shark have dwindled by more than 97% in their numbers in the last two hundred years[21]. Furthermore, given the lack of data on many species, the situation may even be worse.

Large coastal sharks, mainly of the genus Carcharhinus (such as the Sandbar Shark [*Carcharhinus plumbeus*] and the Dusky Shark [Carcharhinus obscurus]), which were widespread in the Mediterranean in the past, are no longer observed by fishermen, and are not reported at all in most parts of the Mediterranean[21].

A Table presenting more detail on the ecological status of species of sharks and rays in the Mediterranean appears in Appendix 1.

The Mediterranean shows a gradient in the number of fish species, with the overall number diminishing as you move eastwards. The same phenomenon is observed when looking at cartilaginous species. There are about 66 species of cartilaginous fishes in the eastern Mediterranean, 35 of which are sharks, 30 rays and one Chimaera[45]. Fifteen species were found to be endangered or critically endangered (Table 2), including species found in our area, and caught either as bycatch (unintentional or discarded catch) or by targeted fishing such as the sandbar shark (*Carcharhinus plumbeus*), the shortfin Mako (*Isurus oxyrinchus*), the common guitarfish (*Rhinobatos rhinobatos*), the piked dogfish (*Squalas acanthias*), and others[13].

Table No. 2: Ecological Status and Trends in Cartilaginous Fish in the Eastern Mediterranean (Based on Cavanagh & Gibson, 2007)

Conservation status	Sharks	Rays	Total
Data Deficient	8	8	-
Least Concern	4	7	-
Near Threatened	2	6	1
Vulnerable	9	3	-
Endangered	3	5	-
Critically Endangered	6	1	-
Not Evaluated	3	-	-

In Israel, given the small catch and low commercial value of cartilaginous fishes, very few research studies have been conducted on this group of vertebrates[28]. The taxonomy of species of cartilaginous fishes in Israel has been drawn up mainly through morphological identification[27] and is presumably out of date[v].

A genetic study conducted in 2014 found that the most common shark off the coast of Israel is the sandbar shark (*Carcharhinus plumbeus*) and not the dusky shark (*Carcharhinus obscurus*), as previously thought. This study found that although they are extremely rare in other parts of the Mediterranean, there is a relatively large quantity of dusky sharks along the Israeli coast, some of which are of Indo-Pacific genetic origin, probably as a result of migration of specimens of the genus through the Suez Canal[10].

Despite the rapid disappearance of large coastal sharks in most parts of the Mediterranean, sharks are often observed and caught in Israel, both close to the shore and by fishermen in deeper waters. In the vicinity of the water outflow pipes (which spill out hot water) from the coolant systems of the coastal power stations in Hadera, Ashdod and Ashkelon, a large number of sharks are observed every winter. According to information gathered from fishermen on the shore, it would appear that there has been an increase in the number of sharks observed along Israel's coast in the last decade[10].

The increase in shark sightings may indicate that the coastal area of Israel serves as a vital habitat for sharks and rays in the Mediterranean[vi]. If this is indeed the case, this is evidence that reinforces the need for conservation and protection of the sharks and rays in our region, in order to conserve the health of the ecosystem of the entire Mediterranean.

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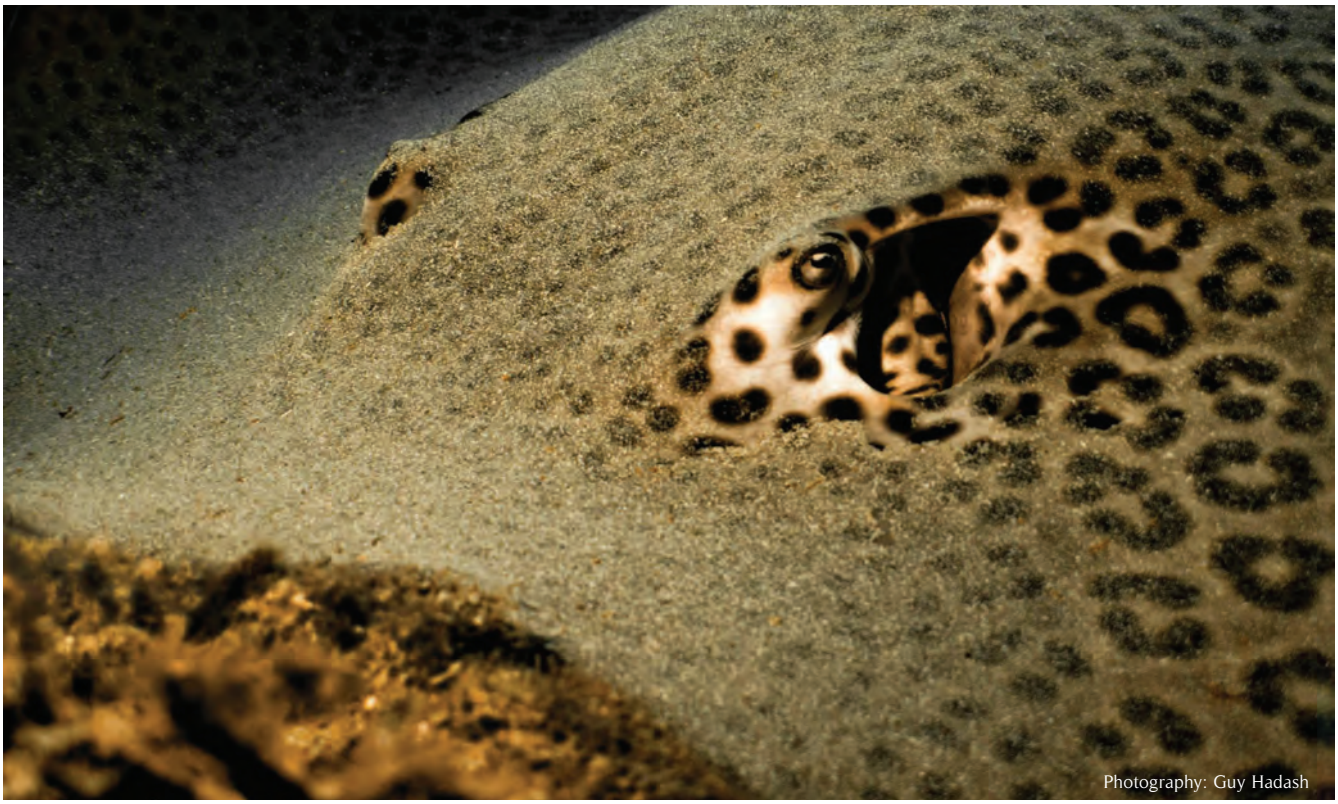
[v] Experience gained from around the world shows that with the development of genetic research and fisheries' technology, new species of cartilaginous fishes are being discovered: between 2005 and 2014, 160 new species of cartilaginous fishes were discovered[41].

[vi] The possibility of Israel maintaining a unique and sensitive habitat for cartilaginous fishes was also recognised by the General Fisheries Commission for the Mediterranean (GFCM). Report of the Workshop on elasmobranch conservation in the Mediterranean and Black Sea. Sate, France 10–12 December 2014.


Photography: Guy Hadash

2.3 Factors that impact on sharks and rays in the Mediterranean

As mentioned, the particular biological characteristics of sharks and rays – a long life expectancy, late sexual maturity, a long gestation period, and a small number of offspring – put them at risk of severe and significant depletion, and they face great difficulty in recovering from anthropogenic activity such as fishing, habitat destruction, or marine pollution[40].

Since, up to the present time, almost no research has been conducted on sharks and rays in the Israeli Mediterranean, and very little quantitative information is available, it is particularly difficult to assess the level of impact of the different factors – be they natural or because of human activity – on sharks and rays in the country. The most significant factors making an impact along the Israeli coast are described below, according to their degree of influence:

2.3.1 Fishing

Sharks and rays are being fished around the world because of increasing demand for their fins, skin, jaws and meat[52]. Although they themselves are the target in many cases, in others they are caught as bycatch. One of the offshoots of this phenomenon is that in many areas around the world, shark and ray populations have dwindled as fishing efforts have grown. As mentioned, because of their great sensitivity to over-exploitation, there is real difficulty in rehabilitating any population that has been harmed and depleted[22,53]. While the financial gain for shark meat is relatively low, the price of shark fins is extremely high and can reach hundreds of dollars. The reason lies in the demand for fins to prepare shark fin soup, a popular delicacy in Far Eastern countries, particularly in China. Therefore, fishermen worldwide remove the fins of the sharks they catch, dry them, and send them to China. The finless shark is often thrown back into the sea to die so as to save space on board and allow storage of larger numbers of fins, although sometimes the whole shark is retained to sell its meat. The estimate is that about 1.4 million metric tons – about 100 million (!) sharks are butchered each year due to fishing[54]. The larger the shark is, or the more sizable its fins, the more desirable the animal will be[12].

