Implementation of the Marine Strategy Framework Directive (MSFD) 2008/56/EC in the Republic of Cyprus

Articles 8, 9, 10

(2017-2022)

November 2024

Department of Fisheries and Marine Research

Ministry of Agriculture, Rural Development and the Environment

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Abbreviations

AZE	Allowable Zone of Effect
BTFM	Benefit Transfer Function Method
CHL-a	Chlorophyll-a
CIS	Common Implementation Strategy
CY	Cyprus
CY-Stat	National statistical agency of Cyprus
CYTA	Cyprus Telecommunications Authority
D1	Descriptor 1 - Biodiversity
D2	Descriptor 2 - Non-Indigenous Species
D3	Descriptor 3 - Commercial fish and shellfish
D4	Descriptor 4 - Food Webs
D5	Descriptor 5 - Eutrophication
D6	Descriptor 6 - Seafloor Integrity
D7	Descriptor 7 - Hydrographic Changes
D8	Descriptor 8 - Contaminants
D9	Descriptor 9 - Contaminants in seafood
D10	Descriptor 10 - Marine Litter
D11	Descriptor 11 - Introduction of energy (including underwater noise)
DCF	Data Collection Framework
DFMR	Department of Fisheries and Marine Research
DLS	Department of Lands and Surveys
DoE	Department of Environment
DoW	Department of Works
DPSIR	Drivers-Pressures-State-Impacts-Responses
EAC	Electricity Authority Cyprus
EC	European Commission
EcAp	Ecosystem Approach
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EMDW	Eastern Mediterranean Deep Water
EMSA	European Maritime Safety Agency
EO	Ecological Objective
ESA	Economic and Social Analysis
EU	European Union
FDI	Fisheries Dependent Info
FRV	Favourable Reference Value
FSRU	Floating Storage Regasification Unit
FTE	Full Time Equivalent
GES	Good Environmental Status
GFCM	General Fisheries Commission for the Mediterranean
HD	Habitats Directive
IAS	Invasive Alien Species
ICES	International Council for the Exploration of the Sea
ICZM	Integrated Coastal Zone Management
IMAP	Integrated Monitoring and Assessment Programme of the Mediterranean Sea and Coast
JRC	Joint Research Centre

JRCC	Joint Rescue Coordination Centre of Cyprus
LIW	Levantine Intermediate Water
LSW	Levantine Surface Water
MARDE	Ministry of Agriculture, Rural Development and Environment, Cyprus
MARPOL	International Convention for the Prevention of Pollution from Ships
MEA	Millenium Ecosystem Assessment
MECI	Ministry of Energy, Commerce and Industry, Cyprus
MED POL	Programme for the Assessment and Control of Marine Pollution in the Mediterranean
MED QSR	Mediterranean Quality Status Report
MEDITS	Mediterranean International Trawl Survey Project
MHWs	Marine Heatwaves
MPA	Marine Protected Area
MRU	Marine Reporting Unit
MS	Member State
MSP	Maritime Spatial Planning
MSCG	Marine Strategy Coordination Group
MSFD	Marine Strategy Framework Directive
MSW	Municipal Solid Waste
N2K	Natura 2000
NEMPomu	National Environmental Monitoring Protocol for offshore mariculture units
NIS	Non-Indigenous Species
n-uPBTs	Non-ubiquitous, persistent, bio accumulative and toxic substances
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
SALA	Limassol-Amathus Sewerage Board
SBA	Sovereign Base Area
SEA	Strategic Environmental impact Assessment
SPA	Special Protection Area
SPA/RAC	Specially Protected Areas Regional Activity Centre
TEU	Twenty Foot Equivalent Units
TEV	Total Economic Value
TV	Threshold Value
T&T	Travel and Tourism
UNEP/MAP	United Nations Environment Programme / Mediterranean Action Plan
uPBTs	Ubiquitous, Persistent, Bio accumulative and Toxic substances
UVC	Underwater Visual Census
WDD	Water Development Department
WFD	Water Framework Directive
WGBYC	Working Group on Bycatch of Protected Species

Executive summary

As an EU Member State, the Republic of Cyprus implements the EU Marine Strategy Framework Directive (MSFD) and accordingly reviews and updates its marine strategy every six years, including Article 8 (Initial Assessment), Article 9 (Determination of Good Environmental Status) and Article 10 (Establishment of Targets).

The Republic of Cyprus has prepared the current text report for Articles 8, 9 and 10, based on the reporting guidance documents issued by the European Commission (EC). The reporting area (Marine Reporting Unit - MRU) includes the marine waters of the Republic of Cyprus, i.e. its territorial sea and Exclusive Economic Zone (EEZ), and the reporting period is from 1 January, 2017 to 31 December, 2022.

The Report was prepared by the Department of Fisheries and Marine Research (DFMR), of the Ministry of Agriculture, Rural Development and Environment (MARDE) and includes four main Chapters:

Chapter 1. Introduction

Chapter 2. Article 9 - Determination of Good Environmental Status

Chapter 3. Article 8 - Assessment of the Marine Waters of the Republic of Cyprus

Chapter 4. Article 10 - Establishment of Environmental Targets

Report to be cited as:

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Chapter 1. Introduction

1.1 Background information

The Republic of Cyprus is an island country in the Eastern Mediterranean Sea and as an EU Member State (MS), it implements the EU Marine Strategy Framework Directive (MSFD) 2008/56/EC for its marine waters, including its territorial sea and Exclusive Economic Zone (EEZ).

The MSFD was put in place to protect the marine ecosystem and biodiversity upon which human health and marine-related economic and social activities depend. The main goal of the MSFD is to achieve Good Environmental Status (GES) of EU marine waters by 2020, which according to the Directive is defined as: ***"The environmental status of marine waters where these provide ecologically diverse and dynamic oceans and seas which are clean, healthy and productive"*** (Article 3). To help EU countries achieve GES, the Directive sets out 11 illustrative qualitative descriptors (Figure 1):

Descriptor 1. Biological Diversity → "*Biological diversity is maintained. The quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climatic conditions*."

Descriptor 2. Non-indigenous species (NIS) → "*Non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystems*."

Descriptor 3. Commercially-exploited fish and shellfish → "*Populations of all commercially exploited fish and shellfish are within safe biological limits, exhibiting a population age and size distribution that is indicative of a healthy stock*."

Descriptor 4. Food webs → "*All elements of the marine food webs, to the extent that they are known, occur at normal abundance and diversity and levels capable of ensuring the long-term abundance of the species and the retention of their full reproductive capacity*."

Descriptor 5. Eutrophication → "*Human-induced eutrophication is minimized, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algae blooms and oxygen deficiency in bottom waters*."

Descriptor 6. Sea-floor integrity → "*Sea-floor integrity is at a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected*."

Descriptor 7. Hydrographical conditions → "*Permanent alteration of hydrographical conditions does not adversely affect marine ecosystems*."

Descriptor 8. Contaminants → "*Concentrations of contaminants are at levels not giving rise to pollution effects.*"

Descriptor 9. Contaminants in fish and other seafood → "*Contaminants in fish and other seafood for human consumption do not exceed levels established by Community legislation or other relevant standards.*"

Descriptor 10. Marine litter → *"Properties and quantities of marine litter do not cause harm to the coastal and marine environment."*

Descriptor 11. Energy including underwater noise → *"Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment."*

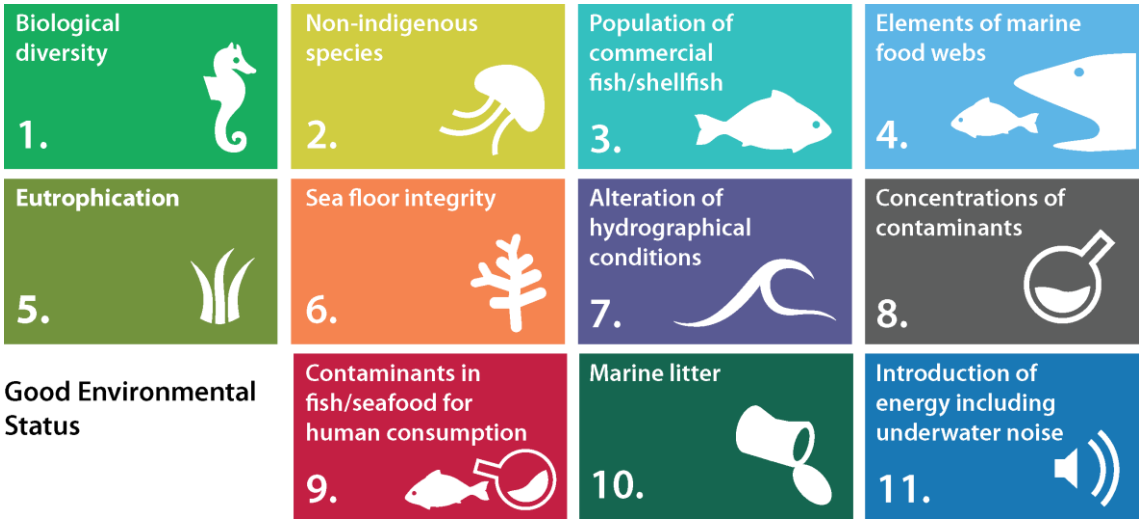

Figure 1. The 11 descriptors of MSFD for determining GES.

The MSFD was transposed into national legislation in 2010 with the "Marine Strategy Law" No. 18(I)/2011 and its amendment 159(I)/2014 (cylaw.org/nomoi/indexes/2011_1_18.html). The initial and second reports (1st Reporting Cycle) of the MSFD implementation in Cyprus have been submitted to the EC and can be found at the EC's WISE website (water.europa.eu/marine/policy-and-reporting/msfd-reports-and-assessments). The present report refers to the implementation of Articles 8, 9 and 10 for the period 2017-2022 (2nd Reporting Cycle - Figure 2).

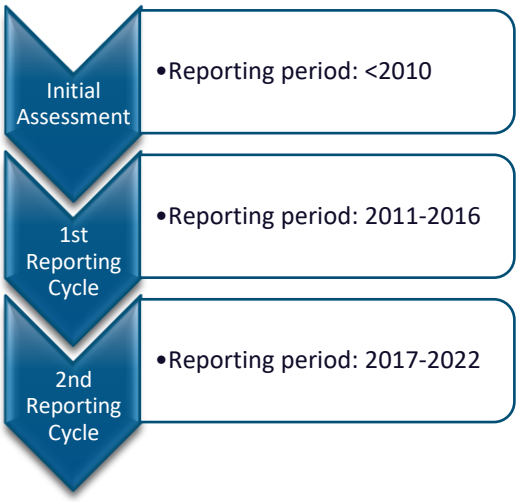

Figure 2. MSFD reporting cycles.

1.2 General characteristics of the marine waters

1.2.1 The Mediterranean Sea

The Mediterranean Sea is a mid-latitude semi-enclosed sea, or an almost isolated oceanic system. Many processes which are fundamental to the general circulation of the world oceans also occur within the Mediterranean, either identically or analogously (Robinson et al., 2001). The Mediterranean Sea separates Europe from Africa at its western end, where it connects with the Atlantic Ocean via the Strait of Gibraltar which provides a major inflow of water. A small amount of water also enters the Mediterranean from the Black Sea as a surface current through the Bosporus, the Sea of Marmara, and the Dardanelles. The region is oceanographically diverse with several distinct sub-seas (Global Ocean Associates, 2004). The general circulation of the Eastern Mediterranean Sea is a complex system including basin scale, sub-basin scale and mesoscale variabilities. It consists of permanent and recurrent eddies, gyres and jets, arising from different driving forces like topography, seasonal changes, and internal dynamical processes (Akpinar et al., 2016). The eastern Mediterranean water column is composed of three superposed water masses: the Levantine Surface Water (LSW, 0-200 m, salinity > 39‰), the Levantine Intermediate Water (LIW, 200-600 m, salinity > 38.7‰) and the Eastern Mediterranean Deep Water (EMDW, salinity < 38.65‰) (Malanotte-Rizzoli, 2001).

Despite its low productivity compared to other seas, the Mediterranean Sea is considered a biodiversity hotspot, representing just 0.3% of the global ocean volume while hosting 7% of identified global marine species, with the highest rate of endemism (20-30%) of marine species in the world (UNEP/MAP and Plan Bleu, 2020). Mediterranean biota includes 55 to 77% of Atlantic species (present in the Atlantic and the Mediterranean), 3 to 10% of pantropical species (species from the globe's hot seas), 5% of Lessepsian species (species from the Red Sea) and between 20 and 30% of endemic species (UNEP/MAP and Plan Bleu, 2020). *Posidonia oceanica* is an example of an endemic marine angiosperm plant, of which the meadows are considered the most important marine ecosystem in the Mediterranean and a priority habitat of the European Habitats Directive 92/43/EEC.

Nowadays, the marine environment of the Mediterranean Sea is under various pressures from many different sources which are interacting together, affecting biodiversity. The intensive and over-increasing human exploitation of especially the coastal marine environment, is the main cause of degradation and destruction of important habitats and species. Among the major pressure sources in the Mediterranean are, tourism, transportation, industry, pollution, overfishing, introduction of non-indigenous species, and global phenomena, such as climate change (UNEP/MAP and Plan Bleu, 2020). The Mediterranean is particularly vulnerable to the introduction of alien species, several of which are characterized as invasive and cause significant impacts to native species and habitats. Today, it is estimated that there are around 1,000 such species in the Mediterranean and the rate of introduction is estimated to be approximately one species every 1.5 weeks (UNEP-MAP SPA/RAC 2010). The Eastern part of the Mediterranean Sea is facing the greatest challenges with alien species

due to its proximity to the Suez Canal, which is now the most important introduction pathway of alien species originating from the Indo-Pacific and Red Sea ("*Lessepsian migrants*").

1.2.2 The Republic of Cyprus

1.2.2.1 Marine Waters

The Republic of Cyprus is an islandic country located in the Levantine Basin in the Eastern Mediterranean. Its marine waters, including its territorial sea and Exclusive Economic Zone (EEZ), cover an area of 98,058 km^2 in the Aegean-Levantine Sea subregion (Figure 3). The Republic of Cyprus proclaimed its EEZ by Law No. 64 (I) 2004 which was submitted to the United Nations (un.org/depts/los/legislationandtreaties/pdffiles/cyp_eez-cs_law_2014.pdf), with its outer limit not extending beyond 200 nautical miles from the baselines from which the breadth of its territorial sea is measured. Articles 74(1) and 83(1) of the United Nations Convention of the Law of the Sea (UNCLOS - un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf) provide that: The delimitation of the EEZ/continental shelf between States with opposite adjacent coasts shall be effected by agreement on the basis of international law, as referred to in 10 in Article 38 of the Statute of the International Court of Justice (icj-cij.org/statute), in order to achieve an equitable solution. Accordingly, the Republic of Cyprus has so far concluded agreements on the delimitation of its EEZ with the Arab Republic of Egypt (in force), the Republic of Lebanon (ratification pending) and the State of Israel (in force), on the basis of the median-line principle. Moreover, in accordance with UNCLOS, in those parts of Cyprus' maritime boundaries where no delimitation agreements have been signed and until such agreements are signed, the Republic of Cyprus considers, in principle, as the outer limit of its EEZ/continental shelf, the median-line which is measured from the baselines from which the breadth of their respective territorial seas is measured. In 2019, the Republic of Cyprus deposited with the UN Secretary-General, pursuant to article 75, paragraph 2, and article 84, paragraph 2, of UNCLOS, a list of geographical coordinates of points, accompanied by an illustrative map (un.org/depts/los/legislationandtreaties/pdffiles/deposit/cyprus_deposit.pdf), concerning the northern and north-western outer limits of the exclusive economic zone and the continental shelf, as contained in the Notification of the Minister for Foreign Affairs of the Republic of Cyprus made pursuant to article 3, paragraph 3, of the Exclusive Economic Zone and the Continental Shelf Laws (consolidation of Laws 64(I)/2004, 97(1)/2014) and published in the official Gazette of the Republic (No. 5158 of 6 May 2019).

Although the Republic of Cyprus is the only internationally recognized state in Cyprus and enjoys all the rights afforded to it by international law with respect to the entire territory of the island of Cyprus, including the maritime areas thereof, due to the Turkish invasion on the island in 1974 in violation of international law and the ongoing illegal occupation of 36.2% of the island by Turkish forces, the Republic of Cyprus does not exercise effective control over all its territory. Out of the 800.7 km of coastline, 413.5 km are occupied by Turkish forces, 3.6 km are in the UN controlled buffer zone and another 76.5 km are within the British military-base Areas (SBAs) of Akrotiri and Dhekelia, leaving only 307.1 km of coastline to be effectively controlled by the Republic of Cyprus. Therefore, data, analyses and results reported in this assessment mostly refer to the marine waters under the effective control of the Republic of Cyprus, except in cases where data were available for the total area assessed, e.g. satellite data.

Figure 3. The marine waters of Cyprus including the territorial sea and the EEZ (in light blue), set as a single MRU in the present assessment.

1.2.2.2 Physical and chemical features

The Republic of Cyprus is located in the Levantine Sea which is one of the most oligotrophic seas in the world, characterized by very low nutrient availability and low primary production, as well as unique hydrographic, hydrological, and physical conditions, like high sea temperatures, evaporation rates and salinity levels (Krom et al., 1991, Pitta et al., 2005; Psarra et al., 2005; Tanaka et al., 2007; Krom et al., 2014). The frequent prolonged periods of drought, the limited runoffs in the coastal waters (Xevgenos et al., 2021) and the presence of 108 damns constructed along the majority of streams of the island (Water Development Department, 2022) reinforce the ultra-oligotrophic characteristics of coastal waters.

The most pronounced oceanographical features in the marine waters of Cyprus are (i) the anticyclonic Cyprus Eddy, which migrates over the broad region of the Eratosthenes seamount and exhibits significant seasonal and inter-annual spatial-temporal variability and (ii) the anticyclonic Shikmona Eddy generated by instabilities of the strong northward flowing jet along the southeasternmost shelf and slope of the Levantine basin (Figure 4).

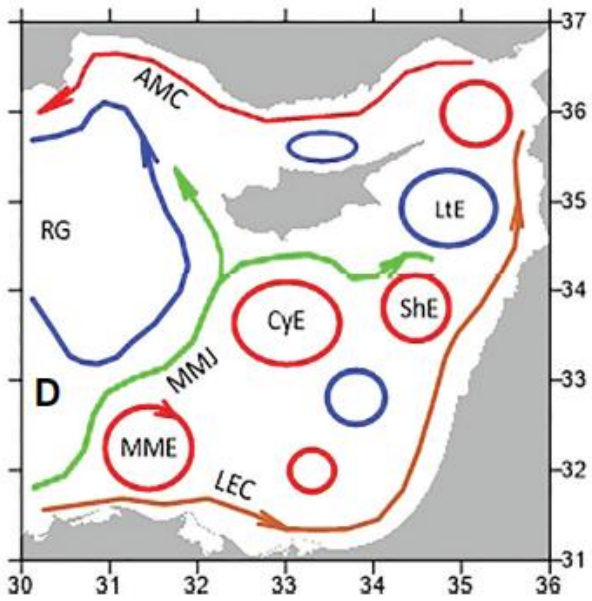

Figure 4. Summary of main flow features in the SE Levantine from 1995-2015 Anticyclonic eddies are shown in red (CyE: Cyprus Eddy; ShE: Shikmona Eddy; MME: Mersa Matruh Eddy), cyclonic eddies in blue (LtE: Lattakia Eddy; RG: Rhodes gyre), the MMJ in green, and the along the shelf-slope currents in brown (LEC: Libyan-Egyptian Current) and red (AMC: Asia Minor Current) (Zodiatis et al., 2023).

Regarding topography and bathymetry, the marine waters of Cyprus (its territorial sea and EEZ) are characterized by a highly exposed coastline, a very narrow shelf and several offshore geomorphological features, mainly seamounts and seamount-like structures (Table 1; Figure 5). To date, the Republic of Cyprus has mapped, in terms of bathymetry, its shelf to the depth of 250 m, as well as the Eratosthenes seamount, at depths between 700 to 1,200 m (eservices.dls.moi.gov.cy). Additional information on physical and chemical features are presented in the Chapter 3.3.

Table 1. Main geomorphological features in Cyprus marine waters (Würtz and Rovere, 2015).

Feature Name	Latitude (°N)	Longitude (°E)	Peak depth (m)	Base depth (m)
Anamur-Kormakiti Ridge	ND	ND	ND	ND
Eratosthenes Seamount	33.74444	32.73362	780-790	1920-1930
Florence Rise	34.82090	31.69151	1560-1570	2100-2110
Hecataeus Rise	34.44201	34.34533	1090-1100	1510-1520
Hecataeus Knoll	34.44025	33.61840	190-200	690-700
Karpas Ridge	35.88444	34.88554	50-60	360-370
Larnaca Ridge	35.27495	35.09294	840-850	ND
Latakia Ridge	35.13782	35.54911	890-900	ND

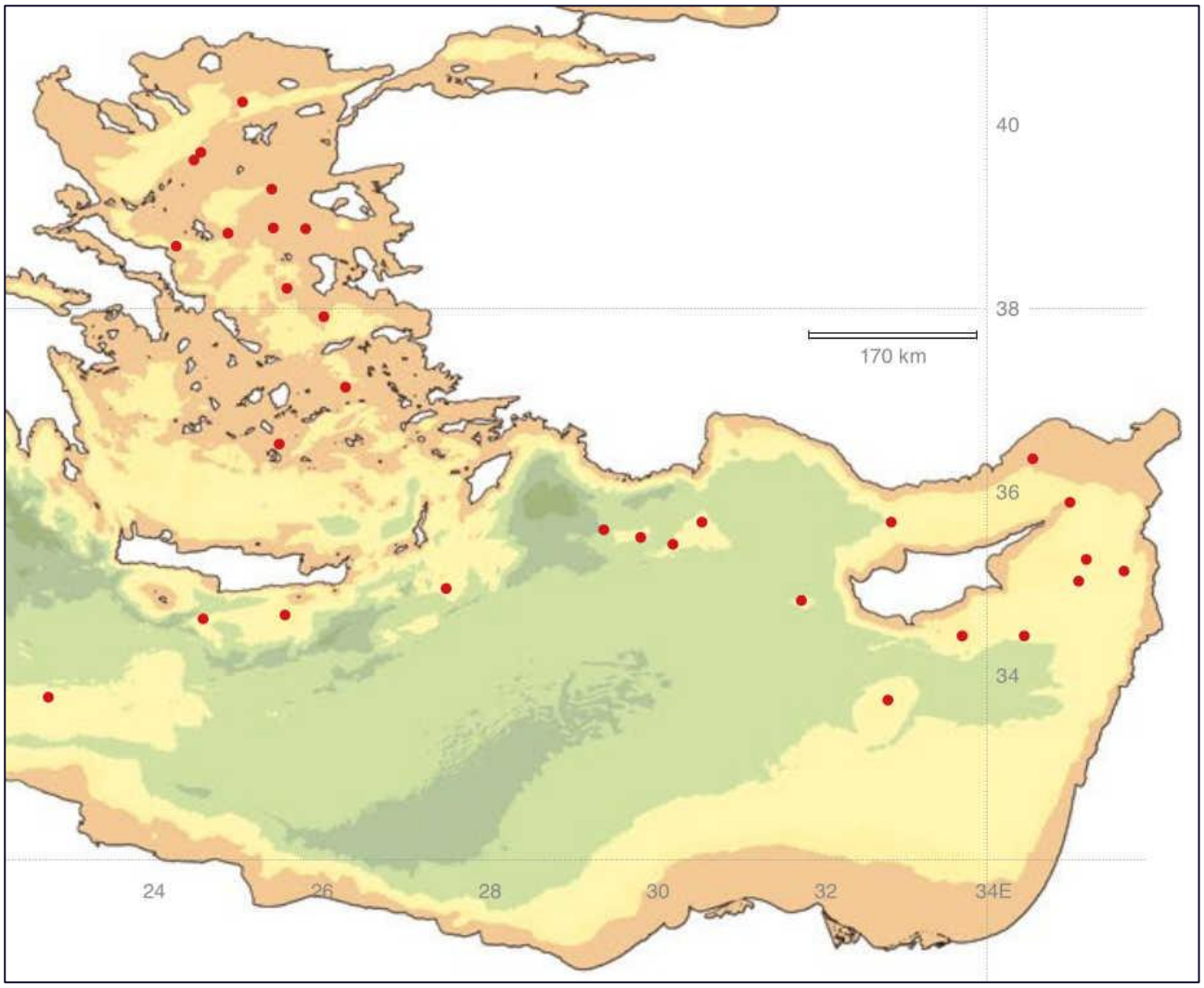

Figure 5. Main seamounts and seamount-like structures in the Eastern Mediterranean Sea (indicated by red dots), including the marine waters of the Republic of Cyprus (modified from Würtz and Rovere, 2015).

1.2.2.3 Biological Features and Habitat Types

Many marine species are found in Cyprus, among which emblematic species like the green and loggerhead sea turtles (*Chelonia mydas* and *Caretta caretta*), the Mediterranean monk seal (*Monachus monachus*) and the bottlenose dolphin (*Tursiops truncatus*), which are included in Annex II of the Habitats Directive. In addition, intensified monitoring efforts and compilation of species checklists over the last years, have improved our knowledge on the presence, status, and spatial distribution of many less known marine organisms. Up-to-date, among others, 319 macroalgae species (Tsiamis et al., 2014; Kletou et al., 2018), 585 polychaeta species (Rousou et al., 2023), 752 molluscs species (Kolokotronis et al., 2022; Kolokotronis following personal communication), 142 amphipods species (Rousou et al., 2020; Garcia Gómez et al., 2024), 91 bryozoan species (Achilleos et al., 2019), 90 holoplanktonic and meroplanktonic taxa (Vasilopoulou et al., 2022), and around 280 fish species (Froese and Pauly, 2024) have been reported in Cyprus. In this framework, DFMR, together with the University of Cyprus, are in the process of establishing an open access web-based dynamic marine biodiversity database for Cyprus (Chartosia and Michailidis, 2024), which is expected to be ready and running by the end of 2025.

Four sensitive marine habitats are present in Cyprus, which are included in Annex I of the Habitats Directive, *Posidonia oceanica* meadows (Habitat 1120*), which is also a Priority Habitat, sand banks with *Cymodocea nodosa* meadows (Habitat 1110), reefs (Habitat 1170) and submerged or partially submerged seacaves (Habitat Type 8330). These habitats, along with other soft sediments and coralligenous substrates have been mapped down to the depth 250 m. Furthermore, the presence of Habitat 1180 on Eratosthenes Seamount, previously discovered by the Nautilus Expedition, was confirmed in 2021 during the implementation of the Eratosthenes Project and its coverage was estimated to be around 700 m^2 (~3.3% coverage of the investigated station and ~0.0005% of the overall Eratosthenes investigated area - DFMR unpublished data). Additional information on biological features and habitats are presented in Chapter 3.3.

1.2.2.4 Pressures and impacts

The identified pressures and impacts on the coastal marine environment of Cyprus include: (i) Incidental Bycatch, (ii) Non-indigenous species, (iii) Physical Loss and Disturbance of the Seabed, (iv) Hydrographic Changes, (v) Eutrophication, (vi) Contaminants in the environment and seafood, (vii) Marine litter, (viii) Underwater noise, and (ix) Climate change, that are addressed in Chapter 3.3.

1.3 Methodology applied for the preparation of the current report

1.3.1 General MSFD reporting information

The EU has prepared the "*European Commission 2023 MSFD guidance: Reporting on the 2024 update of Articles 8, 9 and 10 (MSFD Guidance Document 20)*" (herein MSFD Reporting Guidance) that the MS should follow.

As indicated in the MSFD Reporting Guidance, MS must review and update their marine strategies every six years, including Articles 8 (Initial Assessment), 9 (Determination of GES) and 10 (Establishment of Targets) (Figure 6, Table 2). For the review and update, the following need to be taken into consideration:

- The outcomes and recommendations of the European Commission's (EC) assessment of the 2018 reports;
- The technical reviews of the 2018 reports by the Joint Research Centre (JRC);
- The updated Monitoring Programmes (MSFD Article 11), reported in 2020 which, among others, aim to collect data and information to assess progress towards achieving GES and targets;
- Further implementation of the GES Decision on criteria and methodological standards;
- Commission Directive (EU) 2017/845 which amends the MSFD by replacing its Annex III7;
- Commission Decision (EU) 2017/848 of 17 May 2017 laying down criteria and methodological standards on good environmental status of marine waters;
- Relevant assessments undertaken under other EU policies and international conventions.

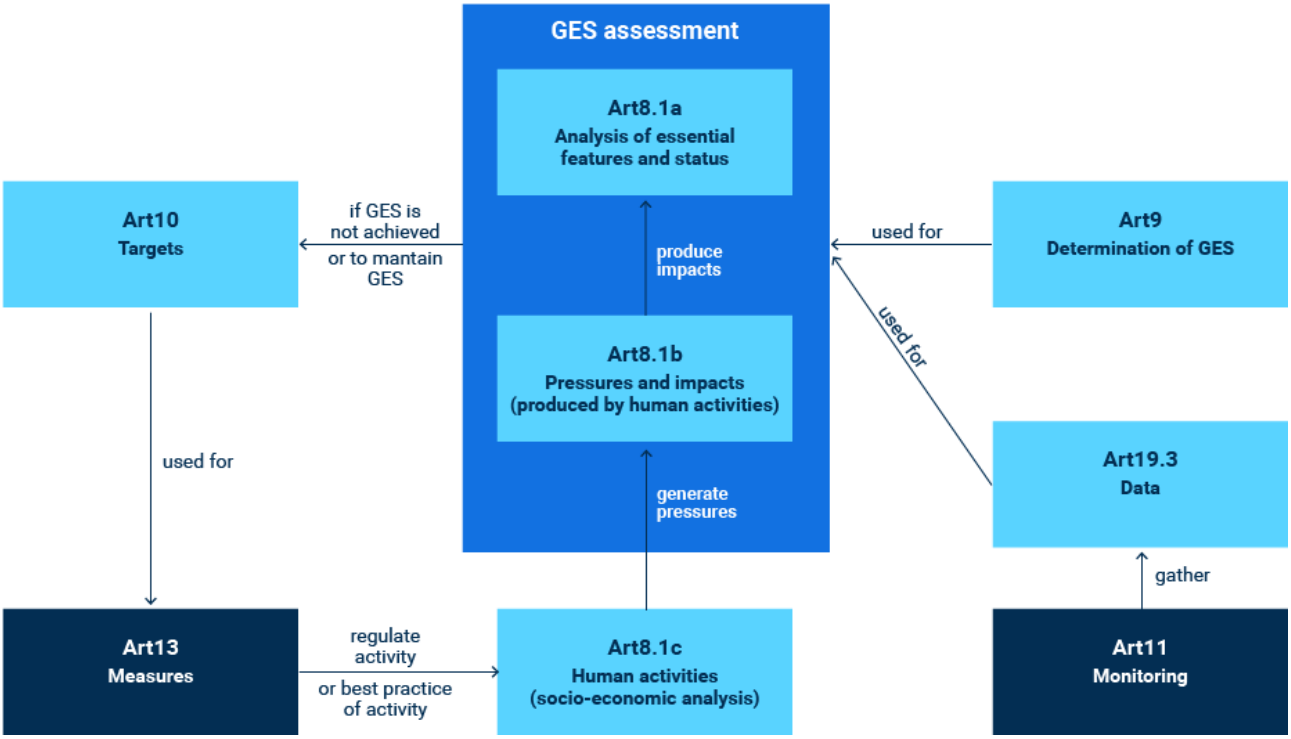

Figure 6. Schematic of MSFD reporting (EU Wise Marine website).

Table 2. Requirements of Articles 8, 9, and 10.

