Profile of the Small-Scale Fisheries of Cyprus – with a Focus on Chrysohou Bay

LOW IMPACT FISHERS OF EUROPE

AP MARINE
Environmental Consultancy Ltd

MAVA
FONDATION POUR LA NATURE

Profile of the Small-Scale Fisheries of Cyprus – with a Focus on Chrysohou Bay

AUTHOR

Dona Englezaki

Credits

Author:
Dona Englezaki

-

Information was gathered working with the fishing communities between 2021 and 2022, while working under the project "Empowering the legacy of MAVA Mediterranean Partnership: Scaling up co-managed and financially sustainable No Take Zones/Marine Protected Areas" (2020-2022), financed by the MAVA Foundation

-

Recommended Citation:
Eglezaki, D. 2022 "Profile of the small-scale fisheries of Cyprus, with a focus on Chrysohou Bay", published by the Low Impact Fishers of Europe.

Contact e-mail:
deputy@lifeplatform.eu

-

OCTOBER - 2022

TABLE OF CONTENTS

Introduction

Description of the area – Cyprus – Chrysochou Bay

Cyprus is located in the Eastern Mediterranean (EM) and in the Levantine Sea which is one of the world's most oligotrophic seas, with very low nutrient availability resulting in a very low primary production and Sea Surface Temperature (SST) of 29-30°C in the summer period. In general, the Levantine Sea is characterized by very high temperatures ranging on an annual basis from 16 ° C in winter period up to 26 ° C in summer period. Respectively, the evaporation and salinity are also high (annual average salinity of the EM >37.5 Practical Salinity Unit (PSU), average salinity in the coastal

waters of Cyprus 39.1 PSU), as well as very limited inflow of fresh water due to lack of large rivers (Department of Fisheries and Marine Reasearch, 2022).

Cyprus has no rivers with a long-lasting flow, and the construction of many rivers and torrent water retention barriers (dams) further restricts the supply of coastal waters with nutrients, while the construction of the Aswan Dam in 1960, further reduced nutrient deposits to the coasts. Additionally, coastal upwelling in the Levantine Sea are generally weak, with deep-water nutrients not being available in the photic zone for the primary production (Department of Fisheries and Marine Reasearch, 2022).

In an attempt to ensure the viability of the coastal fishing of the island, the Department of Fisheries and Marine Research (DFMR) maintains and manages a total of 16 fishing shelters for the safe mooring of professional fishing boats. Out of the 16 fishing shelters in operation in Cyprus, 13 are managed by the DFMR while the other three, the Old Limassol Port, part of the Pafos Port and part of the Latsi Port are managed by the Cyprus Ports Authority (CPA) (Department of Fisheries and Marine Research, 2009).

The Fishing Shelter Law and relevant Regulations apply for all fishing shelters as well as their surrounding area within a 100m radius. In the area of Larnaca to Famagusta there are shelters in Agia Triada, Paralimni, Agia Napa, Potamos Liopetriou, Xylofagou, Ormidia, Xylotymbou, Larnaca and Zygi. In the area of Limassol there are the fishing shelters of the old port of Limassol and Akrotiri. In the area of Paphos, part of the port of Kato Paphos, the fishing shelter of Agios Georgios Pegeias, part of the port of Latsi, the fishing shelter of Pomos, and in the District of Nicosia, the fishing shelter of Kato Pyrgos (Department of Fisheries and Marine Research, 2009).

The port of Latsi, as well as the fishing shelter are located at the east of Polis Chrysochous and at the northern entrance to Akamas peninsula National Park, one of the most interesting areas of Cyprus, in terms of flora and fauna. Previously, the port was used only by fishing boats, but the development of maritime tourism forced the expansion of the port with the construction of a new outer basin by the CPA. The new basin only serves pleasure boats and has all the services offered by a marina while the old basin still serves fishing boats. Following an agreement with the Government, DFMR undertakes the management of the old basin (Cyprus Port Authority, 2022).

Chrysochou Bay

Chrysochou Bay and its surrounding is the area of interest for this report (Figure 1). Akamas peninsula is located in the north western side of Cyprus and adjacent to the north coast is Chrysochou bay. The Chrysochou Bay, includes the Akamas Natura 2000 area, the Polis-Yialia Natura 2000 site and since 2019 the Kakoskali Marine protected area (MPA) which was created by ministerial decree with the objective to create essentially a fish no take zone (NTZ). This area includes important nesting beaches for green and loggerhead turtles and also caves on the rocky shore in which monk seals rest and breed. Furthermore, it includes Vermetus (Dendropoma) reefs and extensive seagrass meadows (*Posidonia oceanica*). The Chrysochou Bay, and in particular the Polis-Yialia Natura 2000 site is very important for loggerhead turtle mating and nesting, for mating and for foraging of juvenile and adult green turtles, as well as for the existence of extensive Posidonia meadows (GC- Marine Environmental Consultancy and Certification, 2020).

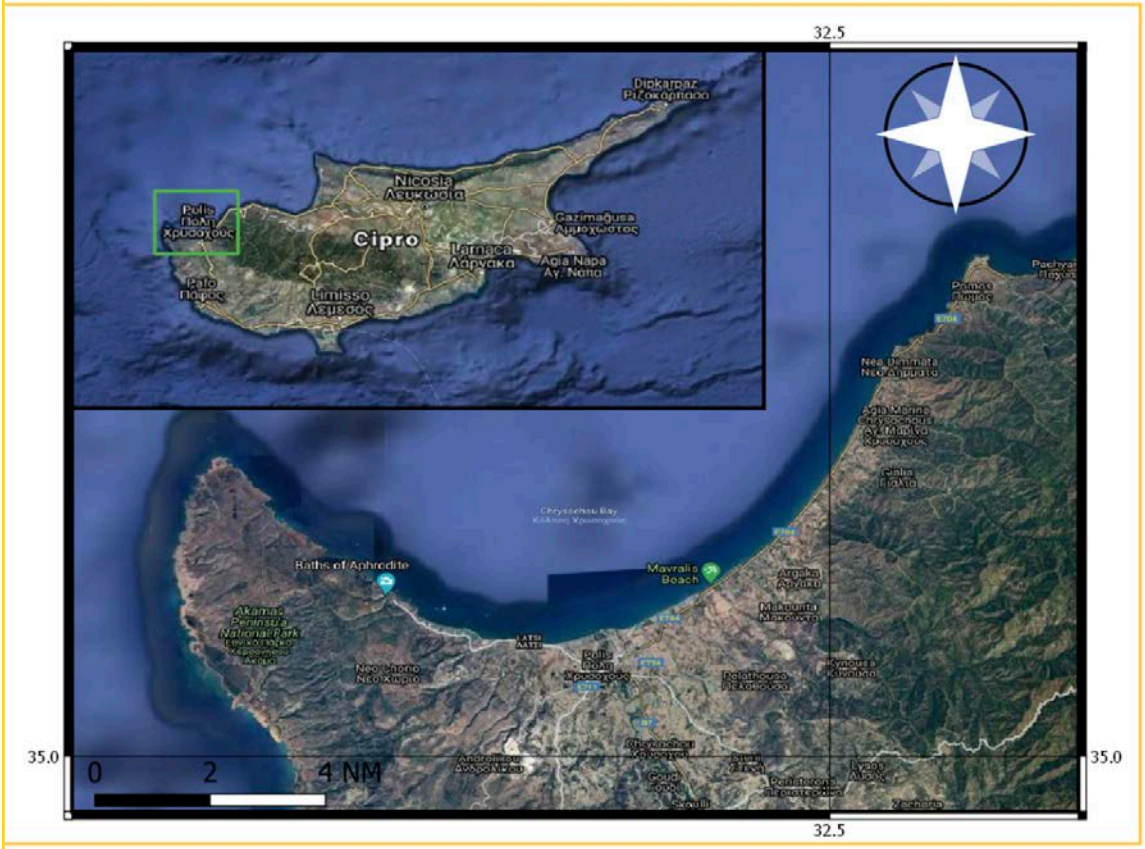
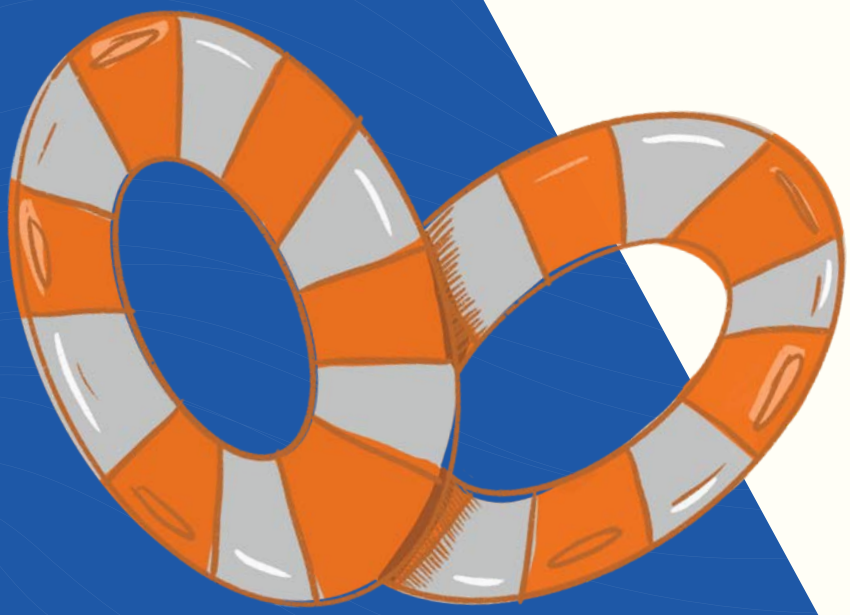


Figure 1: Map of Chrysochou Bay and Cyprus Island. (GC- Marine Environmental Consultancy and Certification, 2020)

CHAPTER 01

Uses, users of the area and Conflicts



PROFILE OF THE SMALL-SCALE FISHERIES OF CYPRUS – WITH A FOCUS ON CHRYSOHOU BAY

1. Uses, users of the area and Conflicts

According to the Maritime Spatial Planning (MSP) project 'THAL-XOR' report 2015, the coastal zone of the Republic of Cyprus (RoC) is mainly crowded and faces increasing pressure from various sources. The main activities within the Cypriot coastal zone are: i) tourism (coastal cruising and yachting); ii) maritime transport; iii) fishing and marine aquaculture; and iv) energy (hydrocarbon and offshore energy production from renewable sources) and raw materials (desalination) (Maria Hadjimichael, 2020).

This report will concentrate on only the main two categories of tourism (coastal, cruising and yachting) and fishing and marine aquaculture, since the reported area is not affected by maritime transport or the energy sector. The reported area has many users, but its busiest time of the year is in summer because of the touristic period. The main users of the area are small scale fishermen, polyvalent fishing vessels, trawlers, recreational fishermen, leisure boats, watersports and rental tourist boats.