Sharks and rays are protected species in Israel and fishing them is illegal, but as enforcement is often weak, illegal shark fishing continues. However, in general, fishing of sharks and cartilaginous fishes in Israel is limited in scope, because cartilaginous fishes may not be consumed under Jewish kashrut law, and most of the fishing and the trade in it is carried out in non-Jewish sectors[8]. Shark and ray fishing makes up only approximately 1.5% of the total fishing catch in the Israeli Mediterranean, but it is nonetheless

Photography: Aviad Scheinin

clear that fishing is a factor that significantly impacts on these fish in Israel.
Fishing can be divided into two main categories: deliberate (targeted) fishing and incidental catch (bycatch). Targeted fishing fully differentiates between the different species. Guitarfish and rays are caught in landing nets from the shore, while sharks are fished mainly at the power stations, but also at sea. Incidental fishing occurs using all types of fishing methods, and cartilaginous fishes are caught in large numbers in trawler nets, in longline systems (colloquially known as 'Sharaks') and drift/trammel nets. In the last decade, there appears to have been an increase in targeted fishing of cartilaginous fishes using trammel nets, arising from the collapse of fishery resources in the coastal area[1-2].
There are no real assessments of cartilaginous fish stocks in Israel. The Fisheries Division does have data on the fishing of this species from 1948 to 2010. However, separation was not always made between the different methods of fishing, and no identification of species was made at all. The catch was jumbled together into very large taxonomic groups (guitarfish, rays, sharks) and in most cases were unified under the heading “non-kosher”. In addition, since 1988, surveys have been carried out irregularly and data is incomplete in many years, while in others there is no data at all. Another difficulty stems from the status of sharks and rays as protected species, making it difficult to collect information from fishermen who are fearful of admitting to an offense. When illegal fishing occurred, the catch was sometimes smuggled to the Gaza Strip, which made it difficult to document the scope of fishing and the species caught.

2.3.2 Habitat changes and destruction

Israel is a country characterized by both a relatively short stretch of coast and by intensive development along the length of its coastal region and waters. A multiplicity of infrastructure and large-scale facilities, such as power stations, desalination facilities, drilling rigs and gas and oil transportation pipelines, receiving stations, as well as mariculture facilities are all evident, and plans abound for further development. Building and operating these infrastructures include drilling and excavation, pumping of water, shifting of sand, resulting in many types of pollution. In addition, such facilities occupy space and replace the natural habitat. All these have a huge impact on the natural habitats of cartilaginous fishes. In Israel, five coastal power stations release hot water into the sea. At the three major stations (Hadera,

Ashdod and Ashkelon), during the winter season, sharks are observed close to shore in the vicinity of the hot water, a phenomenon that has apparently been growing in number and strength in recent years. While there is a link between the high temperature of the water around the power stations and the sharks' appearance, the precise reason is not known. It could be related to food, reproduction, processes of body temperature change, or existing migration routes. The proximity to the power stations puts the sharks in great danger from fishing, and the potential effects of coastal pollution. It is not yet known whether rays are also attracted to the warm waters of the power stations[10].
Man-made changes in the habitats, as well as the establishment of fish farm cages, power stations, oil and gas rigs, and their support systems, may also lead to changes in the migratory routes of various types of cartilaginous fishes.

2.3.3 Changes in biodiversity – invasive species

Since the opening of the Suez Canal in 1869, hundreds of species of marine animals have migrated from the Red Sea to the Mediterranean and created thriving populations in the Levant Basin. Some have spread even further west to Malta, Sicily and Tunisia[26]. This process is known as "Lessepsian Migration," named for the French engineer Ferdinand Marie de Lesseps[43]. The Lessepsian migrant species have a far-reaching impact on the Mediterranean – on its species, its ecosystem, as well as on man. Among them are those of great importance to the food web structure, ecosystems, and organism populations in the Levant region[11,29,47]. Only one species from among the cartilaginous fishes – the reticulate whipray (*Himantura uarnak*), has been positively identified as a migrant to the Mediterranean from the Red Sea. Another species, the blacktip reef shark (*Carcharhinus melanopterus*), is suspected of having a presence in the Mediterranean, but the establishment of the species in the Mediterranean and its origins have not as yet been confirmed [45]. As to the dusky shark (*Carcharhinus obscurus*) – it has been found that some of their number originate from a population of Indo-Pacific origin, which may confirm the passage of specimens of the species through the Suez Canal. However, the dusky shark has a local population in the Mediterranean, so it is not an alien invasive species but instead an example of cryptic invasion of a native species[10]. In view of the large number of invasive species, the opening of the New Suez Canal in July 2015, and any future plans to further expand it, could mean future Lessepsian invasion of cartilaginous fishes with an emphasis on the large predators.

Photography: Aviram Valdman, www.thetower.org/article/photos-worlds-beneath-the-sacred-waters,'Tower Magazine'

2.3.4 Pollution

Because of the particular characteristics of the cartilaginous fishes (large body, long life, predation) they are particularly exposed to such long-term effects as organochloride contamination and accumulation of heavy metals. Among sharks in the Mediterranean, large concentrations have been found of contaminants such as DDT and Tributyltin (TBT) – a compound shown to inhibit development, and which was used in large quantities as a protective coating on ship hulls[35,50]. A study from 1992 found high concentrations of heavy metals in sharks from the eastern Mediterranean[33]. Heavy metals, such as mercury, associated with pollution reaching the coast from rivers, power stations and desalination and purification facilities, have been found in sharks in many studies[17,33,50].

High levels of organochloride compounds have also been measured in cartilaginous fishes. Despite the abundant knowledge available about the impact of these substances on nature in general, very little is known about their effect on cartilaginous fishes[49]. The concentration of contaminants and their effect on cartilaginous fishes have not been examined in Israel.

2.3.5 Mariculture (marine fish farms)

Following the 2006 establishment of open-sea fish farms at a distance of about 11 kilometers off the coast of Ashdod, sharks began to congregate around the cages, initially during certain seasons. However, in the last two years, the sharks are present throughout the year, and their numbers now stand at many dozens. The appearance of sharks near fish cages is a known phenomenon and can damage the mariculture sector, change the ecological balance as a result of the increase in predator numbers in the area, change sharks' migratory routes, and even result in human injury[42].

In 2010 another open-sea fish farm began operating off the Michmoret coast. Despite rumors of sharks in the area, there is to date no documentation of any shark presence there. It is likely that the higher mortality of fish in the open-sea cages near Ashdod attracts sharks to the vicinity of those cages. Also, the procedure for daily removal of dead fish into the marine environment is, de facto, regular shark feeding, thus ensuring their continued presence in the area, which is likely to lead to dependent and even aggressive behavior.

With the development of the mariculture sector, increases in the size of open-sea farms, and the addition of other species of fish to those already being cultivated, the shark problem in the area can only be expected to grow. Over time, the permanent feeding point could attract larger and more dangerous species to the area. Without proper management and the setting of protocols for "clean" removal of dead fish debris and methods for keeping sharks away from the cages when necessary, it is likely that the mariculture farmers will turn to more aggressive methods, such as fishing or massacre, in an attempt to keep the sharks at a safe distance from their farms.

2.4 Plans and actions to protect populations of sharks and rays around the world

The serious threat to shark and ray populations worldwide has in recent years highlighted the need to protect them and brought their plight to the forefront of efforts to protect marine nature. In 1999, FAO, The Food and Agriculture Organization of the United Nations, issued an International Plan of Action for Conservation and Management of Sharks (IPOA-SHARKS).

This framework plan, which is a voluntary one, outlines the baselines for national and regional action plans for protecting sharks in particular and cartilaginous fishes in general, and calls on its member countries and all relevant parties to prepare national and regional action plans to protect cartilaginous fishes. IPOA-SHARKS includes general guidelines on how to go about conserving species and biodiversity, protecting habitats and making sustainable utilization of natural resources[16,19]. The technical guidelines to the plan[20] present the detail [Figure 1].