Articles	Contents	Short Description	Reporting
Article 9	GES determination	MS have to determine, in respect of each marine region or subregion concerned, a set of characteristics for GES on the basis of the qualitative descriptors listed in MSFD Annex3 I.	e-report
Article 8	8(1a, b) Assessment results concerning current status of marine waters and the predominant pressures and environmental impacts of human activities 8(1c) Socio-economic analysis of the uses of marine waters and the costs of degradation	MS have to make an assessment of their marine waters. The assessment comprises three elements: a. An analysis of the predominant essential features and characteristics, and the current environmental status of their marine waters (Article 8(1)(a)). The analysis should cover the physical and chemical features, the habitat types, the biological features and the hydro-morphology. b. An analysis of the predominant pressures and impacts, including human activity, on the environmental status of those waters (Article 8(1)(b)) c. An economic and social analysis of the use of the marine waters, and of the cost of degradation of the marine environment (Article 8(1)(c)), based on the list of uses and human activities marked with an * in Table 2b of MSFD Annex III.	e-report
Article 10	Targets and associated indicators, including an assessment of the progress towards achieving them	MS on the basis of their initial assessment (in 2012), shall establish a comprehensive set of environmental targets and associated indicators for their marine waters.	e-report

The Assessment period shall be defined by the MS to include either 2016-2021 data or 2017-2022 data when reported in 2024. Data are to be reported electronically via the EU's Reportnet system (reportnet.europa.eu).

The development of text-based reports is considered optional, but MS use them to serve their public consultation obligations under MSFD Article 19(2), to ensure that their marine strategies are adopted within national planning. Their structure is pre-defined by the EC and is presented in Table 3.

Table 3. Outline of contents for the 2024 Articles 8, 9 and 10 text-based report.

Overall topic	**Themes**
Introductory sections	Background, general characteristics of the marine waters, process and methodologies for preparation of the report, public consultation, etc.
Objective of the MSFD - Good Environmental Status (Art. 9)	Updated determination of GES, taking account of the GES Decision
Uses of the marine environment (Art. 8 (1c)) DPSIR: Drivers (activities)	Uses and human activities in or affecting the marine environment (MSFD Annex III, Table 2b uses/activities marked with *) • Economic and social analysis of uses and human activities: • Physical restructuring of (rivers,) coastline and seabed • Extraction of non-living resources • Production of energy • Extraction of living resources • Cultivation of living resources • Transport • Urban and industrial uses • Tourism and leisure • Security and defence • Education and research
Pressures and impacts on the marine environment (Art. 8 (1b)) DPSIR: Pressures (and environmental impacts)	Anthropogenic pressures and their impacts (GES Decision Part I and MSFD Annex III Table 2a) • Incidental bycatch (D1C1) • Introduction or spread of non-indigenous species (D2) • Extraction of, or injury to, wild species (partially D3) • Other biological disturbances • Physical disturbance to the seabed (D6C2-C3) • Physical loss of the seabed (D6C1) • Hydrological changes (D7) • Nutrient and organic matter enrichment (eutrophication) (D5) • Contaminants in the environment (D8) • Contaminants in seafood (D9) • Litter (D10) • Underwater noise and other forms of energy (D11) • Climate change
State of the marine environment (Art. 8 (1a)) DPSIR: State (including environmental impacts)	Structure, functions and processes of marine ecosystems (GES Decision Part II and MSFD Annex III Table 1) • Marine species (D1): - Birds - Mammals - Reptiles - Fish - Cephalopods - Commercially exploited fish and shellfish (D3) • Marine habitats: - Pelagic habitats (D1) - Sea-floor integrity/Benthic habitats (D6, D1)

Overall topic	Themes
	- Marine ecosystems, including food webs (D4, D1)
Cost of degradation (Art. 8 (1c)) DPSIR: Impact (loss of ecosystem services)	Cost of degradation of the marine environment (loss of ecosystem services)
Environmental targets to achieve GES (Art. 10) DPSIR: Response (with links to Art. 13 Measures)	Progress in achievement of 2018 environmental targets Update of targets, links to Programme of Measures

1.3.2 Republic of Cyprus MSFD reporting

As an EU MS, the Republic of Cyprus has prepared the present text report for Articles 8, 9 and 10, based on the MSFD Guidance Document issued by the EC. The reporting period is from 1 January, 2017 to 31 December, 2022, and the reporting area is the marine waters of Cyprus (its territorial sea and EEZ), all defined as one Marine Reporting Unit (MRU: MAL-CY-AA-001). However, due to the known political reasons previously discussed, the Republic of Cyprus does not exercise effective control over all its territory, therefore, data, analyses and results reported, mostly refer to the marine waters under the effective control of the Republic of Cyprus, except in cases where data were available for the total area (MRU) assessed, e.g. satellite reanalysis data from Copernicus marine service (marine.copernicus.eu), and it is stated so.

This report was developed based on the structure defined in the updated MSFD Guidance Document (2019) and it includes the following Chapters:

Chapter 1. Introduction

Chapter 2. Article 9 - Determination of Good Environmental Status

Chapter 3. Article 8 - Assessment of the Marine Waters of the Republic of Cyprus

Chapter 4. Article 10 - Establishment of Environmental Targets

Project Team

Bibliography

1.3.2.1 Article 9 - Determination of GES

MSFD Article 9 requires MS to determine a set of characteristics for GES on the basis of the qualitative descriptors. The EU has adopted the Commission Decision (EU) 2017/848 (hereinafter referred to as the "*GES Decision*") which sets out the criteria and methodological standards to be used by MS to ensure consistency and to allow for comparison, between marine regions or subregions, of the extent to which GES is being achieved, in accordance with MSFD Article 9(3). Specifically, the GES Decision sets out the criteria, the criteria elements[1], the scales of assessment and how the criteria are to be used, for each of the MSFD Descriptors. Furthermore, GES Decision provides details per criterion, including: (i) prioritization of criteria, (ii) scales of assessment,(iii) how to derive the extent to which GES is achieved, (iv) when it is expected to use the assessments coming from the coastal and territorial waters (as defined under the Water Framework Directive - WFD) regarding eutrophication and contamination and other assessments, (v) criteria for selecting the species and habitats to be assessed, and (vi) units of measurement for each of the criteria.

Furthermore, the EU has defined a list of GES Features (Table 4) from which the MS must select the Features that they will address for each of the GES Criteria. In its previous submitted MSFD reports,

[1] *"Criteria elements" means constituent elements of an ecosystem, particularly its biological elements (species, habitats and their communities), or aspects of pressures on the marine environment (biological, physical, substances, litter and energy), which are assessed under each criterion.*

the Republic of Cyprus defined GES either at the Criterion level or in some cases at the Descriptor level. Based on the GES Decision and the reviews of previous CY and other MS reports by the EC, the GES for each Descriptor was re-evaluated and defined at the Criterion level and the related GES Features are noted.

Table 4. Description of GES Features according to the MSFD reporting requirements.

GES Feature	Description
BirdsGrazing	Grazing birds
BirdsWading	Wading birds
BirdsSurfaceFeeding	Surface-feeding birds
BirdsPelagicFeeding	Pelagic-feeding birds
BirdsBenthicFeeding	Benthic-feeding birds
MamCetacSmall	Small toothed cetaceans
MamCetacDeepDiving	Deep-diving toothed cetaceans
MamCetacBaleenWhales	Baleen whales
MamSeals	Seals
RepTurtles	Turtles
FishCoastal	Coastal fish
FishPelagicShelf	Pelagic shelf fish
FishDemersalShelf	Demersal shelf fish
FishDeepSea	Deep-sea fish
FishCommercial	Commercially exploited fish and shellfish
CephaCoastShelf	Coastal/shelf cephalopods
CephaDeepSea	Deep-sea cephalopods
HabBenBHT	Benthic broad habitats
HabBenOther	Other benthic habitats
HabPelBHT	Pelagic broad habitats
HabPelOther	Other pelagic habitats
CharaPhyHydro	Physical and hydrological characteristics
CharaChem	Chemical characteristics
EcosysCoastal	Coastal ecosystems
EcosysShelf	Shelf ecosystems

GES Feature	Description
EcosysOceanic	Oceanic/deep-sea ecosystems
PresEnvNISnew	Newly introduced non-indigenous species
PresEnvNISestablished	Established non-indigenous species
PresEnvBycatch	Species affected by incidental by-catch
PresEnvHydroChanges	Hydrographical changes
PresPhyDisturbSeabed	Physical disturbance to seabed
PresPhyLoss	Physical loss of the seabed
PresEnvEutrophi	Eutrophication
PresEnvContNonUPBTs	Contaminants - non UPBT substances
PresEnvContUPBTs	Contaminants - UPBT substances
PresEnvContSeafood	Contaminants - in seafood
PrevEnvAdvEffectsSppHab	Adverse effects on species or habitats
PresEnvAcuPolluEvents	Acute pollution events
PresEnvLitter	Litter in the environment
PresEnvLitterMicro	Micro-litter in the environment
PresEnvLitterSpp	Litter and micro-litter in species
PresEnvSoundImpulsive	Impulsive sound in water
PresEnvSoundContinuous	Continuous low frequency sound

1.3.2.2 Establishment of Indicators

MSFD Article 8 assessments on state and pressures, indicating progress towards achieving GES, are based on indicators that cover all aspects of the Drivers-Pressures-State-Impacts-Responses (DPSIR) framework, and may be related to the analysis of the main characteristics, the analysis of pressures and impacts, or the socio-economic analysis. Based on the reviews of CY and other MS reports by the EC, Indicators defined in the previous reports, were re-evaluated, and new Indicators were defined.

1.3.2.3 Article 8 (1c) - Uses of the Marine Environment

The uses of the marine environment and the corresponding activities per use, have been defined at the EU level. Each of the uses may include more than one activity that is assigned a specific code (activity code) for the purpose of reporting. Furthermore, for each activity, the EU has identified representative NACE codes[1] that correspond to specific statistical data that can be used for the socioeconomic analyses.

According to the MSFD Guidelines provided via EU's Reportnet system, for each of the marine uses, MS report the following information (either optionally or mandatory):

(i) *Description* of the use/activity, of the approach to the analysis and of the assessment outcomes (optional)

(ii) *Socioeconomic data* where available, on:

- Employment: Direct full-time employment under the activity (employees in thousands) (optional)
- Production value (€ million) of the activity (optional)
- Value-added (€ million) by the activity (optional)

(iii) *Related ESA Indicator*: Each activity must be linked to as many socioeconomic Indicator (herein ESA Indicators) codes of the CY-MSFD as necessary (mandatory). The indicators list is presented in Chapter 3.2.1.

(iv) *Related Pressures*: Each activity must be linked to as many pressure codes as necessary (mandatory). The pressure codes have been pre-defined by the EU (Table 5).

(v) *Relate Ecosystem Service*: Each activity must be linked to as many ecosystem services codes as necessary (mandatory), which have also been pre-defined by the EU (Table 6).

In the case of the *Republic of Cyprus*, for the previous MSFD reporting Cycle only six uses corresponding to eight activities were partially addressed, providing, where available, descriptive information and socioeconomical data. For the current report (2017-2022), a total of nine marine uses and 16 activities were identified (Table 7). For each activity, the information indicated above (i-v) is reported where available. The assessment was based on the collection of data from official sources such as the Statistical Service of Cyprus (CY-Stat), Eurostat, National Authorities (e.g. Department of Fisheries and Marine Research, Department of Environment), etc. (Table 5). For the socioeconomic data (employment, production value and added value), when data were available, the annual, average values, and in some cases total values, for years 2017-2022 were reported. For e-reporting, the average values were submitted to EU's Reportnet system.

[1] *NACE is a four-digit classification providing the framework for collecting and presenting statistical data according to economic activity in a wide variety of European statistics in the economic, social, environmental, and agricultural domains.*

Table 5. Uses of marine environment identified for CY reporting (*: partially addressed in previous MSFD reporting cycle; CY-Stat: Statistical Service of Cyprus; DFMR: Department of Fisheries and Marine Research; DLS: Department of Land and Surveys; DoE: Department of Environment; DoW: Department of Works; WDD: Water Development Department).

Uses of marine Environment (Feature)	Activity	Activity codes (e-reports)	NACE codes (e-reports)	Method of assessment / source of data
Physical restructuring of (rivers,) coastline and seabed	Coastal defence and flood protection	ActivRestrucCoastDef	4291 - Construction of water projects	DLS; CY-Stat
	Restructuring of seabed morphology, including dredging and depositing of materials	ActivRestrucSeabedMorph		DoE (Marinas EIAs); DoW
Production of energy *	Non-renewable energy generation *	ActivProdEnerNonRenew	4222 - Construction of utility projects for electricity and telecommunications NACE 35.11- Production of Electricity	Cy-Stat
	Transmission of electricity and communications (cables)	ActivProdEnerCables	4222 -Construction of utility projects for electricity and telecommunications	DLS
Extraction of non-living resources *	Extraction of water *	ActivExtrNonLivingWater	NACE 36.00 - Water extraction	WDD; Cy-Stat
Extraction of living resources *	Fish and shellfish harvesting (professional, recreational) *	ActivExtrLivingFishHarv	0311 - Marine fishing	DFMR; CY-Stat
	Fish and shellfish processing	ActivExtrLivingFishProcess	1020 - Processing and preserving of fish, crustaceans and molluscs	CY-Stat
Cultivation of living resources *	Aquaculture – marine, including infrastructure *	ActivCultivAquaculMarine	0321 - Marine aquaculture	DFMR
Transport *	Transport - infrastructure *	ActivTranspInfras	3011 - Building of ships and floating structures	CY-Stat
			3012 - Building of pleasure and sporting boats	CY-Stat
			3315 - Repair and maintenance of ships and boats	CY-Stat
	Transport - shipping *	ActivTranspShip	5010 - Sea and coastal passenger water transport	CY-Stat
			5020 -Sea and coastal freight water transport	CY-Stat
Urban and industrial uses	Urban uses	ActivUrbIndUrban	NACE 3600 Water collection treatment and supply	CY-Stat; DoE
	Industrial uses	ActivUrbIndIndustrial	N/A	
	Waste treatment and disposal	ActivUrbIndWaste	NACE 37.00 Sewerage - WWTPs	CY-Stat; DoE
Tourism *	Tourism and leisure infrastructure *	ActivTourismInfra	5510 - Hotels and similar accommodation	CY-Stat; Deputy Ministry Of Tourism Statistical Data 2022
	Tourism and leisure activities *	ActivTourismActiv	N/A	CY-Stat; WTTC (2023)
Education and research	Research, survey and educational activities	ActivResearch	N/A	Bibliographic search & Personal communication with Scientists

Table 6. MSFD Pressures (* pressures assessed in Cyprus).

Code	Description
PresBioIntroNIS	*Input or spread of non-indigenous species
PresBioIntroMicroPath	Input of microbial pathogens
PresBioIntroGenModSpp	Input of genetically modified species and translocation of native species
PresBioCultHab	*Loss of, or change to, natural biological communities due to cultivation of animal or plant species
PresBioDisturbSpp	*Disturbance of species (e.g. where they breed, rest and feed) due to human presence
PresBioExtractSpp	*Extraction of, or mortality/injury to, wild species (by commercial and recreational fishing and other activities)
PresInputNut	*Input of nutrients - diffuse sources, point sources, atmospheric deposition
PresInputOrg	*Input of organic matter – diffuse sources and point sources
PresInputCont	*Input of other substances (e.g. synthetic substances, non-synthetic substances, radionuclides) - diffuse sources, point sources, atmospheric deposition, acute events
PresInputLitter	*Input of litter (solid waste matter, including micro-sized litter)
PresInputSound	*Input of anthropogenic sound (impulsive, continuous)
PresInputOthEnergy	*Input of other forms of energy (including electromagnetic fields, light and heat)
PresInputWater	*Input of water - point sources (e.g. brine)
PresEnvHydroChanges	*Hydrographical changes
PresPhyDisturbSeabed	*Physical disturbance to seabed
PresPhyLoss	*Physical loss of the seabed

Table 7. MSFD Ecosystem Services.

Code	Description
EcosysServAll	All ecosystem services
EcosysServNutrAll	All ecosystem services related to nutrition
EcosysServNutrSeafoodAlgae	Wild plants, algae and their outputs
EcosysServNutrSeafoodAnimals	Wild animals and their outputs
EcosysServNutrAquacAlgae	Algal seafood from aquaculture
EcosysServNutrAquacAnimals	Animals from in-situ aquaculture
EcosysServMatAll	All ecosystem services related to provision of materials
EcosysServMatRaw	Fibres and other materials from plants, algae and animals for direct use or processing
EcosysServMatAlgaeAnimalsForAquac	Materials from plants, algae and animals for agricultural use
EcosysServMatGenetic	Genetic materials from all biota
EcosysServEnerAll	All ecosystem services related to provision of energy
EcosysServEnerPlants	Plant-based resources
EcosysServEnerAnimals	Animal-based resources
EcosysServWasteAll	All ecosystem services related to mediation of waste, toxics and other nuisances
EcosysServWasteTreatment	Bio-remediation by micro-organisms, algae, plants, and animals
EcosysServWasteRemovalByOrgan	Filtration/sequestration/storage/accumulation by micro-organisms, algae, plants, and animals
EcosysServWasteRemovalByEcosys	Filtration/sequestration/storage/accumulation by ecosystems
EcosysServWasteSmellVisImpacts	Mediation of smell/visual impacts
EcosysServFlowsAll	All ecosystem services related to mediation of flows
EcosysServFlowsErosionPrev1	Mass stabilisation and control of erosion rates
EcosysServFlowsErosionPrev2	Buffering and attenuation of mass flows
EcosysServFlowsFloodProt	Flood protection
EcosysServFlowsOxygenProd	Ventilation and transpiration
EcosysServMainCondAll	All ecosystem services related to maintenance of physical, chemical and biological conditions
EcosysServMainCondPolli	Pollination and seed dispersal
EcosysServMainCondNurs	Maintaining Nursery Populations and Habitats
EcosysServMainCondGene	Gene pool protection

Code	Description
EcosysServMainCondPest	Pest control
EcosysServMainCondDis	Disease control
EcosysServMainCondDeco	Decomposition and fixing processes
EcosysServMainCondChem	Chemical condition of salt waters
EcosysServMainCondClim	Global climate regulation by reduction of greenhouse gas concentrations
EcosysServInteracPhyAll	All ecosystem services underpinning physical and intellectual interactions
EcosysServInteracPhyRecreat1	Experiential use of plants, animals and land-/seascapes in different environmental settings
EcosysServInteracPhyRecreat2	Physical use of land-/seascapes in different environmental settings
EcosysServInteracPhyScientif	Scientific
EcosysServInteracPhyEducat	Educational
EcosysServInteracPhyCultur	Heritage, cultural
EcosysServInteracPhyEntert	Entertainment
EcosysServInteracPhyAesthe	Aesthetic
EcosysServInteracSpiAll	All ecosystem services underpinning spiritual, symbolic and other interactions
EcosysServInteracSpiSymb	Symbolic
EcosysServInteracSpiRelig	Sacred and/or religious
EcosysServInteracSpiExis	Existence
EcosysServInteracSpiBequ	Bequest

1.3.2.4 Article 8 (1b) - Pressures and impacts on the marine environment

Article 8(1b) of the MSFD refers to the pressures and impacts on the marine environment that have been defined at the EU level. To assess whether GES has been achieved, the GES Decision sets out the Criteria and methodological standards to be used by MS to ensure consistency and to allow for comparison between marine regions or subregions. Furthermore, to assess whether a Criterion element is in GES, Threshold Values[1] (TVs) shall be available. According to the GES Decision, the establishment of TVs shall be defined either at the EU level, or at regional (e.g. in the case of Cyprus via Barcelona Convention) or sub-regional level, or where needed, MS can establish their own National TVs. Therefore, for the 2017-2022 reporting period, for each Criterion element, data analyses were carried out, and where TVs were available or set nationally, they were assessed to determine whether GES has been achieved.

1.3.2.5 Estimation of Cost of Degradation

To estimate the cost of degradation for the underlying ecosystem services a Benefit Transfer Function Method (BTFM) was applied to estimate the Total Economic Value (TEV) of ecosystem services, following the classification introduced by the Millenium Ecosystem Assessment (MEA - MEA, 2005).

[1] *"Threshold value" means a value or range of values that allows for an assessment of the quality level achieved for a particular Criterion, thereby contributing to the assessment of the extent to which good environmental status is being achieved.*

Ecosystem Services

The Ecosystem services refer to the benefits/utility humans derive from natural ecosystems. The MEA provides a common classification in four key categories: Provisioning, Regulating, Cultural and Supporting (Figure 7).

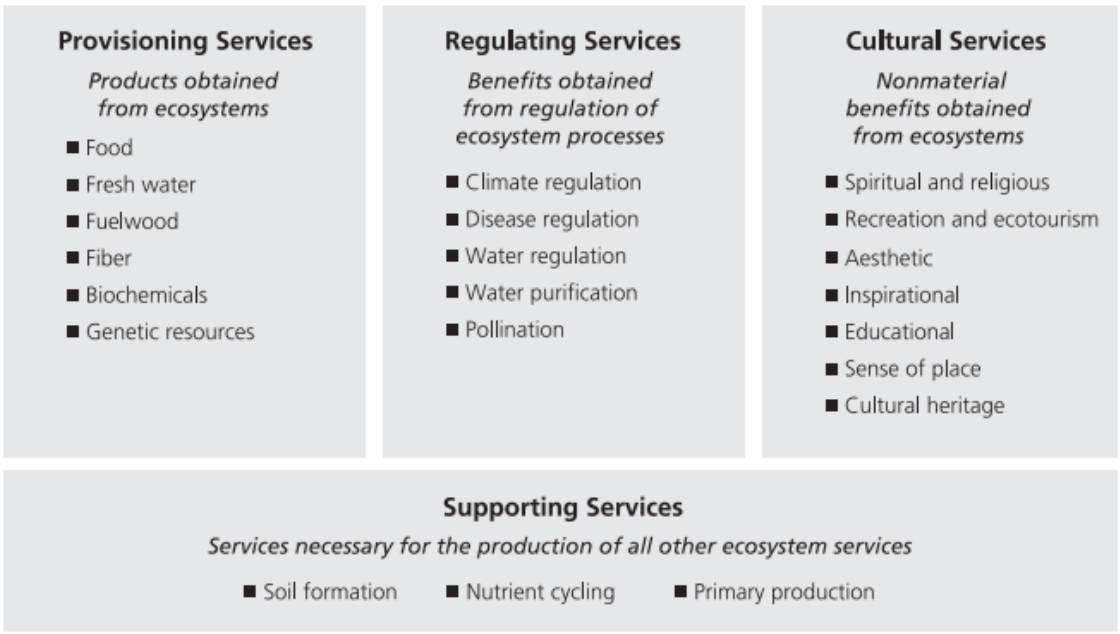

Figure 7. Ecosystem Services Classification (source: MEA, 2005).

Provisioning services are the tangible goods/products obtained from ecosystems. These include all the resources we harvest or extract for food, water, fuel, materials, and other physical needs. Regulating services refer to benefits obtained through the regulation of the ecosystem processes, such as climate, disease or water regulation and pollination. Supporting are the services which are necessary to produce all other ecosystem services, e.g. soil formation, nutrient cycling and primary production. Finally, Cultural Services refer to nonmaterial benefits, such as among others recreation, aesthetic, educational and cultural heritage.

The MSFD and the MEA use slightly different approaches to classify ecosystem services. On the one hand, MSFD focuses more on the ecological status of the services, while on the other hand the MEA focuses on assessing how ecosystems contribute to human well-being/welfare. Table 8 presents the mapping/link between the two frameworks.

Table 8. MSFD and MEA mapping.

MSFD Subject	MSFD Theme	MSFD Sub-theme	MSFD Label: Features and elements	MSFD Code	Link to MEA (2005)
Ecosystem services	-		All ecosystem services	EcosysServAll	Provisioning - Regulating - Cultural
	Nutrition	Biomass	All ecosystem services related to nutrition	EcosysServNutrAll	Provisioning
			Wild plants, algae and their outputs	EcosysServNutrSeafoodAlgae	Provisioning
			Wild animals and their outputs	EcosysServNutrSeafoodAnimals	Provisioning
			Algal seafood from aquaculture	EcosysServNutrAquacAlgae	Provisioning
			Animals from in-situ aquaculture	EcosysServNutrAquacAnimals	Provisioning
	Materials	Biomass	All ecosystem services related to provision of materials	EcosysServMatAll	Provisioning
			Fibres and other materials from plants, algae and animals for direct use or processing	EcosysServMatRaw	Provisioning
			Materials from plants, algae and animals for agricultural use	EcosysServMatAlgaeAnimalsForAquac	Provisioning
			Genetic materials from all biotas (*)	EcosysServMatGenetic	Provisioning
	Energy	Biomass-based energy sources	All ecosystem services related to provision of energy	EcosysServEnerAll	Provisioning
			Plant-based resources	EcosysServEnerPlants	Provisioning
			Animal-based resources	EcosysServEnerAnimals	Provisioning
	Mediation of waste, toxics and other nuisances	-	All ecosystem services related to mediation of waste, toxics and other nuisances	EcosysServWasteAll	Regulating
		Mediation by biota	Bioremediation by micro-organisms, algae, plants, and animals	EcosysServWasteTreatment	Regulating
			Filtration/sequestration/storage/accumulation by micro-organisms, algae, plants, and animals	EcosysServWasteRemovalByOrgan	Regulating
		Mediation by ecosystems	Filtration/sequestration/storage/accumulation by ecosystems	EcosysServWasteRemovalByEcosys	Regulating
			Mediation of smell/visual impacts	EcosysServWasteSmellVisImpacts	Regulating
	Mediation of flows	-	All ecosystem services related to mediation of flows	EcosysServFlowsAll	Regulating
		Mass flows	Mass stabilisation and control of erosion rates	EcosysServFlowsErosionPrev1	Regulating
			Buffering and attenuation of mass flows	EcosysServFlowsErosionPrev2	Regulating
		Liquid flows	Flood protection	EcosysServFlowsFloodProt	Regulating
		Gaseous / air flows	Ventilation and transpiration	EcosysServFlowsOxygenProd	Regulating
	Maintenance of physical, chemical,	-	All ecosystem services related to maintenance of physical, chemical and biological conditions (**)	EcosysServMainCondAll	Regulating

MSFD Subject	MSFD Theme	MSFD Sub-theme	MSFD Label: Features and elements	MSFD Code	Link to MEA (2005)
	biological conditions	Lifecycle maintenance, habitat and gene pool protection	Pollination and seed dispersal (**)	EcosysServMainCondPolli	Regulating
			Maintaining Nursery Populations and Habitats (**)	EcosysServMainCondNurs	Regulating
			Gene pool protection (**)	EcosysServMainCondGene	Regulating
		Pest and disease control	Pest control	EcosysServMainCondPest	Regulating
			Disease control	EcosysServMainCondDis	Regulating
		Soil formation and composition	Decomposition and fixing processes (**)	EcosysServMainCondDeco	Regulating
		Water conditions	Chemical condition of salt waters (**)	EcosysServMainCondChem	Regulating
		Atmospheric composition and climate regulation	Global climate regulation by reduction of greenhouse gas concentrations (**)	EcosysServMainCondClim	Regulating
	Underpinning and/or enhancing physical and intellectual interactions	-	All ecosystem services underpinning physical and intellectual interactions	EcosysServInteracPhyAll	Cultural
		Physical and experiential interactions	Experiential use of plants, animals and land-/seascapes in different environmental settings	EcosysServInteracPhyRecreat1	Cultural
			Physical use of land-/seascapes in different environmental settings	EcosysServInteracPhyRecreat2	Cultural
		Intellectual and representative interactions	Scientific	EcosysServInteracPhyScientif	Cultural
			Educational	EcosysServInteracPhyEducat	Cultural
			Heritage, cultural	EcosysServInteracPhyCultur	Cultural
			Entertainment	EcosysServInteracPhyEntert	Cultural
			Aesthetic	EcosysServInteracPhyAesthe	Cultural
	Underpinning and/or enhancing spiritual, symbolic and other interactions	-	All ecosystem services underpinning spiritual, symbolic and other interactions	EcosysServInteracSpiAll	Cultural
		Spiritual and/or emblematic	Symbolic	EcosysServInteracSpiSymb	Cultural
			Sacred and/or religious	EcosysServInteracSpiRelig	Cultural
		Other cultural outputs	Existence	EcosysServInteracSpiExis	Cultural
			Bequest	EcosysServInteracSpiBequ	Cultural

* Although this service is primarily classified Provisioning, it could also be classified as Supporting
** Although this service is primarily classified as Regulating, it could also be classified as Supporting

While the MSFD does not classify supporting services per se, its focus on biodiversity and maintaining ecosystem structure aligns with the MEA's concept of supporting services.

Valuation of Ecosystem Services

A precise calculation of the cost of degradation requires establishing the TEV framework of the respective ecosystem services (TEEB, 2012). The TEV framework is a broad method for assessing all the benefits derived from ecosystem services, including both direct and indirect values (Figure 8). TEV seeks to capture the full economic value of ecosystems by covering different types of values people place on these services even when they're not traded in regular markets. The two main components consist of Use and Non-Use values.

Use Value refers to the direct, indirect and "option" use values that people realize from ecosystem services. Direct Use Value describes is equal to the benefits which people derive directly from ecosystem goods and services, such as food, water, timber, recreation, and cultural experiences. These values are the most straightforward to quantify since they are tangible and sometimes associated with market prices.

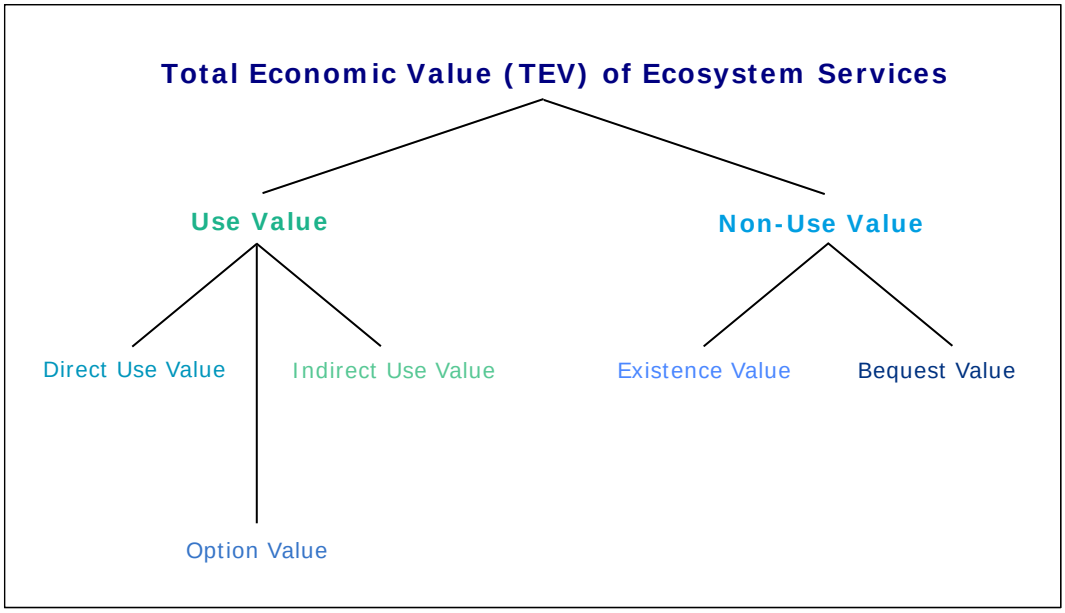

Figure 8. TEV Framework (Source: Authors Elaboration)

On the other hand, the Indirect Use Value refers to those values emanating from ecosystem services, such as water purification, climate regulation, flood control, and soil fertility, which support other economic activities either directly or protect them. Though they are indirect values, they are still vital because they give the environment its continuity to function and provide direct-use resources. Finally, the so-called "Option" Value includes the value attributed to keeping the option of ecosystem services use in the future. This applies where the use of an ecosystem in the present reduces its value for use in the future. An example is the maintenance of biodiversity, providing an option for new medicines or genetic resources that might be invaluable in the future.