Fishers used to be the main stakeholders of the sea in terms of the use of space and marine resources, although since the end of the 1990s, the economic seascape has started to change rapidly (Maria Hadjimichael, 2020). More economically important sectors, such as large-scale fisheries (LSF), marine aquaculture, offshore oil and gas extraction, recreation and tourism activities, have expanded, leading to lack of space for small-scale fishers with potentially serious impacts on their livelihoods (Maria Hadjimichael, 2020).

Cyprus fishing fleet is divided into the following main fleet sectors, established by Cypriot Fisheries Law, Chapter 135, Annex II, Article 13. These sectors are: (i) small-scale inshore vessels composed primarily of small fishing vessels (less than 12 m) that use seasonally deployed passive gear, (ii) polyvalent fishing for pelagic species, fishing within or outside RoC territorial waters, with an overall length 12–24 m, (iii) coastal bottom trawlers, operating within the territorial waters of the RoC (CyLaw, 2022).

According to the Cyprus Fisheries Law 135, limited number of licenses are given annually for the small scale fisheries

(SSCF) and they are divided into three subcategories: vessels with fishing license category A' (full-time activity in fisheries), vessels with fishing license category B' (part-time activity in fisheries) and vessels with fishing license category C' (periodic activity in fisheries). The professional fishing license category (C') was introduced by a new national law in 2007. Based on this law, their fishing activity is performed on a periodic basis since they are allowed to fish only a total of 70 days each year. ((European Commission; Joint Research Centre; Scientific Technical and Economic Committee for Fisheries, 2021) (STECF 21-08)).

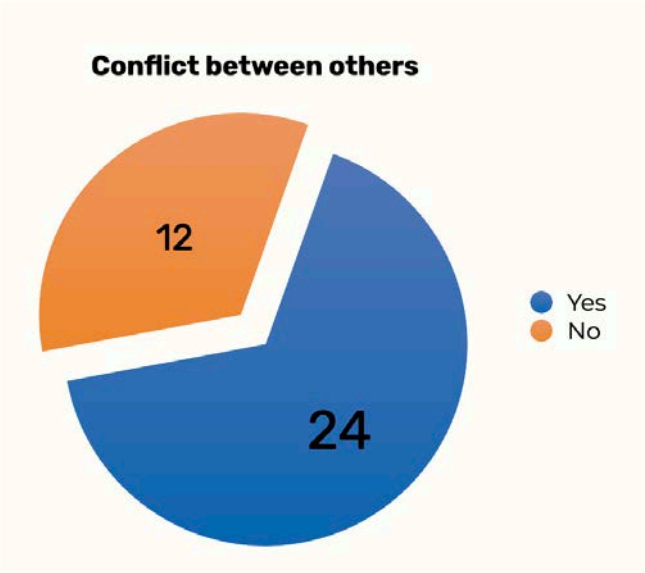
Based to the DFMR reports, there are 39 registered boats on Lachi port (Papageorgiou, Papadopoulou, & Hadjioannou, 2020) and for the purposes of this report 36 fishermen were interviewed through questionnaire. The president of the local fishermen association provided us a list of 42 possible interviewees which included professionals A and B/recreational fishers/assistants/co-owners and some other fishermen from another area who are also fishing in the reported area. From the 36 fishermen that were interviewed 35 were professionals - category A, B and polyvalent, 1 recreational, 1 assistant, 1 co-owner and 1 from another area. As for their profession, 20 interviewers make their living only from fishing while the rest have a second job.

As described above, apart from small-scale fisheries, the Cypriot fisheries contain the trawl fishery and the multipurpose/polyvalent fishery. Since June 2013, two purse seiners have also received a license to operate in Cypriot waters and are included in the sector of multipurpose/polyvalent fishery (one is currently active). The re-introduction of the purse seiners led to the reaction of small-scale fishers who protests outside the Cypriot Parliament in June 2013 claiming its prohibition (Maria Hadjimichael, 2020).

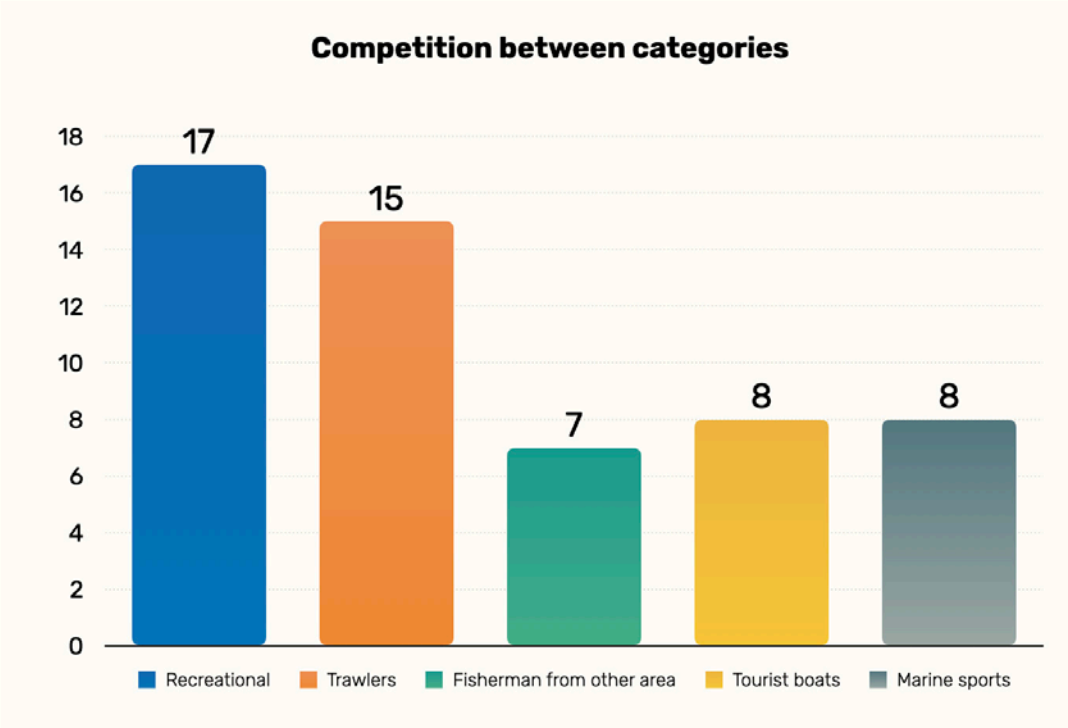
Recreational fishing is also an important activity both in terms of number of those involved and fishing effort and has economic, social and cultural significance. The DFMR is issuing approximately 450 licences for recreational fishers, while it is estimated that hundreds of others fish with rods and lines without a license. Additionally, there are more groups of recreational fishers which include some fishers holding Category C license and some spear fishers. (Maria Hadjimichael, 2020).

The rise of tourism, started from the 80s, appears to have influence over the fishers, especially those who are based close to tourist resorts such as Ayia Napa, Protaras and Paphos (including Latsi – Chrysohou Bay). On one hand, tourism can be seen as a sector potentially affecting the fishers positively, if exploited the right way (i.e., fishing tourism). On the other hand, tourism could also have negative effects, depending on the kind of tourist development. (Maria Hadjimichael, 2020). For example, the lack of marine policing in the area creates multiple conflicts between the users especially from the fisher's point of view. Some of the interviewees stated that rental speed boats or waterspots in summer period come very close to their working area creating problems with their nets or even creating massive waves because of their speed. which creates the fear of sinking the boat.

The interviews showed that conflicts and competition between the user takes place all year along. This is due to different reasons such as (Graphs 1 and 2). Several fishermen stated that the most common problem of the area is the uncontrollable situation with recreational fishermen and the trawler activity. In addition, since the reported area is very touristic during the summer period, competition between users is very high leading to numerous/multiple problems.



Graph 1: Interviewees opinion about conflicts. Collected from fishers for this study (2022).



Graph 2: Interviewees opinion about competition between categories. Collected from fishers for this study (2022)

The introduction of Category C in SSCF sector, made the fishers of the island more concerned about the competition between them, as they compete for the same resources. Also, as fisherman stated, their boats are similar in size and power, but sometimes wealthy recreational fishermen own boats that are more powerful than the small-scale fishers and with more advanced technology. The lack of controlling the activity on the part of the recreational fishers, who sometimes illegally sell their catch to fish markets or restaurants for a lower price, does not minimise the conflicts between them.

As it mentioned above, some recreational fishermen have the ability to buy more advanced technology to support their fishing activity, thus they fish in easier ways in the area. In addition, they go for fishing only on targeted periods during the year and as a result they do not have as many damages on the nets as the professional fishermen have. According to Hadjimichael,2020, the official statistics, shows that recreational fishery captures approximately 15% of the total Cypriot catch. Moreover, spear fishing in particular has gained popularity amongst both locals and tourists alike and there

are fears that beginner spear fishers kill a high proportion of coastal juvenile fish.

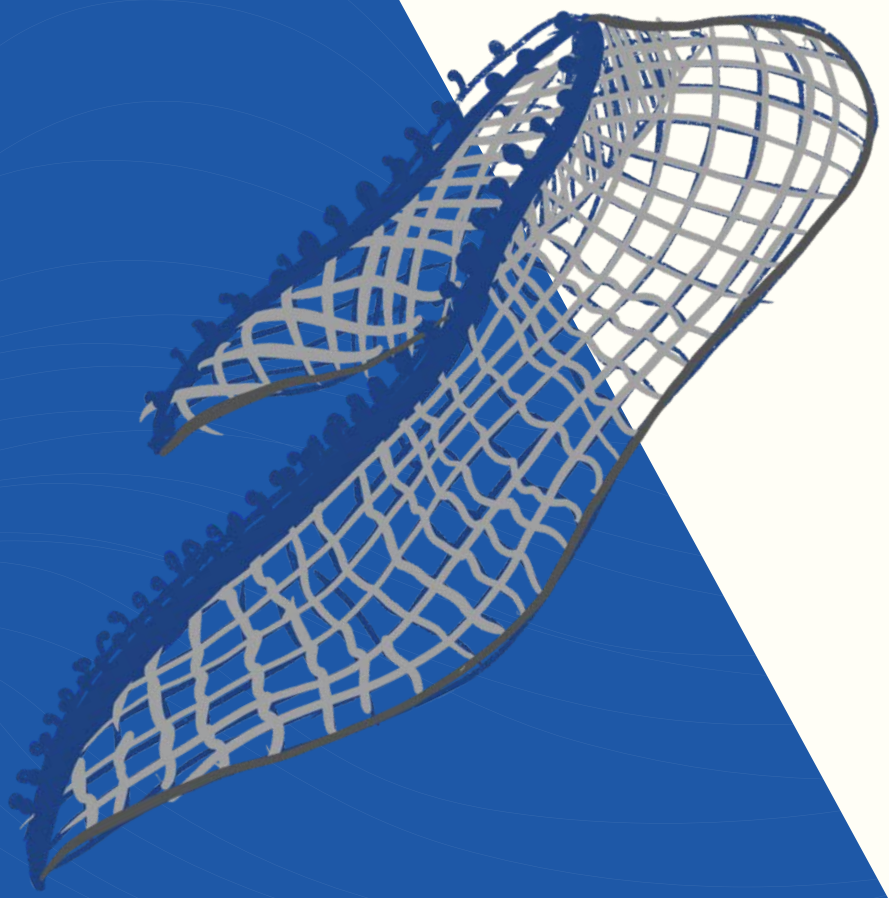
Another conflict that arises from the lack of marine policing is that recreational fishermen sometimes can fish in restricted areas and fishermen are often afraid to report it because of retaliation.