Figure No. 1: Summary of the goals and methods recommended under IPOA-SHARKS for inclusion in shark conservation and management Action Plans (Based on: FAO, 2000; Davis & Worm, 2013)

Goals
Implement sustainable fishing of cartilaginous fishes
Assess risks for cartilaginous fish populations
Identify and protect habitats essential to cartilaginous fishes
Identify and protect populations of sensitive and endangered cartilaginous fish
Develop and improve national and international frameworks for coordinating and consulting among stakeholders from management and interface, research and education
Reduce to a minimum bycatch of cartilaginous fishes
Act to protect the entire food web, biodiversity and marine habitats
Prevent the throwing of waste and remains into the sea when sharks are caught
Encourage the use of the whole animal if cartilaginous fishes are caught
Improve follow-up and document cartilaginous fishes in detail, to the level of the species
Improve follow-up and comprehensively document the trade in cartilaginous fishes through to the level of the species

Methods
Include stakeholders in development, implementation and review of the plan
Identify bodies responsible for performing the actions
Identify and develop capabilities for carrying out the plan
Identify and address all goals defined by IPOA-SHARKS
Draw up an assessment plan on the status of cartilaginous fish populations
Make use of the assessment report to prioritize actions, and set goals and deadlines
Develop metrics for assessing and measuring the success of the action plan
Assess and update the plan at least once every four years
Develop regional plans that complement and complete the national plans
Report to the FAO on progress of the action plan

Technical guidelines
Develop legislative, institutional and managerial tools
Develop human resources and train experts
Create a base on which to support research and monitoring: a handbook of species, field guides, assimilation of information, shared databases for migratory species, and harmonized criteria for classification of the ecological status of species and populations
Management and supervision of fishing
Protection of essential habitats and delineating areas in which shark fishing is prohibited
Release sharks alive or utilize the entire body of the shark
Develop methods to prevent bycatch of sharks
Develop regional plans that complement the national action plans
Report to the FAO on progress of the action plan

IPOA-SHARKS call for the inclusion in National Action Plans (NAPs) of the following elements:

A. An assessment report on fishing pressure, the ecological status of cartilaginous fish populations, and existing management and conservation operations (Appendix 2).
B. A comprehensive plan for conservation and management of cartilaginous fishes, based on the assessment report (Appendix 3).

The United States, the European Union, Australia, Britain, Japan, Taiwan, Canada and many other countries around the world responded to the call and prepared plans to protect cartilaginous fishes based on the IPOA-SHARKS outline. The plans mainly cover improvement in monitoring and research, as well as prevention of bycatch and finning[vii].
The action plan for conservation of cartilaginous fishes in the Mediterranean was prepared by the Regional Action Center for Specially Protected Areas (RAC/SPA), operated as part of the UNEP Mediterranean plan, and in partnership with IUCN. It was adopted by member countries of the Barcelona Convention in 2003. The plan focuses primarily on research and assessment, education and advocacy, prevention of shark

[vii] Finning is the practice of slicing off sharks' fins, which are of high commercial value. The procedure is generally performed while the shark is still alive and the live shark is often thrown back into the sea to die so as not to lose storage capacity on board the vessel.

Photography: Aviram Valdman, www.thetower.org/article/photos-worlds-beneath-the-sacred-waters,'Tower Magazine'

and ray finning, implementation of methods to reduce bycatch, and coordination between legislation and activity at the national level in alignment with regional and international agreements on the issue.
A review of the American, Japanese, British, Australian, and EU NAPs for protection of sharks and rays, and the Mediterranean plan, as well as a Summary Table of the actions taken under these plans, appear in Appendix 4.
Most NAPs also rely on conventions and international and regional agreements on the conservation of cartilaginous fishes. These include, among others, the Convention on the Conservation of Migratory Species (CMS)[viii], which provides protection to a number of species and works to promote protection plans for species of migratory sharks; the Convention on the International Trade in Endangered Species (CITES) [ix], which restricts the trade in endangered species; the European Convention on the Protection of Wild Animals and Habitats (Bern Convention, 1982); the Barcelona Convention, which provides protection to dozens of species of sharks and rays through the Protocol for Specially Protected Areas and Biodiversity (the SPA & BD Protocol)[x], and the FAO's Code of Conduct for Responsible Fisheries.

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viii Convention on the Conservation of Migratory Species of Wild Animals (CMS/Bonn Convention), 1979
ix Convention on the Trade in Endangered Species of Wild Fauna and Flora (CITES), 1975
x Updated for inclusion of Appendix II, III to the Protocol, including protection of 10 species of sharks and rays. Entered into force in March 2014.

2.5 Protection and conservation of sharks and rays in Israel

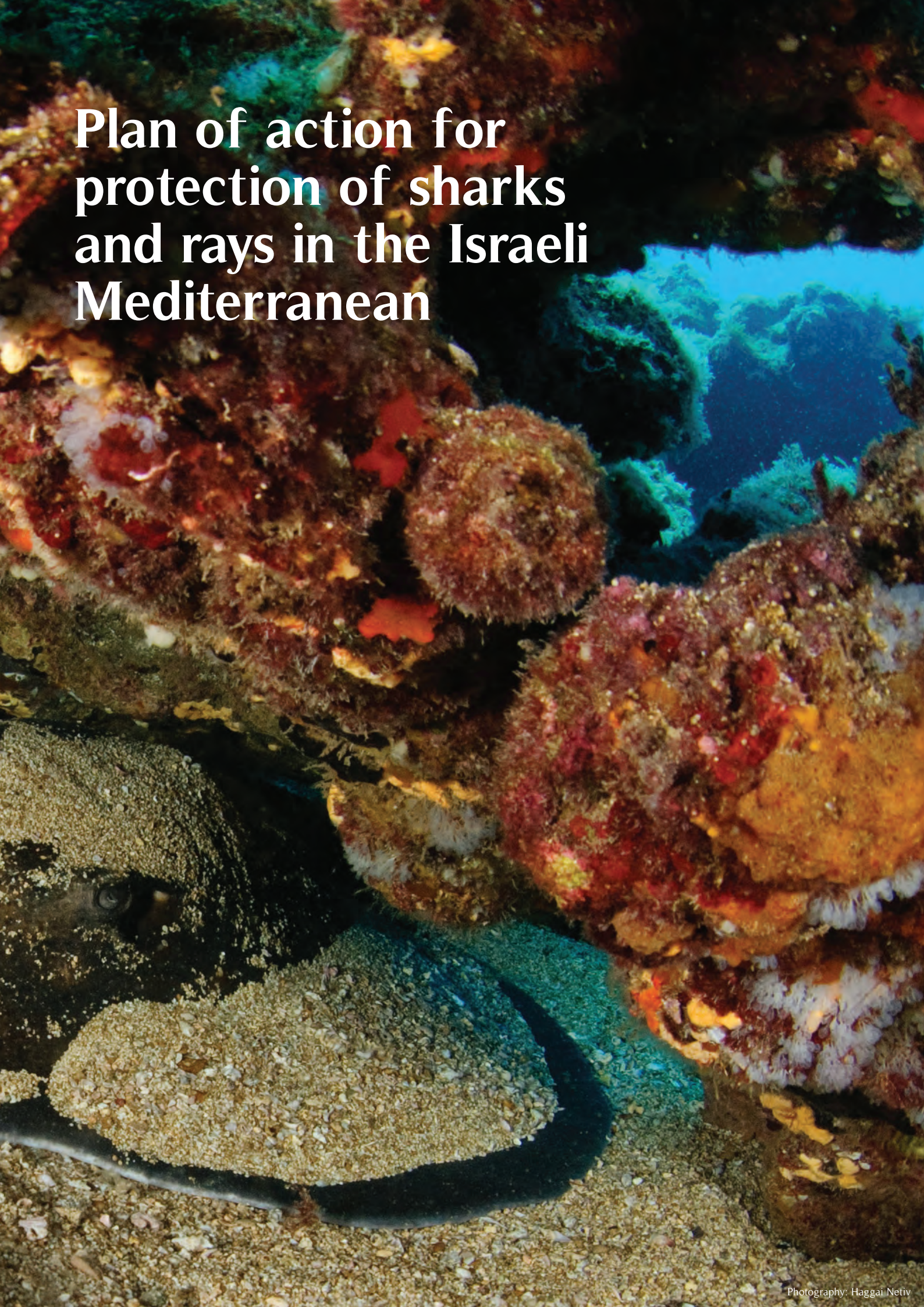
In 2005, sharks and rays were introduced into the list of species protected by law. However, because Israel's Nature and Parks Authority (INPA) and its Fisheries Division could not reach agreement, enforcement of the prohibition on shark and ray fishing was not carried out until, in 2008, INPA started to enforce the ban, but only with regard to sharks – i.e., without enforcing the ban on ray fishing. Enforcement against shark fishing has improved but is still inadequate as such fishing continues; as to ray fishing – if there is any enforcement at all, it is weak[1,4].

The State of Israel's commitment to protecting cartilaginous fishes is also contingent on its being a party to various conventions under which their protection is a requirement. These include the CMS, which Israel signed in 1983; CITES, to which Israel has been a signatory since 1980; the SPA & BD Protocol, as part of the Barcelona Convention, which Israel signed in 1995, (but has yet to ratify); the Action Plan for Conservation of Cartilaginous Fishes in the Mediterranean in the framework of the Mediterranean Action Plan; the Biodiversity Convention, which Israel signed in 1992; and the Code of Conduct for Responsible Fisheries of the FAO, of which Israel is a member.