Non-Use refers to the value people obtain simply because an ecosystem or species remains in existence, whether they exploit that resource or not, which is often categorized into existence and bequest value. The former consists of the value that people place on knowing that an ecosystem or species exists. For example, there are people who could be said to value the existence of endangered species or pristine wilderness areas even though they will never visit them and may never benefit directly from their existence. The latter refers to the value people attribute to maintaining ecosystems and biodiversity for future generations. This value signals intergenerational considerations because it reflects the desire of people to bequeath a healthy environment to future generations.

Without such a TEV calculation, degradation costs will be grossly underestimated, since the traditional market-based valuation methods capture neither indirect, "Option" use values nor non-

use values so important for human well-being and environmental resilience. Non-market values within the TEV framework enlarge the economic appreciation of ecosystems by adding their "hidden" values. Since most of them are not captured by conventional economic systems, valuation is done by employing non-market valuation methods such as contingent valuation, choice modeling, and benefits transfer. This will adequately address policy makers in arriving at informed decisions considering the full spectrum of benefits offered by ecosystems and embark on conservation and sustainable practices in perpetuity that protect both market and non-market values.

To perform the valuation of the underlying ecosystem services, the Meta Analysis and the Benefit Value Transfer Function method (Bergstrom and Taylor, 2006) was used. Benefit transfer is a method generally applied in environmental economics to estimate the economic value of ecosystem services regarding contexts in which primary valuation studies are scant or impracticable. In the case of benefit value transfer, one uses existing data from studies estimating the value of similar ecosystem services at different locations or contexts and applies the information to the site of interest. This very well brings in the basic underlying premise, an assumption that the estimated benefits from one context can be transferred when there are similarities - common sources of variation between the ecological, social, and economic contexts. This technique works well in policymaking and resource management (Costanza et al., 2017).

Based on an extend database of all available papers performing primary valuations globally in the Environmental Valuation Reference Inventory (EVRI, 2022), Sachs et al., (2022) provide the benefit value transfer functions for terrestrial, marine and freshwater ecosystems and Provisioning, Supporting and Regulating ecosystem services. Moreover, using the same database, Koundouri et al. (2023) and Halkos et al., (2024), provide the Benefit Transfer Function for Cultural Ecosystem Services. Table 9 presents the Benefit Transfer Functions, as well as the specification for their implementation for Cyprus. The most recent socioeconomic data such as the mean population age, the share of population with tertiary education, the average annual disposable household income, the number of Households and the gender balance were obtained by the National statistical agency of Cyprus (CY-Stat). Detailed analysis of the Cost of Degradation is presented in Chapter 3.4.

Table 9. Ecosystem Services - Benefit Transfer Functions and Specifications for Cyprus

Model Parameters Marine Ecosystem (Koundouri et al., 2022)		Specification Provisioning	Specification Regulating	Specification Supporting	Model Parameters European Cultural (Koundouri et al., 2023)		Specification Cultural
Alpine	43.01	0.00	0.00	0.00	Gender	60.30	0.47
Atlantic	-64.32	0.00	0.00	0.00	Income	0.00	35.69
Boreal	-102.34	0.00	0.00	0.00	Education	80.21	0.57
Continental	-41.29	0.00	0.00	0.00	CV_Aesthetic	-63.55	0.52
Mediterranean	-37.36	1.00	1.00	1.00	CV_Spiritual	-50.18	0.14
Marine_Atlantic	-11.95	0.18	0.18	0.18	Intabgible Goods	114.46	0.56
Provisioning	33.55	1.00	0.00	0.00	Intagible Social Habits	-50.59	0.28
Regulating	40.21	0.00	1.00	0.00	Intangible Traditional Skills	-57.22	0.46
Supporting	29.24	0.00	0.00	1.00	Tangible Archaeological	-78.35	0.12
sd_questionnaire	8.11	0.33	0.33	0.33	Tangible Historical Building	73.68	0.36
age	2.64	37.90	37.90	37.90	Tangible Paintings	-77.88	0.10
education	-4.60	0.57	0.57	0.57			
choice_experiment	-78.63	0.46	0.46	0.46			
contingent_valuation	-70.84	0.40	0.40	0.40			

1.3.2.6 Article 10 - Establishment of Environmental Targets

According to MSFD Article 10, each MS must establish Environmental Targets[1] to guide progress towards achieving GES in the marine environment, considering the indicative lists of pressures and impacts set out in Table 2 of Annex III, and of characteristics set out in Annex IV. The Targets can either be qualitative or quantitative. In case quantitative environmental Targets are selected, these must be accompanied by specific Target values that must be assessed to define whether the Target has been achieved or not.

In its previous MSFD reports, the Republic of Cyprus defined Targets that were referring to the GES Descriptors. Based on the reviews of previous CY and other MS reports by the EC, all previous Environmental Targets have been removed, and new more appropriate qualitative Targets have been defined.

The Environmental Targets are presented in Chapter 4, which also provides information on:

(i) Target Purpose: MSFD has pre-defined the categories of Target Purpose, and these are:

- Directly Prevent Further Pressure: Aims to directly prevent further inputs of a pressure
- Directly Reduce Existing Pressure in the Sea: Aims to directly reduce existing levels of the pressure in the marine environment (e.g. removal of litter or oil spill clean-up)
- Indirectly Prevent Further Pressure: Indirectly aims to prevent further inputs of a pressure (e.g. by governance mechanisms, financial incentives, awareness campaigns)
- Directly Restore Species/Habitat: Aims to directly restore a species or habitat(s)
- Improve Knowledge: Aims to improve knowledge base (e.g. by research or one-off surveys)
- Art11 Monitoring: Aims to establish Article 11 monitoring programmes (of relevant activities, pressures or impacts)
- Art8 Improve Methods: Aims to improve methodologies for Article 8 assessments (e.g. development of Indicators)
- Art9 Determination of GES: Aims to improve Article 9 determinations of GES (e.g. development of TVs)
- Unknown: Unknown

(ii) Related Criteria or Descriptors: It is noted that in case that a Target refers to all Criteria, then the Descriptor is indicated.

(iii) Related Measures: Based on the Programme of Measures for the Republic of Cyprus that was submitted to the EU in 2023.

(iv) Related Pressures: MSFD has pre-defined the categories of Pressure Elements and these are presented in Table 10.

[1] *A qualitative or quantitative statement on the desired condition of the different components of, and pressures and impacts on, marine waters in respect of each marine region or subregion.*

Finally, as the Environmental Targets are qualitative, for each defined Pressure Element, a Short Description is provided, and the related Indicators are noted.

Table 10. MSFD Pressure List (pressures assessed in Cyprus).

Code	Description
PresBioIntroNIS	Input or spread of non-indigenous species
PresBioIntroMicroPath	Input of microbial pathogens
PresBioIntroGenModSpp	Input of genetically modified species and translocation of native species
PresBioCultHab	Loss of, or change to, natural biological communities due to cultivation of animal or plant species
PresBioDisturbSpp	Disturbance of species (e.g. where they breed, rest and feed) due to human presence
PresBioExtractSpp	Extraction of, or mortality/injury to, wild species (by commercial and recreational fishing and other activities)
PresInputNut	Input of nutrients - diffuse sources, point sources, atmospheric deposition
PresInputOrg	Input of organic matter - diffuse sources and point sources
PresInputCont	Input of other substances (e.g. synthetic substances, non-synthetic substances, radionuclides), diffuse sources, point sources, atmospheric deposition, acute events
PresInputLitter	Input of litter (solid waste matter, including micro-sized litter)
PresInputSound	Input of anthropogenic sound (impulsive, continuous)
PresInputOthEnergy	Input of other forms of energy (including electromagnetic fields, light and heat)
PresInputWater	Input of water - point sources (e.g. brine)
PresEnvHydroChanges	Hydrographical changes
PresPhyDisturbSeabed	Physical disturbance to seabed
PresPhyLoss	Physical loss of the seabed

1.3.2.7 Public consultation

As required by Article 19 of the MSFD:

1. In accordance with relevant existing Community legislation, MS shall ensure that all interested parties are given early and effective opportunities to participate in the implementation of this Directive, involving, where possible, existing management bodies or structures, including Regional Sea Conventions, Scientific Advisory Bodies and Regional Advisory Councils.
2. MS shall publish, and make available to the public for comments, summaries of the following elements of their marine strategies, or the related updates: (a) the initial assessment and the determination of good environmental status, as provided for in Articles 8(1) and 9(1) respectively; (b) the environmental targets established pursuant to Article 10(1); (c) the monitoring programmes established pursuant to Article 11(1); (d) the programmes of measures established pursuant to Article 13(2).
3. Regarding access to environmental information, Directive 2003/4/EC of the European Parliament and of the Council of 28 January 2003 on public access to environmental information shall apply. In accordance with Directive 2007/2/EC, MS shall provide to the Commission, the reviews of the status of their marine environment under Article 20(3)(b), with access and use rights to data and information resulting from the initial assessments made pursuant to Article 8 and from the monitoring programmes established pursuant to Article 11. No later than six months after the data and information resulting from the initial assessment made pursuant to Article 8 and from the monitoring programmes established pursuant to Article 11 have become available, such

information and data shall also be made available to the European Environment Agency, for the performance of its tasks.

In November 2024, the DFMR made the current report publicly available via the public consultation governmental platform (e-consultation.gov.cy), for a period of four weeks. Furthermore, all data and metadata (except those classified as sensitive) used in the analyses were uploaded to DFMR's website at moa.gov.cy/moa/dfmr. The report was finalised and submitted to the EU along with the electronic reports via the EU's Reportnet system in December 2024.

Chapter 2. Article 9 - Determination of Good Environmental Status

The Republic of Cyprus has re-evaluated all GES definitions, and in relation to the previous reporting cycle, has proceeded to (i) modification of nine, (ii) addition of 34, and (iii) removal of 22 (Table 11). As a result, a total of 43 GES definitions remains (Table 12).

Table 11. Re-evaluation of GES definitions per Descriptor according to the MSFD reporting requirements.

Descriptor	GES		
	Modified from last reported determination	**New determination**	**2018 determination no longer needed**
D1 - Biodiversity	0	18 *GES defined based on the GES 2017 Decision*	4 *Removed as the GES was referring to the Descriptor level*
D2 - NIS	1 *GES modified as this was mentioning the Criteria codes but was describing the Descriptor*	1 *GES defined based on the GES 2017 Decision*	1 *Removed as the GES was referring to the Descriptor level*
D3 - Population of commercial fish/shellfish	0	3 *GES defined based on the GES 2017 Decision*	1 *Removed as the GES was referring to the Descriptor level*
D4 - Food webs	0	3 *GES defined based on the GES 2017 Decision*	3 *Removed as the GES was referring to the Descriptor level*
D5 - Eutrophication	2 *Wrong text was included in 2018 e-reports for the GES determination. The correct GES is included at the current reporting*	3 *GES defined based on the GES 2017 Decision*	2 *Removed as the GES was referring to the Descriptor level*
D6/D1, D6 - Sea floor integrity	0	6 *GES defined based on the GES 2017 Decision*	6 *Removed as the GES was referring to either the Descriptor level or no text was written in the e-reports*
D7 - Alteration of hydrographical conditions	0	2 *GES defined based on the GES 2017 Decision*	1 *Removed as the GES was referring to the Descriptor level*
D8 - Concentrations of contaminants	1 *Wrong text was included in 2018 e-reports for the GES determination. The correct GES is included at the current reporting*	1 *GES defined based on the GES 2017 Decision*	2 *Removed as the GES was referring to the Descriptor level and/or was listed as a secondary criterion according to the GES decision no longer needed for reporting.*
D9 - Contaminants in	1	1	1

Descriptor	GES		
	Modified from last reported determination	**New determination**	**2018 determination no longer needed**
fish/seafood for human consumption	*Wrong text was included in 2018 e-reports for the GES determination. The correct GES is included at the current reporting*	*GES defined based on the GES 2017 Decision*	*Removed as the GES was referring to the Descriptor level*
D10 - Marine Litter	2 *Wrong text was included in 2018 e-reports for the GES determination. The correct GES is included at the current reporting*	2 *GES defined based on the GES 2017 Decision*	1 *Removed as the GES was referring to the Descriptor level*
D11 - Introduction of energy including underwater noise	2 *Wrong text was included in 2018 e-reports for the GES determination. The correct GES is included at the current reporting*	0	0
TOTALS	9	40	22
	49		

Table 12. Updated GES definitions per descriptor according to the GES Decision and the MSFD reporting requirements (Update Type GES: ND = New determination; M = Modified from last reported determination).

GES Descriptor	GES Criterion	GES Description	GES Feature	Update Type GES
D1 Biodiversity: Birds; Marine mammals; Reptiles; Fish; Cephalopods	D1C1 (Primary)	The mortality rate per species from incidental by-catch is below levels which threaten the species, such that its long- term viability is ensured.	BirdsGrazing; BirdsSurfaceFeeding; BirdsWading; MamCetacSmall; MamCetacDeepDiving; MamCetacBaleenWhales; MamSeals; RepTurtles; FishCommercial; FishCoastal; FishPelagicShelf; FishDemersalShelf; CephaCoastShelf	ND
	D1C2 (Primary)	The population abundance of the species is not adversely affected due to anthropogenic pressures, such that its long-term viability is ensured.	BirdsGrazing; BirdsSurfaceFeeding; BirdsWading MamCetacSmall; MamCetacDeepDiving; MamCetacBaleenWhales; MamSeals; RepTurtles; FishCommercial; FishCoastal; FishPelagicShelf; FishDemersalShelf; nCephaCoastShelf	ND
	D1C3 (Primary for commerciall y-exploited fish and cephalopod s and secondary for other species.)	The population demographic characteristics (e.g. body size or age class structure, sex ratio, fecundity, and survival rates) of the species are indicative of a healthy population which is not adversely affected due to anthropogenic pressures.	FishCommercial; FishCoastal; FishPelagicShelf; FishDemersalShelf; FishCommercial; CephaCoastShelf	ND

GES Descriptor	GES Criterion	GES Description	GES Feature	Update Type GES
	D1C4 (Primary for species covered by Annexes II, IV or V to Directive 92/43/EEC and secondary for other species.)	The species distributional range and, where relevant, pattern is in line with prevailing physiographic, geographic and climatic conditions.	BirdsGrazing; BirdsSurfaceFeeding; BirdsWading; MamSeals; MamCetacSmall; RepTurtles	ND
	D1C5 (Primary for species covered by Annexes II, IV and V to Directive 92/43/EEC and secondary for other species.)	The habitat for the species has the necessary extent and condition to support the different stages in the life history of the species.	MamSeals; MamCetacSmall; RepTurtles′; HabBenBHT; HabBenOther	ND
D1 Biodiversity: pelagic habitats	D1C6 (Primary)	The condition of the habitat type, including its biotic and abiotic structure and its functions (e.g. its typical species composition and their relative abundance, absence of particularly sensitive or fragile species or species providing a key function, size structure of species), is not adversely affected due to anthropogenic pressures	Pelagic broad habitats; Other pelagic habitats	ND
D2 Non-indigenous species	D2C1 (Primary)	The number of non-indigenous species which are newly introduced via human activity into the wild, per assessment period (6 years), measured from the reference year as reported for the initial assessment under Article 8(1) of Directive 2008/56/EC, is minimized and where possible reduced to zero.	PresEnvNISnew	M
	D2C2 (Secondary)	Abundance and spatial distribution of established non-indigenous species, particularly of invasive species, contributing significantly to adverse effects on particular species groups or broad habitat types.	PresEnvNISestablished	ND
D3 Commercial fish and shellfish	D3C1 (Primary)	The Fishing mortality rate of populations of commercially-exploited species is at or below levels which can produce the maximum sustainable yield (MSY).	FishCommercial	ND
	D3C2 (Primary)	The Spawning Stock Biomass of populations of commercially-exploited species are above biomass levels capable of producing maximum sustainable yield.	FishCommercial	ND
	D3C3 (Primary)	The age and size distribution of individuals in the populations of commercially-exploited species is indicative of a healthy population. This shall include a high proportion of old/large individuals and limited adverse effects of exploitation on genetic diversity.	FishCommercial	ND
D4/D1 Food webs/ Biodiversity	D4C1 (Primary)	The diversity (species composition and their relative abundance) of the trophic guild is not adversely affected due to anthropogenic pressures.	SpeciesGroups	ND

GES Descriptor	GES Criterion	GES Description	GES Feature	Update Type GES
	D4C2 (Primary)	The balance of total abundance between the trophic guilds is not adversely affected due to anthropogenic pressures.	SpeciesGroups	ND
	D4C3 (Secondary)	The size distribution of individuals across the trophic guild is not adversely affected due to anthropogenic pressures.	SpeciesGroups	ND
	D4C4 (Secondary)	Productivity of the trophic guild is not adversely affected due to anthropogenic pressures.	SpeciesGroups	ND
D5 Eutrophication	D5C1 (Primary)	Nutrient concentrations [Dissolved Inorganic Nitrogen (DIN), Dissolved Inorganic Phosphorus (DIP) are not at levels that indicate adverse eutrophication effects.	PresEnvEutrophi	M
	D5C2 (Primary)	Chlorophyll a [in water] concentrations are not at levels that indicate adverse effects of nutrient enrichment.	PresEnvEutrophi	M
	D5C6 (Secondary)	The abundance of opportunistic macroalgae is not at levels that indicate adverse effects of nutrient enrichment.	PresEnvEutrophi	ND
	D5C7 (Secondary)	The species composition and relative abundance or depth distribution of macrophyte communities achieve values that indicate there is no adverse effect due to nutrient enrichment including via a decrease in water transparency, in coastal waters.	PresEnvEutrophi	ND
	D5C8 (Secondary)	The species composition and relative abundance of macrofaunal communities, achieve values that indicate that there is no adverse effect due to nutrient and organic enrichment	PresEnvEutrophi	ND
D6/D1 Seabed/ Biodiversity	D6C1 (Primary)	Spatial extent and distribution of physical loss (permanent change) of the natural seabed.	PresPhyLoss	ND
	D6C2 (Primary)	Spatial extent and distribution of physical disturbance pressures on the seabed.	PresPhyDisturbSeabed	ND
	D6C3 (Primary)	Spatial extent of each habitat type which is adversely affected, through change in its biotic and abiotic structure and its functions (e.g. through changes in species composition and their relative abundance, absence of particularly sensitive or fragile species or species providing a key function, size structure of species), by physical disturbance.	HabBenBHT; PrevEnvAdvEffectsSppHab	ND
	D6C4 (Primary)	The extent of loss of the habitat type, resulting from anthropogenic pressures, does not exceed a specified proportion of the natural extent of the habitat type in the assessment area.	HabBenBHT; PresPhyLoss	ND
	D6C5 (Primary)	The extent of adverse effects from anthropogenic pressures on the condition of the habitat type, including alteration to its biotic and abiotic structure and its functions (e.g. its typical species composition and their relative abundance, absence of particularly sensitive or fragile species or species providing a key function, size structure of species), does not exceed a specified proportion of the natural extent of the habitat type in the assessment area.	HabBenBHT; PrevEnvAdvEffectsSppHab	ND
D7 Hydrographical changes	D7C1 (Secondary)	Spatial extent and distribution of permanent alteration of hydrographical conditions (e.g. changes in wave action, currents, salinity, temperature) to the seabed and water column, associated in particular with physical loss of the natural seabed.	PresEnvHydroChanges; PresPhyDisturbSeabed; PresPhyLoss	ND
	D7C2 (Secondary)	Spatial extent of each benthic habitat types adversely affected (physical and hydrographical characteristics and associated biological	PresEnvHydroChanges; PresPhyDisturbSeabed; PresPhyLoss	ND

GES Descriptor	GES Criterion	GES Description	GES Feature	Update Type GES
		communities) due to permanent alteration of hydrographical conditions.		
D8 Contaminants	D8C1 (Primary)	Within coastal and territorial waters, the concentrations of contaminants do not exceed the following TVs: (a) for contaminants set out under point 1(a) of criteria elements, the values set in accordance with Directive 2000/60/EC; b) when contaminants under point (a) are measured in a matrix for which no value is set under Directive 2000/60/EC, the concentration of those contaminants in that matrix established by MS through regional or subregional cooperation; (c) for additional contaminants selected under point 1(b) of criteria elements, the concentrations for a specified matrix (water, sediment or biota) which may give rise to pollution effects. MS shall establish these concentrations through regional or subregional cooperation, considering their application within and beyond coastal and territorial waters. Beyond territorial waters, the concentrations of contaminants do not exceed the following TVs: (a) for contaminants selected under point 2(a) of criteria elements, the values as applicable within coastal and territorial waters; (b) for contaminants selected under point 2(b) of criteria elements, the concentrations for a specified matrix (water, sediment or biota) which may give rise to pollution effects. MS shall establish these concentrations through regional or subregional cooperation.	PresEnvContNonUPBTs; PresEnvContUPBTs	M
	D8C3 (Primary)	The spatial extent and duration of significant acute pollution events are minimised.	PresEnvAcuPolluEvents	M
D9 Contaminants in seafood	D9C1 (Primary)	The level of contaminants in edible tissues (muscle, liver, roe, flesh or other soft parts, as appropriate) of seafood (including fish, crustaceans, molluscs, echinoderms, seaweed and other marine plants) caught or harvested in the wild (excluding fin-fish from mariculture) does not exceed: (a) for contaminants listed in Regulation (EC) No 1881/2006, the maximum levels laid down in that Regulation, which are the TVs for the purposes of this Decision; (b) for additional contaminants, not listed in Regulation (EC) No 1881/2006, TVs, which MS shall establish through regional or subregional cooperation.	PresEnvContSeafood	M
D10 Marine Litter	D10C1 (Primary)	The composition, amount and spatial distribution of litter on the coastline, in the surface layer of the water column, and on the seabed, are at levels that do not cause harm to the coastal and marine environment.	PresEnvLitter	M
	D10C2 (Primary)	The composition, amount and spatial distribution of micro-litter on the coastline, in the surface layer of the water column, and in seabed sediment, are at levels that do not cause harm to the coastal and marine environment.	PresEnvLitterMicro	M
	D10C3 (Secondary)	The amount of litter and micro-litter ingested by marine animals is at a level that does not adversely affect the health of the species concerned.	PresEnvLitterSpp	ND
	D10C4 (Secondary)	The number of individuals of each species which are adversely affected due to litter, such as by entanglement, other types of injury or mortality, or health effects.	PresEnvLitterSpp	ND

GES Descriptor	GES Criterion	GES Description	GES Feature	Update Type GES
D11 Underwater noise	D11C1 (Primary)	The spatial distribution, temporal extent, and levels of anthropogenic impulsive sound sources do not exceed levels that adversely affect populations of marine animals.	PresEnvSoundImpulsive	M
	D11C2 (Primary)	The spatial distribution, temporal extent and levels of anthropogenic continuous low-frequency sound do not exceed levels that adversely affect populations of marine animals.	PresEnvSoundContinuous	M

Chapter 3. Article 8 - Assessment of the Marine Waters of the Republic of Cyprus

3.1 Establishment of Indicators

3.1.1 Indicators for GES assessment

In its previous MSFD reports, the Republic of Cyprus defined specific Indicators to be assessed to investigate whether GES is achieved. Given that the GES Criteria have been updated (see Chapter 2), the Indicators were also re-evaluated and as a result, 44 Indicators are now defined (Table 13).

Table 13. CY Indicators per Descriptor according to the MSFD reporting requirements (Update Type CY-Indicator: ND: New determination; M: Modified from last reported determination).

GES Descriptor	GES Component	GES Description	CY Indicator	Elements/Features
D1B Birds	D1C1	The mortality rate per species from incidental by-catch is below levels which threaten the species, such that its long-term viability is ensured.	CY.1.1 Percentage of population of vulnerable and non-target species dying as bycatch (related to marine mammals, seabirds, marine reptiles)	*Gulosus aristotelis desmarestii* *Larus audouinii*
D1B Birds	D1C2	The population abundance of the species is not adversely affected due to anthropogenic pressures, such that its long-term viability is ensured.	CY.1.2 Population abundance (number of indiv.) of the species is not adversely affected due to anthropogenic pressures (related only to marine mammals, marine reptiles)	*Gulosus aristotelis desmarestii* *Larus audouinii*
D1M Marine mammals	D1C1	The mortality rate per species from incidental by-catch is below levels which threaten the species, such that its long-term viability is ensured.	CY.1.1 Percentage of population of vulnerable and non-target species dying as bycatch (related to marine mammals, seabirds, marine reptiles)	*Tursiops truncatus*
D1M Marine mammals	D1C2	The population abundance of the species is not adversely affected due to anthropogenic pressures, such that its long-term viability is ensured.	CY.1.2 Population abundance (number of indiv.) of the species is not adversely affected due to anthropogenic pressures (related only to marine mammals, marine reptiles)	*Tursiops truncatus*

GES Descriptor	GES Component	GES Description	CY Indicator	Elements/Features
D1M Marine mammals	D1C4	The species distributional range and, where relevant, pattern is in line with prevailing physiographic, geographic and climatic conditions.	CY.1.4 Species distribution Range (km^2)	*Tursiops truncatus*
D1M Marine mammals	D1C5	The habitat for the species has the necessary extent and condition to support the different stages in the life history of the species.	CY.1.5 Habitat extent for the species (km^2)	*Tursiops truncatus*
D1R Reptiles	D1C1	The mortality rate per species from incidental by-catch is below levels which threaten the species, such that its long-term viability is ensured.	CY.1.1 Percentage of population of vulnerable and non-target species dying as bycatch (related to marine mammals, seabirds, marine reptiles)	*Caretta caretta* *Chelonia mydas*
D1R Reptiles	D1C2	The population abundance of the species is not adversely affected due to anthropogenic pressures, such that its long-term viability is ensured.	CY.1.2 Population abundance (number of indiv.) of the species is not adversely affected due to anthropogenic pressures (related only to marine mammals, marine reptiles)	*Caretta caretta* *Chelonia mydas*
D1R Reptiles	D1C4	The species distributional range and, where relevant, pattern is in line with prevailing physiographic, geographic and climatic conditions.	CY.1.4 Species distribution Range (km^2)	*Caretta caretta* *Chelonia mydas*
D1R Reptiles	D1C5	The population demographic characteristics (e.g. body size or age class structure, sex ratio, fecundity, and survival rates) of the species are indicative of a healthy population which is not adversely affected due to anthropogenic pressures.	CY.1.5 Habitat extent for the species (km^2)	*Caretta caretta* *Chelonia mydas*
D1F Fish	D1C1	The mortality rate per species from incidental by-catch is below levels which threaten the species, such that its long-term viability is ensured.	See D3	*See D3C1*
D1F Fish	D1C2	The population abundance of the species is not adversely affected due to anthropogenic pressures, such that its long-term viability is ensured.	See D3	*See D3C2*
D1F Fish	D1C3	The population demographic characteristics (e.g. body size or age class structure, sex ratio, fecundity, and survival rates) of the species are indicative of a healthy population which is not adversely affected due to anthropogenic pressures.	See D3	*D3C3 in Chapter 3.3.13*

GES Descriptor	GES Component	GES Description	CY Indicator	Elements/Features
D1P	D1C6	The condition of the habitat type, including its biotic and abiotic structure and its functions (e.g. its typical species composition and their relative abundance, absence of particularly sensitive or fragile species or species providing a key function, size structure of species), is not adversely affected due to anthropogenic pressures	CY.1.6.1 Zooplankton abundance (in m^3) CY.1.6.2 Species richness (S) biodiversity index CY.1.6.3 Shannon-Wiener (H) biodiversity index CY.1.6.4 Pielou evenness (J) biodiversity index	Zooplankton communities
D2	D2C1	The number of non-indigenous species which are newly introduced via human activity into the wild, per assessment period (6 years), measured from the reference year as reported for the initial assessment under Article 8(1) of Directive 2008/56/EC, is minimised and where possible reduced to zero.	CY.2.1 The number of newly introduced NIS via human activity (trend)	Newly introduced NIS
D2	D2C2	Abundance and spatial distribution of established non-indigenous species, particularly of invasive species, contributing significantly to adverse effects on particular species groups or broad habitat types.	CY.2.2 IAS abundance (trend)	Established NIS
D3	D3C1	The Fishing mortality rate of populations of commercially-exploited species is at or below levels which can produce the maximum sustainable yield (MSY).	CY.3.1 Fishing mortality rate (F/FMSY) of commercially exploited species	*Boops boops* *Merluccius merluccius* *Mullus barbatus* *Mullus surmuletus* *Octopus vulgaris* *Pagellus acarne* *Pagellus erythrinus* *Serranus cabrilla* *Sparisoma cretense* *Spicara maena* *Spicara smaris* *Thunnus alalunga* *Thunnus thynnus* *Xiphias gladius*
D3	D3C2	The Spawning Stock Biomass of populations of commercially-exploited species are above biomass levels capable of producing maximum sustainable yield.	CY.3.2 Stock status (B/BMSY) of commercially exploited species	*Boops boops* *Merluccius merluccius* *Mullus barbatus* *Mullus surmuletus* *Octopus vulgaris* *Pagellus acarne* *Pagellus erythrinus* *Serranus cabrilla* *Sparisoma cretense* *Spicara maena* *Spicara smaris* *Thunnus alalunga* *Thunnus thynnus*

GES Descriptor	GES Component	GES Description	CY Indicator	Elements/Features
				Xiphias gladius
D3	D3C3	The age and size distribution of individuals in the populations of commercially-exploited species is indicative of a healthy population. This shall include a high proportion of old/large individuals and limited adverse effects of exploitation on genetic diversity.	CY.3.3 Mean length of individuals (trend)	*Boops boops* *Merluccius merluccius* *Mullus barbatus* *Mullus surmuletus* *Octopus vulgaris* *Pagellus acarne* *Pagellus erythrinus* *Serranus cabrilla* *Sparisoma cretense* *Spicara maena* *Spicara smaris* *Thunnus alalunga* *Thunnus thynnus* *Xiphias gladius*
D4/D1	D4C1	The diversity (species composition and their relative abundance) of the trophic guild is not adversely affected due to anthropogenic pressures.	CY.4.1.1 Species richness (S) biodiversity index (trend) CY.4.1.2 Shannon-Wiener (H) biodiversity index (trend) CY.4.1.3 Simpson (SDI) biodiversity index (trend) CY.4.1.4 Pielou evenness (J) biodiversity index (trend)	Top predators Medium predators Lower predators or omnivores
D4/D1	D4C2	The balance of total abundance between the trophic guilds is not adversely affected due to anthropogenic pressures.	CY.4.2 Relative abundance of trophic guilds	All trophic guilds
D5	D5C1	Nutrient concentrations [Dissolved Inorganic Nitrogen (DIN), Dissolved Inorganic Phosphorus (DIP)are not at levels that indicate adverse eutrophication effects.	CY.5.1 Concentration of nutrients in water column (µmol/l)	DIN (Dissolved Inorganic Nitrogen) Dissolved Inorganic Phosphorus (DIP)
D5	D5C2	Chlorophyll a [in water] concentrations are not at levels that indicate adverse effects of nutrient enrichment.	CY.5.2 Concentration of Chlorophyll-a in water column (µg/l)	Chlorophyll-a
D5	D5C6	The abundance of opportunistic macroalgae is not at levels that indicate adverse effects of nutrient enrichment.	CY.5.6 Abundance of Macroalgae (Ecological Evaluation Index (EEI-c)	Benthic habitats - opportunistic macroalgae
D5	D5C7	The species composition and relative abundance or depth distribution of macrophyte communities achieve values that indicate there is no adverse effect due to nutrient enrichment including via a decrease in water transparency, in	CY.5.7.1 *Rapid Easy Index (PREI) [P.oceanica]* CY.5.7.2 Annual shoot densities of *P. oceanica*	Benthic habitats - macrophyte communities