Additionally, SSCF also compete in terms of primary resources with the purse seiners since they both particularly target bogue (*Boops boops*), as well as other species, which is a highly prized commercial species in the RoC.

Trawlers activity plays a major role on the fishing community of the area, causing competition and conflict. A study made for this matter on behalf of the fishermen of the area, financed by the LIFE organisation regarding the ongoing project called 'A Co-Managed No Take Zone Project in Chrysochou Bay' , (GC- Marine Environmental Consultancy and Certification, 2020), showed that the Chrysochou bay, specifically, is the area where the trawling activity is likely to cause the largest habitat disturbance. As this study shows the restriction of bottom trawling in Chrysochou Bay is strongly supported by local fishers and their communities. In addition, fishermen believe that its closure would benefit them, especially in regards to the increasing the status of various fish stocks in the bay. This vies is supported by another study made in the area (PROTOMEDEA, 2019) that showed that in Chrysochou Bay there is an important fishing activity carried out by small scale fleets, who can benefit from the bottom trawl ban.

CHAPTER 02

Fishing activities in the area



PROFILE OF THE SMALL-SCALE FISHERIES OF CYPRUS – WITH A FOCUS ON CHRYSOHOU BAY

2. Fishing activities in the area

The Cypriot fishers' sector is led by small-scale vessels that generally use a variety of fishing gears on the same fishing trip. The fleet capacity of Cyprus in 2020 contained 864 registered vessels with a combined gross tonnage of 3 900 GT and total engine power of around 41 000 kW ((European Commission; Joint Research Centre; Scientific Technical and Economic Committee for Fisheries, 2021)(STECF 21-08)).

Table 1. General description of the Cyprus fishing fleet (2010-2020)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
No. of vessels	1013	1079	1082	1001	951	905	838	817	822	858	864
of which inactive	104	122	175	68	97	65	70	64	54	84	79
Tonnage (GT)	4400	4101	4043	3384	3511	3625	3390	3505	3684	3812	3918
Engine power (kW)	44380	45881	45908	41515	41111	41227	36393	37686	39226	40801	40976

Table 1: General description of the Cyprus fishing fleet 2010 – 2020 (Department of fisheries and Marine Sesearch, 2021).

It represents the 95% of the total fleet of the island both in 2019 and in 2020 regarding the number of vessels and employment, the 32% of the total weight of landings and the 45% of total value of landings in 2019. Their fishing area is close to landing points (less than 12 n.m.) and they mostly use one or more passive gears in the same fishing trip. The main type of gears used are trammel nets (GTR), set gillnets (GNS) and set longlines (LLS). ((European Commission; Joint Research Centre; Scientific Technical and Economic Committee for Fisheries, 2021)(STECF 21-08)). The table 2 below shows detailed information regarding the numbers of licenses issued in 2018/2019, and the type of gear used by each category (Maria Hadjimichael, 2020).

Table 2. Types and numbers of fishers active in Cyprus waters

Category	Specifications	Gear	Number of licences[a]
Small-scale (A & B)[a]	Boats smaller than 12 metres. Category A: Full-time fishers	Seasonal passive gear (gillnets, longlines, pots etc)	327 (according to law up to 500 licences can be issued)
	Category B: Part-time fishers		
Trawlers (inshore)[b]		Trawler	2
Multipurpose/Polyvalent[b]	Boats 18–24 m	Longlines, bottom longlines, gillnets	35
Mediterranean fishing (operates beyond the 200 nm and within the Mediterranean Sea)[b]			9
Purse seiner[b]		Purse seiner	2
Category C (with boat)[c]	Professional fishers with licences to fish over the weekend and bank holidays	Gillnets of up to 600 m	450
Category C (cast net)[c]	Professional fishers with licences to fish over the weekend and bank holidays		300
Rod and line	No licence required		Estimated at hundreds of fishers

a,b,c The data have been compiled using the latest announcement by the DFMR on licence applications/ renewals (Maria Hadjimichael, 2020)

Table 2: Types and numbers of fishers active in Cyprus waters

Fleet related to target species

As mentioned above, Cyprus's fishing sector is represented by small scale fishing sector (coastal), polyvalent fishing sector and trawlers sector.

Coastal fishing is operating with small, wooden boats, 4 to 12 meters long and the fishermen of this category use mainly bottom set longlines and static nets including trammel nets, monofilament nets and gillnets. (European Commission; Joint Research Centre; Scientific Technical and Economic Committee for Fisheries, 2021)(STECF 21-08).

Static nets target a variety of demersal fish such as the red mullet, striped red mullet, common pandora, bogue, picarel, white seabream, sand steenbras, Mediterranean parrot fish, dusky spinefoot, blotched picarel, common dentex, dusky grouper, red porgy and cuttlefish as well as some epibenthic and pelagic fish such as the greater amberjack, bullet tuna, horse mackerel and round herring. Bottom set longlines tar-

get usually large predatory fish like the dusky grouper, common dentex, red porgy and common pandora. (European Commission; Joint Research Centre; Scientific Technical and Economic Committee for Fisheries, 2021)(STECF 21-08).

Polyvalent fishing sector operates with boats over 12 meters long. This category is using all the above-mentioned gears and in addition they use surface drifting longlines targeting demersal and pelagic species like swordfish and albacore tuna. (European Commission; Joint Research Centre; Scientific Technical and Economic Committee for Fisheries, 2021) (STECF 21-08).

Bottom trawling sector operates with iron boats over 18 meters long. The trawl nets are cone-shaped nets which are dragged by the fishing boat. At the beginning of the net there are two ropes (one on the right side and one on the left side) which are tied to iron doors - left and right of the boat. While fishing, the trawl net lies on the bottom of the sea and collects the catch at the end of the net (bag that has smaller mesh size). The target species are mostly mix of demersal species. (Food and Agriculture Organization of United Nations, 2022).

For the purposes of this report, through interviews, it was transmitted that the fishermen of Chrysohou's Bay are SSCF which use wooden boats smaller than 12 m. Some fishermen are using boats made from fiberglass. It is also noted that fishers of the area are not using a variety of type of fishing gears. Some stated that they only deal with static / bottom set nets because it's more easier now days rather than using other types of gear. The most common fishing gear are the static nets like gillnets and trammel nets, with a variety of mesh size, depending on the targeted species and in accordance with season, pots, set longlines, troll lines and pole lines. Many fishershave mentioned that they are using monofilament 38mm mesh size nets for *Boops boops* and38mm nylon nets for *Mullus* species. In terms of fishing, they most target breams and rockfish. Others are also using set longlines, hand lines and pole lines on downriggers and mechanised Troll lines. Fishermen who use these type of gears are also using fishing bait like *Sarda sarda, Octopus vulgaris, Loligo vulgaris, Spicara smaris, Scomber colias, Sardina pilchardus, Tunnus alalunga, shrimps, Sepia officinalis, Sardinella aurita, Trachurus trachurus* and Ilex. Some of them are also using *Scomber colias* and *Boops boops* as bait for the Troll line gear

and some others are using Sepia officinalis and fake bait for the Squid-jiggers gear. (Iwannou G. & Michailides N, 2011).

Methods used by fishers of the area:

Fishing location and fishing trips of the area

Most fishers of the reported area come from a long line of fishers (2nd, 3rd and 4th generation of fishers). This was the main reason behind their professional engagement. Fishers stated that their involvement started from a very young age (7 or 10 years old) since their father or mother was taking them on fishing trips. Most of the fishers that have been interviewed for this report, stated that they follow the same method as their mentor, fish in the same location as their mentor and also owned their mentor's boat.

There are also some fishers who, even though they have learned how to fish from their family/mentor, did not follow the same method of fishing since the technology changed rapidly. A fisherman stated that technology made their life easier. For example, in the old days they used to throw a 'sound line' into the sea in order to check the depth, but nowadays sonar equipment is installed inside the boat. Furthermore, in the past they used to lift the nets by hand, but now they have net hauler/ winch instead. Another reason for not following the same fishing methods as in the past is because their mentor used to be in a different sector, like the SSCF sector or the recreational sector, while they decided to follow the Polyvalent sector and vice versa.

As for fishing locations, even if the fishers have followed their mentor's steps, fishing locations have changed throughout the years. A lot of statements have been made on this subject. One statement that is worth mentioning is that fishers have changed their mentor's location because of the low fish stock in that specific area. Moreover, some fishers moved to other cities resulting in new fishing locations.

The duration of a fishing trip depends on the fishing location, the targeted species and on seasonality. According to fishers, the duration of their fishing trip is usually between half day and one day in total, with a maximum of one overnight stay at sea. The most common substate fishermen use is rocky areas, mud areas and sandy areas.

Description of fishing gears of the area

Gillnets GNS:

Fishermen put their nets either on a straight line when the bottom is rocky or in a lot of depth, or in a zig-zag formation when the bottom is flat or in shallow depth. At the beginning and at the end of the nets they place a buoy. These types of nets are monofilament, a single sheet of net of sizes >38mm so fish can get caught in the net mesh. 1 unit is equated to 200m. Generally they are set in different fishing grounds depending on the targeted species.

- Category A: The maximum allowance for units are 12 monofilament units and up to 2400m in total.
- Category B: The maximum allowance for units are 12 monofilament units and up to 2400m in total.
- Category C: Not permitted

(European Comission, 2022) , (Department of Fisheries and Marine Reasearch, 2009) (Collected from fishers for this study (2022))

Trammel nets – bottom set nets (GTR):

Fishermen put their nets either on a straight line when the bottom is rocky or in a lot of depth, or in turns when the bottom is flat or in shallow depth. At the beginning and at the end of the nets they place large, floated objects. These nets have 2 extra layers of sheet with bigger mesh size than the main one. The main one is in the middle while the extra layers are set on the right and left of the main mesh. Set in different fishing grounds depending on the targeted species. 1 unit is equated to 200m.