Requirements for sustainable management of fishing in general and cartilaginous fishes included among them, are also present in the guidelines of the OECD, whose ranks Israel joined in 2010, through the General Fisheries Commission for the Mediterranean (GFCM), affiliated to the FAO.

Photography: Haggai Netiv

Plan of action for protection of sharks and rays in the Israeli Mediterranean



Photography: Haggai Netiv

3. Plan of action for protection of sharks and rays in the Israeli Mediterranean

The Action Plan proposed is based on the action plan structure proposed by the FAO, and on key elements present in national and regional action plans from around the world. At the same time, the Plan has been adjusted to the situation in Israel, which differs to some extent to that in other countries. This difference arises in particular from the fact that domestic consumption of cartilaginous fishes is relatively low, because of Kashrut laws, although there is a market for fish of these species among non-Jewish populations. Finning of sharks is not a common practice in Israel. Additionally, sharks and rays are protected by law and fishing of them is prohibited.

3.1 The goals of the Action Plan

The Action Plan's main goals are to:

1. Improve the legislation for protecting sharks and rays, and its coordination;
2. Build effective enforcement to protect shark and ray populations in Israel;
3. Protect habitats vital to sharks and rays under the remit of marine protected areas.

3.2 Plan outline

- An effective Action Plan requires identification of:
- Relevant entities that have influence;
- The most effective courses of action to influence these entities;
- Target audiences for actions to be performed;
- Partners for implementation of the Plan.

Impact factors

Sharks and rays in Israel are affected by local, regional and global factors. Fishing off the coast of Israel has a critical impact on the shark and ray populations in Israel but, crucially, because some of the species are migratory and could travel for thousands of kilometers, it is essential that activity be carried out at the regional level in tandem with international cooperation. As already stated, the impact factors most significant and requiring inclusion in the Plan include:

- Fishing;
- Destruction of habitats;
- Invasive species and changes in the food web and biodiversity;
- Pollution;
- Mariculture.
-

Proposed courses of action in the Action Plan include:

- Filling in the gaps and inconsistencies in legislation on the subject of cartilaginous fishes;
- Increased enforcement of the prohibition on the fishing of cartilaginous fishes;
- Reducing bycatch by fishermen;
- Promoting protection over vital habitats;
- Collecting information and preparing status assessments;
- Using focused advocacy vis-à-vis user groups;
- Educating and providing information to the general public;
- International cooperation.

The target audiences for these activities are:

- The professional level of government – the Israel Nature and Parks Authority, the Fishing Division at the Ministry of Agriculture and Rural Development, planning departments;
- User groups – commercial and sport fishermen;

- Academia, and governmental and non-governmental research institutions;
- The general public.

The activities have potential partners from domestic and international environmental organizations, from academia, and from the government entities.

3.3 Activities under the Action Plan

The Action Plan incorporates four main tools:

1. Improving legislation, management and interface;
2. Research, monitoring and assessment;
3. Advocacy and education actions;
4. Regional and international actions.

3.3.1 Legislation, management and interface

In order to enable the protection and rehabilitation of the shark and ray populations in Israel, there is an immediate need for more stringent enforcement against fishing of these animals, and formalization of a system to protect them and their habitats.

Hereunder are activities required in this area:

3.3.1.1 Extending enforcement to cover the prohibition on ray fishing;

3.3.1.2 Strengthening enforcement of the prohibition of shark fishing by increasing manpower and budget for inspection and enforcement, while also increasing the level of financial penalties imposed on offenders;

3.3.1.3 Amending the Fisheries Ordinance and the Fishing Regulations – so that they prohibit both the fishing of sharks and rays, so as to create uniformity with the list of protected species;

3.3.1.4 Taking technical and regulatory steps to reduce the incidental fishing (bycatch) of cartilaginous fishes;

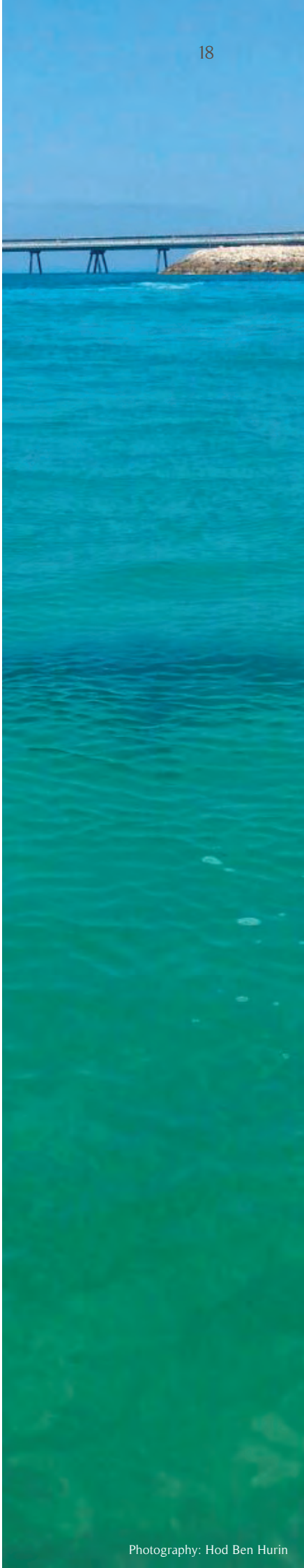
3.3.1.5 Promoting approval and declaration of marine reserves. It is important to include in protected marine areas habitats that are vital to cartilaginous fishes, if such habitats are identified in our area;

3.3.1.6 Developing 'catch and release' as a branch of sport fishing – encourage fishermen to catch and release large specimens; issue special licenses to fishermen who participate in studies for labeling, and promote this type of fishing as a sport conducive to sustainable tourism.

3.3.2 Research, monitoring and assessment

There is an urgent need to fill in the gaps in information on ecology, biology and fishing pressure on cartilaginous fishes in Israel. As stated, very little information exists on these organisms and any significant plan for management and interface arrangements will have to be based on far more substantial and reliable information than that presently available. It is important to collect figures from the following fields, and distribute and assimilate them among relevant audiences:

3.3.2.1 Research on the biology and ecology of cartilaginous fish populations in Israel – ecological research should be conducted to identify local and invading species living in our area, migratory routes, population distribution patterns, breeding patterns, as well as



Photography: Hod Ben Hurin

Photography: Noam Matzri

identification of the areas critical to breeding and development of the offspring of these species;

3.3.2.2 Conducting stock and ecological status assessments of the different species of cartilaginous fishes – such assessments are essential to the effective operation of a scheme aimed at protecting sharks and ray populations;

3.3.2.3 Monitoring commercial fishing of cartilaginous fishes – accurate information (down to the species' level) has to be collected on commercial targeted fishing and bycatch that reaches the harbor docks and is thrown into the sea;

3.3.2.4 Monitoring of sport fishing of cartilaginous fishes – down to the species' level for both targeted fishing and bycatch;

3.3.2.5 Research to examine appropriate management and interface tools – it is necessary to assess and develop management and interface tools that will allow optimal and effective implementation of a sustainable fishery interface, the operation of protected marine areas and more, such as: development of technical and regulatory mechanisms for reducing bycatch;

3.3.2.6 Socio-economic research – research of this type is designed to provide estimates of the economic and cultural value of shark and ray species as part of the services of the ecosystem. The value of sharks and rays may be expressed in balance of the ecological system, as an attraction for viewing, and more. Information of this type is used to support planning and management;

3.3.2.7 Evaluation of the Action Plan and its revision every four years – in accordance with the FAO guidelines, NAPs should be periodically assessed and revised accordingly.

Photography: Aviram Valdman, www.thetower.org/article/photos-worlds-beneath-the-sacred-waters, 'Tower Magazine'

3.3.3 Advocacy and education

Success in the promotion of policies to protect cartilaginous fishes in Israel requires raising the awareness of the public and decision-makers to their importance and the need to protect them. The public advocacy campaign should therefore be treated as a parallel and reinforcing activity to lobbying for the desired policy. Education activities are an important additional cornerstone for the short and long-term reinforcement of public awareness.