GES Descriptor	GES Component	GES Description	CY Indicator	Elements/Features
		coastal waters, the values set in accordance with Directive 2000/60/EC.		
D5	D5C8	The species composition and relative abundance of macrofaunal communities, achieve values that indicate that there is no adverse effect due to nutrient and organic enrichment.	CY.5.8 BENTIX index [Zoobenthos]	Benthic habitats - macrobenthic communities
D6/D1	D6C1	Spatial extent and distribution of physical loss (permanent change) of the natural seabed.	CY.6.1 Area of natural seabed lost due to new infrastructure	Physical loss of the seabed
D6/D1	D6C2	Spatial extent and distribution of physical disturbance pressures on the seabed.	CY.6.2 Area of natural seabed physically disturbed (trend)	Physical disturbance of the seabed
D6/D1	D6C3	Spatial extent of each habitat type which is adversely affected, through change in its biotic and abiotic structure and its functions (e.g. through changes in species composition and their relative abundance, absence of particularly sensitive or fragile species or species providing a key function, size structure of species), by physical disturbance.	CY.6.3 Area of natural seabed by broad habitat type adversely affected	Not set
D6/D1	D6C4	The extent of loss of the habitat type, resulting from anthropogenic pressures, does not exceed a specified proportion of the natural extent of the habitat type in the assessment area.	CY.6.4 Area of natural seabed by broad habitat type lost	Physical loss of the seabed
D6/D1	D6C5	The extent of adverse effects from anthropogenic pressures on the condition of the habitat type, including alteration to its biotic and abiotic structure and its functions (e.g. its typical species composition and their relative abundance, absence of particularly sensitive or fragile species or species providing a key function, size structure of species), does not exceed a specified proportion of the natural extent of the habitat type in the assessment area.	CY.6.5 Extent (level) of adverse effects of each habitat type	Adverse effects on the seabed
D7	D7C1	Spatial extent and distribution of permanent alteration of hydrographical conditions (e.g. changes in wave action, currents, salinity, temperature) to the seabed and water column, associated in particular with physical loss of the natural seabed.	CY.7.1 Extent of marine area affected by permanent alterations	Hydrographical changes
D7	D7C2	Spatial extent of each benthic habitat type adversely affected (physical and hydrographical characteristics and associated biological communities) due to permanent alteration of hydrographical conditions.	CY.7.2 Extent of adverse effect per habitat type in each assessment area (km^2)	Hydrographical changes
D8	D8C1	Within coastal and territorial waters, the concentrations of contaminants do not	CY.8.1.1 Concentration of	See Table 57

GES Descriptor	GES Component	GES Description	CY Indicator	Elements/Features
		exceed the following TVs: (a) for contaminants set out under point 1(a) of criteria elements, the values set in accordance with Directive 2000/60/EC; b) when contaminants under point (a) are measured in a matrix for which no value is set under Directive 2000/60/EC, the concentration of those contaminants in that matrix established by MS through regional or subregional cooperation; (c) for additional contaminants selected under point 1(b) of criteria elements, the concentrations for a specified matrix (water, sediment or biota) which may give rise to pollution effects. MS shall establish these concentrations through regional or subregional cooperation, considering their application within and beyond coastal and territorial waters. Beyond territorial waters, the concentrations of contaminants do not exceed the following TVs: (a) for contaminants selected under point 2(a) of criteria elements, the values as applicable within coastal and territorial waters; (b) for contaminants selected under point 2(b) of criteria elements, the concentrations for a specified matrix (water, sediment or biota) which may give rise to pollution effects.	ubiquitous persistent, bioaccumulative and toxic substances (uPBTs)	
			CY.8.1.2 Concentration of non-ubiquitous persistent, bioaccumulative and toxic substances (non-uPBTs)	See Table 58
D8	D8C3	The spatial extent and duration of significant acute pollution events are minimized.	CY.8.3 Number of spills and illegal discharges	See Table 59
D9	D9C1	The level of contaminants in edible tissues (muscle, liver, roe, flesh or other soft parts, as appropriate) of seafood (including fish, crustaceans, mollusks, echinoderms, seaweed and other marine plants) caught or harvested in the wild (excluding fin-fish from mariculture) does not exceed: (a) for contaminants listed in Regulation (EC) No 1881/2006, the maximum levels laid down in that Regulation, which are the TVs for the purposes of this Decision; (b) for additional contaminants, not listed in Regulation (EC) No 1881/2006, TVs, which MS shall establish through regional or subregional cooperation.	CY.9.1 Concentrations of contaminants (µg/l) in seafood	See Table 60
D10	D10C1	The composition, amount and spatial distribution of litter on the coastline, in the surface layer of the water column, and on the seabed, are at levels that do not cause harm to the coastal and marine environment.	CY.10.1.1 Amount of litter per category in number of items: — per 100 metres (m) on the coastline	Macrolitter (all)

GES Descriptor	GES Component	GES Description	CY Indicator	Elements/Features
			CY.10.1.2 Amount of micro-litter per kilogram (dry weight) (kg) of sediment [for coastline and for seabed]	
D10	D10C2	The composition, amount and spatial distribution of micro-litter on the coastline, in the surface layer of the water column, and in seabed sediment, are at levels that do not cause harm to the coastal and marine environment.	CY.10.2.1 Amount of micro-litter per kilogram (dry weight) (kg) of sediment for the coastline and for seabed CY.10.2.2 Amount of micro-litter per square meter (m^2) in surface layer of the water column	Microlitter
D10	D10C3	The amount of litter and micro-litter ingested by marine animals is at a level that does not adversely affect the health of the species concerned.	CY.10.3.1 Amount of micro-litter in grams (g) per individual for each species	Litter and micro-litter in species
			CY.10.3.2 Number of marine litter items per individual for each species	Litter and micro-litter in species; *Caretta caretta*
D10	D10C4	The number of individuals of each species which are adversely affected due to litter, such as by entanglement, other types of injury or mortality, or health effects.	CY.10.4 Number of individuals affected (lethal; sub-lethal) by marine litter per species	*Caretta caretta*
D11	D11C1	The spatial distribution, temporal extent, and levels of anthropogenic impulsive sound sources do not exceed levels that adversely affect populations of marine animals.	CY.11.1 Proportion of days and geographical distribution where loud, low, and mid-frequency impulsive sounds exceed levels that are likely to entail significant impact on marine animals.	Sound
D11	D11C2	The spatial distribution, temporal extent and levels of anthropogenic continuous low-frequency sound do not exceed levels that adversely affect populations of marine animals.	CY.11.2 Trends in the ambient noise level within the 1/3 octave bands 63 and 125 Hz (centre frequency) (re 1µPa RMS; average noise level in these octave bands over a year).	Sound

3.1.2 Socioeconomic (ESA) Indicators

Although text reports and socioeconomic data on each of the marine uses' activities were provided in the previous reporting MSFD cycles, no socioeconomic indicators were defined. In the current MSFD reporting cycle, socioeconomic indicators are defined by activity to facilitate detailed and consistent description and assessment of the uses of the marine environment in this and future reporting cycles. A total of 45 Economic and Social Analysis (ESA) Indicators for the 16 Activities that apply for Cyprus have been defined (Table 14).

Table 14. ESA indicators by Activity (CY-Stat: Statistical Service of Cyprus; DFMR: Department of Fisheries and Marine Research; DLS: Department of Lands and Surveys; DoE: Department of Environment; DoW: Department of Works; WDD: Water Development Department).

Uses of marine Environment (Feature)	Activity	ESA Indicators	Source of Data
Physical restructuring of (rivers,) coastline and seabed	Coastal defence and flood protection *(ActivRestrucCoastDef)*	**CY_ESA.01**: Number of new breakwaters for coastal defence	DLS
		CY_ESA.02: Area coverage of new breakwaters for coastal defence	DLS
		CY_ESA.03: Number of new flood coastal protection projects	WDD
	Restructuring of seabed morphology, including dredging & depositing of materials *(ActivRestrucSeabedMorph)*	**CY_ESA.04:** Volume of dredged material (m^3)	DoE (Marinas EIAs); DoW
		CY_ESA.05: Number of dredging carried out	DoE (Marinas EIAs); DoW
		CY_ESA.06: Destinations of dredged material, in volume (m^3)	DoE (Marinas EIAs), DoW
Production of energy	Non-renewable energy generation (ActivProdEnerNonRenew)	**CY_ESA.07**: Number of power plant stations	WDD
	Transmission of electricity and communications (cables) *(ActivProdEnerCables)*	**CY_ESA.08**: Length coverage of new cables (in km)	DLS
Extraction of non-living resources	Extraction of water *(ActivExtrNonLivingWater)*	**CY_ESA.09**: Volume of extracted seawater	WDD
Extraction of living resources	Fish and shellfish harvesting (professional, recreational) *(ActivExtrLivingFishHarv)*	**CY_ESA.10**: Average annual number of professional fishing licenses	DFMR
		CY_ESA.11: Average annual number of recreational fishing licenses	DFMR
		CY_ESA.12: Average annual number of coastal fishing vessels	DFMR
		CY_ESA.13: Average annual number of multipurpose vessels	DFMR
		CY_ESA.14: Average annual number of bottom trawlers	DFMR
		CY_ESA.15: Average annual number of purse seiners	DFMR
		CY_ESA.16: Average annual total capacity (GT)	DFMR
		CY_ESA.17: Average annual total engine power (KW)	DFMR
		CY_ESA.18: Average annual total catch (t)	DFMR
	Fish and shellfish processing *(ActivExtrLivingFishProcess)*	**CY_ESA.19**: Average annual number of companies with fish processing being the main activity	CY-Stat
Cultivation of living resources	Aquaculture – marine, including infrastructure *(ActivCultivAquaculMarine)*	**CY_ESA.20:** Average annual number of marine offshore aquaculture companies	DFMR
		CY_ESA.21: Average annual number of marine hatcheries	DFMR

Uses of marine Environment (Feature)	Activity	ESA Indicators	Source of Data
		CY_ESA.22: Average annual number of shrimp farms	DFMR
		CY_ESA.23: Average annual production license range of marine offshore aquaculture companies (in tons)	DFMR
Transport	Transport infrastructure *(ActivTranspInfras)* Transport – shipping *(ActivTranspShip)*	**CY_ESA.24:** Passengers embarked and disembarked in all ports by direction (*1000)	EUROSTAT
		CY_ESA.25: Vessels arriving in the main ports by type of vessels (number)	EUROSTAT
		CY_ESA.26: Gross weight of goods transported to/from main ports, by type of traffic (Thousand tons)	EUROSTAT
Urban and industrial uses	Urban uses *(ActivUrbIndUrban)* Industrial uses *(ActivUrbIndIndustrial)*	**CY_ESA.27:** Number of discharging industries into the sea	DoE
	Waste treatment and disposal *(ActivUrbIndWaste)*	**CY_ESA.28:** Average annual total waste produced	DoE
		CY_ESA.29: Average annual total managed waste	DoE
		CY_ESA.30: Average annual total recycled waste	DoE
		CY_ESA.31: Average annual total incinerated waste	DoE
		CY_ESA.32: Average annual biodegradable managed waste	DoE
		CY_ESA.33: Average annual waste to landfills	DoE
Tourism	Tourism and leisure infrastructure *(ActivTourismInfra)*	CY_ESA.34: Number of touristic residential facilities *(last year of MSFD reporting)*	CY-Stat
		CY_ESA.35: Number of touristic residential rooms *(last year of MSFD reporting)*	CY-Stat
		CY_ESA.36: Number of touristic residential beds *(last year of MSFD reporting)*	CY-Stat
		CY_ESA.37: Number of Marinas *(last year of MSFD reporting)*	DLS
	Tourism and leisure activities *(ActivTourismActiv)*	**CY_ESA.38:** Average annual percentage of bathing water quality being in Excellent & Good condition	EUROSTAT
		CY_ESA.39: Average annual number of Blue Flag beaches	CYMEPA
		CY_ESA.40: Average annual number of Blue Flag Marinas	CYMEPA
		CY_ESA.41: Average annual number of Tourists travelling days	CY-Stat
		CY_ESA.42: Average annual number of Tourists expenditure per person by trip (in €)	CY-Stat
		CY_ESA.43: Average annual number of Tourists expenditure per person per day (in €)	CY-Stat
Education and research	Research, survey and educational activities *(ActivResearch)*	**CY_ESA.44:** Average annual number of scientific publications linked to the marine environment per year	Bibliography
		CY_ESA.45: Number of new scientific publications linked to the marine environment per assessment period (6 years)	Bibliography

3.2 Uses of the marine environment

A total of nine categories of uses of the marine environment and 16 activities in the marine environment have been identified in the Republic of Cyprus, as presented in Chapter 3.1.2. A short description of each marine use and activity is given below, along with the relevant socioeconomic data where available, as well as the related indicators, pressures and ecosystem services.

3.2.1 Physical restructuring of coastline and seabed

3.2.1.1 Coastal defence and flood protection (ActivRestrucCoastDef)

Description

The Republic of Cyprus has 800.7 km of coastline, out of which 413.5 km are occupied by Turkish forces, 3.6 km are UN controlled buffer zone and another 76.5 km are within the British Sovereign Base Areas (SBA)of Akrotiri and Dhekelia, leaving only 307.1 km to be effectively controlled by the Republic of Cyprus.

The “coastal zone”, the area that extends 2 km inland from the coastline covers 23% of the country’s total area, in which about 50% of the total population lives and works and 90% of the tourism industry is located. Coastal areas generate by far the largest source of household income, as well as other major activities and most of the urban development. A growing concern about the threats of environmental degradation in coastal areas has led to the establishment of regional level cooperation in the Mediterranean in the context of the Barcelona Convention (1975) and the development of programs targeting at actions towards sound coastal resource management on an integrated basis. Early enough though, it had become apparent that problems of environmental quality in the marine environment, which was the initial focus of the Barcelona Convention, are linked to human activities many of which are concentrated along the coastal areas and further upstream (Coccossis et al, 2008).

The coast of Cyprus is microtidal and its wave regime varies, with the most energetic waves observed along the western and southern coastline. The regional sea level has accelerated to 2.4-3.8 mm/year since the late 1990s. Regarding the extreme sea levels, their storm surge components have a seasonal footprint and heights that have rarely exceeded 0.4 m (Monioudi et al, 2023). Cyprus’s coastal region hosts over half its population and drives a significant portion of its economic activity, including coastal tourism, shipping, fishing, etc., (Ramos et al, 2007). The coastal zone of Cyprus is extensively occupied by various permanent engineering structures such as Ports (Larnaca, New Limassol, Old Limassol, Pafos, Latsi), marinas, fishing shelters, docks/piers, artificial reefs, aquaculture units, breakwaters, power stations, desalination units and dams.

Costal defence

Regarding the protection of coasts in Cyprus, the state collaborates with local authorities to prepare protection studies. These studies assess the type of coastal projects needed; a responsibility overseen by the Public Works Department. Project types are determined based on the specific challenges and environmental conditions of the study area. Following assessment, projects undergo

evaluation and approval by the Environmental Authority to ensure compliance with environmental standards and regulations. This systematic approach aims to ensure that the coastal protection efforts in Cyprus are both effective and environmentally sustainable.

Flood protection

Article 2 of Directive 2007/60/EC provides a broad definition of "flood", emphasizing the temporary nature of water covering land that is not typically submerged under normal conditions (WDD, 2000). The definition highlights various types of floods, which include:

1. Fluvial floods: Flooding from rivers, mountain streams, and temporary Mediterranean watercourses.
2. Coastal Floods: Flooding caused be sea water inundating coastal areas.
3. Groundwater floods: Rising underwater levels leading to surface flooding.
4. Pluvial/urban floods: Flooding due to the accumulation of rainwater, exacerbated by poor drainage systems.
5. Artificial water-bearing structure flooding: Floods resulting from the failure of technical; infrastructure, such as dam breaches.
6. Tsunamis: Large waves caused by events like earthquakes or underwater landslides that result in significant coastal flooding.

Cyprus has established a comprehensive Flood Risk Management Plan in accordance with the Water Framework Directive (2000/60/EC) and the Floods Directive (2007/60/EC). This plan aims to effectively manage flood risks at the Basin Area level through a series of clearly defined objectives and measures including:

- understanding of flood risks
- identification of high-risk areas
- data availability for decision making
- risk management for community and environmental benefit
- coordination among involved bodies (national, provincial, and local bodies involved in flood hazard management)

By aligning with EU directives, the plan aims to effectively mitigate flood risks, safeguard communities and the environment, and ensure efficient allocation of resources.

The Water Development Department has conducted a flood risk assessment to support the evaluation, management and mitigation of floods hazards (WDD, 2020). Furthermore, to assess the severity of floods, a comprehensive record of historical flood events was complied. This record includes 588 flood episodes spanning from 1859 to 2018.

Based on the Flood Risk Assessment Report (WDD, 2020) and analysis of historical flood records in Cyprus, it can be concluded that while there is a risk of coastal flooding for developments located near the coastline, especially on the western coasts of the country, this risk is relatively minor compared to other sources of flooding, such as urban floods and flash floods, which are among the

most critical flood events in the Republic of Cyprus. To limit the risks of coastal flooding, a wide beach protection zone should be maintained without developments, considering altitude differences as well as the provisions of the protocol of the Integrated Management of Coastal Zones of the Mediterranean, as outlined in the Barcelona Convention. The flood protection projects in Cyprus are focused on water infrastructures, including the construction of breakwaters, which are analysed in Chapter 3.3.6.

Socioeconomic data

The activity is related to NACE 42.91 Construction of Water Projects (Table 15).

Table 15. Socioeconomic data on NACE42.91

NACE 42.91 Construction of Water Projects	MSFD 2017-2022							
Indicators	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**Average**	**Total**
Direct employment (*1000 FTE) under the activity	0.133	0.175	0.166	0.100	0.078	0.089	0.123	N/A
Production value (€ million) of the activity	28,864	25,629	29,676	21,053	9,199	8,451	20,479	122,9
Value-added (€ million) by the activity	5,593	6,822	8,265	3,857	1,198	2,294	4,672	28,03

Related ESA Indicators, Pressures and Ecosystem Services

The Coastal Defense and Flood Protection activity is directly and/or indirectly related to the following ESA Indicators, Pressures and Ecosystem Services:

CY ESA Indicators		**01/2017 - 12/2022**
CY_ESA.01: Number of new breakwaters for coastal defense		39 (in seven 7 areas)
CY_ESA.02: Area coverage of new breakwaters for coastal defense		0.061 km^2
CY_ESA.03: Number of new flood coastal protection projects		0
Pressures	• Hydrographical changes (PresEnvHydroChanges) • Physical disturbance to seabed (PresPhyDisturbSeabed) • Physical loss of the seabed (PresPhyLoss)	
Ecosystem Services	• Flood protection (EcosysServFlowsFloodProt) • Chemical condition of salt waters (EcosysServMainCondChem) • Global climate regulation by reduction of greenhouse gases (EcosysServMainCondClim) • Mass stabilisation and control of erosion rates (EcosysServFlowsErosionPrev1) • Maintaining nursery populations and habitats (EcosysServMainCondNurs) • Gene pool protection (EcosysServMainCondGene) • Decomposition and fixing processes (EcosysServMainCondDeco)	

3.2.1.2 Restructuring of seabed morphology, including dredging & depositing of materials (ActivRestrucSeabedMorph)

Description

This activity considers the dredging of sediments from the seabed to increase or maintain the draft of ports and their deposit in the marine environment. Dredging can be defined as the removal and transportation of material from the seabed. Dredging is essential to maintain the operation of ports, for the construction of infrastructure and, in some cases, as an environmental improvement (elimination of contaminated sediments, etc.).

The reference document regarding dredging is the "*Guidelines for the management of dredged material*" as revised in 2022 (DFMR, 2022b). Regarding the relocation of sediments from dredging to marine areas, it is only allowed when they cannot be put to productive use and certain pollution thresholds are not exceeded. This activity requires authorization and must be carried out in previously defined areas designated for this purpose. Among the other uses given to sediments, are the filling of construction sites, the regeneration of beaches, agricultural uses, filling of wetlands, etc.

The analysis of this activity for the purpose of MSFD reporting is carried out through three ESA Indicators for the objectives pursued by the activity itself:

- Volume of dredged material (m^3);
- Number of dredging operations carried out;
- Destinations of dredged material, in volume (m^3).

I. *Volume of dredged material (m^3)*

This indicator is related to the volume of dredged material in m^3 that has been dredged in marinas, fishing shelters and marine works in Cyprus, as follows:

Marinas: A total of 524,000 m^3 of sediments were dredged in the period 2017-2022, 330,000 m^3 in Agia Napa marina in 2017 and 194,000 m^3 in Paralimni marina in 2022.

Fishing shelters: A total of 49,800 m^3 of sediments were dredged in the fishing shelters of the Republic of Cyprus during 2017-2022, 26,500m^3 in Larnaca fishing shelter, 20,800 m^3 in Kato Pyrgos fishing shelter and 2,500m^3 in Ormideia fishing shelter.

Marine works: A total of 92,200 m^3 of material was dredged in marine works related to breakwater construction in the period 2017-2022, 36,000 m^3 in Larnaca area, 28,000m^3 in Pervolia area, 12,200 m^3 in Polis area, 11,000 m^3 in Oroklini area, 4,000 m^3 in Venus Hotel area and 1,000 m^3 in Chloraka area.

Overall, a total of 666,000 m^3 of seabed material was dredged in Cyprus in the period 2017-2022.

II. *Number of dredging operations carried out*

A total of 13 dredging operations have been carried out during 2017-2022, two in marinas, four in fishing shelters and seven in marine works (breakwaters), averaging two dredging operations per year overall.

III. Destinations of dredged material, in volume (m^3)

Depending on its characteristics, dredged material can have different destinations, filling works (generally port expansions), regeneration of beaches, dumping in selected non-sensitive areas (when the material is contaminated), depositing on land or dumping into the sea. Although the latter is generally recommended to be avoided and instead put the material into productive use, all dredged material from marinas and fishing shelters in Cyprus (573,800 m^3) was dumped into the sea during this reporting period. On the other hand, all material dredged in marine works (breakwaters - 92,200 m^3) was used for beach regeneration.

Socioeconomic data

For the activity of restructuring the morphology of the seabed, including dredging and deposit of materials, no specific economic statistics are available. As a result, there is no data available on economic indicators such as the number of employees, production value, gross value added or contribution to GDP for this activity in the Republic of Cyprus.

Related ESA Indicators, Pressures and Ecosystem Services

The Restructuring of Seabed Morphology activity, including dredging and depositing of material is directly and/or indirectly related to the following ESA Indicators, Pressures and Ecosystem Services:

CY ESA Indicators		**01/2017 - 12/2022**
CY_ESA.04: Volume of dredged material (m^3)		666,000
CY_ESA.05: Number of dredging carried out		13
CY_ESA.06: Destinations of dredged material, in volume (m^3)		92,200 m^3 for beach regeneration 573,800 m^3 dumped into the sea
Pressures	• Disturbance of species (PresBioDisturbSpp) • Physical disturbance to seabed (PresPhyDisturbSeabed) • Input of other substances (PresInputCont) • Input of anthropogenic sound (impulsive, continuous) (PresInputSound)	
Ecosystem Services	• Maintaining nursery populations and habitats (EcosysServMainCondNurs) • Gene pool protection (EcosysServMainCondGene) • Pollination and seed dispersal (EcosysServMainCondPolli) • Mass stabilization and erosion control (EcosysServFlowsErosionPrev1) • Bioremediation by organisms (EcosysServWasteTreatment) • Filtration/sequestration/storage by ecosystems (EcosysServWasteRemovalByEcosys) • Chemical condition of salt waters (EcosysServMainCondChem) • Physical and experiential interactions (EcosysServInteracPhyRecreat1; EcosysServInteracPhyRecreat2) • Scientific and educational interactions (EcosysServInteracPhyScientif; EcosysServInteracPhyEducat)	

3.2.2 Production of Energy

3.2.2.1 Non-renewable energy generation (ActivProdEnerNonRenew)

Description

Cyprus does not have primary energy sources, therefore the Electricity Authority Cyprus (EAC) relies exclusively on imported fuels, mainly fuel oil, to produce electricity. Currently, EAC has three power plants with a total installed capacity of 1,478 MW as follows:

Vasilikos Power Station: Vasilikos Power Station is the biggest infrastructure project ever carried out in Cyprus. Its importance is closely linked to the country's broader economic growth. It is an advanced technology power station consisting of:

- Three conventional generation units, each with a generating capacity of 130 MW, fuelled by heavy fuel oil. All three units have been fitted with emissions abatement technologies for the reduction of nitrogen oxides, sulphur dioxides and dust, to reduce those emissions below the levels set by the European Large Combustion Plant Directive. In addition, the boilers have been converted to burn both HFO and natural gas.
- One 38 MW Gas Turbine fuelled by diesel oil.
- Two Combined Cycle Gas Turbine units, each with a capacity of 220 MW, fuelled by diesel oil and with the potential to be adapted to use natural gas for fuel.
- One additional Combined Cycle Gas Turbine Unit of a capacity of 160 MW fuelled by both Natural Gas and diesel oil, as a backup fuel, is expected to be delivered for commercial operation in 2024.

On 11 July 2011, following an explosion at the Mari naval base, Vasilikos Power Station, which lies adjacent to the naval base, suffered heavy damage that brought its operations to a complete standstill. The power station has since been repaired and is fully operational.

Vasilikos Power Station generates 65% of the total generation produced by the Authority's Power Stations. The thermal efficiency for units generated of the three conventional units is about 38%, while that of Combined Cycle Units is about 48%.

Dhekelia Power Station: Located on the south-eastern coast of Cyprus, Dhekelia Power Station, with an installed capacity of 460 MW, generates about 34,5% of the total generation produced by the Authority's Power Stations. The thermal efficiency of the Steam Turbines for Units generated is about 30% while the corresponding thermal efficiency of the Internal Combustion Units is about 42%.

Moni Power Station: The installed capacity of the Station was reduced to 150 MW (4 Gas Turbines X37.5 MW). It should be noted that, since the 14th of October 2013, all the conventional 30 MW units using heavy fuel oil have been withdrawn from service. Moni Power Station generates about 0,5% of the total generation produced by the Authority's Power Stations. The thermal efficiency of the Gas Turbines for units generated is about 24%.

It is noted that around 4.5 km of underwater pipelines related to power plants (fuel transfer and/or cooling) exist in the MRU (area under the effective control of the Republic of Cyprus) (Figure 9).

Figure 9. Underwater pipelines related to production of energy (red), extraction of non-living resources, namely desalination (white), and waste management (yellow), within the area of the MRU under the effective control of the Republic of Cyprus.

Socioeconomic data

In 2022, the EAC had 2,232 employees. The financial results per year and the changes from the previous year are shown in Table 16. The income from sales of electricity per year before the special discount totalled to €1,265,908,000 showing an increase of €468,580,000 or 59%. The significant increase in sales revenue was mainly due to the increase in the tariff price because of the automatic adjustment due to the increase in fuel prices as well as the introduction of the new tariffs from June 2022. During the year, customers were granted a special discount of €7,794,000 (2021: €14,199,000) due to the COVID-19 pandemic. The total operating costs were €1,304,959,000 showing an increase of €416,510,000 or 47%, mainly due to the increase in fuel costs resulting from the increase in fuel prices, and due to the increase in greenhouse gas emission allowances cost. After accounting for net profit from reversal of impairment of financial assets of €542,000, finance costs of €8,534,000 and share of loss in equity accounted investees of €406,000, there was a profit before tax of €12.885.000 compared to a loss before tax of €47,078,000 in the previous year. After the addition of tax income amounting to €6,000, the net profit was €12,891,000 (2021: net loss €41,755,000).

The total electricity-generating capacity through thermal energy production has increased only slightly from 2010 to 2019 (2.8%), and the concomitant increase in cooling water usage remained similarly low at 2.6%.

Table 16. Socioeconomic data on the NACE 35.11.

NACE 35.11	MSFD 2017-2022							
Indicators	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**Average**	**Total**
Direct employment (*1000 FTE) under the activity	2.071	2.120	2.210	2.221	2.206	2.232	2.177	N/A
Production value (€ million) of the activity	702.536	828.544	896.262	740.413	944.868	1.437221	924.974	4,114
Value-added (€ million) by the activity	284.168	273.168	302.512	245.036	241.511	302.952	274.891	1,649

Related ESA Indicators, Pressures and Ecosystem Services

The main pressures related to the non-renewable energy generation are the contribution of polluting substances and the change in hydrological conditions. However, as no new facilities have been built in this reporting cycle, there are no new changes in hydrological conditions nor is there information available on possible new contributions of polluting substances.

The non-renewable energy generation is directly and/or indirectly related to the following ESA Indicators, Pressures and Ecosystem Services:

CY ESA Indicators		**01/2017 - 12/2022**
CY_ESA.07: Number of power plant stations		3
Pressures	• Input of other substances (PresInputCont) • Hydrographical changes (PresEnvHydroChanges)	
Ecosystem Services	• Bioremediation by organisms (EcosysServWasteTreatment) • Filtration/sequestration/storage by ecosystems (EcosysServWasteRemovalByEcosys) • Chemical condition of salt waters (EcosysServMainCondChem) • Flood protection (EcosysServFlowsFloodProt) • Global climate regulation by reduction of greenhouse gases (EcosysServMainCondClim)	

3.2.2.2 Transmission of electricity and communications (cables) ActivProdEnerCables

Description

An extensive network of domestic and international submarine communication cables exists in the MRU (Figure 10). Most of these are newer technology fibre-optic cables developed primarily by the Cyprus Telecommunications Authority (CYTA), connecting Cyprus to neighbouring countries and international networks through three landing stations, Agia Napa, Pentaskhinos and Yeroskipou (Figure 11). In total, around 3,817 km of underwater cables exist in the MRU (area under the effective control of the Republic of Cyprus), of which around 506 km were set/deployed within the assessment period (2017-2022).