- Category A: The maximum allowance for units are 23 units of bottom set nets and up to 4000 meters. When another licensed person or a helper is on board, then the maximum allowance units are 28 and up to 5000 meters.
- Category B: The maximum allowance for units are 17 units of bottom set nets and up to 3000 meters.

- Category C: The maximum allowance for units are 4 units of bottom set nets, up to 800 meters and mesh size 38 millimetres and above.

(European Comission, 2022), (Department of Fisheries and Marine Reasearch, 2009), (Collected from fishers for this study (2022))

Bottom longlines (LLS):

Set in different fishing grounds depending on the targeted species. Longlines are traditionally long continuous monofilament mainline that every 2-4 meter has a side-line or gangion with a baited hook attached to it. The longline is placed inside a big pot/basket and the hooks are stabilised on to a plastic rim on the top of the pot, so as to not get tangled with the line. The hooks are usually baited beforehand so setting the longline can be done quickly. At the beginning and at the end they also place buoys. Longlines are usually set on the bottom.

- Category A/B: the maximum hooks fishermen can use are 1000 per person on board with total limit of 5 000 hooks per vessel.

- Category C: two bottom lines with more than two hundred (200) hooks each.

(European Comission, 2022), (Department of Fisheries and Marine Reasearch, 2009), (Collected from fishers for this study (2022))

Pots/traps (FPO):

Generally, pots are traps with usually one or in some cases two entrances. Fishermen place their pots at shallow waters between 5 to 15m, early in the morning- before the sunrise and then they bring them up, 4 hours after the sunrise. In shallow waters, fishermen don't use rope and buoy. The best season to operate with pots is April to October. A usual tactic is to accustom and attract fish to traps by baiting (usually with vegetable since the fish targeted are herbivores) open traps (that the fish cannot get trapped in) for a few days. Then

the open traps are replaced by proper traps and the fish get trapped inside. For the most part these are selective gears, that have good results and are robust.

- Category A/B: the maximum allowance of using traps are 250 fishing traps

- Category C: the maximum allowance of using traps are 4 fishing traps

(European Comission, 2022), (Department of Fisheries and Marine Reasearch, 2009), (Collected from fishers for this study (2022))

Troll lines (LTL):

Fishermen bait the troll lines usually with squids, sardine or mackerel and lower them to the point of the bottom they want to fish. After the sinker reaches the bottom, fishermen usually hold the line in their hand to feel the bites of the fish. Then, after making sure that the fish have been caught in the troll lines, the fishermen activate the electronic mechanism, which raises the probe and the fish to the surface.

- Category A/B: The use of fishing line and bait (natural or artificial) is allowed

- Category C: In addition to the fishing gear specified by law, the use is allowed troll lines and two fishing rods.

(European Comission, 2022), (Department of Fisheries and Marine Reasearch, 2009), (Collected from fishers for this study (2022))

Hand lines and pole lines hand or mechanised LHM/LHP:

The hand lines and pole lines are pulled into the sea by the boat at a speed between 2 to 2.5 knots. On the main line and at a certain distance of about 15 m from each other, the fishermen place lead sinkers so that they can regulate the depth at which the Hand lines and pole lines fishes. Depending on the depth and the species they want to fish, the fishermen leave the corresponding number of weights in the sea.

- Category A/B: The use of fishing line and bait (natural or artificial) is allowed

- Category C: In addition to the fishing gear specified by law, the use of troll lines and up to two fishing rods is allowed.

(European Comission, 2022), (Department of Fisheries and Marine Reasearch, 2009), (Collected from fishers for this study (2022))

Squid-jiggers:

With the help of troll lines, fishermen use squid jiggers in cases they want to target squids. They use the same technique as troll lines. When the squid attacks the squid jigger, it always grabs it from the middle of it. By pulling the squid towards the boat from the head, the squid slides towards the needles on the edge of the squid jigger where it is pinned and cannot escape until it's been removed on the boat. As a main fishing line of the squid jigger, fishermen usually use a fishing line with a diameter of around 0.8 mm which at the end of the line they place a small weight.

- Category A/B: The use of fishing line and bait (natural or artificial) is allowed

- Category C: In addition to the fishing gear specified by law, the use of troll lines and up to two fishing rods is allowed.

(European Comission, 2022), (Department of Fisheries and Marine Reasearch, 2009), (Collected from fishers for this study (2022))

As for the repair of the nets they are using, most of the fishermen stated that they fix their own nets because there are very expensive in order to buy new ones. In general, they buy parts of the net (nylon) and they added them where they are needed. Some fishers stated that's they do not repair the nets themselves but find other fishers with more experience and in general older fishermen which know how to fix them. More "wealthy" fishermen buy new ones and they keep the old ones for a backup.

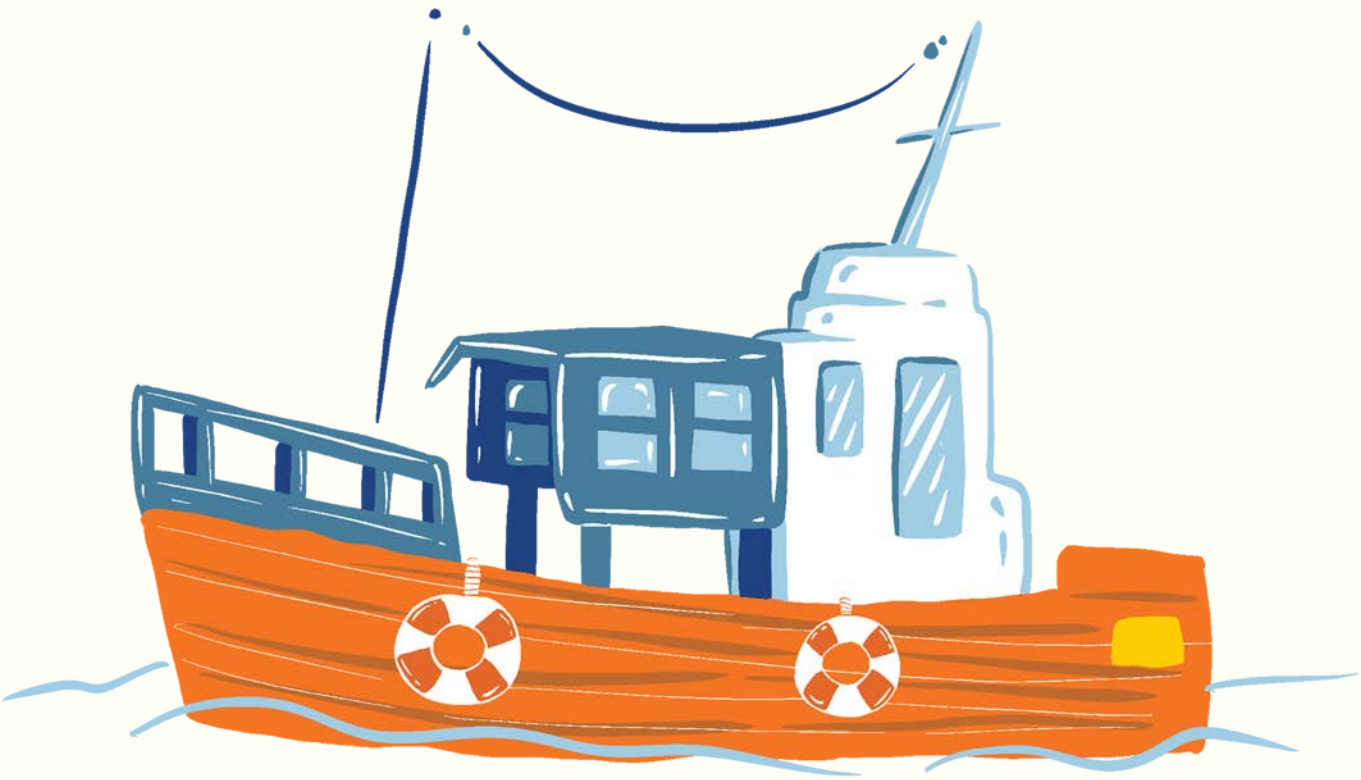
The role of women in the fishing sector hasn't received enough attention and it still remains a very unclear sector in the fishing field. The interview conducted as part of this research showed the women of the family actually help a lot

with fishermen's fishing activities. Some of them fix the nets by themselves or prepare the longlines for the next day or even help with the cleaning of the boat including the fishing gears. A fisherman stated that in certain cases, like the fishing period of picarell which is a very busy period for the fishermen in the area, his wife and his mother help him with the fishing removal of the nets. Specifically, he quoted "that period is a very busy one and I need as many working hands as I can get. We must take the fish to the fish market as soon as possible".

Technology instalments on boat

According to the interviewees technology plays a major lore to their lives. Almost everyone, for example, has on their boat all the needed equipment, like GPS, sonar bathometer, radar, net haulers winch and radio telecommunications equipment. The year of installation of the equipment varies between the fishers of the area. Some of them stated that the equipment was installed since the beginning of their profession and they have never updated them, but some others stated that they have updated everything recently (2021).

In the next table, there is information gathered from the interviewees regarding their fishing activity related with their fishing gear.