Among the activities proposed in this framework are:

3.3.3.1 Production of a handbook of species for the fishing community – such field guides are essential to the accurate identification of the types of cartilaginous fish caught and should improve documentation and follow up;

3.3.3.2 Focused activity with stakeholders – in tandem with the broad public information campaign, information should be directed to specific groups of stakeholders, such as diving clubs, fishing forums, and other groups that have a direct link to the subject matter, but lack "professional" knowledge;

3.3.3.3 Making information accessible to the public, researchers and decision-makers – it is necessary to generate publicity materials, methods and events, online activities through a dedicated website,

Facebook page, etc. in order to raise awareness among the lgenera public, policy makers, stakeholders and researchers;

3.3.3.4 Educational activities for youth – here the intention is to a range of activities such as the preparation of educational plans on cartilaginous fishes and ways to protect them, lectures and field trips for school children;

3.3.3.5 Operating a Citizens' Science Program – such programs expand the circle of information gathering, and have a significant advocacy-education value. Examples of programs of this type include operation of a program for reporting on sightings of cartilaginous fishes at sea or close to the coast, running of a national labeling program in conjunction with sport fishermen (such programs are already operational in Europe and the United States), and programs to train fishermen on how to catch, tag, measure and correctly release living cartilaginous fishes back into their natural environment.

3.3.4 Regional and international activity

Activity at regional and international levels will enable strengthening of the existing knowledge base and two-way information exchange, as well as promotion of joint regional action plans of particular relevance to migratory species of cartilaginous fishes.

Such actions include:

3.3.4.1 Sharing of protocols and information gained from monitoring and research – harmonization of methods of study and comparison of data at the international level will assist in formulating optimal policy and in decision-making processes;

3.3.4.2 Promoting joint research, monitoring and education programs – cooperation in regional and international projects helps to raise financing resources, saves resources, and facilitates activities that have a broader geographic reach and greater impact;

3.3.4.3 Stakeholder participation in international meetings for knowledge exchange – participation in forums and workshops relevant to the issue of conservation of sharks and rays and associated topics. Examples of such opportunities are the workshops and conferences organized by the European Elasmobranch Association, GFCM meetings, and others;

3.3.4.4 Establishing a regional center for research and conservation of sharks and rays – if research affirms the presence of a concentration and/or breeding grounds for sharks and rays in our region, the possibility should be considered of establishing a regional center to coordinate research and conservation efforts across the Eastern Mediterranean. Such a center would also maintain contact with researchers and conservation organizations in the Western Mediterranean and other areas around the world.

3.3.4.5 Submitting an assessment report every two years to the FAO on progress in development of the Plan, its implementation and evaluation of its performance.

The summary of actions per domain, responsible bodies, potential partners, current status, and outcomes of the Action Plan appear in Table No. 3.

Table No. 3: The Action Plan – Summary of activities in each field, the responsible body, potential partners, current status and Action Plan outcomes

	Current status	Action	Responsible institution/partner	Outcome
Improving the legislation, management and interface	No enforcement of ban on ray fishing	Enforcement of ban on ray fishing	Israel Nature and Parks Authority (INPA) and the Min. of Agriculture & Rural Development	Protection of ray populations
	Enforcement is not effective enough & shark fishing continues	Tougher enforcement of the ban on shark fishing in fishing harbors	INPA and the Min. of Agriculture & Rural Development	Protection of shark populations
	There is no ban on sharks and rays in the Fisheries Ordinance & Regulations	Amending the Fisheries Ordinance and the Fishing Regulations (prohibiting fishing, trading and discharge in port of protected species)	Ministry of Agriculture & Rural Development	Coherence between the legislation on nature conservation (INPA responsibility) and the legislation on authorities and entities across the fisheries and fishing spectrum (under responsibility of Fisheries Div. of the Min. of Agriculture)
	Cartilaginous fishes are caught as bycatch in trawler nets and longlines in large numbers	Taking technical & regulatory steps to reduce bycatch of cartilaginous fishes	the Min. of Agriculture & Rural Development; fishermen	Reduction in bycatch of cartilaginous fish
	A relatively small volume of marine reserves; low information levels on specific habitats essential to sharks & rays	Promoting approval and declaration of marine reserves, especially those containing areas essential to cartilaginous fishes (if these are discovered)	The Director of Planning; INPA	Protection of vital habitats for cartilaginous fishes
	'Catch & release' fishing is not developed in Israel	Development of 'catch & release' as a branch of sustainable sport fishing; teaching fishermen correct release	the Min. of Agriculture & Rural Development; the Fishery Forum; fishing clubs; academia	Reduction in mortality of cartilaginous fishes; vital ecological information for interfacing
Research, monitoring and assessment	Extremely low volume of information and research	Research on the biology and ecology of cartilaginous fish populations in Israel; locating areas essential to them; research to evaluate applicable management and interface tools; socio-economic research	the Min. of Agriculture & Rural Development; academic and research institutes	Biological and ecological information; management and interface tools; relevant socio-economic information

	Current status	Action	Responsible institution/partner	Outcome
Research, monitoring and assessment	There are no estimates of stocks of cartilaginous fish	Conducting a stock and ecological assessment of the different cartilaginous species	the Min. of Agriculture & Rural Development; INPA; academia; environmental organizations; fishermen	Stock assessments for cartilaginous fishes
	Partial and incomplete data on cartilaginous bycatch in commercial fishing	Conducting surveys on large fishing boats, obligation to report on sharks & rays landings in all ports (harbors)	the Min. of Agriculture & Rural Development; Min. of Finance; INPA; academia and research institutes	Information on fishery pressure and effort; data on bycatch, data on catches and landings
	Almost no data has been collected on sport fishing of cartilaginous fishes	Monitoring of sport fishing of cartilaginous fishes, educating fishermen to report and identify these by species	the Min. of Agriculture & Rural Development; INPA; academia and research institutes	Information on fishery pressure and effort; data on bycatch, data on catches
	There is no National Action Plan for protection of sharks and rays	Assessing and updating the Action Plan every 4 years	entity coordinating the project, preferably led or supported by the government	A relevant and up-to-date Action Plan
Information and education	INPA started to prepare and distribute a guide to protected species in the Mediterranean	Producing species guides for fishermen	the Min. of Agriculture & Rural Development; INPA; environmental organizations	Reliable information of species distribution and fishing pressure
	INPA in collaboration with the Society for the Protection of Nature have started targeted advocacy actions	Focused activity with stakeholders	the Min. of Agriculture & Rural Development; INPA; environmental organizations	Creating awareness and support of activities to protect and rehabilitate for the long-term
	There is almost no advocacy activity on the subject targeting the wider public	Making information accessible to the public, to researchers and decision-makers	the Min. of Agriculture & Rural Development; INPA; environmental organizations	Heightened support and collaboration from the public, researchers and decision-makers
	There is almost no advocacy activity on the subject targeting youth	Educational activities for youth	Ministry of Education; the Min. of Agriculture & Rural Development; Ministry of environmental protection & INPA; environmental organizations	Creating awareness and support of protection and rehabilitation actions for the long-term

	Current status	Action	Responsible institution/partner	Outcome
Information and education	There are no coherent Citizen Science programs on the subject	Introducing Citizen Science programs	Environmental organizations; INPA; academia	Increasing the circle data collection; heightened awareness of the subject
Regional and international activities	There is no consistent collaboration on information transfer with entities from overseas	Sharing protocols and information from monitoring and research	the Min. of Agriculture & Rural Development; INPA; academia; environmental organizations	Collaboration and information from international environmental organizations, and researchers from other countries
	There is no collaboration on international research, monitoring, conservation and education programs	Promoting joint programs for research, monitoring and education	Academia; environmental organizations; the Min. of Agriculture & Rural Development; INPA; Min. of Education; Min. of Environmental Protection	Pooling of resources; exchange of information and methods; action at regional and international level
	Occurs on a small scale	Participation of stakeholders in international information-exchanging meetings	Academia; environmental organizations and community; the Min. of Agriculture & Rural Development; INPA;	Exchange of information and methods; creating the possibility of taking action at the regional and international level
	There is no national or regional center for research and conservation of sharks and rays	Establishment of a regional center for research and conservation of sharks and rays	Academia; INPA; environmental organizations;	Pooling of resources; exchange of information and methods; action at regional and international level
	There is no national Action Plan for protection of sharks and rays	Submitting an assessment reports every 2 years to FAO on progress in development, implementation and evaluation of the Plan	The entity coordinating the project	Defined objectives for the Plan; collaboration and support from the FAO and other international bodies

Table No. 4: Stages in implementation of the Action Plan according to proposed timetables

Area	Action / Months	1st Year				2nd year				3rd year				4th year			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Legislation, management and interface	Strengthening enforcement of the ban on fishing of cartilaginous fishes																
	Enforcement of ban to fishing of rays as well																
	Amending the Fisheries Ordinance and the Fishing Regulations																
	Taking technological and regulatory steps to reduce bycatch of cartilaginous fishes																
	Promoting approval and declaration of marine reserves that include in their footprint areas that are essential to cartilaginous fish																
	Developing 'catch & release' as a branch of sustainable tourism sport fishing																
Research, monitoring and assessment	Research on the biology and ecology of cartilaginous fish populations in Israel; socio-economic research																
	Monitoring of commercial fishing of cartilaginous fishes																
	Monitoring of sport fishing of cartilaginous fishes																
	Conducting a stock and ecological assessment of the different cartilaginous species																
	Assessing and updating the Action Plan every 4 years																