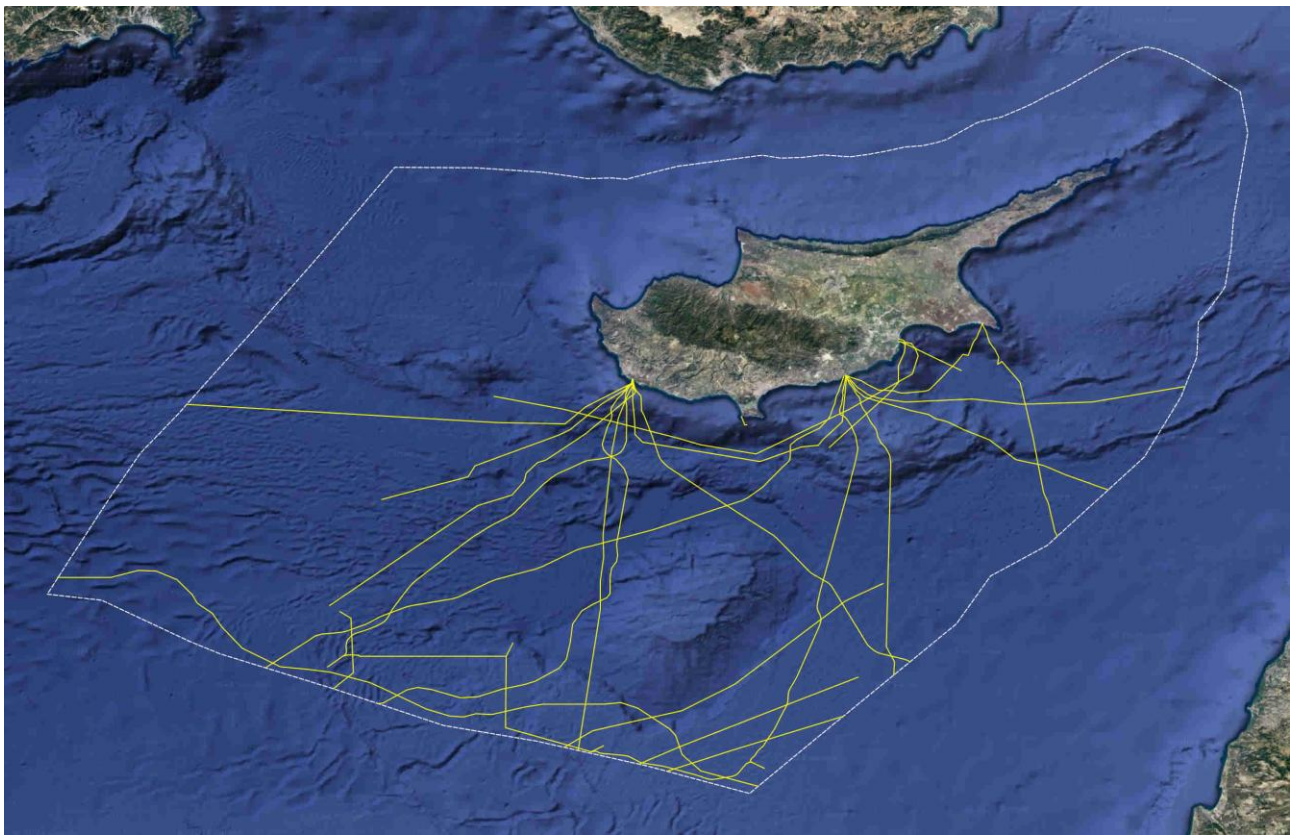

Figure 10. Underwater cables within the MRU (area under the effective control of the Republic of Cyprus).

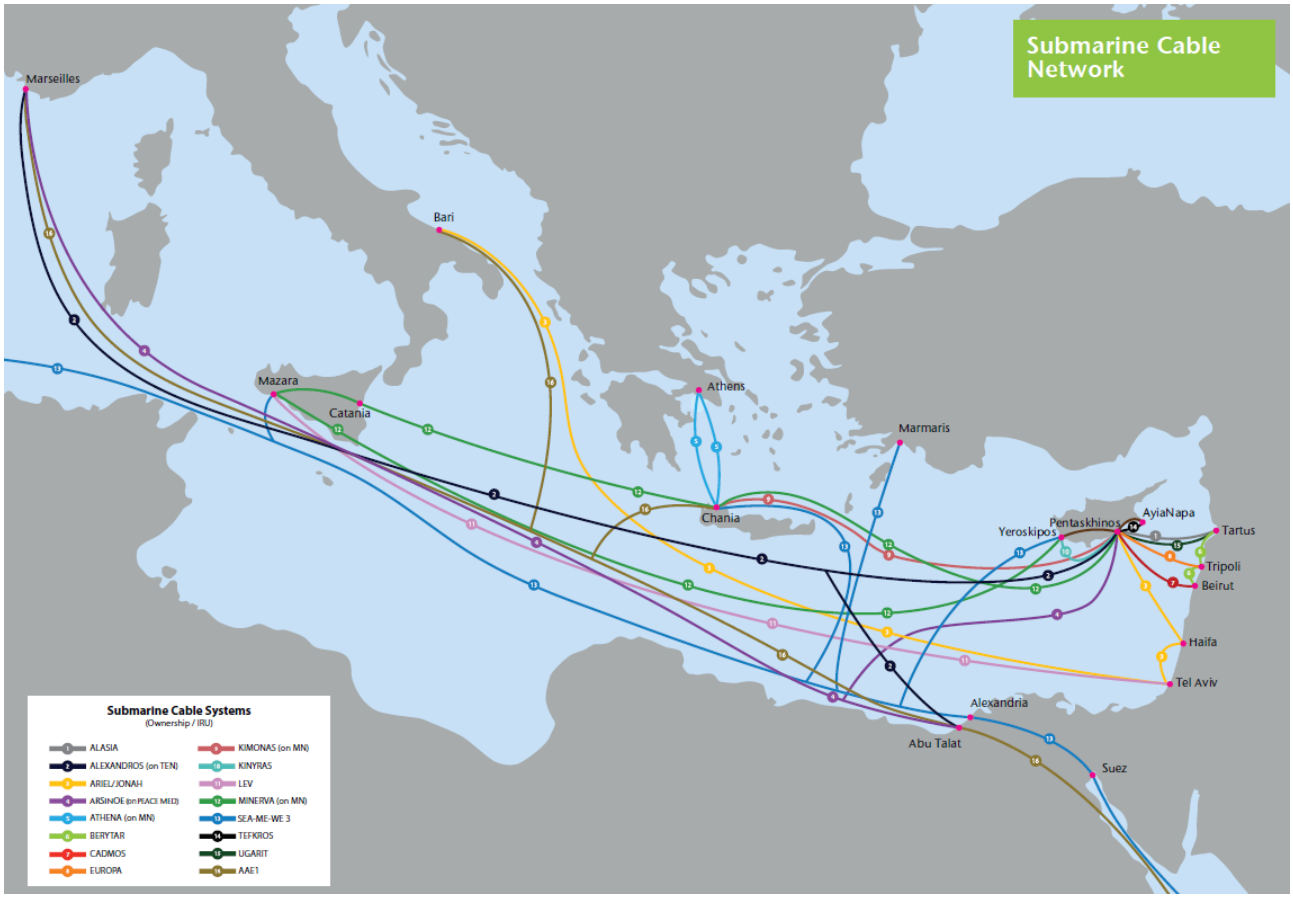

Figure 11. Submarine cable network developed by the Cyprus Telecommunications Authority (CYTA - source: www.submarinenetworks.com/en/stations/europe/cyprus).

Socioeconomic data

N/A

Related ESA Indicators, Pressures and Ecosystem Services

The transmission of communications is directly and/or indirectly related to the following ESA Indicators, Pressures and Ecosystem Services:

CY ESA Indicators	**01/2017 - 12/2022**
CY_ESA.08: Length coverage of new cables (in km)	506
Pressures	• Physical loss of the seabed (PresPhyLoss) • Physical disturbance to seabed (PresPhyDisturbSeabed)
Ecosystem Services	• Mass stabilization and erosion control (EcosysServFlowsErosionPrev1) • Maintaining nursery populations and habitats (EcosysServMainCondNurs) • Decomposition and fixing processes (EcosysServMainCondDeco) • Gene pool protection (EcosysServMainCondGene)

3.2.3 Extraction of non-living resources

3.2.3.1 Extraction of water (ActivExtrNonLivingWater)

Description

The extended drought observed in Cyprus in the last decade of the 20th century which resulted into an unsatisfactory storage of water in the dams, necessitated the creation of seawater desalination plants aiming to make the supply of drinking water to the large urban and tourist centres independent of rainfall. Presently, five desalination plants are in operation in Cyprus, in Dhekelia, Limassol (Episkopi), EAC Vasilikos and Larnaca and in Pafos.

Dhekelia Desalination Plant: The plant started to operate in April 1997 with a capacity of 40,000 m^3/day and it was acquired by the Government in 2005, making use of a specific term in the contract. The plant was renovated in 2005, in July 2008 its capacity was increased by 10,000 m^3/day and in April 2009 by another 10,000 m^3/day, with its total capacity presently amounting to 60,000 m^3/day. The Dhekelia Desalination Plant covers the drinking water requirements of free Ammochostos area and part of the requirements of Larnaca.

***Limassol (Episkopi) Desalination Plant*:** The contract for the construction and operation of the plant was signed in August 2009. The capacity of the plant is 40.000 m^3/day with an ability of extension to 60.000 m^3/day. The Limassol Desalination Plant covers part of the drinking water requirements of the District of Limassol.

EAC Vasilikos Desalination Plant: The contract for the supply of water from Vasilikos Desalination Plant was signed with EAC in February 2010 for a period of 20 years. Despite the fact that the 20-year period started in July 2013, the plant was in reserve until the end of 2015. The plant is of a capacity of approximately 60,000 m^3/day and it covers the drinking water requirements of communities in the District of Limassol, while it supplies the Choirokitia-Ammochostos conveyor through the Choirokitia water treatment plant. The daily freshwater production capacity

remained the same from 2017 to 2022 at approximately 31,000 m^3/day, resulting in an annual production capacity of 16,000,000 m^3/year for 2017 and 11,500,000 m^3/year for 2022.

***Larnaca Desalination Plant*:** The contract for the construction and operation of the Larnaca Desalination Plant was signed in 1999. This was a 10-year contract, and the plant started to operate in June 2001 with a capacity of 52,000 m^3/day. In January 2009, the capacity of the plant was increased by 10,000 m^3/day and reached 62,000 m^3/day. The contract expired in July 2011 at which time the plant became property of the WDD. A new 25-year contract period started in July 2015, and it is expected to expire in June 2040. The plant was mainly in reserve until the end of 2015. The capacity of the plant is 60,000 m^3/day. The Larnaca Desalination Plant presently largely satisfies the requirements of the Districts of Nicosia and Larnaca.

Pafos Desalination Plant: The desalination plant of Pafos has a capacity of 15,000 m^3/day to satisfy the requirements of the District of Pafos. The plant started its operation at the end of 2019.

The contribution of the desalination plants in the solution of the freshwater shortage problem that affects our country is huge. The desalination plants in Dhekelia and Larnaca satisfy a great part of the drinking water requirements of the Districts of Nicosia, Larnaca and free Ammochostos, with a minimum total production capacity of 32.8 MCM/year. The desalination plants in Limassol (Episkopi) and Vasilikos satisfy a great part of the drinking water requirements of the District of Limassol and part of the requirements of free Ammochostos, with a minimum total production capacity of 32.8 MCM/year (Table 17).

Table 17. Desalination plant freshwater output values for 2017 and 2022 (* Data are available only for the year 2021; Source: WDD, 2024).

Plant	2017		2022	
	Daily output 10^3 m^3	Annual output 10^6 m^3	Daily output 10^3 m^3	Annual output 10^6 m^3
Dhekelia	55	20	38	14
Larnaca	51	18.5	47	17
Limassol	38	14	20	7.5
Pafos	*13.5	*3	6.5	2.4
Vasilikos	44	16	32.5	12

A by-product of desalination is toxic brine which can degrade coastal and marine ecosystems unless treated. For every litre of potable water produced, about 1.5 litres of liquid polluted with chlorine and copper are created in most desalination processes. The toxic brine depletes oxygen and impacts organisms along the food chain when pumped back into the sea (UNEP, 2019). Studies on the effects of desalination on the marine environment (Argyrou, 1999), have shown that the main impact comes from the disposal of brine and basically concerns a local increase in salinity that affects the marine environment only in the immediate area of the disposal point (200 meters around the discharge point from the pipeline). Therefore, although desalination is a potential stressor, its impact on the coastal waters of Cyprus is not considered significant (Table 18). Desalination also comes with a high energy demand. Using renewable energy sources for desalination can be an option to mitigate carbon emissions stemming from desalination.

Table 18. Desalination plant brine generation values for 2017 and 2022 (* Data available only for 2021; Source: WDD, 2024).

Plant	2017		2022	
	Daily output 10^3 m^3	Annual output 10^6 m^3	Daily output 10^3 m^3	Annual output 10^6 m^3
Dhekelia	82	30	60	21
Pafos	*20	*4	20	3.5

It is noted that around 8 km of underwater pipelines related to desalination plants (seawater intake / brine output) exist in the MRU (area under the effective control of the Republic of Cyprus) (Figure 9).

The sharpness of the problem of water shortages in Cyprus makes the desalination sector particularly important despite its small contribution to the country's macroeconomic aggregates. Needs are expected to increase, and due to the increase in tourist flows, the total capacity and number of desalination units will also have to increase accordingly.

It is finally noted that requests have been recently submitted to the Ministry of Agriculture, Rural Development and the Environment, mainly by hoteliers, for the creation of private desalination units to meet the needs of their units.

Socioeconomic data

Data in Table 19 corresponds to the economic activity of water extraction between the years 2017 and 2022. During this period, the number of full-time paid employees gradually increased, from 363 in 2017 to 392 in 2022.

The value of production also showed a general upward trend, peaking at €134.125 million in 2022. The gross value added followed a similar trend, with a maximum of €40.056 million in 2022. Despite representing a small percentage of the national gross domestic product, water extraction plays a crucial role in providing essential resources for multiple sectors of the economy and the sustainability of them.

The data presented reveal the critical importance of water extraction activity in Cyprus between 2017 and 2022. Despite representing a constant percentage of the national GDP, this activity shows sustained growth in terms of employment and output value, peaking in 2022.

Table 19. Economic activity of water extraction between the years 2017 and 2022.

NACE 36.00	MSFD 2017-2022							
Indicators	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**Average**	**Total**
Direct employment (*1000 FTE) under the activity	0.363	0.359	0.356	0.365	0.387	0.392	0.370	N/A
Production value (€ million) of the activity	98.186	108.798	108.405	95.218	114.222	134.125	109.826	658.954
Value-added (€ million) by the activity	32.659	32.407	34.530	33.353	39.330	40.056	35.389	212.335

Related ESA Indicators, Pressures and Ecosystem Services

The extraction of water is directly and/or indirectly related to the following ESA Indicators, Pressures and Ecosystem Services:

CY ESA Indicators		**01/2017 - 12/2022**
CY_ESA.09: Volume of extracted seawater		155.5x10^6 m^3
Pressures	• Hydrographical changes (PresEnvHydroChanges) • Input of water – point sources (e.g. brine) (PresInputWater) • Disturbance of species (PresBioDisturbSpp) • Input of anthropogenic sound (impulsive, continuous) (PresInputSound)	
Ecosystem Services	• Flood protection (EcosysServFlowsFloodProt) • Chemical condition of salt waters (EcosysServMainCondChem) • Global climate regulation by reduction of greenhouse gases (EcosysServMainCondClim) • Filtration/sequestration/storage by ecosystems (EcosysServWasteRemovalByEcosys) • Bioremediation by organisms (EcosysServWasteTreatment) • Maintaining nursery populations and habitats (EcosysServMainCondNurs) • Gene pool protection (EcosysServMainCondGene) • Pollination and seed dispersal (EcosysServMainCondPolli) • Physical and experiential interactions (EcosysServInteracPhyRecreat1; EcosysServInteracPhyRecreat2) • Scientific and educational interactions (EcosysServInteracPhyScientif; EcosysServInteracPhyEducat)	

3.2.4 Extraction of living resources

3.2.4.1 Fish and shellfish harvesting (professional, recreational) (ActivExtrLivingFishHarv)

Description

The sea fishing sector of Cyprus consists of small-scale coastal fishing, bottom trawling, purse seining and multipurpose vessel fishing. Coastal fishing is carried out with small, usually wooden boats, four to 12 m in length, which mainly use static bottom gear, namely gill and trammel nets, longlines and traps. Multipurpose vessels are over 12 m in length and, in addition to coastal fishing gear, they target large pelagic fish with drifting surface longlines. Bottom trawling and purse seining are carried out by vessels over 18 m in length. In addition to professional fishing, recreational fishing is also practiced in the waters of Cyprus, either surface fishing from shore or boat using mainly hook and line technics, or freediving underwater fishing with spearguns, depending on the type of license. During the assessment period, coastal fishing vessels averaged 740 per year (320 full time and 420 part time licenses), multipurpose vessels to 35, bottom trawlers to 6 and purse seiners to 2.

The main fish stocks targeted by the Cyprus fishing sector can be divided into two categories, demersal and large pelagic species. Demersal species, such as red mullets, sea breams, rabbitfish, octopus, etc., are mainly targeted by the small-scale coastal vessels, as well as the bottom trawlers. Small bentho-pelagic species like picarels are also targeted by the purse seiners, while small pelagic species (e.g. anchovy, sardine, mackerel, etc.) are not as abundant and thus not targeted stocks. Large pelagic species targeted by the multipurpose fleet include mainly albacore, bluefin tuna and swordfish.

Socioeconomic data

The annual contribution of sea fishing to the Cypriot economy is relatively low, however, the fishing sector in Cyprus is considered important, mainly because it offers economic and social benefits to coastal areas, creates jobs and offers healthy products to consumers. According to official DFMR statistics submitted to the Statistical Service of Cyprus (www.cystat.gov.cy), during the 2017-2022 assessment period, an annual average of around 1425 t of fishery products, with a total first sale value of €7.65 million, were landed by the Cypriot fleet (Tables 20 and 21, Figure 12). It should be noted that international trawling catches, as well as bluefin tuna purse seine and most of the longline bluefin tuna catches came from areas outside Cyprus waters, i.e. not in the present assessment MRU. These catches represented around 10% in weight and 15% in value of the total catches during this period.

Table 20. Annual landings in weigh (t) and first sale value (k€) of the Cypriot fishing fleet during the assessment period 2017-2022.

	landings (t)						value (k€)					
Fleet section	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Small scale fleet - coastal	797	511	469	357	501	444	6,279	3,435	3,372	2,608	3,604	3,170
Polyvalent fleet - coastal	11	7	12	16	13	12	104	74	113	123	131	123
Trawlers - coastal	86	52	141	80	95	107	546	320	792	606	702	699
Purse seiners - coastal	32	0	18	0	10	21	125	0	61	2	39	90
Polyvalent fleet - pelagic	666	731	693	663	650	548	1,939	1,937	1,899	1,844	2,062	2,152
Trawlers - international waters	85	94	63	13	17	26	860	822	678	179	173	270
Purse seiners - bluefin tuna	59	75	85	95	95	90	470	477	658	735	741	873

Table 21. Socioeconomic data on NACE 03.11.

NACE 03.11	**MSFD 2017-2022**							
Indicators	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**Average**	**Total**
Direct employment (*1000 FTE) under the activity	1.14	1.145	1.127	1.267	1.238	1.234	1.192	N/A
Production value (€ million) of the activity	10.32	7.07	7.57	6.1	7.45	7.38	7.65	45.89
Value-added (€ million) by the activity	-	-	-	-	-	-	-	-

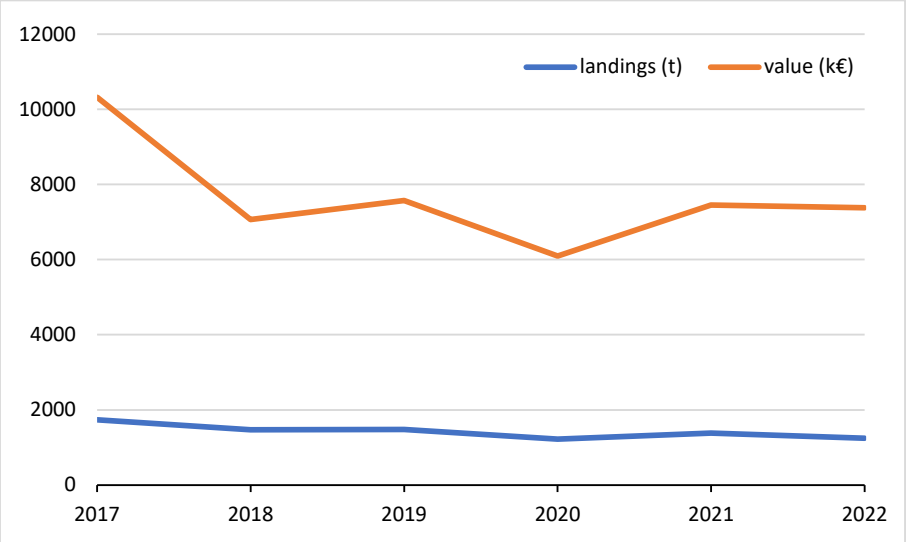

Figure 12. Annual landings in weigh (t) and first sale value (k€) of the Cypriot fishing fleet during the assessment period 2017-2022.

During the assessment period, around 1,210 people were directly employed as fishers on average per year, of which 790 as full-time and 420 as part-time workers (Table 21, Figure 13). Of these, only 0.3% were women.

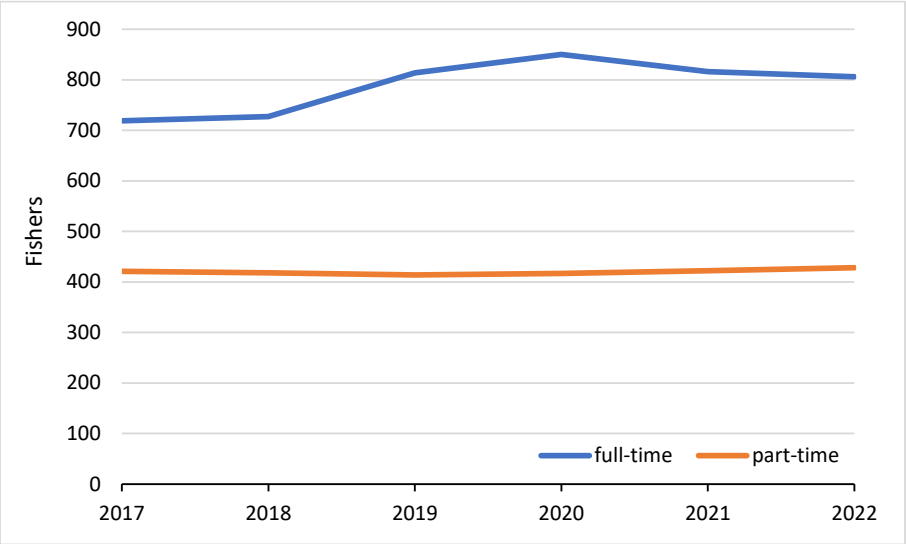

Figure 13. Employment in sea fisheries in Cyprus during the years 2017-2022.

The fishing sector in Cyprus is facing significant sustainability problems, which are due to various factors, such as the low productivity of the waters of the area, the overfishing of certain benthic and pelagic species, the increasing presence of alien species which exacerbates the negative effects on the ecosystem and fisheries, the limitation of the fishing grounds of Cyprus due to the Turkish occupation and the lack of professional training of fishermen in modern methods of fishing and navigation. In addition, the outdated marketing system where most fishers sell their catch to small fish retail shops at fixed prices without any auction schemes, the consumers' preference for specific

types of fish combined with their difficulty in accepting new species (e.g. NIS) and the competition with imported products (imports ~75% of annual per capita consumption of fishery products - www.cystat.gov.cy), also pose significant challenges.

Related ESA Indicators, Pressures and Ecosystem Services

The Fish and shellfish activity is directly and/or indirectly related to the following ESA Indicators, Pressures and Ecosystem Services:

CY ESA Indicators		01/2017 - 12/2022
CY_ESA.10: Average annual number of professional fishing licenses		775
CY_ESA.11: Average annual number of recreational fishing licenses		5545
CY_ESA.12: Average annual number of coastal fishing vessels		742
CY_ESA.13: Average annual number of multipurpose vessels		33
CY_ESA.14: Average annual number of bottom trawlers		2
CY_ESA.15: Average annual number of purse seiners		2
CY_ESA.16: Average annual total capacity (GT)		3550
CY_ESA.17: Average annual total engine power (KW) per year		37236
CY_ESA.18: Average annual total catch (t) per year		1431
Pressures	• Extraction of, or mortality/injury to, wild species (PresBioExtractSpp)	
Ecosystem Services	• Nutrition (wild animal outputs) (EcosysServNutrSeafoodAnimals) • Maintaining nursery populations and habitats (EcosysServMainCondNurs) • Gene pool protection (EcosysServMainCondGene) • Mass stabilization and erosion control (EcosysServFlowsErosionPrev1)	

3.2.4.2 Fish and shellfish processing (ActivExtrLivingFishProcess)

Description

The fish processing industry in Cyprus is a very small sector focusing mainly on the domestic market. The island's limited marine resources and the fact that most fish captured or produced locally are aimed at human consumption in fresh form, mean that most of the raw material for processing is imported. Products typically include salted, smoked and frozen fish, as well as various seafood products. Cyprus follows EU regulations, which means that the processing plants must adhere to strict standards for hygiene, traceability, and labeling. While not a dominant sector, the fish processing industry contributes to the Cypriot economy through employment and local food supply. The sector faces major challenges such as competition from direct imports, fluctuations in raw material supply, and the need to maintain high standards to meet EU regulations.

Socioeconomic data

Statistical data on the sector are collected only for companies with fish processing as their main activity and as there are only two such companies in Cyprus, data are not made available for privacy protection reasons.

Related ESA Indicators, Pressures and Ecosystem Services

The Fish and Shellfish processing activity is directly and/or indirectly related to the following ESA Indicators, Pressures and Ecosystem Services:

CY ESA Indicators		**01/2017 - 12/2022**
CY_ESA.19: Average annual number of companies with fish processing being the main activity		2
Pressures	Indirectly linked with: • Extraction of, or mortality/injury to, wild species (PresBioExtractSpp)	
Ecosystem Services	• Nutrition (wild animal outputs) (EcosysServNutrSeafoodAnimals)) • Bioremediation by organisms (EcosysServWasteTreatment) • Filtration/sequestration/storage by ecosystems (EcosysServWasteRemovalByEcosys) • Chemical condition of salt waters (EcosysServMainCondChem) • Maintaining nursery populations and habitats (EcosysServMainCondNurs) • Gene pool protection (EcosysServMainCondGene)	

3.2.5 Cultivation of living resources

3.2.5.1 Aquaculture - marine, including infrastructure (ActivCultivAquaculMarine)

Description

Aquaculture in Cyprus constitutes an important component of the primary agricultural production, showing impressive growth rates and high-quality export products. Marine aquaculture started in Cyprus in an experimental basis by the Department of Fisheries and Marine Research in 1972, while the first private nursery and the first private fattening units begun operation in 1986 and 1988 respectively. In 2022, the marine aquaculture sector of Cyprus included:

- Nine private open-sea fish farms with annual productions ranging between 300 and 2,200 tons.
- Three private land-based marine fish hatcheries trading in fish fry.
- One land-based shrimp farm.

The ***open-sea fish farms*** are located at 1-4 km from shore, at water depths of 20-70 m (Figure 14). The open-sea farming approach was selected as more environmentally friendly but also because of limitations to available coastal areas due to many competitive uses. The main marine species commercially cultured are the gilthead sea bream (*Sparus aurata*) and the European sea bass (*Dicentrachus labrax*), and in much lower quantities *Argyrosomus regius, Pagrus major, Siganus rivulatus* and *Pagellus erythrinus*. For the period 2017-2022, the gilthead sea bream was the main species cultured in Cyprus, accounting for 66% in weight and 61% in value of the total mariculture production, followed by the European sea bass with 33% and 39% respectively (Figure 15).

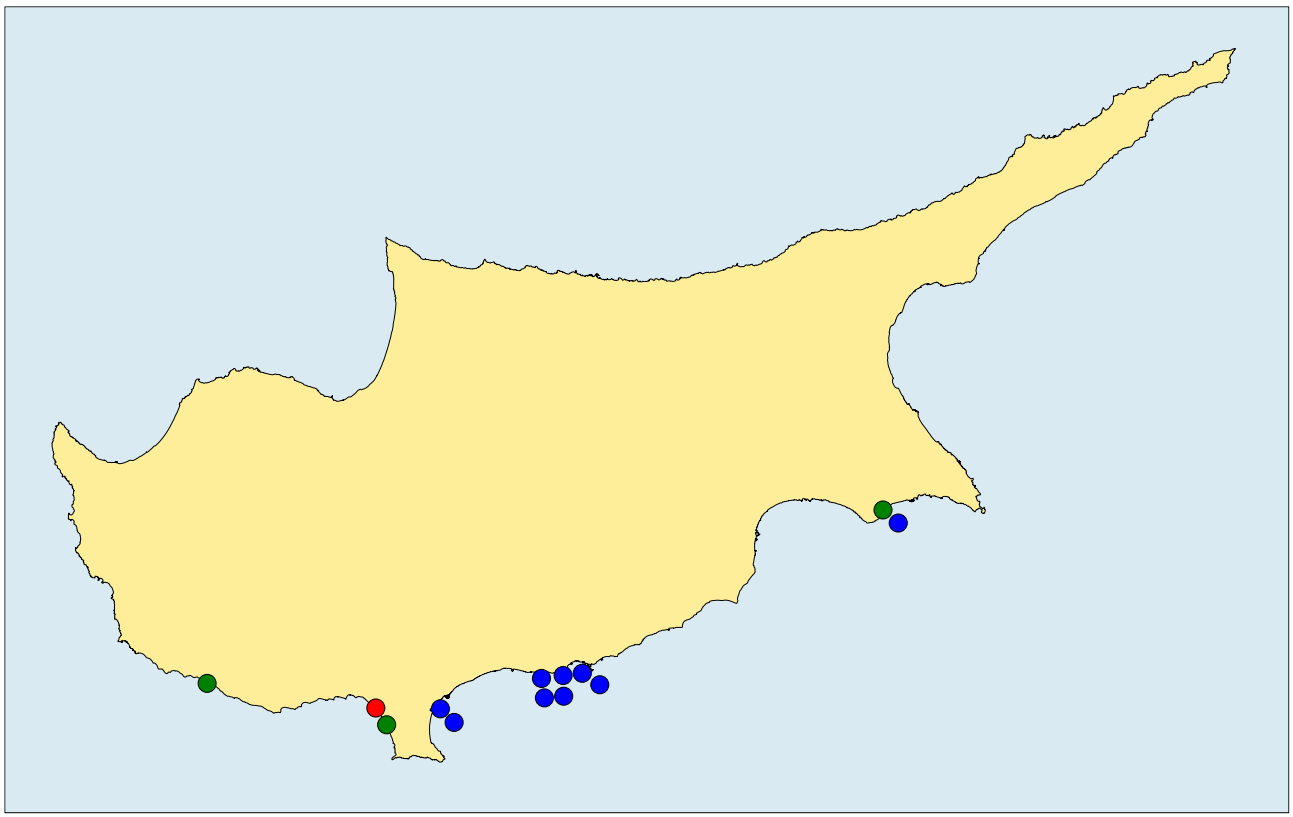

Figure 14. Location of open-sea fish farms (blue), marine fish hatcheries (green) and shrimp farm (red).

According to the Cyprus Aquaculture Laws and Regulations, all offshore mariculture units must carry out environmental monitoring surveys in winter and summer and submit the results of the reports to DFMR and DoE. DFMR issued an environmental monitoring protocol to be implemented which is simple and cost-effective and includes specific techniques and parameters that are good indicators of environmental disturbance/change over time. These indicators are: (i) Chla and nutrient (NO_3^-, NO_2^-, NH_4^+, PO_4^3) concentrations (every winter and summer), (ii) Sediment physicochemical properties (OM, TOP) (every summer), and (iii) assessment of benthic macrofauna communities by applying the WFD Bentix Index to determine the ecological status. The indicators are assessed at stations at 0 m (under cages), 50 m, 200 m and 500 m distances from the cages (downstream the main currents) and at a reference station >2 km from the cages (upstream the main currents). Mediterranean guides for aquaculture monitoring have established that monitoring practices should be performed inside and outside of Allowable Zone of Effect (AZE), based on the carrying capacity and nutrient exchange of the fish farm (Macías et al, 2019). Lampa et al (under preparation) have carried out a meta-data analysis of 2010-2021 environmental monitoring data from the Cypriot fish farms and the AZE agreed with the 50 m distance from the fish farm units.

The ***marine fish hatcheries*** and the ***shrimp-farm*** operate on-land based facilities that are located in coastal areas. The main fish fry are the sea bream (*Sparus aurata*) and the European sea bass (*Dicentrachus labrax*), accounting for 66% and 33% of the total production and 60% and 38% of total value of the mariculture production for the period 2017-2022, respectively (Figure 15).