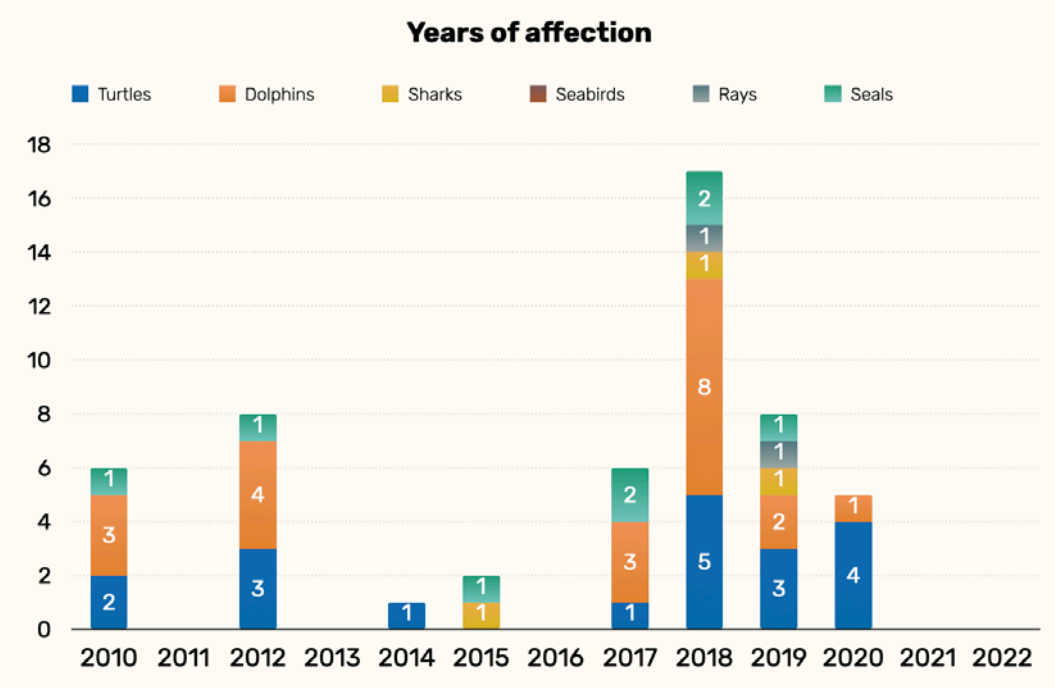
Fishing Gear	Season	Use of Gear	Bait used	Target species	Type of sea bottom & depth
Gillnets GNS	all year	Set the nets on a straight line or in turns. Generally, they are set in different fishing grounds depending on the targeted species. 1 unit is 200m. max 12 units	No bait	*Boops boops, Sparisoma cretense, Mullus surmuletus, Seriola dumerilii, Pagrus pagrus, Sphyraena sphyraena, Sarda sarda, Siganous spp., Spicara maena, Mycteroperca rubra, Mugil cephalus, Sparus aurata, Epinephelus costae, Spicara smaris, Epinephelus marginatus, Diplodus sargus*, lobster	depth of 10 - 100m rocky /sandy/algae substrate
Trammel nets GTR	all year	Set the nets on a straight line or in turns. Generally, they are set in different fishing grounds depending on the targeted species. 1 unit is 200m. max 23 units for A category, 17 units for B and 4 units for C category	No bait	*Sparisoma cretense, Mullus surmuletus ,Sepia officinalis, Mycteroperca rubra, Epinephelus marginatus, Diplodus sargus, Diplodus puntazzo, Seriola dumerilii ,Dentex dentex ,Sphyraena sphyraena, Sarda sarda, Diplodus vulgaris, Epinephelus caninus, Oblada melanura, Mullus barbatus, Boops boops ,lobster, Scyllarides latus, Scorpaena spp., Loligo spp., Pagellus erythrinus, Epinephelus costae, Parupeneus forrskali , Spicara smaris*	Depth 10 – 300m Rocky /sandy/mud substrate
Set longline LLS	all year	Set in different fishing grounds depending on the targeted species. fishermen place small rocks inside the pots so it will get faster to the bottom preventing messing the bottom lines. Max use of hooks 1000 per person and 5000 per boat for category A/B. 200 hooks for category C	*Sarda sarda, octopus, Loligo spp.,Spicara smaris, Scomber colias ,Sardina pilchardus, Tunnus alalunga, shrimp, Sepia officinalis, Sardinella aurita, Trachurus trachurus*	*Pagrus pagrus , Diplodus sargus, Epinephelus costae, Epinephelus marginatus, Epinephelus caninus, Dentex dentex ,Polyprion americanus, Epinephelus aeneus, Oblada melanura ,Xiphias gladius, Tunnus alalunga, Serranus scriba, Conger conger, Muraena helena, Diplodus vulgaris, Diplodus puntazzo, Mycteroperca rubra*	Depth 50 500m Rocky / sandy/ mud substrate
Hand lines and pole lines hand or mechanised LHM	August - October	electronic mechanism. When the sinker reaches the bottom, fishermen hold the line to feel the bites of the fish.	Sepia officinalis, Loligo spp., Sardina pilchardus ,Sarda sarda ,Scomber colias	*Epinephelus marginatus, Dentex dentex, Pagrus pagrus .Diplodus sargus. Merluccius merluccius .Pagellus bogaraveo. Ilex spp.*	Depth 50 – 200m Rocky/ sandy/ mud substrate
Hand lines and pole lines hand LHP	June - August + August - October	Pulled into the sea by the boat at speeds of 2 to 2.5 knots. Depending on the depth and the species the fishermen leave the corresponding number of weights in the sea.	Sarda sarda. Sepia officinalis. Tunnus alalunga .octopus .Ilex spp.	*Seriola dumerilii. Epinephelus marginatus. Mullus barbatus. Dentex dentex. Sarda sarda*	Depth 50 – 300m Rocky/ sandy / mud substrate
Pots FPO	June - August best season April - October	Fishermen place their pots at shallow waters between 5 to 15m before sunrise and collect after sunrise. 250 traps for category A/B. 4 traps for category C	No bait	shrimp	
Troll line LTL	February - March + June - August + September - December	pulled into the sea by the boat at speeds of 2 to 2.5 knots. fishermen place the lead every certain distance (15m) to regulate the depth	Scomber colias .Boops boops	*Polyprion americanus. Thunnus thynnus. Sarda sarda .Seriola dumerilii, Tunnus alalunga, Coryphaena hippurus*	Depth 10 – 100 m
Squid-jiggers	December – April+ September – November	same technique as troll lines., the squid slides towards the needles on the edge of the squid jigger where it is pinned and cannot escape	Sepia officinalis Fake bait	*Ilex spp., Loligo spp., Sepia officinalis*	

Table 3: Fishing Gear – fishing activity, Collected from fishers for this study (2022) (Iwannou G. & Michailides N, 2011).

Target species - By catch species

The main fish stocks targeted by the Cyprus fishing sector can be divided into two categories, Demersal and large pelagic species. Demersal species are mainly targeted by coastal fishing and bottom trawling and include species such as picarell, bogue, red mullet, barbell mullet, octopus and others. Large pelagic species are targeted by polyvalent vessels and include species such as the albacore tuna, the bluefin tuna and the swordfish. Small pelagic species like sardines and anchovies are not targeted stocks, since they are very sparce (Papageorgiou, Papadopoulou, & Hadjioannou, 2020).

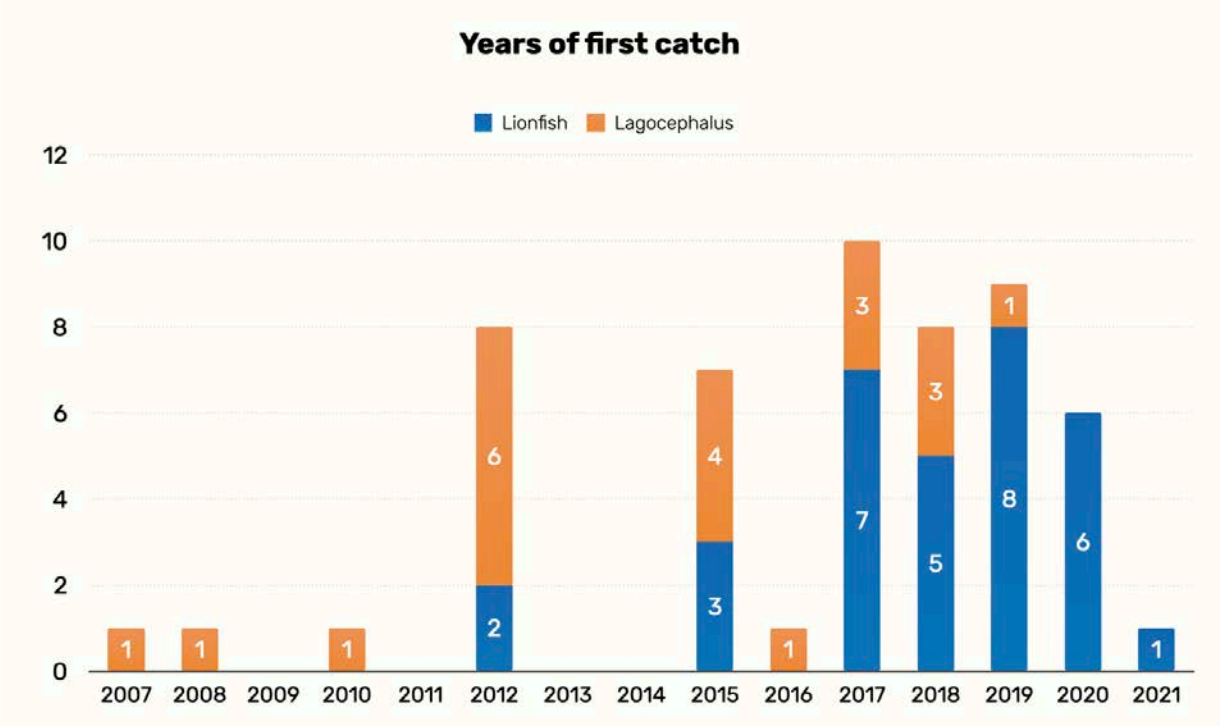
However, other fish categories, such as the invasive Lessepsian species, have appeared in Cyprus waters in the last 20 years, which is negatively affecting the fish stocks of the island and also the lives of fishermen. Expect from the targeted species and the lessepsian species, fishermen catch on their nets many other species which have no commercial value. Also, sometimes by-catch species, most of which are protected species (small turtles, rays, small dolphins), are caught in the nets. Besides the lack of commercial value, lessepsian and by-catch species are causing many problems to the fishermen operation because some of them are also destroying the fishing equipment in order to feed off the nets, from the catch of the fishermen.



Graph 3: By – catch species and the year of first affection Collection from fishers for this study 2022.

Coming across to marine species such as dolphins, sea turtles and seals are unavoidable for all fishers, particularly small-scale ones (Maria Hadjimichael, 2020). During the interviews, almost all fishermen pointed out the extensive damages caused by dolphins, turtles, and seals to their fishing gears. The interaction with dolphins and turtles started many years ago, resulting in many damages as mentioned above. The year of affection varies between the fishers of the area but as is shown in the graph 3, the last couple of years, their interaction has been increased. The most common problem these species caused are the damages on the net – creation of big holes - and the fish depredation.

In 2017 the invasive lessepsians species like *Lagocephalos sceleratus* - referred to by the locals as '*lagocephalos*' (rabbit fish) and the recently reported species in Cyprus waters, lionfish - *Pterois miles*, significantly affect the biodiversity and thus, the economic performance of the fisheries sector. (Maria Hadjimichael, 2020), ((European Commission; Joint Research Centre; Scientific Technical and Economic Committee for Fisheries, 2021)(STECF 21-08)). This "*lessepsian migrant*", is very common in the Indo-Pacific region, which migrated from the Red Sea into the Mediterranean through the Suez Canal. Since the water temperature have increased around the island in recent decades, this species had the opportunity to become dominate, becoming much more common since 2004 (Department of Fisheries and Marine Reaserch, 2018). The year of first catch varies between the fishers of the area and as it is shown in the Graph 4, their interaction with lagocephalus and lionfish began in very early stages.



Graph 4: Interaction with invasive species – Year of fist catch. Collected from fishers for this study 2022.