Area	Action / Months	1st Year				2nd year				3rd year				4th year			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Information and education	Production and distribution of species guides to the species fishermen																
	Focused advocacy activity with stakeholders																
	Making information accessible to the public, researchers and decision-makers																
	Educational activities for youth																
	Operating Citizen Science programs																
Regional and international activities	Sharing of protocols and information from monitoring and research																
	Promoting joint research, monitoring, conservation and education programs																
	Participation of stakeholders in international information-exchanging meetings																
	Establishment of a regional center for research and conservation of sharks and rays																
	Submission of an assessment report every two years to FAO on progress in development, implementation and evaluation of the Plan																

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Photography: Aviram Valdman, www.thetower.org/article/photos-worlds-beneath-the-sacred-waters,'Tower Magazine'

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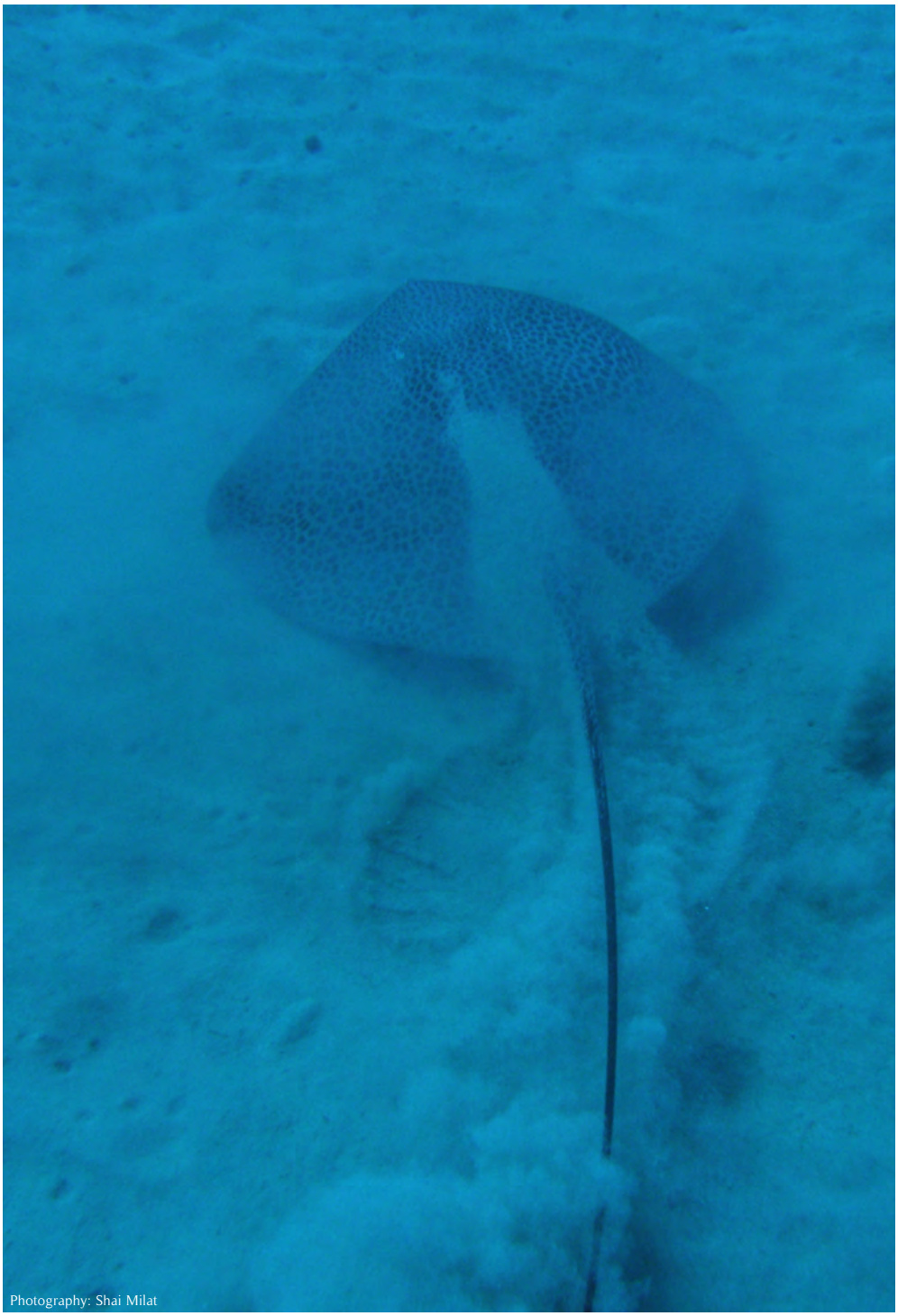

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Photography: Uri Ferro

Appendices

Appendix 1: Ecological status of sharks and rays in the Mediterranean

Status	English name	Latin name
DD	Bigeye Thresher Shark	*Alopias superciliosus*
VU	Common Thresher Shark	*Alopias vulpinus*
DD	Bignose Shark	*Carcharhinus altimus*
DD	Spinner Shark	*Carcharhinus brevipinna*
DD	Blacktip Shark	*Carcharhinus limbatus*
DD	Dusky Shark	*Carcharhinus obscurus*
EN	Sandbar Shark	*Carcharhinus plumbeus*
CR	Sand Tiger	*Carcharias taurus*
EN	Great White Shark	*Carcharodon carcharias*
VU	Gulper Shark	*Centrophorus granulosus*
VU	Basking Shark	*Cetorhinus maximus*
DD	Kitefin Shark	*Dalatias licha*
DD	Bramble Shark	*Echinorhinus brucus*
LC	Velvet Belly Lanternshark	*Etmopterus spinax*
VU	Whithound	*Galeorhinus galeus*
LC	Blackmouth Catshark	*Galeus melastomus*
VU	Sharpnose Sevengill Shark	*Heptranchias perlo*
NT	Bluntnose Sixgill Shark	*Hexanchus griseus*
CR	Shortfin Mako	*Isurus oxyrinchus*
CR	Porbeagle	*Lamna nasus*

Status	English name	Latin name
VU	Starry Smoothhound	*Mustelus asterias*
VU	Common Smoothhound	*Mustelus mustelus*
DD	Blackspotted Smoothhound	*Mustelus punctulatus*
EN	Small-tooth Sand Tiger Shark	*Odontaspis ferox*
CR	Angular Rough Shark	*Oxynotus centrina*
VU	Blue Shark	*Prionace glauca*
LC	Small Spotted Catshark	*Scyliorhinus canicula*
NT	Nursehound	*Scyliorhinus stellaris*
LC	Little Sleeper Shark	*Somniosus rostratus*
VU	Smooth Hammerhead	*Sphyrna zygaena*
EN	Piked Dogfish	*Squalus acanthias*
NE	Longnose Spurdog	*Squalus blainville*
CR	Sawback Angelshark	*Squatina aculeata*
CR	Smoothback Angel Shark	*Squatina oculata*
NT	Roughtail Stingray	*Dasyatis centroura*
DD	Blue Stingray	*Dasyatis chrysonota*
NT	common stingray	*Dasyatis pastinaca*
NE	Tortonese's Stingray	*Dasyatis tortonesei*
CR	Blue Skate	*Dipturus batis*
NT	Sharpnose Skate	*Dipturus oxyrinchus*

Status	English name	Latin name
CR	Spiny butterfly Ray	*Gymnura altavela*
DD	Reticulate Whipray	*Himantura uarnak*
EN	Sandy Ray	*Leucoraja circularis*
DD	Shagreen Ray	*Leucoraja fullonica*
NT	Cuckoo Ray	*Leucoraja naevus*
EN	Giant Devil Ray	*Mobula mobular*
NT	Common Eagle Ray	*Myliobatis aquila*
CR	Smalltooth Sawfish	*Pristis pectinata*
NE	Duckbill	*Pteromylaeus bovinus*
NT	Pelagic Stingray	*Pteroplatytrygon violacea*
LC	Starry Ray	*Raja asterias*
DD	Blonde Ray	*Raja brachyura*
NT	Thornback Skate	*Raja clavata*
LC	Brown Skate	*Raja miraletus*
LC	Spotted Ray	*Raja montagui*
NT	Speckled Skate	*Raja polystigma*
DD	Rough Ray	*Raja radula*
DD	Undulate Ray	*Raja undulata*
EN	Common Guitarfish	*Rhinobatos rhinobatos*
EN	Blackchin Guitarfish	*Rhinobatus cemiculus*
NT	Lusitanian Cownose Ray	*Rhinoptera marginata*