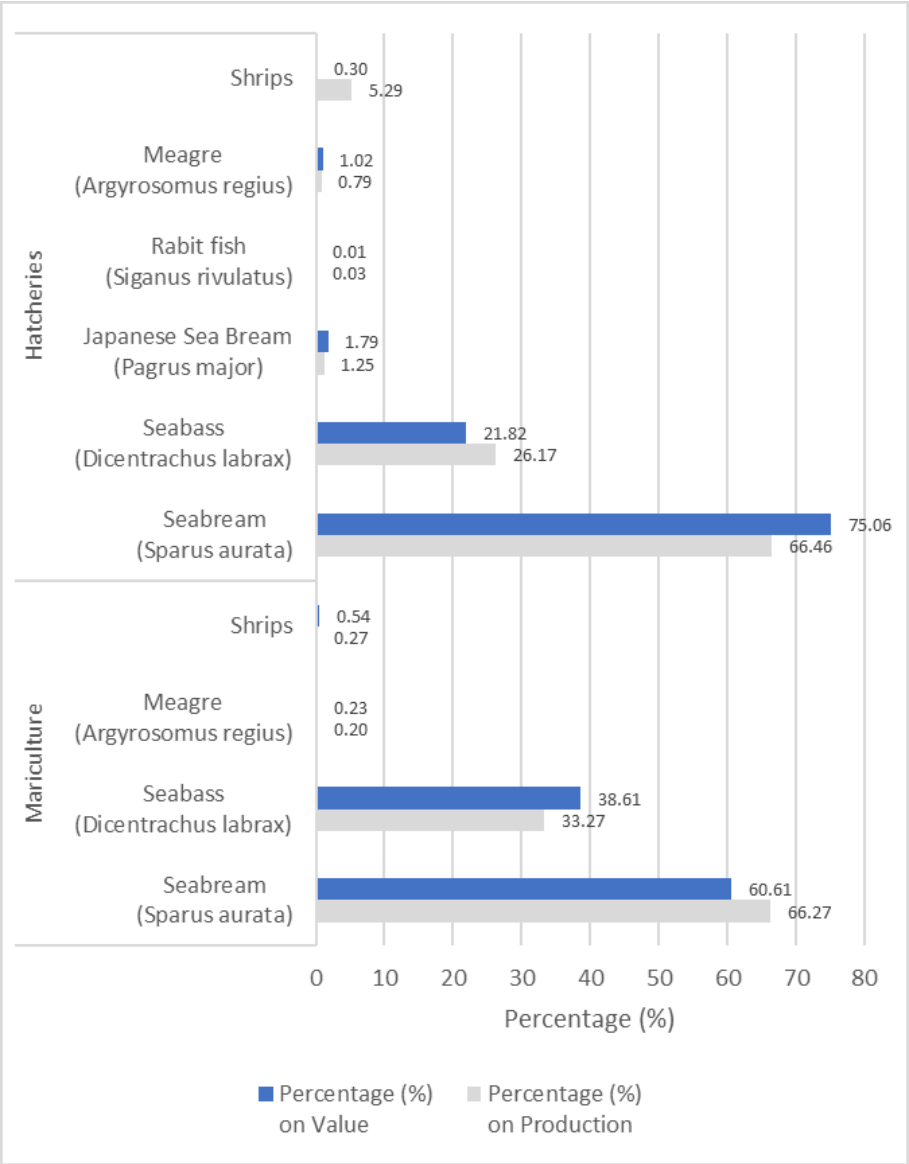

Figure 15. Percentage of contribution in production and value per species in mariculture and hatcheries.

Socioeconomic data

According to the Multiannual National Strategic Aquaculture Plan 2021-2030 (DFMR, 2021), the Cypriot aquaculture sector produces more than 80% of the total Cyprus fish production and its marine farmed fish are the 3rd most important exported product in value of the primary agriculture sector.

The total value of production for both fish and fry for the period 2017-2022 was €274,823,000. In 2020, due to the Covid pandemic, the marine aquaculture production declined, followed by an increase in 2021 and 2022, exceeding the production of 2019. The annual average Full Time Equivalent (FTE) in the mariculture sector in the period 2017-2022, was 282 employees (Table 22).

Table 22. Socioeconomic data for the Mariculture sector for the period 2017-2022 (NACE 0321 - Marine aquaculture)

NACE 0321 - Marine aquaculture	MSFD 2017-2022							
Indicators	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**Average**	**Total**
Direct employment (*1000 FTE) under the activity	0.321	0.256	0.288	0.287	0.269	0.274	0.282	N/A
Production value (€ million) of the activity	41.902	43.369	49.199	42.100	47.432	50.822	44.832	274.823
Value-added (€ million) by the activity	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Related ESA Indicators, Pressures and Ecosystem Services

Aquaculture is directly and/or indirectly related to the following ESA Indicators, Pressures and Ecosystem Services:

CY ESA Indicators		01/2017 - 12/2022
CY_ESA.20: Average annual number of marine offshore aquaculture companies		9
CY_ESA.21: Average annual number of marine hatcheries		3
CY_ESA.22: Average annual number of shrimp farms		1
CY_ESA.23: Average annual production license range of marine offshore aquaculture companies (in tons)		300 - 2200
Pressures	• Loss of, or change to, natural biological communities due to cultivation of animal or plant species (PresBioCultHab) • Input of organic matter (PresInputOrg) • Input of nutrients (PresInputNut) • Input of litter (PresInputLitter) • Physical disturbance to seabed (PresPhyDisturbSeabed)	
Ecosystem Services	• Maintaining nursery populations and habitats (EcosysServMainCondNurs) • Gene pool protection (EcosysServMainCondGene) • Animals from in-situ aquaculture (EcosysServNutrAquacAnimals) • Bioremediation by organisms (EcosysServWasteTreatment) • Filtration/sequestration/storage by ecosystems (EcosysServWasteRemovalByEcosys) • Chemical condition of salt waters (EcosysServMainCondChem) • Physical and experiential interactions (EcosysServInteracPhyRecreat1; EcosysServInteracPhyRecreat2) • Scientific and educational interactions (EcosysServInteracPhyScientif; EcosysServInteracPhyEducat) • Mass stabilization and erosion control (EcosysServFlowsErosionPrev1)	

3.2.6 Transport

3.2.6.1 Transport shipping (ActivTranspShip)

Description

Shipping and trend analysis

One of Cyprus's most prosperous sectors historically has been shipping. It is the industry that has generated the most foreign direct investment over the longest period of time and is expected to continue growing. There are roughly 42 ship managers, 45 charterers, and 72 owners of foreign ships based in Cyprus, according to the most recent data recorded by the Cypriot Department of Merchant Shipping. Almost 1,700 registered vessels (Table 23) with 23 million gross tonnages are

registered under the Cyprus Flag. Regarded as one of the top three ship-management centers globally and the biggest ship-management center for third parties in Europe, Cyprus's merchant fleet is ranked as the 11th largest in the world and the 3rd largest in EU (Figure 16). For a small island, the numbers are noteworthy: Cyprus controls over 5% of the global fleet, and its companies oversee over 20% of the global third-party ship management industry.

Table 23. Number of Ships in The Cyprus Register (Source: Deputy Ministry of Shipping).

Date	2017	2018	2019	2020	2021	2022
Permanently Registered	1511	1556	1528	1532	1522	1490
Provisionally registered	31	27	55	50	50	37
Parallel[1]	125	138	140	147	152	152
Total	1667	1721	1723	1729	1724	1679
Note 1: New category since 1986						

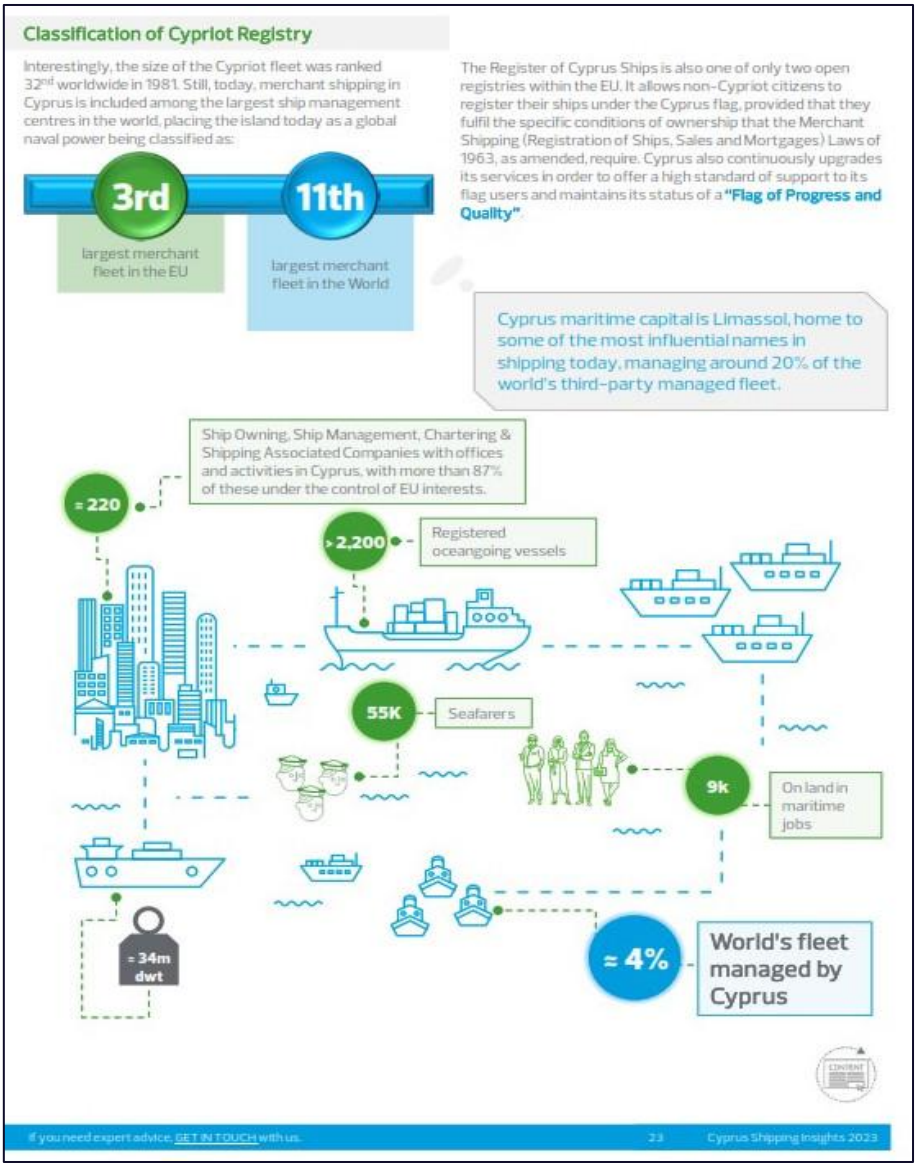

Figure 16. Classification of Cypriot Registry (Source: Cyprus Shipping Insights, 2023).

Thriving Shipping Cluster

The Cypriot maritime shipping industry contributes significantly more to the economy than other nations active in merchant shipping. In fact, it generates over 11 billion euros annually, or over 7% of the country's GDP. Around 5% of this comes from ship management alone. Cyprus is home to more than 250 companies offering the full range of shipping-related services. This indicates that the country has a significant resident shipping industry. Foreign companies with physical locations in Cyprus, make a significant contribution. Particularly, Companies from Germany, Greece, Switzerland, Malta and Singapore make a significant contribution. These contribution rates are expected to remain the same in 2024. The dominant players in the shipping industry generate 94% of the total revenue in the first half of the year, i.e. the first half of 2023. Ship management companies accounted for 46% of this. Approximately 9,000 workers are employed by shipping companies headquartered in Cyprus and more than 55,000 seafarers work on Cyprus-flagged vessels. All services offered by Cyprus are managed by the Maritime Administration, which is composed of the Port Authority, the Ministry of Merchant Shipping, the Ministry of Transport, Communications and Works.

Foundations for a Favourable Future

Cyprus' maritime industry is a maritime hub and EU jurisdiction that has demonstrated its ability to adapt to changing market conditions and keep up with technological advancements, as evidenced by its expanding registry and updated protocols. The primary goals of the nation are to strengthen the safety and competitiveness of Cyprus shipping, draw in more businesses, and advance maritime education and “blue jobs” to guarantee that the nation has a trained labour force to support and grow the industry. Despite the obstacles it faces, Cyprus is ultimately committed to upholding the excellence and calibre of the Cyprus flag, which is still regarded as one of the most competitive in the world.

Socioeconomic data

Water transport (NACE 50) necessarily implies that this sector requires the sea to provide its service. Therefore 100% dependence is attributable to this NACE category. In the following tables socioeconomic data are provided for the NACE 5010 - Sea and coastal passenger water transport and 5020 - Sea and coastal freight water transport (Table 24).

Table 24. NACE 50 Water transport NACE group categories (5010 and 5020).

NACE	MSFD 2017-2022							
	Indicators	2017	2018	2019	2020	2021	2022	Average
NACE 5010 Sea and coastal passenger water transport	Direct employment (*1000 FTE) under the activity	230	260	272	121	179	201	210.5
	Production value (€ million) of the activity	15,725	16,727	18,642	5,837	12,112	22,836	15,313
	Value-added (€ million) by the activity	6,619	6,373	7,409	-197	4,674	8,399	5,546
NACE 5020	Direct employment (*1000 FTE) under the activity	49	50	51	82	91	91	69

NACE	MSFD 2017-2022							
	Indicators	2017	2018	2019	2020	2021	2022	Average
Sea and coastal freight water transport	Production value (€ million) of the activity	21,992	22,181	25,208	34,481	52,020	73161	38173.83
	Value-added (€ million) by the activity	8,561	9,156	11,192	10,322	15,002	23,708	12,990.16

3.2.6.2 Transport infrastructure (ActivTranspInfras)

Description

Cyprus, as an island, is heavily based on its ports as they are the most important gates that serve the international trade of goods and the movement of passengers. The volume of movement of ships, passengers and goods through the five main ports of Cyprus is shown in Tables 25 and 26.

Table 25. Gross weight of goods transported to/from main ports in Cyprus (in thousand tons) for the period of 2017-2022 (Source: Eurostat).

Port Area	2017	2018	2019	2020	2021	2022
Dekeleia	362	251	306	401	377	413
Larnaca	1,141	2,204	2,425	1,844	1,618	1,259
Limassol	2,898	3,049	2,830	2,600	2,372	2,790
Moni	115	-	-	-	-	-
Zygi	3,344	1,444	1,867	2,628	2,618	3,773
Total	7,860	6,948	7,428	7,473	6,985	8,235

Table 26. Passengers in all ports, vessels arriving, and Gross weight of goods transported to/from main ports in Cyprus, for the period of 2017-2022 (Source: Eurostat).

CY Indicators	2017	2018	2019	2020	2021	2022	Average	Total
Passengers embarked and disembarked in all ports by direction (*1000)	72	28	53	5	29	19	34.33	240
Vessels arriving in the main ports by type of vessels (number)	3,179	2,250	2,263	1,833	1,818	2,201	2,257.33	15,801
Gross weight of goods transported to/from main ports ('000 tons)	7,860	6,948	7,428	7,473	6,985	8,235	7,488.16	52,417

Ports: Along with bulk ports and oil terminals in Vasiliko, Dhekelia, and Larnaca, the two most significant ports in Cyprus are Limassol and Larnaca. With an annual handling capacity of 500,000 TEU (Twenty Foot Equivalent Units), Limassol is the primary port, handling approximately 90% of export and import volumes. Larnaca's capacity is approximately 250,000 TEU. Following the commercialization of the Port of Limassol and the redevelopment plans of the Port of Larnaca, the port sector in Cyprus has grown significantly in the last few years. The port has operated effectively, and 2022 was one of DP World Limassol's best years ever, with cruises rising 46% and passenger volume rising 338 percent, respectively, and a massive 63 percent increase in total cargo tonnage volume over 2019. The growing significance of the area in global shipping has benefited the owners of the recently constructed port of Limassol. Increased trade, the development of regional ports, the finding of natural gas reserves in the eastern Mediterranean,

and the expansion of the Suez Canal which handles more than 10% of all maritime trade worldwide, were the causes of this increase. Over the next 25 years, the state treasury will receive about two billion euros from the expansion and modernization of the port of Limassol, which has increased competitiveness. The second-largest port in Cyprus is situated in Larnaca, only 2 km from the city centre and 6 km from the main airport on the island. It provides roll-on/roll-off, general cargo, oil and gas service, and other services.

Transhipment Hub: Cyprus is now a convenient hub for trade between Europe and the Far East and has solidified its status as a significant EU outpost in the Eastern Mediterranean thanks to its advantageous geographic location and modern infrastructure. The development of logistics services firms has paralleled the quick modernization and expansion of Cyprus' two airports, Pafos and Larnaca, as well as the country's principal port, Limassol. The company makes significant investments in technology, equipment, and warehousing to fulfil the increasing demand for services related to transshipment, processing, and re-export.

Socioeconomic data

The socioeconomic data related to the Transport infrastructure are provided for NACE 3011 - Building of ships and floating structures, 5222 - Service activities incidental to water transportation, 5224 - Cargo handling, and 5229 - Other transportation support activities (Table 27).

Table 27. Socioeconomic data on NACE 3011, 5222, 5224, 5229 (Source: CY-Stat).

NACE	Main indicators	MSFD 2017-2022						
		2017	2018	2019	2020	2021	2022	Average
NACE 3011 Building of ships and floating structures	Direct employment (*1000 FTE) under the activity	0.049	0.043	0.048	0.043	0.061	-	0.0488
	Production value (€ million) of the activity	3.705	3.601	4.077	4.917	7.275	-	4.715
	Value-added (€ million) by the activity	1.551	1.680	1.843	2.033	2.732	-	1.9678
NACE 5222 Service activities incidental to water transportation	Direct employment (*1000 FTE) under the activity	0.522	0.553	0.570	0.556	0.567	0.608	0.563
	Production value (€ million) of the activity	112.564	129.732	137.802	130.916	128.491	156.688	132.699
	Value-added (€ million) by the activity	38.110	51.956	54.481	54.118	53.355	61.208	52.205
NACE 5224 Cargo Handling	Direct employment (*1000 FTE) under the activity	0.319	0.349	0.357	0.353	0.372	0.401	0.359
	Production value (€ million) of the activity	18.012	20.632	20.604	19.611	20.974	22.967	20.467
	Value-added (€ million) by the activity	11.360	12.515	12.515	11.782	12.175	14.415	12.460
NACE 5229 Other transportation support activities	Direct employment (*1000 FTE) under the activity	7.512	7.686	8.189	6.185	6.466	7.819	7.310
	Production value (€ million) of the activity	1,936.854	2,040.647	2,278.569	2,311.875	2,756.653	3,521.779	2,474.396
	Value-added (€ million) by the activity	320.331	352.080	380.826	348.024	410.017	433.637	374.153

Related ESA Indicators, Pressures and Ecosystem Services for the two activities

Transport-infrastructure and Transport-shipping are directly and/or indirectly related with the following ESA Indicators, Pressures and Ecosystem Services:

CY ESA Indicators	**01/2017 - 12/2022**
CY_ESA.24: Passengers embarked and disembarked in all ports by direction (*1000)	34.33
CY_ESA.25: Vessels arriving in the main ports by type of vessels (number)	2,257.33
CY_ESA.26: Gross weight of goods transported to/from main ports, by type of traffic (Thousand tons)	7,488.16
Pressures	• Input or spread of non-indigenous species (PresBioIntroNIS) • Physical disturbance to the seabed (PresPhyDisturbSeabed) • Input of anthropogenic sound (PresInputSound) • Input of litter (PresInputLitter) • Input of other substances (PresInputCont)
Ecosystem Services	• Gene pool protection (EcosysServMainCondGene) • Maintaining nursery populations and habitat (EcosysServMainCondNurs) • Disease control (EcosysServMainCondDis) • Mass stabilization and erosion control (EcosysServFlowsErosionPrev1) • Physical and experiential interactions (EcosysServInteracPhyRecreat1; EcosysServInteracPhyRecreat2) • Scientific and educational interactions (EcosysServInteracPhyScientif; EcosysServInteracPhyEducat • Filtration/sequestration/storage by ecosystems (EcosysServWasteRemovalByEcosys) • Bioremediation by organisms (EcosysServWasteTreatment) • Chemical condition of salt waters (EcosysServMainCondChem)

3.2.7 Urban

3.2.7.1 Urban uses (ActivUrbIndUrban)

Description

Waste Water Treatment Plants (WWTPs)

The term municipal wastewater describes liquid waste from the normal activities of a city. Domestic wastewater and urban wastewater usually show only minor differences in their characteristics and are treated as a common category of liquid waste in terms of their treatment. Wastewater treatment aims to the acceleration of the processes by which their purification is achieved in nature. In general, the parameters that characterize urban wastewater are biochemical oxygen demand (BOD5), chemical oxygen demand (COD), suspended solids (SS).

Cyprus is a rare case in the Mediterranean where almost all municipal wastewater is treated and reused. There are five wastewater treatment plants (Pafos, Limassol, Larnaca, Agia Napa, Paralimni) with recycled water production for the large coastal urban centers. The government's policy is to include the recycled water in the water balance and at the same time the quality is controlled and remains constant. Almost all stations in Cyprus have tertiary treatment, filtration and chlorination to achieve high quality characteristics so that the recycled water can be used in agriculture. In Cyprus, the treatment of wastewater, especially today when water resources are constantly decreasing and tend to be exhausted, is considered very important, since it allows their reuse.

Recycled water from municipal wastewater treatment plants is reused for irrigation purposes under the Code of Good Agricultural Practice at a rate of 77%, for groundwater enrichment (Pafos Station) at a rate of 14%, and up to 9% may be discharged into surface/coastal waters under certain conditions (winter months-reduced demand for irrigation).

Recycled water coming from the tertiary treatment of wastewater is a reliable source of water which adds important quantities to the water balance and at the same time, allows saving fresh water at the dams and underground aquifers.

In accordance with the Sewage Systems Law (L 108(I)/2004), which harmonized national legislation with European Directive 91/271/EEC on urban wastewater, for each residential settlement having a population over 2,000 persons, a wastewater collection network must exist and be in operation, to carry wastewater at a wastewater treatment plant and where it shall be subjected to at least secondary treatment. From the commencement of the implementation of the Directive in Cyprus, an additional program for the tertiary treatment of wastewater has been implemented, so that the produced recycled water is suitable to be used for irrigation purposes. This tactic was applied both at sewage systems of large urban areas and in rural areas.

Recycled water is now used in Cyprus for the irrigation of agricultural and livestock cultivations as well as green areas, subject to some conditions and upon the implementation of specific practices and the avoidance of others, in accordance with the Code on Good Agricultural Practice. In the meantime, the process for the implementation of a program for the reuse of wastewater is also in progress at a European level as well as the preparation of a document providing guidelines and/or regulations from the European Commission which encourages its exploitation as a significant water resource. This action is expected to establish the quantitative parameters which must characterize recycled water as well as the way it is to be used. However, it is noted that the existing corresponding parameters and the relevant measures in force in the Republic of Cyprus are already strict and within the limits studied at European level.

The Water development Department is competed for the tertiary treatment and management of recycled water produced by the Urban Sewage Boards of Nicosia, Limassol-Amathus, Larnaca, Pafos and Paralimni-Agia Napa. The annual production of the said plants (except for the wastewater treatment plant at Mia Milia) reached 21.9×10^6 m^3 of water in 2016, which are distributed through the government irrigation networks for the irrigation of agricultural and livestock cultivations and green areas.

It is noted that the recycled water produced by Pafos Sewage Board is channelled to Ezousa aquifer, with significant environmental benefits. From there, it is now pumped in the same manner as fresh water and is distributed for use through the government network for irrigation purposes only. Similarly, important quantities of recycled water produced by the Limassol-Amathus Sewage Board are channelled to Akrotiri aquifer used for irrigation purposes only.

A small part of the treated water (10-20%) is discharged into the sea in Larnaca and Limassol during the winter months for emergency reasons, e.g. when there is no demand. Only a small percentage (<1%) of the total load produced each year as municipal wastewater is discharged into the sea. Concentrations of nutrients at the discharge point of the Limassol-Amathounta Sewerage Board (SALA) are at higher levels than coastal reference stations for all nutrients, however concentrations

are well below the maximum legally permissible levels of discharged treated water, possibly indicating sufficient mixing with seawater even at the disposal point itself.

The reasons why recycled water ends up in the sea are the following:

- Larnaca: Recycled water ends up in the sea only when the secondary water storage tanks are maintained and there is no demand for recycled water.
- Limassol: During the winter months when there is no demand for recycled water, then part of it is directed to the Polemidia dam and what is left due to the size of the pipeline overflows into the sea. These discharges are covered by the Discharge Permits, where the period of discharge (winter months) and the characteristics of the recycled water are specified mainly regarding total phosphorus and nitrogen to avoid eutrophication.

It is noted that around 0.5 km of underwater pipelines related to wastewater management exist in the MRU (area under the effective control of the Republic of Cyprus) (Figure 9).

Socioeconomic data

The socioeconomic data related to the Urban uses are provided for NACE 37.00 Sewerage -WWTPs (Table 28).

Table 28. Socioeconomic data on the NACE 37.00 Sewerage -WWTPs.

NACE 37.00 Sewerage -WWTPs	2017	2018	2019	2020	2021	2022	Average
Direct employment (*1000 FTE) under the activity	0.386	0.384	0.392	0.395	0.433	0.477	0.411
Production value (€ million) of the activity	107.134	111.382	116.267	116.081	119.775	126.593	116.205
Value-added (€ million) by the activity	78.636	79.817	82.443	86.888	85.524	80.204	82.252

3.2.7.2 Industrial uses (ActivUrbIndIndustrial)

Description

Fuel Residues management

The oil recycling plant of ECOFUEL (CYPRUS) LTD is a facility licensed by the Department of the Environment for the processing of mineral oils and petroleum residues from ships. The plant operates in the area of the Port of Vasilikos and is active in the collection, transport and recycling of all types of petroleum waste (wastewater, sludge, fuel, etc.) turning them into industrial fuel for reuse. The waste received by the factory comes mainly from the Cypriot ports but also from other existing sources of such waste, which are transported by trucks with the appropriate permits to the company's reception facilities in Vasilikos Port. The plant has a capacity of 90,000 tons per year.

ECOFUEL (CYPRUS) LTD aims to manage hazardous waste in a controlled basis, using improved environmental practices, with applications across the whole spectrum of its activities in accordance with the principles of sustainable development. To achieve this goal, the company has developed

an Environmental Management System according to ISO 14001 standard, through which it ensures to provide the necessary resources, so that modern infrastructures, appropriate organizational structure and adequately trained staff are continually available.

Waste is treated according to its physical and chemical properties and is separated into 3 main phases: (a) oils, (b) water and (c) solids. The oils are processed until they meet industrial fuel specifications, the water until they meet state discharge limits, and the solid phase is delivered to licensed facilities for final disposal. The aqueous phase of the waste after its treatment is discharged, together with the cooling water used by the plant, into the sea through a discharge pipe and is controlled according to the conditions of the discharge permit that the company has received from the Department of the Environment.

Socioeconomic data

No available data.

Related ESA Indicators, Pressures and Ecosystem Services

The Urban and Industrial Uses activities are directly and/or indirectly related to the following ESA Indicators, Pressures and Ecosystem Services:

CY ESA Indicators	**01/2017 - 12/2022**
CY_ESA.27: Number of discharging industries into the sea	3
Pressures	• Extraction of, or mortality/injury to, wild species (PresBioExtractSpp) • Hydrographical changes (PresEnvHydroChanges) • Input of water - point sources (PresInputWater) • Input of nutrients (PresInputNut) • Input of organic matter (PresInputOrg) • Input of other substances (PresInputOrg) • Input of litter (PresInputLitter)
Ecosystem Services	• Nutrition (wild animal outputs) (EcosysServNutrSeafoodAnimals) • Maintaining nursery populations and habitats (EcosysServMainCondNurs) • Gene pool protection (EcosysServMainCondGene) • Flood protection (EcosysServFlowsFloodProt) • Chemical condition of salt waters (EcosysServMainCondChem) • Global climate regulation by reduction of greenhouse gases (EcosysServMainCondClim) • Filtration/sequestration/storage by ecosystems (EcosysServWasteRemovalByEcosys) • Bioremediation by organisms (EcosysServWasteTreatment) • Physical and experiential interactions (EcosysServInteracPhyRecreat1; EcosysServInteracPhyRecreat2) • Scientific and educational interactions (EcosysServInteracPhyScientif; EcosysServInteracPhyEducat)

3.2.7.3 Waste treatment and disposal (ActivUrbIndWaste)

Description

Waste management is subject to environmental legislation, which establishes the responsibilities of the agents participating in the waste management chain, defines the types of waste and establishes the procedures for its correct management.

According to the information published by the National Agency of Statistics, in Cyprus, 614.6 thousand tons of Municipal Solid Waste (MSW) were generated during the year 2022, of which 13.14% was recycled, 59.1% ended up in landfills and 2.4% was incinerated (Table 29).

Landfills on the coast or near riverbanks are considered a source of marine litter. Plastics deposited in a landfill near the coast can end up in the sea, blown by the wind.

On the other hand, landfills can also cause episodes of diffuse pollution in marine waters due to leachate from urban solid waste. In addition, landfills can also cause polluting episodes due to runoff (as happens when failures occur in the leachate collection system or in cases of uncontrolled landfills located in old gravel pits, for example).

Table 29. Productions of waste per category (in thousands).

Thousand tons	2011-2016							MSFD reporting period 2017 – 2022						
	2011	2012	2013	2014	2015	2016	Average	2017	2018	2019	2020	2021	2022	Average
Total waste produced	588.84	588.33	546.97	527.39	539.75	552.94	557.37	551.39	575.63	585.73	557.73	585.24	614.62	578.39
Total managed waste	541.55	542.2	510.63	481.45	499.71	516.29	515.31	516.09	494.01	484.52	467.36	450.13	468.99	480.18
Total recycled waste	65.64	67.95	68.19	62.3	71.83	73.68	68.27	83.69	87.87	91.42	89.61	75.03	80.82	84.74
Total incinerated waste	0	0	0	4.45	0	1.97	1.07	1.68	3.98	5.63	7.83	13.93	14.69	7.96
Biodegradable managed waste	47.92	50.99	41.15	42.76	46.16	48.63	46.27	51.19	111.23	132.66	127.12	131.43	134.6	114.71
Waste to landfills	475.91	467.48	434.49	398.67	409.99	424.44	435.16	423.16	392.86	379.39	364.14	354.3	363.34	379.53

Socioeconomic data

N/A

Related ESA Indicators, Pressures and Ecosystem Services

The Waste Treatment and Disposal activity is directly and/or indirectly related to the following ESA Indicators, Pressures and Ecosystem Services:

CY ESA Indicators	01/2017 - 12/2022
CY_ESA.28: Average annual total waste produced	578.39
CY_ESA.29: Average annual total managed waste	480.18
CY_ESA.30: Average annual total recycled waste	84.74
CY_ESA.31: Average annual total incinerated waste	7.96
CY_ESA.32: Average annual biodegradable managed waste	114.71
CY_ESA.33: Average annual waste to landfills	379.53
Pressures	• Input of nutrients - diffuse sources, point sources, atmospheric deposition (PresInputNut) • Input of organic matter – diffuse sources and point sources (PresInputOrg) • Input of other substances (PresInputCont) • Input of litter (PresInputLitter)

Ecosystem Services	• Bioremediation by organisms (EcosysServWasteTreatment) • Filtration/sequestration/storage by ecosystems (EcosysServWasteRemovalByEcosys) • Chemical condition of salt waters (EcosysServMainCondChem) • Physical and experiential interactions (EcosysServInteracPhyRecreat1; EcosysServInteracPhyRecreat2) • Scientific and educational interactions (EcosysServInteracPhyScientif; EcosysServInteracPhyEducat)

3.2.8 Tourism

3.2.8.1 Tourism and leisure infrastructure (ActivTourismInfras)

Description

The tourism and hospitality industry has seen significant investment, with luxury marinas in all coastal cities, golf courses, leisure and theme parks, and high-end resorts being developed across the island. In the tourist infrastructure field, the Republic of Cyprus has two international airports (Pafos International Airport and Larnaca International Airport - Glafcos Clerides), two cruise ports (Limassol and Larnaca) and four Marinas (Larnaca, Limassol, St. Raphael, Agia Napa). In terms of *touristic residential facilities*, in 2022 Cyprus accounted for 806 units that included hotels, hotel apartments, traditional villages, and other accommodation types (e.g. traditional buildings, hostels, touristic villas, touristic camping sites) with 43,103 rooms and 88,455 beds (Table 30).