In 2019, the DFMR announced a plan regarding the targeted fishing against lagocephalus in the coastal waters of Cyprus. The purpose of the Plan was to target the species in the coastal zone of Cyprus by collective groups of fishermen (category A/ B/polyvalent fishing license) to create an intense fishing pressure on the reproductive population of the species. This Plan was implemented through the Action 1.18.7 - Thalassa 2014 – 2020 "Participation in other actions aimed at maintaining and improving biodiversity and ecosystem services, such as the restoration of specific marine and coastal habitats to support sustainable fish stocks, including their scientific preparation and assessment" (European Maritime and Fisheries Fund (EMFF) 'Thalassa 2014-2020', 2019). A payment was also announced regarding the kgs of the species which it was set at €3 per kg.

Most targeted species and seasonality

Based on the interviews made for the purposes of this report, the table 4 below shows the mainly targeted species of Chrysochou Bay. Fishermen were asked about their most targeted species during the year. The table below (table 4) shows a combination of the most targeted species and their target-

ed season. For example, as it can been seen in the table below, 21 and 24 fishermen stated that bogue's seasonality or is most targeted is between spring and summer respectively. On the other hand, Picarel's seasonality or is most targeted is between winter and spring.

Targeted species	Common name	Winter	Spring	Summer	Fall
Boops boops	Bogue	15	21	24	15
Diplodus sargus	White seabream	10			
Epinephelus marginatus	Dusky grouper		14	13	10
Loligo spp.	Squid	12			
Mullus surmuletus	Striped red mullet	12	17		
Polyprion americanus	Wreckfish			11	
Sepia officinalis	Common cuttlefish	13	11		
Siganus luridus	Dusky spinefoot			22	
Siganus rivulatus	Marbled spinefoot			17	
Sparisoma cretense	Mediterranean parrotfish			20	11
Spicara smaris	Picarel	13	27		

Table 4: Most targeted species and seasonality. Collected form fishers for this study 2022. (Iwannou G. & Michailides N, 2011).

Fishing effort

In 2018, the fishing effort of the ssf was 30644 days. For the same year, the fishing effort of the pelagic longline fishery was 1667 days and for the trawlers and purse-seiners (24 – 40m length) was 441 and 5, correspondingly (Papageorgiou, Papadopoulou, & Hadjioannou, 2020).

FISHING EFFORT (TOTAL NUMBER OF FISHING DAYS)	
Reference year: 2018	
Trawlers	441
Longliners	1667
Small-scale vessels (with and without engine)	30644
Polyvalents	-
Purse-seiners	5

Table 5: fishing effort - total number of fishing days. (Papageorgiou, Papadopoulou, & Hadjioannou, 2020).

An estimated 47,765 days were spent at sea in 2019, a significant increase of 8% compared to 2018, especially considering the reduction of 32% when compared to the period 2008-2018. The SSCF spent 6% more days at sea in 2019 and they also increase their fishing trips per day by 6% more in 2019, than in 2018. Having in mind that the energy consumed decreased by 4% compared to previous year 2018, it means that, they were performed shorter (closer to the shore) fishing trips. (European Commission; Joint Research Centre; Scientific Technical and Economic Committee for Fisheries, 2021) (STECF 21-08).

In 2019, the LSF vessels increased slightly at 40 vessels (one more vessel than in 2018) with a combined gross tonnage of 1 760 GT and a total engine power of 7 644 kW. In 2019, there was a significant increase of 45% in the days spent at sea compared to 2018, reaching the 3 057 days. The same picture stands for the fishing trips which increased by 25%. (European Commission; Joint Research Centre; Scientific Technical and Economic Committee for Fisheries, 2021)(STECF 21-08).

CHAPTER 03

Ecosystem

PROFILE OF THE SMALL-SCALE FISHERIES OF CYPRUS – WITH A FOCUS ON CHRYSOHOU BAY

3. Ecosystem

The northeast side of the Akamas peninsula, which is a part of Chysochou bay, is of significant importance since it there are nesting areas for green and loggerhead turtles. There are data on nesting since the 1980s when the Cyprus Turtle Conservation Project started.

The area of Chrysohou bay includes coastal and deeper water reefs and small islands, such as Ayios Georgios Islet in the Kakoskali MPA. Figure 2 shows the marine Natura 2000 areas (up to 50m depth) as well as the Kakoskali MPA (up to 200m depth). Areas of rocky shores with sea caves harbouring monk seals can be found throughout the Akamas peninsula. The west side of the peninsula has extensive rocky bottoms and the east side has a mosaic of rocky, muddy and sandy areas. Up to 50m depth on both sides, a mosaic of posidonia meadows, rocky and sandy substrate can be found. Deeper areas are covered with sandy / muddy substrate with occasional areas of rocky reef (GC- Marine Environmental Consultancy and Certification, 2020).

The Kakoskali MPA, in the west of Chrysochou bay, was legislated by the Ministerial Decree relevant to the fisheries law, number 258/2019, in 2019. The area contains a unique mosaic of priority habitats (92/43/EEC- EU Habitats Directive) including coralligerous rocky reefs, Posidonia meadows and an underwater cave with unique biostalactites which were created by a complex of organisms (e.g. corals, bryozoans, sponges) supporting high biodiversity. Apart from the Posidonia beds, the most important, widely distributed and well-developed habitat is that of the reefs. The area is characterized, in shallow waters, by dense Cystoseira forests, harbouring a rich invertebrate fauna.

The sea caves at Halavro MPA, which is a second MPA in the area, offer resting and breeding habitats for the monk seal (Papageorgiou, Papadopoulou, & Hadjioannou, 2020).

Figure 2: Map of Chrysohou bay. Areas in green are marine Nature 2000 designated areas. Yellow square depicts Kakoskali MPA (red square is the NTZ). White outline depicts Halavro MPA.

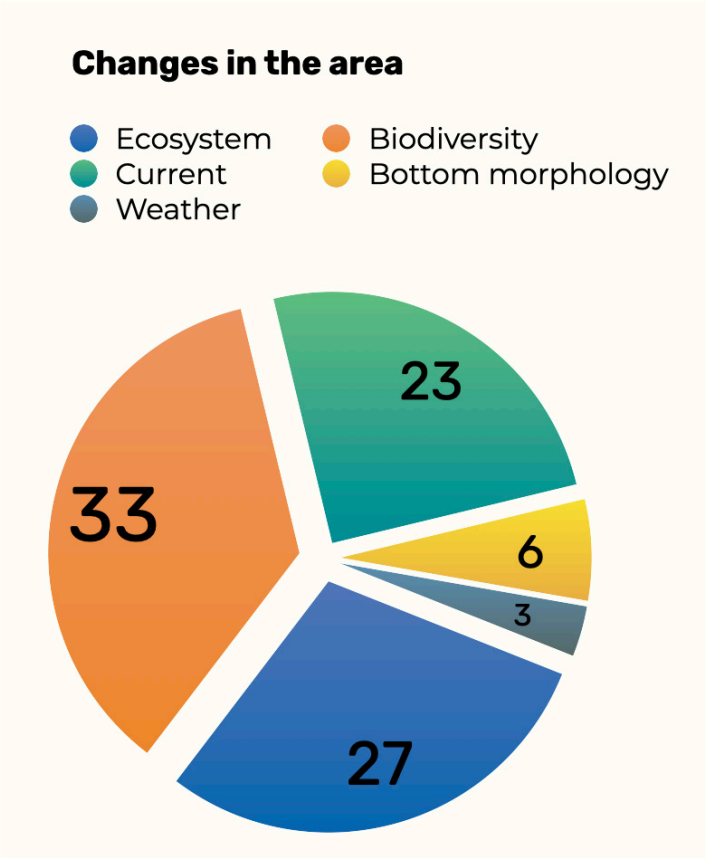
Chrysohou bay is generally exposed to winds, mainly from the west and east, and sometimes from the north during the winter period. The usual winds are westerly, so exposure to wave action increases towards the east in the Bay. Currents are variable, often depending on the wind direction (GC- Marine Environmental Consultancy and Certification, 2020).

Wind driven currents in Chrysochou Bay are reliant on a number of factors, including the time of year, and nature of the winds in the area. In the summer period, westerly winds produce frequent spells of rough seas on the west coast, and shelter is provided in the protected west coast of Chrysochou bay. In the winter period, the wind conditions in the bay can limit fishing activities especially when the wind is from the north or east.

Changes of the area

The fishermen of the area noticed a lot of changes regarding the ecosystem in general. As is shown in the graph below, most of the observed changes in the biodiversity, weather and sea currents of the area. The observations, regarding

the biodiversity of the area, were mostly about the invasion of new species and the low fish stocks. Regarding weather, fishermen stated that the weather changed rapidly, in a negative way, though the years and it's more difficult for them to operate. As for the currents, a lot of them stated that the area always had strong and rough currents but the last couple of years noticed that they have been increase and became stronger.



Graph 5: observation of changes at Chrysochou Bay. Collected from fishers 2022.

Targeted species and their reproductive habits

The eating habits and the fishing grounds of the most targeted species of the area, which were mention in the previews chapter (table....), are shown below. The information was provided during the interviews with the fishermen, along with the official report from the DFMR Iwannou G. & Michailides N, 2011).

Mullus surmuletus: The red mullet is a small demersal species, found in rocky, sandy or muddy bottoms and at a depth, usually, up to 100 meters. It feeds on benthic microorganisms such as shrimps, amphibians, polychaetes, molluscs and small fish. The mullet breeding season is from May to July.

Boops boops: Bogue fish is a semi-pelagic species and lives in the water column above variety of substrates and can be found at a depth between 5 and 100 meters. It feeds mainly on crustaceans and planktonic organisms. Breeding season of the species begins in February and ends in April. Bogue is a hermaphrodite fish, first matures as a female and later changes into a male.

Spicara smaris: Picarell is a semi-pelagic species and occurs mainly in areas with rich vegetation, as well as in sandy and muddy substrates. It is more likely to meet it at a depth between 20 and 150 meters. It feeds on planktonic organisms and small invertebrates. In Cyprus, the reproduction of the species takes place in the middle of February and is completed around the end of April. Picarell is a hermaphrodite fish, it initially matures as a female and later, usually, at the age of 2, changes to a male. During the breeding season the fish migrate to shallower waters, where the female lays her eggs on the bottom, usually in seaweed, while the male fertilizes them and guards them until they hatch.

Siganus luridus: Dusky spinefoot is a demersal species and occurs in the same areas as the white tench, but in smaller numbers. It is migrated to our parts from the Red Sea, through the Suez Canal. It feeds on seaweed and algae. The breeding season of the species begins in May and ends around the end of August. Dusky spinefoot is sexually mature when its length is between 12 and 16 cm.