Status	English name	Latin name
CR	Bottlenose Skate	*Rostroraja alba*
DD	Round Fantail Stingray	*Taeniurops grabata*
LC	Spotted Torpedo	*Torpedo marmorata*
DD	Great Torpedo Ray	*Torpedo nobiliana*
LC	Ocellate Torpedo	*Torpedo torpedo*
NT	Rabbitfish	*Chimaera monstrosa*

Hebrew names marked with an asterisk* have been proposed by Dr. Danny Golani and the Society for the Protection of Nature in Israel and have not as yet been approved by the Academy of the Hebrew Language

KEY:
NE –Not Evaluated
DD – Data Defficient
LC – Least Concern
NT – Near Threatened
VU – Vulnerable
EN – Endangered
CR – Critically Endangered

Appendix 2: IPOA-Sharks guidelines for use in shark and ray National Action Plan assessment reports

Appendix B

SUGGESTED CONTENTS OF A SHARK ASSESSMENT REPORT

A shark assessment report should, *inter alia*, contain the following information:

- Past and present trends for:
  - Effort: directed and non-directed fisheries; all types of fisheries;
  - Yield: physical and economic
- Status of stocks
- Existing management measures:
  - Control of access to fishing grounds
  - Technical measures (including bycatch reduction measures, the existence of sanctuaries and closed seasons)
  - Other, such as monitoring, control and surveillance
- Effectiveness of management measures
- Possible modifications of management measures.

Appendix 3: IPOA-SHARKS guidelines for recommended elements in National Action Plans for the Protection of Sharks and Rays

Appendix A

SUGGESTED CONTENTS OF A SHARK PLAN

I. BACKGROUND

When managing fisheries for sharks, it is important to consider that the state of knowledge of sharks and the practices employed in shark catches may cause problems in the conservation and management of sharks, in particular:

- Taxonomic problems
- Inadequate available data on catches, effort and landings for sharks
- Difficulties in identifying species after landing
- Insufficient biological and environmental data
- Lack of funds for research and management of sharks
- Little coordination on the collection of information on trans-boundary, straddling, highly migratory and high seas stocks of sharks
- Difficulty in achieving shark management goals in multispecies fisheries in which sharks are caught.

Photography: Shai Milat

Photography: Aviram Valdman, www.thetower.org/article/photos-worlds-beneath-the-sacred-waters,'Tower Magazine'

II. CONTENT OF THE SHARK PLAN

The Technical Guidelines on the Conservation and Management of Sharks, under development by FAO, provide detailed technical guidance, both on the development and the implementation of the Shark plan. Guidance will be provided on:

- Monitoring
- Data collection and analysis
- Research
- Building of human capacity
- Implementation of management measures

The Shark plan should contain:

A. Description of the prevailing state of:

- Shark stocks, populations;
- Associated fisheries; and,
- Management framework and its enforcement.

B. The objective of the Shark plan.

C. Strategies for achieving objectives. The following are illustrative examples of what could be included:

- Ascertain control over access of fishing vessels to shark stocks;
- Decrease fishing effort in any shark where catch is unsustainable;
- Improve the utilization of sharks caught;
- Improve data collection and monitoring of shark fisheries;
- Train all concerned in identification of shark species;
- Facilitate and encourage research on little known shark species;
- Obtain utilization and trade data on shark species.

Photography: Aviram Valdman, www.thetower.org/article/photos-worlds-beneath-the-sacred-waters,'Tower Magazine'

Appendix 4: National Action Plans around the world for protection of sharks and rays

The US Action Plan

The US is ranked 8th in the world in the quantity of cartilaginous fishes that it catches – about 30 thousand metric tons annually, which is about 3.7% of the entire catch of cartilaginous fish globally[37,51].

The Magnuson-Stevens Act serves as the legal basis for fisheries management in the US. Fisheries management in US federal waters is carried out by Regional Fisheries Management Councils, whereas fisheries management in the coastal waters of the different States is carried out by the Fishing and Wildlife Authority of that State. These authorities developed, as necessary, regional and local plans for fisheries management under the supervision and guidance of the National Marine Fisheries Service. Since 2000 there has been a ban on shark finning at sea[51].

The US Action Plan for Conservation and Management of Sharks is not a binding legal document, but a document providing recommendations and suggestions for action to the Council, the regional committees and the state fisheries authorities.

Japan's Action Plan

Japan is ranked 9th in the world in the quantity of cartilaginous fishes that it lands annually – about 25 thousand metric tons, which is about 3% of the entire global catch of cartilaginous fish[37]. Many areas of Japan have a tradition of using products derived from the meat, skin and bones of sharks and fishing for the species is therefore relatively well developed. Bycatch and shark finning occur on a relatively small scale, mainly in the fishing of tuna and, as of 2008, the law bans finning at sea. The Japanese Ministry of Agriculture, Forestry and Fisheries is responsible for the supervision of fishing and in 2001 developed a National Action Plan for Conservation and Management of Sharks[30].

The UK's Action Plan

About 13,000 metric tons of cartilaginous fish are landed annually in the UK, approximately 1.6% of the entire global catch of these species[37]. It is however known that the data on the catch is not accurate and a large part of the catch is probably not reported[23]. The UK Action Plan for Conservation and Management of Sharks was drawn up and published in 2004 by the Joint Nature Conservation Committee (the JNCC), the advisory body to the British Government on conservation matters. Defra – the Department of the Environment, Food and Rural Affairs, in collaboration with the relevant authorities in Wales, Scotland and Northern Ireland, and with the 12 regional fishing authorities, is responsible for operation of the Plan. The Plan recommends

actions on key relevant aspects, focusing on management of fishing in the territorial waters of Britain, as well as management of fishing in the open sea, which is under the responsibility of the European Union.

Australia's Action Plan

The volume of shark fishing in Australia is relatively small: about 9,000 metric tons are landed annually. However, the bycatch is significant and it is neither documented nor quantified[6-7,37]. The Department of Agriculture, Fisheries and Forests in Australia has developed the Australian Action Plan for Conservation and Management of Sharks and is responsible for its implementation through committees operating in the various states and territories of Australia.

In similar manner to the US Action Plan, Australia bans the fishing of specific species of endangered sharks prohibits the removal (finning) of shark fins at sea in most regions. The Plan has no legal status but is based on existing laws at the federal and the state level, and serves as a recommendations and guidelines document only. The Plan started to operate in 2004 and was updated in 2012.

The European Union's Action Plan

The total catch of cartilaginous fishes of the EU countries is about 100,000 metric tons annually, approximately 12% of the entire global catch of these species. The EU is one of the largest shark fin providers in the world to South East Asia[25]. Fishing is carried out all over the world – in the Atlantic Ocean, the Mediterranean, the Indian Ocean and the Pacific Ocean. Relevant legislation for protection of cartilaginous fishes exists in the EU, and as of 2003 there is a ban on EU vessels and on the vessels of all nations in European waters to perform the removal of sharks' fins at sea[11]. However, the continued thinning of cartilaginous fish populations in the European fishing areas and in the world have raised the urgent need for preparation of an integrative, broad and effective plan and management and protection of cartilaginous fishes, which was published in 2009[46].

An Action Plan for the Mediterranean

The total catch of cartilaginous fishes in the Mediterranean is about 7,000 metric tons annually, without the incidental catch that is thrown back into the sea, which according to estimates accounts for about 50% of the catch[9]. The Action Plan for Conservation and Management of Sharks in the Mediterranean was prepared by the Regional Action Center for Specially Protected Areas (RAC/SPA), which is operated in the framework of the Mediterranean Plan of UNEP and in collaboration with IUCN. The Plan was adopted in 2003 by the member countries of the Barcelona Convention. As part of the implementation of the Plan, RAC/SPA published guidelines and assessments, such as guidelines on how to reduce bycatch when fishing[39] and assessment of the ecological status of cartilaginous fishes in the Mediterranean[38]. The Plan focuses mainly on research and evaluation, education and information, prevention of removal of shark and ray fins, embedding systems to reduce bycatch and coordination between legislation and activity to conserve cartilaginous fishes at the national level and to regional and international agreements and activity on the issue.

[xi] Council Regulation (EC) 1185/2003 on the removal of shark fins on board vessels.