Table 30. Capacity of accommodation establishments in December 2022 (Source: Deputy Ministry of Tourism Statistical Data 2022 - www.gov.cy/tourism).

Accommodation	Units	Rooms	Beds
HOTELS	253	29,803	59,043
5*	30	7,275	14,412
4*	71	12,743	25,449
3*	73	6,897	13,556
2*	49	2,275	4,427
1*	24	543	1,065
Hotels with no stars	6	70	134
Hotel Apartments	227	9,312	19,768
Type A'	47	3,850	8,072
Type B'	79	3,068	6,372
Type Γ'	20	586	1,248
Type not determined	81	1,808	4,076
Touristic Villages	16	2,702	5,522
Other Traditional Budlings	192	751	1,695
Other Types of Accommodation*	118	535	2,427
Total Accommodation	806	43,103	88,455

** Hostels, Touristic Villas and Touristic Camping Sites*

Socioeconomic data

Data provided in Table 31 corresponds to the NACE 5510 - Hotels and similar accommodation.

Table 31. Economic and social indicators for the NACE 5510 (Accommodation) which includes also NACE 5510 - Hotels and Similar Accommodation for the period 2017-2022.

NACE 5510	MSFD 2017-2022							
Indicators	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**Average**	**Total**
Direct employment (*1000 FTE) under the activity	19.94	21.83	23.05	12.75	19.71	22.63	19.99	N/A
Production value (€ million) of the activity	1,145.61	1,225.89	1,267.61	306.26	894.40	1,395.30	1,039.18	6,235.07
Value-added (€ million) by the activity	269.00	289.18	223.20	127.49	113.17	212.91	205.82	1234.94

Related ESA Indicators, Pressures and Ecosystem Services

The Tourism and leisure infrastructure activity is directly and/or indirectly related to the following ESA Indicators, Pressures and Ecosystem Services:

CY ESA Indicators		**12/2022**
CY_ESA.34: Number of touristic residential facilities (Hotels, Hotel Apartments, Traditional Villages, and other accommodation types (e.g. traditional buildings, hostels, touristic villas, touristic camping sites))		806
CY_ESA.35: Number of touristic residential rooms		43,103
CY_ESA.36: Number of touristic residential beds		88,455
CY_ESA.37: Number of Marinas		4
Pressures	*Mainly related to CY_ESA.37* • Input or spread of non-indigenous species (PresBioIntroNIS) • Disturbance of species (PresBioDisturbSpp) • Input of other substances (PresInputCont) • Input of litter (solid waste matter, including micro-sized litter) (PresInputLitter) • Physical disturbance to seabed (PresPhyDisturbSeabed) • Physical loss of the seabed (PresPhyLoss) • Input of anthropogenic sound (impulsive, continuous) (PresInputSound)	
Ecosystem Services	• Gene pool protection (EcosysServMainCondGene) • Maintaining nursery populations and habitats (EcosysServMainCondNurs) • Disease control (EcosysServMainCondDis) • Pollination and seed dispersal (EcosysServMainCondPolli) • Bioremediation by organisms (EcosysServWasteTreatment) • Filtration/sequestration/storage by ecosystems (EcosysServWasteRemovalByEcosys) • Chemical condition of salt waters (EcosysServMainCondChem) • Physical and experiential interactions (EcosysServInteracPhyRecreat1; EcosysServInteracPhyRecreat2) • Scientific and educational interactions (EcosysServInteracPhyScientif; EcosysServInteracPhyEducat) • Mass stabilization and erosion control (EcosysServFlowsErosionPrev1) • Decomposition and fixing processes (EcosysServMainCondDeco)	

3.2.8.2 Tourism and leisure activities (ActivTourismActiv)

Description

The Republic of Cyprus is an islandic country that attracts tourists due to a blend of interesting history, culture, mountains, the long coastline with diversity of beaches and excellent quality of bathing waters. Cyprus has a wide range of natural and cultural attractions including numerous archaeological and historical sites, National Parks, UNESCO sites.

Cyprus is year-after-year crowned as having the “Cleanest Bathing Waters in Europe”. For the reporting period 2017-2022 the average percentage of beaches classified to be in Excellent/Good condition was estimated to be 98.15% and none was classified in moderate or bad condition (Figure 17). Furthermore, in 2022 there were 74 Blue Flag beaches (2017-2022 average: 67) and 2 Blue Flag marinas (Table 32, Figure 18).

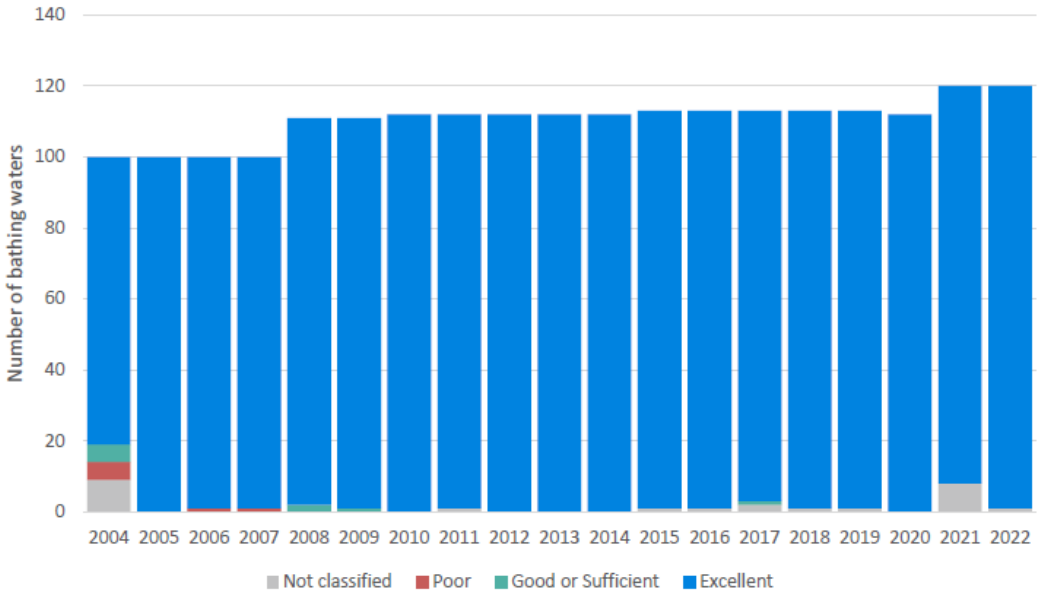

Figure 17. Trend of coastal bathing water quality. Each column represents an absolute number of bathing waters in the season. Quality classes “good” and “sufficient” are merged for comparability with the classification of the preceding Bathing Water Directive 76/160/EEC (EEA, 2024).

Table 32. Data on bathing water quality and blue flags.

Years	Bathing water quality (%)						Nb of beaches with Blue Flags	Nb of Marinas with Blue Flags
	Excellent	Good	Excellent & Good	Sufficient	Poor	Not classified		
2017	97.3	0.9	98.2	0	0	1.8	63	1
2018	99.1	0	99.1	0	0	0.9	63	1
2019	99.1	0	99.1	0	0	0.9	65	1
2020	100	0	100	0	0	0	66	1
2021	93.3	0	93.3	0	0	6.7	68	1
2022	99.2	0	99.2	0	0	0.8	74	2
Average	98	0.15	98.15	0	0	1.85	67	N/A

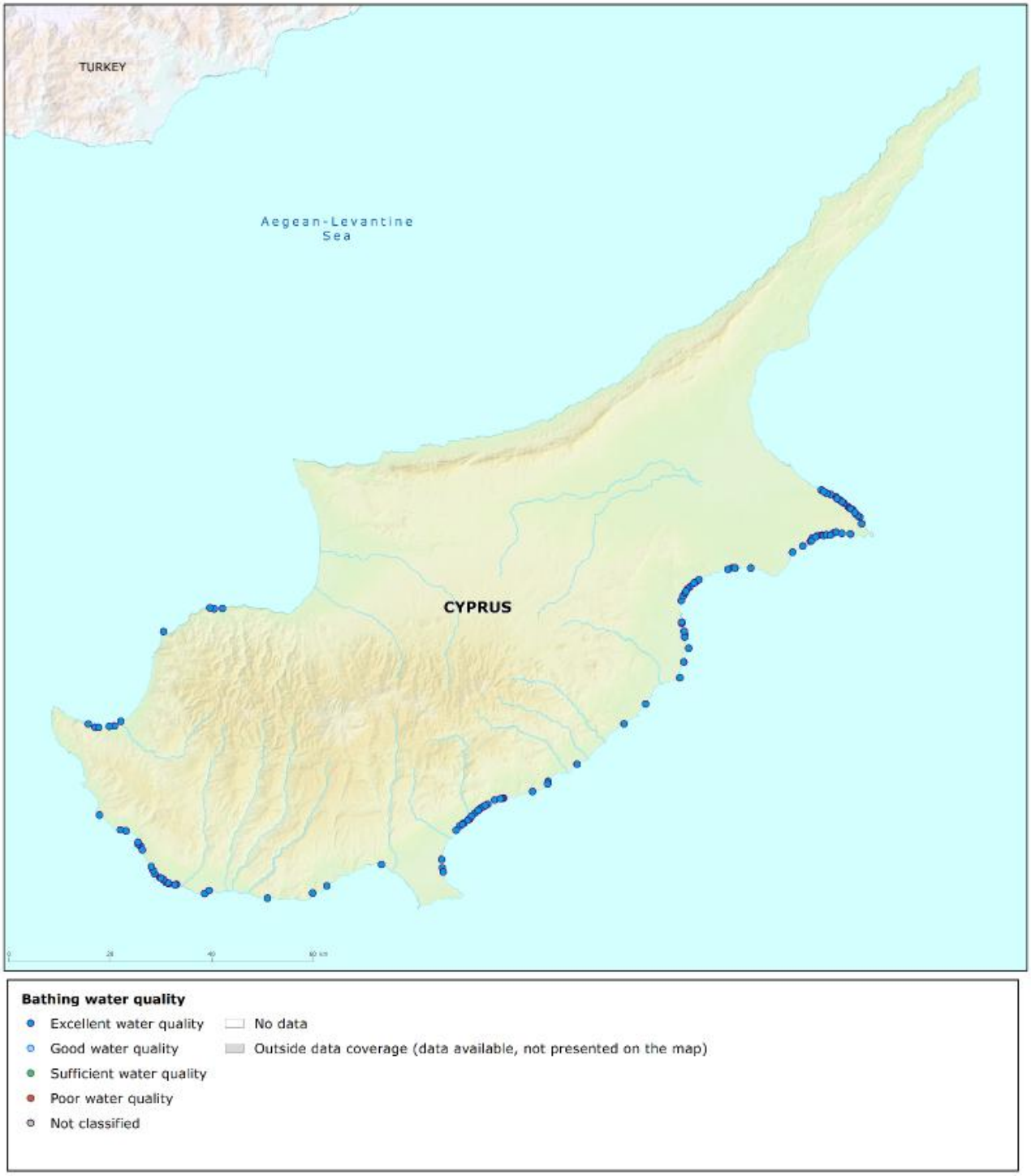

Figure 18. Map of the bathing waters reported during the 2022 bathing season (EEA, 2024).

During the period 2017-2022, 32.6% of tourists originated from the United Kingdom and Russia (22% and 10.6% respectively) followed by Israel, Greece, Germany, Poland, Sweeden, Ukraine, Switzerland and Lebanon. The preferred vacation period was late spring to mid-autumn and the average travelling days was 10 days. Pafos was the most popular place to stay, followed by Agia Napa, Limassol, Larnaca and Paralimni, all coastal areas. The expenditure per person, both by trip and per day, showed a decline during the Covid-19 period followed by an increase in 2021 and 2022. The average expenditure per person was €705.40 per trip and €71.40 per day (Figure 19).

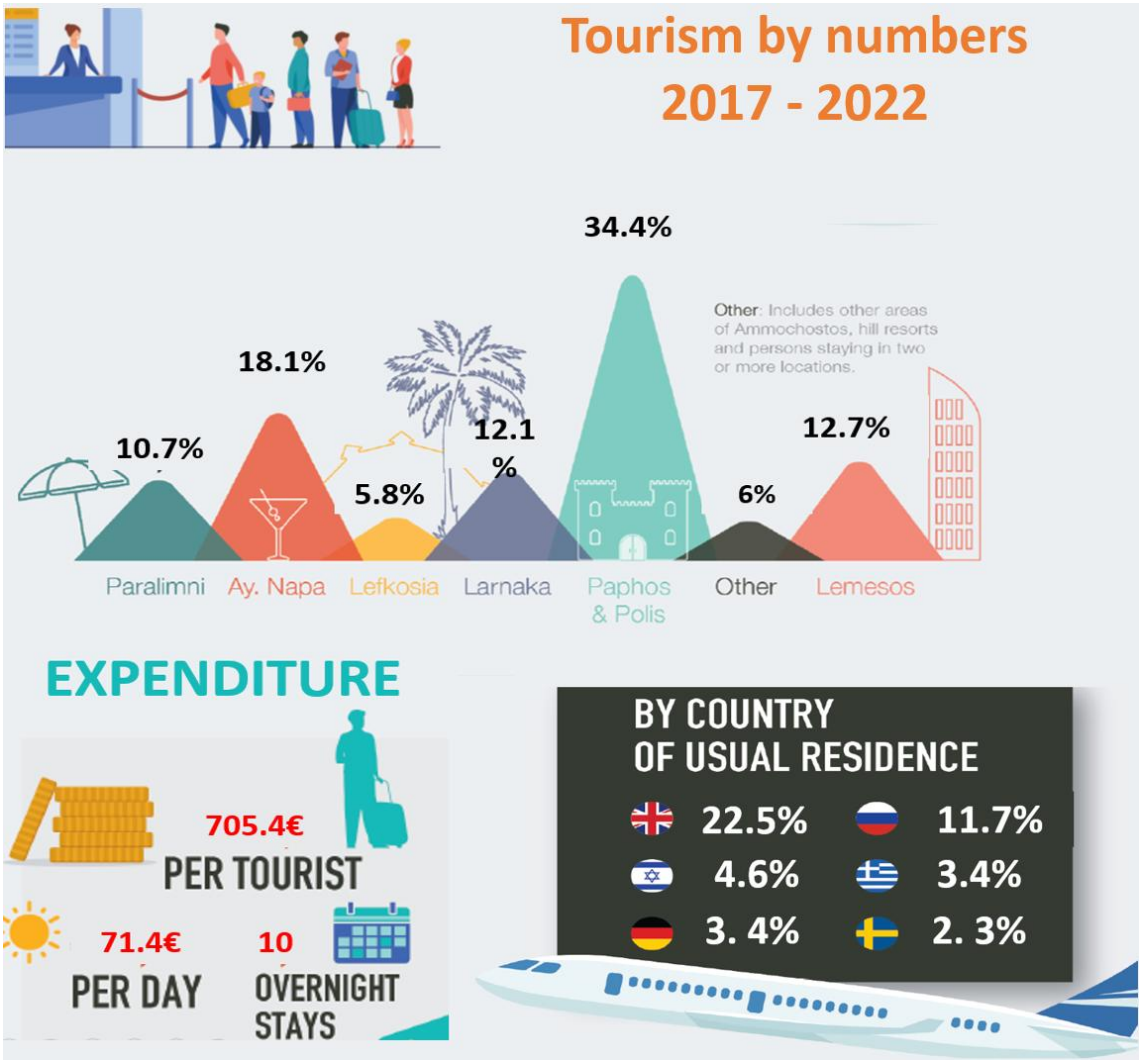

Figure 19. Information on tourists' accommodation preferences, expenditure and tourist by country of usual residence (CY-stat infographic modification).

Socioeconomic data

Travel and Tourism (T&T) has always been a very important sector for the Cypriot economy. The contribution of T&T (direct and indirect) to the country's GDP was estimated to be around 12% in 2022. In 2020-2021 the touristic sector was affected due to the Covid-19 related measures and restrictions that were applied.

T&T is a very important sector for the Cypriot economy generating not only direct economic impacts but also indirect and induced impacts. *Direct contribution* refers to economic activities that are directly linked with tourists, such as hotels, food and beverage, travel agencies, recreational and leisure services. *Indirect impacts* include investment spending in T&T, government spending that helps tourism (e.g. marketing and promotion), domestic purchases of goods and services by the sectors dealing directly with tourists, while induced impacts refer to the spending of those who are directly or indirectly employed by the T&T industry.

According to the national T&T report of Cyprus for the period 2017-2022 (WTTC, 2023[1] - Tables 33 and 34):

- The ***direct contribution*** of the T&T sector to the GDP in 2022 was €1,447.4 million (5.5% of GDP). This primarily reflected the economic activity generated by industries such as hotels, travel agents, airlines and other passenger transportation services (excluding commuter services). The same source indicated that the direct contribution of T&T to GDP is expected to grow by 4.9% to €2,474.8 million (8% of GDP) from 2023 to 2033. When assessing the average direct contribution and the total direct contribution for the period 2017-2022, this was €1,311.62 million and €7,869.7 million respectively.
- The ***total contribution*** of the T&T sector to the GDP in 2022 was €3,201.6 million (12.2% of GDP). The total contribution includes both direct contribution and indirect impacts. When assessing the average total contribution and the total contribution for the period 2017-2022, this was €2,748.68 million and €16,492.1 million respectively.
- The average ***number of jobs directly*** generated by T&T was estimated to be 24,700 including employment by hotels, travel agent airlines and other passenger transportation services (excluding commuter services). It also included activities of restaurant and leisure industries directly supported by tourists. The total numbers of jobs directly and indirectly generated by T&T were estimated to be 52,050.

Table 33. Socioeconomic data on Travel & Tourism (WTTC, 2023).

WTTC report 2023	MSFD 2017-2022							
Indicators	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**Average**	**Total**
Direct contribution of Travel & Tourism to GDP (€mn)	1,687.8	1,701	1,685.9	351.1	996.5	1,447.4	1,311.62	7,869.7
Indirect contribution of Travel & Tourism to GDP (€mn)	1,653	1,688.6	1,712.6	534	1,280	1,754.2	1,437.07	8,622.4
Total contribution of Travel & Tourism to GDP (€mn)	3,340.8	3,389.6	3,398.5	885.1	2,276.5	3,201.6	2,748.68	16,492.1
Direct contribution of Travel & Tourism to Employment (*1000 FTE)	25.3	26.4	26.2	20	24.2	26.1	24.7	N/A
Total contribution of Travel & Tourism to Employment (*1000 FTE)	53.5	56	56.5	42	50.2	54.1	52.05	N/A

Table 34. Socioeconomic data on Travel & Tourism.

WTTC report 2023	MSFD 2017-2022							
Indicators	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**Average**	**Total**
Direct employment (*1000 FTE) under the activity	25.3	26.4	26.2	20	24.2	26.1	24.7	N/A
Production value (€ million) of the activity	3340.8	3,389.6	3,398.5	885.1	2,276.5	3,201.6	2,748.68	16,492.1
Value-added (€ million) by the activity	-	-	-	-	-	-	-	-

[1] *assets-global.website-files.com/6329bc97af73223b575983ac/647f163816a75fec9100ac72_EIR2023-Cyprus.pdf*

Related ESA Indicators, Pressures and Ecosystem Services

The Tourism and leisure activity is directly and/or indirectly related to the following ESA Indicators, Pressures and Ecosystem Services:

CY ESA Indicators	01/2017 - 12/2022
CY_ESA.38: Average annual percentage of bathing water quality being in Excellent and Good condition	98.15
CY_ESA.39: Average annual number of Blue Flag beaches	67
CY_ESA.40: Average annual number of Blue Flag Marinas in 2022	2
CY_ESA.41: Average annual number of Tourists travelling days	10
CY_ESA.42: Average annual number of Tourists expenditure per person by trip (in €)	705.4
CY_ESA.43: Average annual number of Tourists expenditure per person per day (in €)	71.4
Pressures	• Disturbance of species (PresBioDisturbSpp) • Input of litter (PresInputLitter) • Physical disturbance to seabed (PresPhyDisturbSeabed) • Input of anthropogenic sound (impulsive, continuous) (PresInputSound)
Ecosystem Services	• Pollination and seed dispersal (EcosysServMainCondPolli) • Bioremediation by micro-organisms, algae, plants, and animals (EcosysServWasteTreatment) • Filtration/sequestration/storage/accumulation by ecosystems (EcosysServWasteRemovalByEcosys) • Ventilation and transpiration (EcosysServFlowsOxygenProd) • Mass stabilization and control of erosion rates (EcosysServFlowsErosionPrev1) • Flood protection (EcosysServFlowsFloodProt) • All ecosystem services underpinning spiritual, symbolic and other interactions (EcosysServInteracSpiAll) • All ecosystem services underpinning physical and intellectual interactions (EcosysServInteracPhyAll)

3.2.9 Education and research

3.2.9.1 Research, survey and educational activities (ActivResearch)

Description

Over the past decade there has been an increasing trend of research projects that are directly linked to the marine environment and funded through various European schemes such as Horizon 2020, Interreg, etc. A similar trend is observed when looking at the annual number of scientific papers published in scientific articles. Between 2017-2022 a total of 154 new papers have been published with an average annual number of 25 publications ($\pm$9) on various aspects of the marine environment of Cyprus and address either one or more descriptors of the MSFD. The Descriptor Non-Indigenous species (D2) is addressed in 95.3% of the articles followed by D6 - Seafloor Integrity (73.8%) and D1 - Biodiversity (56.4%). No articles have been found on Descriptors D9 - Contaminants in fish and other seafood, and D11 - Energy including underwater noise (Figure 20).

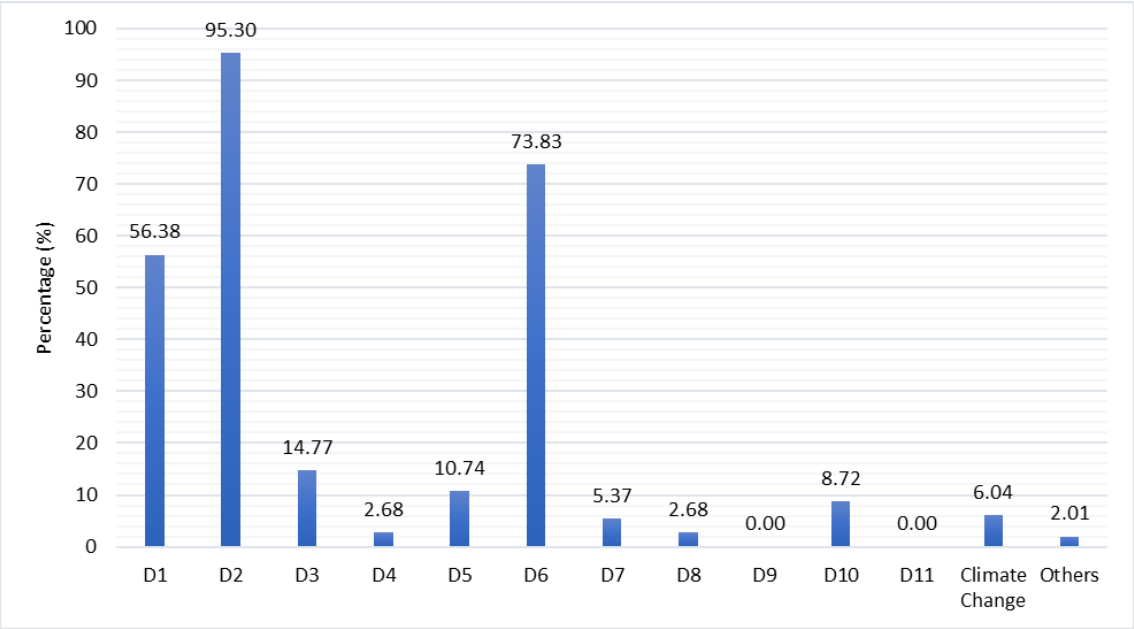

Figure 20. Percentage of scientific articles addressing MSFD Descriptors, climate change and other issues related to the marine environment of Cyprus.

Socioeconomic data

Although NACE 7210 addresses research and experimental development on natural sciences and engineering, as this does not specifically correspond to the marine environment, it was decided not to include any socioeconomic data for this reporting cycle.

Related ESA Indicators, Pressures and Ecosystem Services

The Education and Research Activity is directly and/or indirectly related to the following ESA Indicators, Pressures and Ecosystem Services:

CY ESA Indicators		**01/2017 - 12/2022**
CY_ESA.44: Average annual number of scientific publications linked to the marine environment per year		25
CY_ESA.45: Number of new scientific publications linked to the marine environment per assessment period (6 years)		154
Pressures	• Input or spread of non-indigenous species (PresBioIntroNIS) • Disturbance of species (PresBioDisturbSpp) • Extraction of, or mortality/injury to, wild species (PresBioExtractSpp) • Input of nutrients - diffuse sources, point sources, atmospheric deposition (PresInputNut) • Input of organic matter - diffuse sources and point sources (PresInputOrg) • Input of other substances - diffuse sources, point sources, atmospheric deposition, acute events (PresInputCont) • Input of litter (PresInputLitter) • Input of anthropogenic sound (impulsive, continuous) (PresInputSound) • Input of water - point sources (PresInputWater) • Hydrographical changes (PresEnvHydroChanges) • Physical disturbance to seabed (PresPhyDisturbSeabed) • Physical loss of the seabed (PresPhyLoss)	
Ecosystem Services	• Scientific (EcosysServInteracPhyScientif) • Educational (EcosysServInteracPhyEducat)	

	• Gene pool protection (EcosysServMainCondGene) • Pollination and seed dispersal (EcosysServMainCondPolli) • Pest control (EcosysServMainCondPest) • Filtration/sequestration/storage/accumulation by ecosystems (EcosysServWasteRemovalByEcosys) • Decomposition and fixing processes (EcosysServMainCondDeco) • Bioremediation by micro-organisms, algae, plants, and animals (EcosysServWasteTreatment) • Ventilation and transpiration (EcosysServFlowsOxygenProd) • Flood protection (EcosysServFlowsFloodProt) • Mass stabilisation and control of erosion rates (EcosysServFlowsErosionPrev1)

3.3 Pressures and impacts on the marine environment

3.3.1 Incidental bycatch (D1C1)

The incidental catch of vulnerable species (often referred to as bycatch) is a threat to both fisheries' sustainability and marine environment conservation. The MSFD directive addresses incidental bycatch through the D1C1 criterion which is assessed below.

D1C1: The mortality rate per species from incidental by-catch is below levels which threaten the species, such that its long-term viability is ensured.

Methodology

Criterion D1C1 of the GES Decision is defined as "*The mortality rate per species from incidental by-catch is below levels which threaten the species, such that its long-term viability is ensured".* The Criterion applies to: (i) birds, (ii) mammals, (iii) reptiles and (iv) non-commercially-exploited species of fish and cephalopods.

The Decision also states that "*Member States shall establish the Threshold Values for the mortality rate from incidental by-catch per species, through regional or subregional cooperation*." These TVs are generally expected to be set as fixed percentages of the best population estimates for these species/groups (Vasilakopoulos et al., 2022). This requires not only knowledge of the population size of each species in the assessment area and period, but also a good estimate of what would be the optimal population size the ecosystem.

To assess this Criterion, all protected marine species including seabirds, cetaceans, Mediterranean monk seals and sea turtles, as well as protected fish species (n/a for cephalopods), i.e. species for which there is a prohibition to fish for, retain on board, tranship and land in the study area and are thus non-commercially exploited (Table 35), were considered. It is noted that catches of undersized individuals of non-protected fish species was not considered in this analysis.

Table 35. Fish species for which there is a prohibition to fish for, retain on board, tranship and land in the assessment area (all elasmobranchs except two *Acipenser* species).

Species	Common name	Regulation/Recommendation
Acipenser naccarii	Adriatic sturgeon	Reg. (EU) 2019/1241
Acipenser sturio	Sturgeon	Reg. (EU) 2019/1241
Carcharhinus falciformis	Silky shark	ICCAT 11-08
Carcharhinus longimanus	Oceanic whitetip shark	Reg. (EU) 2023/194, ICCAT 10-07
Sphyrna spp.	Hammerhead sharks	Reg. (EU) 2023/194, ICCAT 10-08, GFCM/36/2012/3
Galeorhinus galeus	Tope shark	GFCM/36/2012/3
Alopias superciliosus	Bigeye thresher	Reg. (EU) 2023/194, ICCAT 09-07
Cetorhinus maximus	Basking shark	Reg. (EU) 2019/1241, Reg. (EU) 2023/194, GFCM/36/2012/3
Carcharodon carcharias	Great white shark	Reg. (EU) 2019/1241, Reg. (EU) 2023/194, GFCM/36/2012/3
Isurus oxyrinchus	Shortfin mako	GFCM/36/2012/3
Lamna nasus	Porbeagle	Reg. (EU) 2023/194, GFCM/36/2012/3
Carcharias taurus	Sand tiger shark	GFCM/36/2012/3
Odontaspis ferox	Smalltooth sand tiger	GFCM/36/2012/3
Gymnura altavela	Spiny butterfly ray	GFCM/36/2012/3

Species	Common name	Regulation/Recommendation
Mobula alfredi	Reef manta ray	Reg. (EU) 2019/1241
Mobula birostris	Giant manta	Reg. (EU) 2019/1241
Mobula eregoodootenkee	Longhorned mobula	Reg. (EU) 2019/1241
Mobula hypostoma	Lesser devil ray	Reg. (EU) 2019/1241
Mobula kuhlii	Shortfin devil ray	Reg. (EU) 2019/1241
Mobula mobular	Devil fish	Reg. (EU) 2019/1241, Reg. (EU) 2023/194, GFCM/36/2012/3
Mobula munkiana	Munk's devil ray	Reg. (EU) 2019/1241
Mobula rochebrunei	Lesser Guinean devil ray	Reg. (EU) 2019/1241
Mobula tarapacana	Chilean devil ray	Reg. (EU) 2019/1241
Mobula thurstoni	Smoothtail mobula	Reg. (EU) 2019/1241
Rhincodon typus	Whale shark	Reg. (EU) 2023/194
Anoxypristis cuspidata	Pointed sawfish	Reg. (EU) 2019/1241
Pristis clavata	Dwarf sawfish	Reg. (EU) 2019/1241
Pristis pectinata	Smalltooth sawfish	Reg. (EU) 2019/1241
Pristis pristis	Common sawfish	Reg. (EU) 2019/1241
Pristis zijsron	Longcomb sawfish	Reg. (EU) 2019/1241
Glaucostegus cemiculus	Blackchin guitarfish	Reg. (EU) 2023/194, GFCM/36/2012/3
Rhinobatos rhinobatos	Common guitarfish	Reg. (EU) 2023/194, GFCM/36/2012/3
Oxynotus centrina	Angular roughshark	GFCM/36/2012/3
Squatina spp.	Angelsharks	Reg. (EU) 2023/194, GFCM/36/2012/3
Squatina squatina	Angelshark	Reg. (EU) 2019/1241

While wetland birds are systematically monitored in Cyprus, birds that are frequently found in coastal or offshore areas are generally not as well studied. However, a few studies have focused on population sizes of coastal birds, for example Audouin's gull (*Larus audouinii*) and the Mediterranean shag (*Gulosus aristotelis desmarestii*) (e.g. Charalambidou and Gucel 2008). The two species are also selected to be included in Criterion D1C2 assessment (see Chapter 3.3.12.1). The seabird population is currently being assessed in the framework of the Birds Directive (2009/147/EC, Art. 12), which calls for the protection and management of all naturally occurring birds, their eggs, nests and habitats within all EU MS, and data are expected to be available in Spring 2025. The results of "Bird Species Surveys in the Marine Waters of the Republic of Cyprus - Tender 13/2020" (DFMR, 2022a) were also used for this assessment. Due to the absence of good population estimates, no TVs have been set yet for seabirds for D1C1.