Siganus rivulatus: The Marbled spinefoot is a benthic species and we find it, mainly, in areas with meadows of the sea phanerogam posidonia (*Posidonia oceanica*). It is also likely to be found in rocky bottoms, not far from the coast, between 1 and 60 meters deep, but usually not more than 30 meters deep. It is a Lessepsian immigrant, which first appeared in the waters of Cyprus around 1869, after the opening of the Suez Canal. it feeds with algae. Marbled spinefoot is a migratory species and often forms large herds, which may exceed 100 individuals. The breeding season of the species begins in May and ends around the end of August. It becomes sexually mature at about 2 years old, when its length is around 14 cm.

Sparisoma cretense: Parrotfish is a relatively common fish found on the coast of Cyprus. It is a demersal species and is found in areas with *Posidonia oceanica* meadows, on sandy and muddy substrates and also on rocky bottoms, not far from the coast, at a depth between 1 and 50 meters. Parrotfish feeds on small invertebrates, seaweed and algae. The breeding season of the species begins in July and ends around the end of September. During the breeding season, the species flocks and approaches the coasts. The male and female differ morphologically.

Seasonality and reproduction

In addition to the seasonality of the species, most of the interviewees stated that seasonality has changed almost for all the species. Generally, they notice that seasons have changed regarding their days. They said that the last couple of years, the season of the fishes either would be 20 days ahead or delaying 20 days. Moreover, they stated that for some species their whole season has changed through the years. For example, the seasonality of the red porgy was only at the winter period but now throughout the year, dusky spinefoot was only in summer period and now is all year long, bogue was in August - summer and now is in September – fall period and sea breams was in April – spring period and now is in May – spring.

The main reason of these changes is the weather conditions. Since the weather is unstable, as the fisher state, the changes of the seasonality are unavoidable.

As for their reproductive period, almost all fishermen know

when the time of reproduction is happening for each species. The most common period of reproduction, as the fishermen stated, is March – April (i.e red mullet, Picarell). On the other hand, bogue and dusky spinefoot have a different reproduction period. Their reproduction period is May and summer respectively.

Fish stocks

The supervision and management of the fishing stocks are the main key goals of the DFMR in Cyprus and the Common Fisheries Policy (CFP) in general and are been achieved through the implementation of appropriate management measures (Department of fiheries and Marine Research, 2022).

For these purposes and under the Community and National Legislation (Regulation (EC) No 1967/2006 - APPENDIX III and Fisheries Regulations - APPENDIX II) a table with the most commercial species and their minimum conservation sizes was created (table 6). Specifically, the regulation states: 'fishing, possession, transport and sale of Mediterranean items shown in the table below are prohibited when they are smaller in size from the corresponding one listed' (Department of fiheries and Marine Research, 2022).

SCIENTIFIC NAME	MINIMUM LANDING SIZE
DICENTRARCHUS LABRAX	25 cm
DIPLODUS ANNULARIS	12 cm
DIPLODUS PUNTAZZO	18 cm
DIPLODUS SARGUS	23 cm
DIPLODUS VULGARIS	18 cm
ENGRAULIS ENCRASICOLUS	9 cm
EPINEPHELUS SPP.	45 cm
LOPHIUS SPP.	30 cm
LITHOGNATHUS MORMYRUS	20 cm
MERLUCCIUS MERLUCCIUS	20 cm
MUGIL SPP.	16 cm
MULLUS SPP.	11 cm

PAGELLUS ACARNE	17 cm
PAGELLUS BOGARAVEO	33 cm
PAGELLUS ERYTHRINUS	15 cm
PAGRUS PAGRUS	18 cm
POLYPRION AMERICANUS	45 cm
SARDINA PILCHARDUS	11 cm
SCOMBER SPP.	18 cm
SOLEA VULGARIS	20 cm
SPARUS AURATA	20 cm
TRACHURUS SPP.	15 cm

Table 6: Species that are prohibited from landing and selling are shown in Annex III a and b (Department of fiheries and Marine Research, 2022).

Additionally, Since 2005, the Fisheries Section of the DFMR in Cyprus, has been implementing the National Data Collection Program, which is based on the Community Fisheries Legislative Framework (Regulations (EC) No 199/2008, No. 665/2008 and Decision 2010/93 / EU). The program aims to create multi-year data series, compatible between EU Member States, which will guarantee the assessment of the state of fisheries resources and the sustainability of the fisheries sector. (Papageorgiou, Papadopoulou, & Hadjioannou, 2020).

In 2019, two stock assessments were performed; Red mullet (*Mullus barbatus*) and common pandora (*Pagellus erythrinus*). The first one showed a slight over-exploitation with intermediate Spawning Stock Biomass (SSB) and the other one was assessed in sustainable exploitation with relatively high biomass. In 2020 a transitional assessment of red mullet (*Mullus barbatus*) found the stock to be in over-exploitation with high SSB. (European Commission; Joint Research Centre; Scientific Technical and Economic Committee for Fisheries, 2021) (STECF 21-08).

When the fishermen were asked about the type of fish they don't catch as much as before, most of them responded that the striped red mullet is almost vanished from the area the last couple of years. Their reduction was noticed since 2012. Some other fishes that are in a very low stock as well as the striped red mullet are bogue, pandora, dusky grouper, com-

mon Dentex and red mullet. Mainly, the reason for their reduction, as fishers stated, is the invasion of lessepsian species in the area. Lessepsian species have recently dominated in the marine environment of the island. Additionally, it is assumed that climate change affects the population of fishes as well. Also, they stated that, water temperature is increased during the years and some species might have migrated to another place because of it. Recreational fishermen played a major role to the reduction of the populations, according to small scale fisherman.

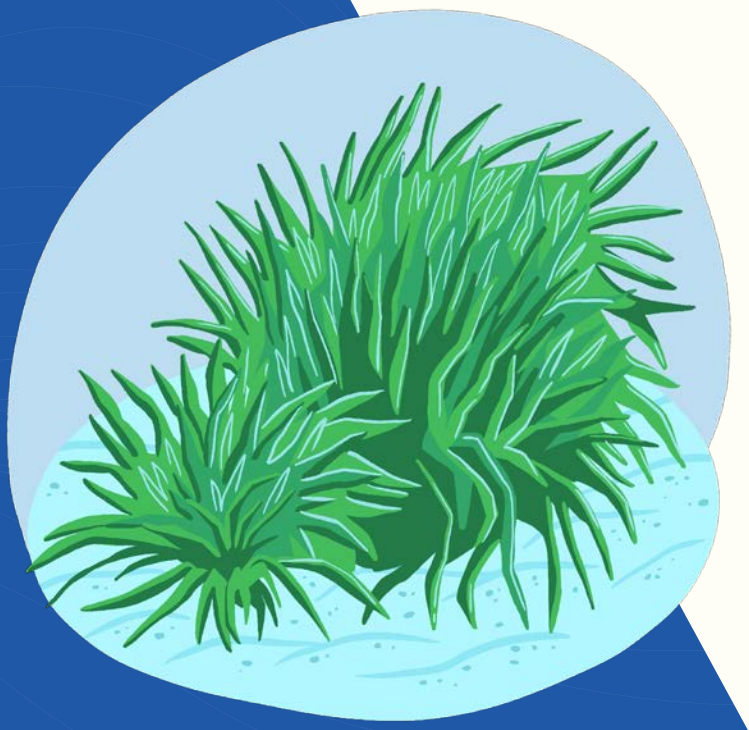
Quote from fishermen: *"Some of them got very excited when they catch a big fish, but they don't think about the future of that species. If you catch all the big fish, then how they will reproduce in order to increase their fish stock?"*. Moreover, overfishing plays a major role as well.

Quote from fisherman *"if we want to increase our populations, we must stop our fishing activities for 5 years or even create more NTZ. if it happens, then everyone must follow the rules"*.

Fishermen try to limit their interaction with endangered species (i.e dolphins and turtles) as much as they can by using multiple types of equipment like pingers for dolphins (a device that transmits short high-pitched signals preventing dolphins to get near the fishing nets). As fishermen stated, the results from this device weren't so successful. They acknowledged that dolphins are very smart animals and they got used it very quickly. Some others confirmed that at the beginning, the equipment was perfectly working but after some uses the dolphins came back. In the previous years, most fishers used to place explosives in specific areas to deter dolphins. Nowadays, they don't use it as much since its illegal, bad for the environment and is causing injuries to the dolphins.

CHAPTER 04

Recommendations



4. Recommendations

Proposed ideas

During the interviews, fishermen were asked if there is overfishing in their area, and if yes, what thoughts and measures they have in mind in order to increase the fish stocks. Their responses were very similar. Firstly, almost everyone acknowledged that there is extensive overfishing in the area from all sectors. In addition, they suggested the creation of marine policing at a 24/7 basis. A lot of illegal fishing is happening during the night, which is not controllable, since the DFMR does not patrol during night hours. Port police cannot do anything either since they don't have the manpower to restrain these activities. In addition, they suggested the marine policing in relation to the recreational fishermen become more effective. According to them, official bodies do not check the recreational fishermen's catches (fish sizes and kgs) or patrol to check their fishing activity – area, gears etc., like they do for the professionals.

Secondly, they suggested a permanent banning of trawler and purse seins activity. A study made for this matter on behalf of the fishermen of the area, financed by the LIFE organisation regarding an ongoing project called 'A Co-Managed No Take Zone Project in Chrysochou Bay', showed that the bottom trawl fishery in Chrysochou Bay should be permanently banned because "*it is clear that the area is unique in term of oceanographic features and productivity, hosting a large amount of iconic species as marine turtles and vulnerable habitats as seagrass meadows, as well as nursey grounds of commercially important demersal species.*" (GC- Marine Environmental Consultancy and Certification, 2020). Moreover, '*The bottom trawl activity in the bay, even if limited to a few months, is intense in some parts of the area. According to the analyses carried out on MEDITS survey data, a permanent closure of the area could further benefit the juveniles of different species (of commercial and non-commercial interest) limiting the habitat disruption caused by excessive fishing*.' (GC- Marine Environmental Consultancy and Certification, 2020).