Photography: Aviad Scheinin

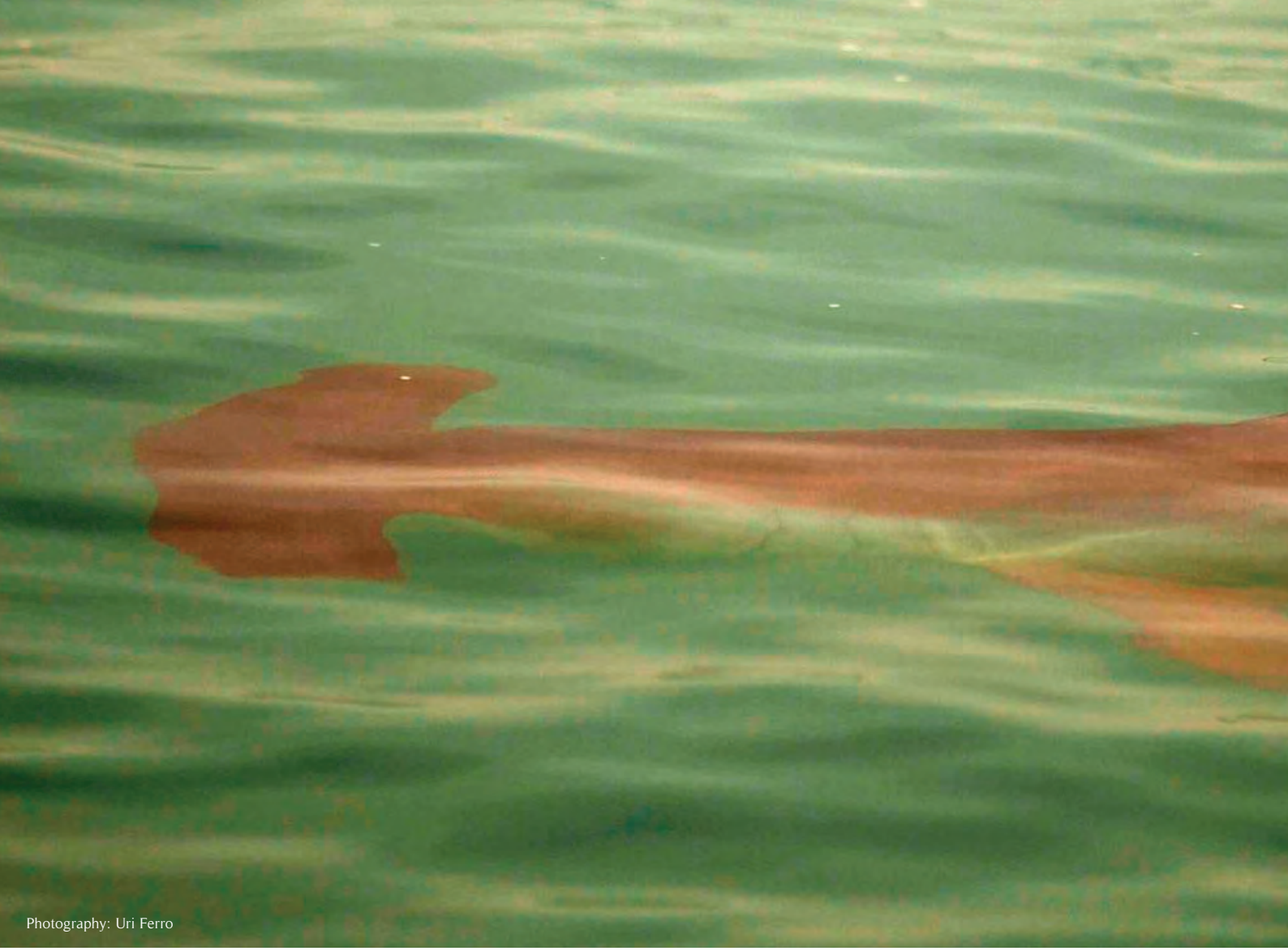
Table No. 5: Summary of activities (by topic) included in a sample of national and regional action plans for the protection of sharks and rays:

Area	Action	US	UK	Japan	Australia	EU	Plan for Med
Monitoring and research	Promotion of research on biology, ecology, habitats, reproduction and distribution of species and populations	X	X	X		X	X
	Collection of detailed information of fishing catch on the docks (targeted fishing & bycatch)	X	X	X	X	X	X
	Collection of information on trade in cartilaginous fishes	X	X		X	X	
	Collection of information on 'hidden' mortality	X			X		
	Collection of information on fishing pressure	X	X				
	Improvement in collection of information on sport fishing				X	X	
	Collection of information on throwing back into the sea	X	X				
	Research into economic and social impacts of actions to conserve and manage cartilaginous fishes			X			
	Improvement in collection of information on native species				X		
	Development of methods to reduce bycatch and mortality	X					

Area	Action	US	UK	Japan	Australia	EU	Plan for Med
	Coordination and harmonization of research and monitoring methods and formats				X		
	Operation of up-to-data databases on catches				X		
Assessment	Assessment of status of populations and habitats	X	X	X	X	X	X
	Assessment of the effectiveness of plans in operation	X	X	X	X	X	X
	Development of Indices of distribution according to the criteria of IUCN & CITES		X				
	Evaluation of seasonal and spatial interface (of areas where fishing is prohibited)	X					
	Identification of gaps in information		X				
	Assessing methods for reducing bycatch and mortality	X					
	Assessing a quota system for sustainable fishing of deliberate, unintentional and bycatch of cartilaginous fishes	X					
Legislation	Updating the list of protected species according to local status and in accordance with international conventions		X				X
	Prohibition on finning at sea	X	X	X	X	X	X

Area	Action	US	UK	Japan	Australia	EU	Plan for Med
Management and interaction with and among parties working to protect sharks and rays in the Mediterranean	Preventing bycatch through technical and regulatory means	X	X	X	X	X	X
	Preventing finning at sea	X	X	X	X	X	X
	Determining times and spatial limits for fishing ban/s	X	X			X	X
	Using fishing quotas	X	X			X	
	Reducing the fishing fleet	X	X			X	
	Minimum/maximum size of fish	X	X				
	Establishing a forum of stakeholders and experts to develop, apply and asses the Plan		X	X		X	
	Training specialists					X	X
	Creating programs for species' rehabilitation		X		X		
	Improving coordination of actins between different regions			X			
	Improving the interface with sport/ recreational fishing			X			
	Placing of inspectors on large fishing vessels					X	
	Reducing 'hidden mortality'				X		
	Using economic methods to influence the trade in cartilaginous fish					X	
	Adjusting existing fisheries management to cover fishing of cartilaginous fishes						X

Area	Action	US	UK	Japan	Australia	EU	Plan for Med
Education & advocacy	Development of species guides and additional means to assist in identification of species	X	X	X	X		
	Programs to disseminate information to commercial and sport fishermen	X		X	X	X	X
	Advocacy and transfer of information to the general public	X		X	X	X	X
	Bringing information to the attention of relevant stakeholders		X	X			
International activities	Reporting to the FAO	X		X		X	
	Regional and international activity coordination		X	X		X	X
	Coordinating and transferring regional information		X	X		X	X
	Activity in relevant international forums	X		X		X	X
	Development and promotion of sustainability methods and programs				X	X	
	Updating of the list of protected species in international conventions		X				



Photography: Uri Ferro

About the EcoOcean Association

EcoOcean is a nonprofit association. The Association, which was founded in 2002 by a group of scientists and environmentalists, is today one of Israel's leading organizations dedicated to conservation of marine and coastal environments.

The Association's goals promote conservation of coastal and marine environments in our region by advocating marine research and education, and engagement with the wider community.

EcoOcean operates the R/V Mediterranean Explorer, a research vessel that supports research studies aimed at expanding knowledge and enhancing the state of the marine and coastal environment. It is also a key element in stimulating cooperation among researchers from different countries.

In education, the Association operates the 'Megalim Center' - an educational "discovery" center that teaches marine and environmental sciences at Kibbutz Sdot Yam. The Association runs a variety of educational programs at Megalim on marine and environmental topics. These are aimed at a wide range of audiences: lectures, field trips, research studies, study days and seminars, a variety of sea and beach activities, and more. EcoOcean runs an annual education program on the marine environment in schools across the country, working in collaboration with the Ministry of Environmental Protection, the Green Network, and other entities and organizations.

In terms of cooperation within the community, EcoOcean is the Israeli representative of the Foundation for Environmental Education (FEE), running its global Blue Flag program. The Blue Flag is an eco-label awarded to bathing beaches and marinas based on strict criteria on environmental education, seawater quality, services to the public, and environmental management.

Other programs operated by EcoOcean on behalf of FEE include 'Young Reporters for the Environment', which promotes involvement of youth in environmental issues through journalistic tools, and the Green Key program, which is an eco-label for the hospitality industry.

The Association is also active in the community, where it runs groups of volunteers and high-visibility public campaigns on the major issues that have an impact on the marine environment: marine debris, protection of marine animal species and habitats, and more.

EcoOcean also promotes international partnerships in education, research and environmental conservation. In this context, the Association is a member of, and active partner in, consortia, forums and international networks such as Mare Nostrum, MedPan, MIO-ECSDE, and others. The Association runs international programs for schoolchildren and students in collaboration with organizations and research institutions around the world.