Thirdly, they suggested that the DFMR should give motivation to fishermen to target intensively lagocephalous species to reduce their numbers. In addition to the suggestions, some

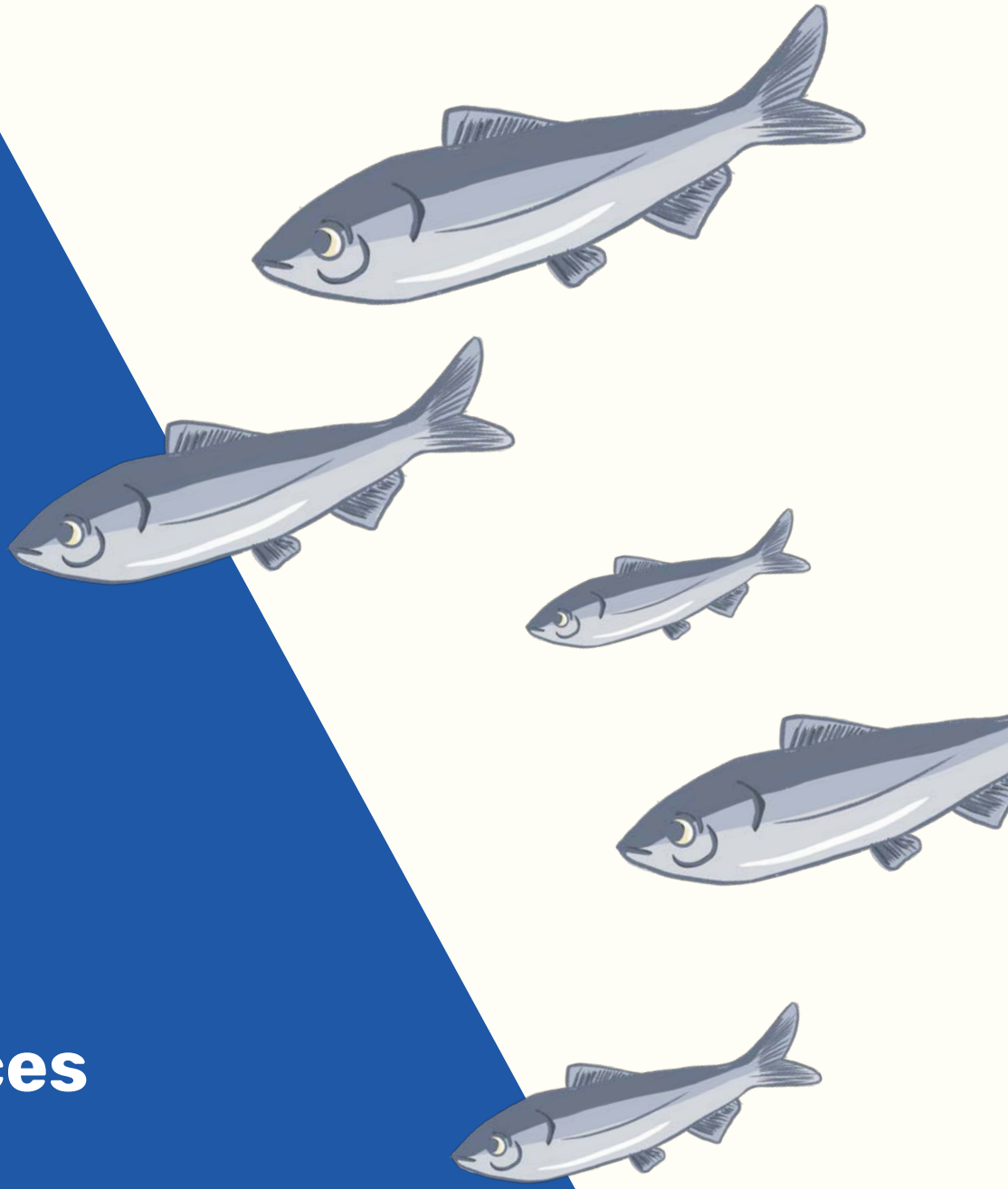
more drastic suggestions made from a lot of fishermen. They suggested the banned of fishing activities for everyone in the area for the period of 2 to 5 years. They are willing to stop their fishing activities but they would need an income as well. Quote of fisherman "*if they give us a monthly allowance, we certainly would stop fishing for a period of time*". In addition to this, they also suggested fishing with rotation for a period of time if the DFMR would reimburse them for the time they will not work. Fourthly, almost everyone suggested the creation of more NTZ but with a strong marine policing in the area for 24/7. Lastly, they suggested DFMR should find a way to create fishfarms for the most commercial species like they do in the aquaculture sector.

Local co-management with fishers

"Co-management is a great opportunity to improve the management of small-scale fisheries, especially in marine protected areas. This tool would make it possible to establish rules based on the traditional ecological knowledge of fishers, on the advice of scientists, the obligations of the administration and the interests of society. Organizing decision-making using this model would enrich the processes and ensure that the fishermen concerned would comply with these decisions without bias because they would be co-responsible for them" (Alicia S. ; Iuri P. ;Macarena M, 2020).

Fishermen of Chrysohou Bay, have been introduced to co management idea since 2020. Through LIFE organisation, Cyprus in collaboration with Malta and Spain, participated in the ongoing project called "Empowering the legacy of MAVA Mediterranean Partnership: Scaling up co-managed and financially sustainable No Take Zones/Marine Protected Areas" (20142_20130). The subtitle for the Cyprus contribution to the above is 'A Co-Managed No Take Zone Project in Chrysochou Bay'. This project involves the fishermen of Chrysohou Bay because of the significant importance of the area. From the beginning, the president of the Local Fishermen Association embrace the idea of co management and help with the implementation of the project. At the preliminary meetings, a lot of local fishermen participated and been educated about the co management model. Moreover, it was explained to them why the area was chosen and why the area has such of im-

portance. They instantly showed their willingness to embrace and implement the model because, as they stated, it's the first time fishermen been brought into the spotlight up to the decision-making. Administration took a lot time to understand the concept of co management and accept the concept of share of power. Even though they were a bit cautious about the model, and in addition the legal structure of Cyprus didn't support the creation of a co-management committee with legal status, they suggested the creation of an ad hoc committee, until legislation is in place. Recently, a meeting was organised with the possible stakeholders including fishermen of the area, in order to create the ad hoc co management committee. The managers of the program informed the stakeholders about the concept and model of co management with case studies by exchanging ideas with representatives from Malta . During the meeting, all stakeholders expressed their willingness to proceed with this concept and gave positive feedback about the successfulness of the implementation of this project.



References

Alicia Said. ; Iuri Peri. ; Macarena Molina. (2020). *MedTEK: Traditional Ecological Knowledge of Mediterranean Small-scale Fishing Communities. Preliminary Findings in Cabo de Gata (Spain), Malta and Pantelleria island (Italy) sites.* Retrieved from Research: https://lifeplatform.eu/wp-content/uploads/2021/02/LIFE-MedTEK-Report-compressed.pdf

CyLaw. (2022). *CyLaw*. Retrieved from Fisheries Law (Chapter 135): http://www.cylaw.org/nomoi/enop/non-ind/0_135/full.html

Cyprus Port Authority. (2022). *Cyprus Port Authority*. Retrieved from Latchi Port: https://www.cpa.gov.cy/el/latchi-port

Department of fisheries and Marine Research. (2022). *Department of fiheries and Marine Research1*. Retrieved from Minimum alloable sizes of marine organisms cought in Cyprus: http://www.moa.gov.cy/moa/dfmr/dfmr.nsf/All/EBBCD9DC39970AB6C2257E6700204396?OpenDocument

Department of Fisheries and Marine Reasearch. (2009). *Department of Fisheries and Marine Reasearch1*. Retrieved from Professional fishing methods of Cyprus: http://www.moa.gov.cy/moa/dfmr/dfmr.nsf/All/BDE168B228D73DCE42257D70003D0CF2/$file/ALIEYTIKES%20METHODOI.pdf?OpenElement

Department of Fisheries and Marine Reasearch. (2022). *Department of Fisheries and Marine Reasearch*. Retrieved from Marine Environment: http://www.moa.gov.cy/moa/dfmr/dfmr.nsf/All/991F6F4CB50AC9AB42257D80003A88F8?OpenDocument

Department of Fisheries and Marine Reaserch. (2018). *Pocket Guide of Non-Indigenous Species in Cavo Greco and Nisia Marine Protected Areas in Cyprus.* Marine & Environmental Research (MER) Lab and AP Marine Environmental Consultancy Ltd.

Department of Fisheries and Marine Research. (2009). *Department of Fisheries and Marine Research*. Retrieved from The fishing shelters of Cyprus: http://www.moa.gov.cy/moa/dfmr/dfmr.nsf/All/3BDC162342FE472042257D70003B4E11/$file/AΛIEYTIKA%20KATAΦYΓIA%20NEO.pdf?OpenElement

Department of fisheries and Marine Sesearch. (2021). *CYPRUS ANNUAL REPORT ON EFFORTS DURING 2020 TO ACHIEVE A SUSTAINABLE BALANCE BETWEEN FISHING CAPACITY AND FISHING OPPORTUNITIES.*

European Comission. (2022). *European Commission*. Retrieved from Fishing gears: https://fish-commercial-names.ec.europa.eu/fish-names/fishing-gears_el#GE

European Commission; Joint Research Centre; Scientific Technical and Economic Committee for Fisheries. (2021). *Publications Office*. Retrieved from The 2021 annual economic report on the EU fishing fleet (STECF 21-08): https://op.europa.eu/en/publication-detail/-/publication/77fb8e7b-58a7-11ec-91ac-01aa75ed71a1/language-en

European Maritime and Fisheries Fund (EMFF) '*Thalassa 2014-2020*'. (2019). Thalassa 2014 - 2020. Retrieved from Anouncements: http://www.moa.gov.cy/moa/opf/opf2014.nsf/All/F79F9F81F8F94F25C22583E70026E58D?OpenDocument

Food and Agriculture Organization of United Nations. (2022). *Food and Agriculture Organization of Unidet Nations*. Retrieved from Fishing Gear Type: https://www.fao.org/fishery/en/geartype/search

GC- Marine Environmental Consultancy and Certification. (2020). *Characterization of Chrysochou Bay (Cyprus) to support the permanent bottom trawling closure.*

Iwannou G. & Michailides N. (2011). *The 100 most important fish spexies in the Cyprus Seas*. Department of Fisheries and Marine Reasearch.

Maria Hadjimichael. (2020). Chapter 6, Losing Space: The Rise of the Blue Economy and the Marginalisation of Small-Scale Fishers in Cyprus. *Small Scale Fisheries in Europe: Status Resiliance and Governance* , pp. 105-123.

Papageorgiou, M., Papadopoulou, A., & Hadjioannou, L. (2020). Cyprus Bycatch Project "Understanding multi-taxa 'bycatch' of vulnerable species and testing mitigation a collaborative approach in Cyprus". Technical Report: Results of Phase 1 (2018-20019) of the bycatch monitoring programme in Cyprus. *BirdLife Cyprus and Enalia Physis Environmental Research Centre Nicosia*, 32. Retrieved from Cyprus Bycatch Project phase I – Technical Report: https://enaliaphysis.org.cy/wp-content/uploads/2021/01/report.pdf

PROTOMEDEA. (2019). "*Towards the establishment of Marine Protected Area Networks in the Eastern Mediterranean*" *(PROTOMEDEA).*

LOW IMPACT FISHERS OF EUROPE

AP MARINE
Environmental Consultancy Ltd

MAVA
FONDATION POUR LA NATURE