Regarding cetaceans and specifically the selected indicator species *Tursiops truncatus* (see Chapter 3.3.12.2 for details), DFMR estimated the population's Favourable Reference Value (FRV) under the Habitats Directive), to 30-100 individuals, based mainly on extrapolation from a limited amount of data and the visual survey conducted in 2016-1017 in the assessment area (see Chapter 3.3.12.2 for details). Although the population size for the species has been defined, no TVs have been set for this Criterion yet.

As far as the Mediterranean monk seal is concerned, its population size was well known during the assessment period, due to its biological/ecological features and because the species is closely and systematically monitored by the DFMR through a dedicated monitoring program (see Chapter 3.3.12.3 for details). DFMR is currently in the process of estimating the species' population Favourable Reference Value (FRV) in the area, which will be used in next report under the Habitats Directive. Therefore, it was decided not to set a TV for D1C1, until this estimate is available.

Population estimates for sea turtles (*Caretta caretta* and *Chelonia mydas*) are also approximate, although based on the number of nests, the population has significantly increased during the last decades (see Chapter 3.3.12.4 for details). DFMR is currently in the process of better assessing the population and its FRV as a proxy of the number of breeding females. Due to the absence of good population estimates, no TVs have been set yet for sea turtles.

For the protected fish species considered here, no population estimations and no TVs are expected to be available soon. Nevertheless, onboard sampling coverage is expected to largely improve in the future that will allow for better assessment of the number and condition of bycatch species. In addition, recent information campaigns (e.g. FAO and ACCOBAMS, 2018) are expected to further reduce the percentage of bycaught specimens' mortality, as more successful releasing practises shall be used.

Based on the absence of TVs described above, we consider that GES is determined only in the cases where no mortalities have been recorded (value being 0). When mortalities are recorded, GES is not determined (TV set at national level).

For the assessment of this Criterion for all groups and species, data reported for ICES WGBYC data calls on bycatch of protected species as well as those reported for GFCM TASK III data calls on incidental catch of vulnerable species, for the years 2017 to 2022, were analysed. These data were collected in the framework of the EU Data Collection Framework (DCF) and EU Fisheries Control schemes, by either port observers, at-sea observers, through interviews with fishers, or by trained vessel crew observers. Effort data reported for DCF data calls on Fisheries Dependent Information (FDI) were also used to raise estimations to annual totals. The three main fishing modes (metiers) within the MRU (GSAs 24/25/26/27) that are covered in the monitoring schemes were considered: a) the small-scale vessels (PG) using bottom set static gear (trammel nets: GTR, gillnets: GNS, longlines: LLS), b) the pelagic longliners (LLD) and c) the bottom trawlers (OTB). These data were combined and analysed to estimate the mean annual number of individuals of these species that died as bycatch per fishing mode in the assessment period.

Results

Specimens of one species of seabird (*Gulosus aristotelis desmarestii*), two species of sea turtles (*Caretta caretta*, *Chelonia mydas*) and five species of fish (Chondrichthyes: *Isurus oxyrinchus*, *Glaucostegus cemiculus*, *Gymnura altavela*, *Rhinobatos rhinobatos*, *Squatina squatina*) died as bycatch during the assessment period. More common bycatch specimens were the loggerhead sea turtle *Caretta caretta* and the protected blackchin guitarfish *Glaucostegus cemiculus* for which Cyprus is a hotspot according to scientific literature (e.g. Giovos et al., 2021). No deaths of marine mammals (cetaceans or Mediterranean monk seals) due to bycatch were reported during the reporting period. All reported incidents were related to the small-scale fisheries (PG-GTR, PG-LLS) while no reports were related to pelagic longliners (LLD) or bottom trawlers (OTB), even though the latter were very well monitored (Table 36, Figure 21).

Based on the methodology described above, Criterion D1C1 is considered to be in GES for marine mammals (cetaceans and the Mediterranean monk seals) but cannot be determined for seabirds, marine turtles and fish at the moment, due to the absence of set TVs (Table 37).

Table 36. Estimated mean annual number of individuals of protected species of seabirds, turtles and fish that died as bycatch and percentage of days-at-sea observed, per fishing mode, during the assessment period 2017-2022 (PG: small-scale vessels using bottom set static gear, GTR: trammel nets, GNS: gillnets, LLS: longlines, LLD: pelagic longliners, OTB: bottom trawlers).

fishing mode		**PG-GTR**	**PG-GNS**	**PG-LLS**	**LLD**	**OTB**	**TOTAL**
% days-at-sea observed		4.69	0.72	0.17	3.39	5.81	1.99
Birds	*Gulosus aristotelis desmarestii*	4	0	0	0	0	4
Sea turtles	*Caretta caretta*	0	0	120	0	0	120
	Chelonia mydas	21	0	0	0	0	21
	Cheloniidae	9	0	0	0	0	9
Fish	*Isurus oxyrinchus*	4	0	0	0	0	4
	Glaucostegus cemiculus	0	0	120	0	0	120
	Gymnura altavela	17	0	0	0	0	17
	Rhinobatos rhinobatos	4	0	0	0	0	4
	Squatina squatina	4	0	0	0	0	4

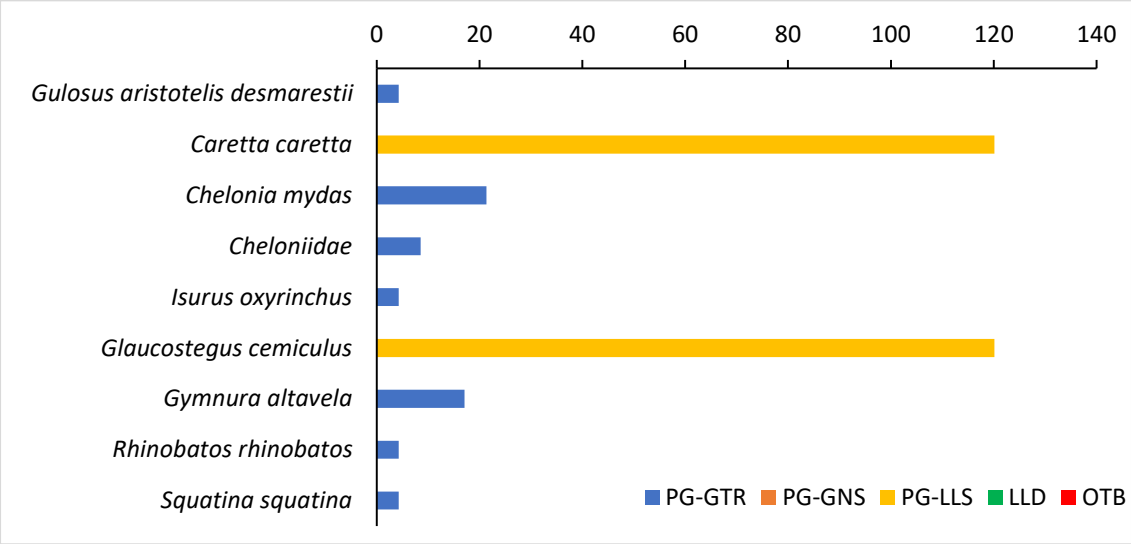

Figure 21. Estimated mean annual number of individuals of protected species of seabirds, turtles and fish that died as bycatch per fishing mode, during the assessment period 2017-2022 (PG: small-scale vessels using bottom set static gear; GTR: trammel nets; GNS: gillnets; LLS: longlines; LLD: pelagic longliners; OTB: bottom trawlers).

Table 37. Summary of D1 assessment.

Descriptor	**Criterion**	**Indicator**	**Feature/Element**	**TV**	**GES**
D1: Species groups of birds, mammals, reptiles, fish and cephalopods	D1C1: The mortality rate per species from incidental by-catch is below levels which threaten the species, such that its long-term viability is ensured	CY1.1: Fraction of population of vulnerable and non-target species dying as bycatch	Seabirds	Not set	Not assessed
			Cetaceans	Not set	In GES
			Mediterranean monk seal	Not set	In GES
			Sea turtles	Not set	Not assessed
			Non-target fish species	Not set	Not assessed

3.3.2 Introduction or spread of non-indigenous species (D2)

MSFD Directive addresses Non-Indigenous Species (NIS) through Descriptor 2 (Non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystems) and specific Criteria.

It is noted that Cyprus has requested an exception to a Program of Measures (MSFD Article 14) with regards to NIS, since the primary source of NIS in the region is the unaided introduction through the Suez Canal, a major structure beyond the control of the EU, rendering any measure inapplicable (DFMR, 2023b). Nevertheless, it was decided that D2 continues to be evaluated, in the spirit of recent efforts such as the 2017 National Action Plan concerning species introduction and invasive species in Cyprus (Katsanevakis, 2017) and thus, the evaluation of two criteria, D2C1 and D2C2 is described below.

D2C1: The number of non-indigenous species which are newly introduced via human activity into the wild, per assessment period (6 years), measured from the reference year as reported for the initial assessment under Article 8(1) of Directive 2008/56/EC, is minimized and where possible reduced to zero.

Methodology

Criterion D2C1 of the GES Decision is defined as "*The number of non-indigenous species which are newly introduced via human activity into the wild, per assessment period (6 years), measured from the reference year as reported for the initial assessment under Article 8(1) of Directive 2008/56/EC, is minimized and where possible reduced to zero".* The Decision also states that "*Member States shall establish the threshold value for the number of new introductions of non-indigenous species, through regional or subregional cooperation".*

The trend of the number of newly introduced NIS via human activity was used as the Indicator for the evaluation of this Criterion. A stable or negative trend when comparing the present with the previous 6-year assessment period indicated improvement, whereas a positive trend was an indication of deterioration. The number of marine NIS introduced via human activity in Cyprus waters was estimated for the 6-year assessment period based on the most recent revisions of NIS in Cyprus waters (Michail et al., in prep.). Elements evaluated were the newly introduced NIS, excluding questionable and cryptogenic species, as well as any unicellular planktonic or parasitic species, according to the recommendations by Tsiamis et al. (2021).

Results

While there was a significant increase in the reporting of new NIS from the 2005-2010 to the 2011-2016 6-year period, most possibly largely due to increased scientific interest during that period, the number of newly recorded NIS slightly reduced in the last 6-year period (2017-2022), indicating an improvement or, at least, a stabilization of the process (Table 38). Nevertheless, as no TVs have been set on an EU or regional/subregional level for this Criterion, this evaluation is not considered an assessment and consequently D2C1 status is not assessed (Table 39).

Table 38. Number of newly introduced non-indigenous marine species in Cyprus waters per 6-year assessment period based on Michail et al. (in prep.).

Reporting period	NIS	Cryptogenic	Questionable	Total NIS
up to 2009	122	12	11	145
2010-2015	4	1	0	5
2011-2016	47	9	1	57
2017-2022	40	4	6	50

Table 39. Summary of D2 assessment methodology and results.

Descriptor	Criterion	Indicator	Feature	TV	GES
D2: Non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystems	D2C1 (Primary): The number of non-indigenous species which are newly introduced via human activity into the wild, per assessment period (6 years), measured from the reference year as reported for the initial assessment under Article 8(1) of Directive 2008/56/EC, is minimized and where possible reduced to zero	CY2.1: The number of newly introduced NIS via human activity (trend)	Newly introduced NIS	Not set	Not assessed
	D2C2 (Secondary): Abundance and spatial distribution of established non-indigenous species, particularly of invasive species, contributing significantly to adverse effects on particular species groups or broad habitat types	CY2.2: IAS abundance (trend)	Established NIS	Not set	Not assessed

D2C2: Abundance and spatial distribution of established non-indigenous species, particularly of invasive species, contributing significantly to adverse effects on particular species groups or broad habitat types.

Methodology

Criterion D2C2 of the GES Decision is defined as "*Abundance and spatial distribution of established non-indigenous species, particularly of invasive species, contributing significantly to adverse effects on particular species groups or broad habitat types*". The trend of Invasive Alien Species (IAS) abundance (and biomass) was used as Indicator for the evaluation of this Criterion. A stable or negative trend when comparing the present with the previous 6-year assessment period indicated improvement, whereas a positive trend was an indication of deterioration. Of the 260 alien species (including cryptogenic) reported so far in Cyprus, 16 are considered invasive (Martinou et al., 2020; Michail et al., in prep. - Table 40).

Table 40. Marine IAS reported in Cyprus.

Kingdom	Phylum	Class	Order	Family	Scientific name
Animalia	Annelida	Polychaeta	Phyllodocida	Nereididae	*Pseudonereis anomala*
	Arthropoda	Malacostraca	Decapoda	Potamidae	*Charybdis (Charybdis) hellerii*
	Chordata	Actinopterygii	Perciformes	Siganidae	*Siganus luridus*
			Perciformes	Siganidae	*Siganus rivulatus*
			Scorpaeniformes	Scorpaenidae	*Pterois miles*
			Syngnathiformes	Fistulariidae	*Fistularia commersonii*

Kingdom	Phylum	Class	Order	Family	Scientific name
			Tetraodontiformes	Tetraodontidae	*Lagocephalus sceleratus*
			Tetraodontiformes	Tetraodontidae	*Torquigener flavimaculosus*
	Cnidaria	Scyphozoa	Rhizostomeae	Cassiopeidae	*Cassiopea andromeda*
	Mollusca	Bivalvia	Mytilida	Mytilidae	*Brachidontes pharaonis*
			Ostreida	Pteriidae	*Pinctada imbricata radiata*
		Gastropoda	Littorinimorpha	Strombidae	*Conomurex persicus*
			Trochida	Trochidae	*Trochus erithreus*
			Caenogastropoda	Cerithiidae	*Cerithium scabridum*
Plantae	Chlorophyta	Ulvophyceae	Bryopsidales	Caulerpaceae	*Caulerpa cylindracea*
	Tracheophyta	Liliopsida	Alismatales	Hydrocharitaceae	*Halophila stipulacea*

Two (2) Underwater Visual Census (UVC) surveys were carried out during the assessment period (2017-2022), one close to the beginning and one close to the end of the period (DFMR 2018; 2023a). Both were focused on monitoring NIS abundance and biomass in selected Marine Protected Areas (MPAs) and marine Natura 2000 (N2K) sites in Cyprus. The first survey focused on Kavo Gkreko (CY3000005) and Thalassia Periochi Nisia (CY3000006) N2K sites on the east coast of Cyprus, and the second on Lara-Toxeftra and Pegeia Sea Caves MPAs, as well as Thalassia Periochi Moulia N2K site (CY4000006) on the west coast of the island. Although the timeframe of the two surveys was ideal for a comparison between the start and the end of the MSFD assessment period, this was avoided due to the known environmental and ecological differences between the areas of the two studies. However, the combined mean biomass (kg/km^2) of recorded IAS was estimated from these surveys (Table 41) to be compared to the biomass that will be estimated is similar surveys planned for the next assessment period.

Table 41. Mean biomass (kg/km^2) of IAS from underwater visual census surveys during the assessment period 2017-2022.

Species	Mean Biomass (kg/km^2)
Fistularia commersonii	145
Pterois miles	18
Siganus luridus	32
Siganus rivulatus	205
Torquigener flavimaculosus	335
Lagocephalus sceleratus	-

For Criterion D2C2 evaluation, the 6-year-period recorded NIS and IAS abundance (n/km^2) and biomass (kg/km^2) in Cyprus waters, were estimated from the Mediterranean International Trawl Survey Project (MEDITS) data between 10 and 800 m depth (Bertrand et al., 2002; Spedicato et al., 2019 - Table 42).

Table 42. NIS and IAS recorded in Cyprus waters during MEDITS surveys from 2005 to 2022 and used for the assessment of Criterion D2C2.

Type	NIS	IAS
Crustaceans (Decapoda)	*Erugosquilla massavensis*	
	Penaeus japonicus	
	Thalamita poissonii	
Fish (Osteichthyes)	*Dussumieria elopsoides*	
	Etrumeus golanii	
	Fistularia commersonii	Y
	Lagocephalus sceleratus	Y
	Lagocephalus suezensis	
	Pterois miles	Y
	Sargocentron rubrum	
	Siganus luridus	Y
	Siganus rivulatus	Y
	Sphyraena chrysotaenia	
	Stephanolepis diaspros	
	Torquigener flavimaculosus	Y
	Upeneus moluccensis	
	Upeneus pori	
Plantae (Ulvophycea)	*Caulerpa racemosa*	Y

Results

Both abundance and biomass of both NIS and IAS show a significantly increasing trend in relation to the previous period (Figure 22). Although MEDITS does not cover all depth zones, its strict protocols allow for reliable comparisons between years and assessment periods, thus the increasing trend can be considered a good indication of environmental degradation concerning NIS. Nevertheless, as no TVs have been set on an EU or regional/subregional level for this Criterion, this evaluation is not considered an assessment and consequently D2C2 status is not assessed (Table 13).

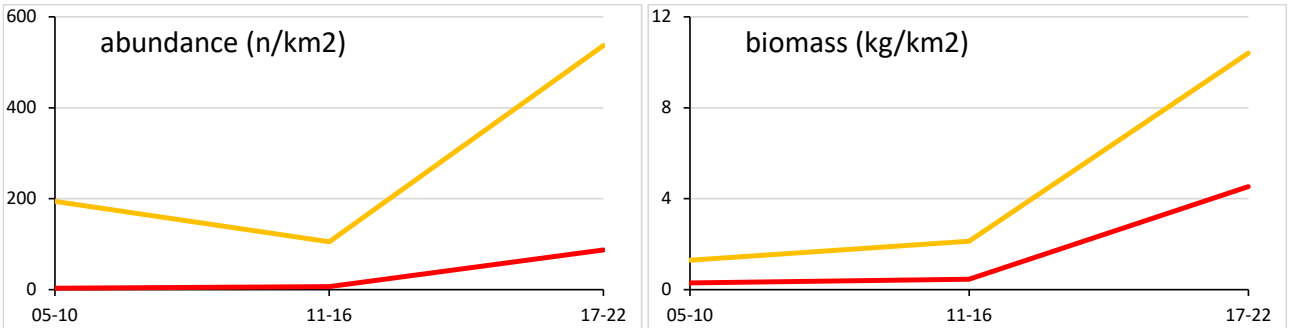

Figure 22. Average 6-year-period abundance (n/km^2) and biomass (kg/km^2) of NIS (yellow) and IAS (red) recorded in Cyprus waters during MEDITS surveys from 2005 to 2022.

3.3.3 Extraction of, or injury to, wild species (partially D3)

See Chapter 3.3.13.

3.3.4 Physical disturbance to the seabed (D6C2 & D6C3)

See Chapter 3. 3.14.

3.3.5 Physical loss of the seabed (D6C1)

See Chapter 3.3.14.2.

3.3.6 Hydrographic Changes (D7)

Hydrographic conditions in the marine environment are defined by physical parameters of seawater, such as temperature, salinity, currents, etc. Human activities on the coast or within the marine environment can disrupt these hydrographic processes, potentially altering hydrography and negatively impacting marine ecosystems. MSFD addresses D7 through two criteria that are considered secondary.

D7C1: Spatial extent and distribution of permanent alteration of hydrographical conditions to the seabed and water column, associated in particular with physical loss of the natural seabed

Methodology

Criterion D7C1 of the GES Decision is defined as "*Spatial extent and distribution of permanent alteration of hydrographical conditions (e.g. changes in wave action, currents, salinity, temperature) to the seabed and water column, associated in particular with physical loss of the natural seabed".* According to the GES Decision, D7C1 is expressed as "*the extent of the assessment area hydrographically altered in square kilometres (km^2)*" and the area of assessment includes the total natural extend of all habitats in the assessment area. For the assessment of Criterion D7C1, the outcomes of Criterion D6C1 evaluation (the distribution and an estimate of the extent of physical loss) were used. New infrastructure within the period 2017-2022, included the construction of one marina in Agia Napa area (0.140 km^2 - completed project), one FSRU Marine jetty in Vasilikos area (0.013 km^2 - under construction) and 39 breakwaters in seven different areas around Cyprus (0.061 km^2 in total - completed projects). It is noted that D7C1 was considered not assessed due to the lack of a TV.

To assess whether an area is hydrographically altered, the following methods are suggested by the GES Decision:

(a) Monitoring shall focus on changes associated with infrastructure developments, either on the coast or offshore.

(b) Environmental impact assessment hydrodynamic models, where required, which are validated with ground-truth measurements, or other suitable sources of information, shall be used to assess the extent of effects from each infrastructure development.

(c) For coastal waters, the hydromorphology data and relevant assessments under Directive 2000/60/EC shall be used.

Alterations of hydrographic conditions in the Mediterranean are addressed under UNEP/MAP-IMAP Ecological Objective EO7-Hydrography with objective: Alteration of hydrographic conditions does not adversely affect coastal and marine ecosystems. Common Indicator 15: Location and extent of the habitats impacted directly by hydrographic alterations (MED QSR, 2023).

To examine the possible hydrographic changes due to the construction of infrastructure of the three prementioned types, the second method was applied. Consequently, for the new completed infrastructures between 2017 and 2022, the Environmental Impact Assessments (EIAs) and Strategic Environmental Impact Assessments (SEAs) were reviewed, and information on the possible impacts

was retrieved (Table 43). However, given that no TVs have been set for D7C1, its status remains unknown (Table 45).

Table 43. EIA and SEA reports on hydrographic changes linked to development

Activity	Type of development	Environmental Impact Statement (EIA) / Strategic Environmental Impact Assessment (SEA) source
Tourism and leisure infrastructure	Agia Napa Marina: New marina including construction works and a new breakwater	eia.moa.gov.cy/public/eiaview.html?no=1578
Transport infrastructure	Vasilikos Jetty/trestle (access bridging on piled structures)	eia.moa.gov.cy/public/eiaview.html?no=2061
Costal defense and flood protection - New Breakwaters	Poli Chrysochous: 10 Germasogeia: 5 Oroklini: 5 Pervolia-Kiti: 6 Geroskipou: 6 Amathousa: 4 Parklane beach: 3	eia.moa.gov.cy/public/eiaview.html?no=195 eia.moa.gov.cy/public/eiaview.html?no=1758 eia.moa.gov.cy/public/eiaview.html?no=1349 eia.moa.gov.cy/public/eiaview.html?no=471 eia.moa.gov.cy/public/eiaview.html?no=1870

Results

As mentioned earlier, the new infrastructure constructed within the period 2017-2022, included one marina in Agia Napa area (0.140 km^2), one jetty in Vasilikos area (0.013 km^2) and 39 breakwaters in seven different areas around Cyprus (0.061 km^2 in total).

I. Agia Napa Marina (completed project)

The Agia Napa region is a popular tourist destination known for its recreational beaches and pristine waters. To further support the growth of tourism, a new marina was built at Makronisos area and constructions involved land reclamation, dredging on near shore areas, and the construction of protective breakwaters projecting out into the sea. Agia Napa Marina occupies an area of 0.14 km^2 (Figure 23). According to the submitted EIA the following potential impacts, related to the hydrographic conditions were identified:

1. *Changes to the seabed topography, sediment composition and structure as a result of dredging*

   Marine dredging and removal of seabed sediments will lower the seabed levels out to elevations ranging from -3.5 to -6 m.

2. *Alteration of coastal morphology and impacts to Agia Napa beaches*

   Generally, reclamation, new in-water structures such as breakwaters, and dredging activities, may lead to alterations of wave refraction, diffraction and reflection processes, resulting in variations in current patterns and flows, and on long shore drift in the littoral zone. Changes in littoral drift can affect beach erosion or accretion, consequently reshaping the coastal landscape. Part of the EIA was a specialized shoreline impact analysis and modelling study. The DHI MIKE21 spectral wave model was utilized to simulate offshore waves propagating onshore while the MIKE21 hydrodynamic model determined the resulting littoral currents generated by the waves. The predominant direction for sediment movement is from west to east. Five beach zones were identified along the adjacent shoreline that could potentially be

impacted by the project. Based on the results, no significant impacts on the existing sandy beach areas within approximately 1 km of the project were expected after the construction. Only the shoreline shape of one beach located west of the marina (Figure 24 - beach 5) was expected to possibly conform to new wave conditions.

3. *Reduced water circulation*

   The construction of a marina can generally create a condition of reduced water circulation. In a poorly flushed marina, pollutants tend to concentrate in the water and/or sediments. Pollutants and debris can accumulate behind waterside structures, poorly flushed corners and secluded or protected spots. This can result in stagnant, polluted and foul-smelling waters with little biological activity and poor aesthetic appeal. As part of the EIA to assess the potential environmental characteristics and impacts of the marina development in terms of water quality and basin circulation, flushing analysis was conducted utilizing the DHI MIKE21 software package. Based on the results of the models and to ensure good circulation and flushing of the basin, the master planners incorporated several features in design strategy to minimize the problems caused due to the reduced water circulation.

4. *Other impacts identified by the EIA based on hydrodynamic models*

   The EIA indicated that both the construction and operational phases of the port and marina project had manageable and generally limited environmental impacts:

   Marine Ecology: During construction, dredging and excavation impacted local marine communities and temporarily favoured NIS. However, due to the lack of significant ecological features in the area and the absence of major impacts from sediment transport, long-term ecological damage was unlikely. During operation, no adverse effects on marine ecology were observed, as the impact on the surrounding marine area was minimal.

   Sea Water Quality: Construction activities temporarily affected seawater quality due to sediment and waste management issues, with potential plumes and noise disturbances affecting local fauna. However, these impacts were short-term and were mitigated through appropriate management measures, including water treatment and habitat protection.

   Marine Engineering: Temporary alterations to the hydrodynamic regime occurred during construction, but these changes were reversible, with no long-term adverse effects.

   Hydrologic Alterations: Temporary impacts from excavation and soil drainage were mitigated by treating pumped water to remove sediments, with future disposal sites determined based on expert recommendations.

   Coastal Impacts: The port infrastructure influenced coastal morphology within specified zones, but no significant erosion trends were observed. The project did not adversely affect adjacent coastline.

Overall, the Agia Napa Marina design and management measures successfully mitigated potential negative impacts, ensuring that both construction and operational phases proceeded with minimal and reversible environmental consequences.

Figure 23. New infrastructure for 2017-2022 assessment period in Agia Napa Marina (0.14 Km^2).

Figure 24. Beaches along adjacent shoreline (source: eia.moa.gov.cy/public/eiaview.html?no=1578).

II. <u>Vasilikos FSRU Marine Jetty (under construction)</u>

Vasilikos FSRU Marine Jetty is under construction as part of the Project "*Removing internal bottlenecks in Cyprus to end isolation and to allow for the transmission of gas from the Eastern Mediterranean region (CyprusGas2EU)".* Up to December 2022 (end of reporting period), the project occupied approximately 0.013 Km^2 (Figure 25). As the FSRU marine jetty is under construction, this will be further assessed in the next reporting cycle.

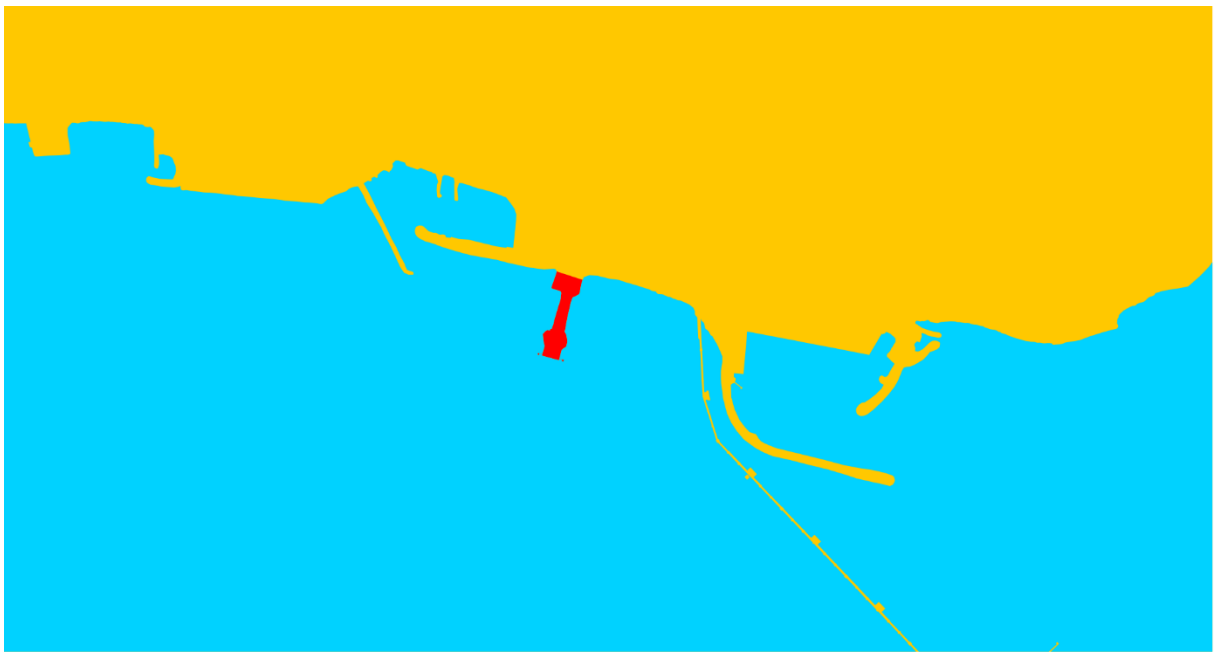

Figure 25. The new jetty infrastructure for 2017-2022 assessment period in Vasilikos area.

III. Breakwaters (completed projects)

Breakwaters fall into the category of structures built parallel to the coast, without any direct contact with the shoreline. They are primarily used to protect boats from wave action and to limit coastal erosion. However, like all human interventions, these constructions disrupt the preexisting physical balance in the environment. Their presence alters the hydrodynamic conditions of the coastal zone, leading to various changes in the surrounding area (Karabas et al., 2015; Antoniou et al., 2019).

Submerged and emerged breakwaters have been widely implemented worldwide, yet they have been found to have many undesirable environmental consequences (Saengsupavanich et al., 2022). While breakwaters are constructed to protect coastlines, they can also have significant negative environmental effects. For example, they can alter natural sediment transport, which can lead to erosion of the nearby area and consequently affect the ecology of the area (reduce biodiversity etc.) Additionally, they may interfere with coastal ecosystems by changing water circulation patterns and affecting the health of local marine life. In any case, their physical impacts on beach morphology and hydrodynamics are very well documented and include, among others, wave dissipation effectiveness, updrift accretion, downdrift erosion, the formation of tombolo or salient, flanking, scouring, eddies, and rip currents (Saengsupavanich et al., 2022).

Coastal management strategies in Cyprus have utilized breakwaters as a primary solution to mitigate coastal erosion and protect shorelines. As mentioned before, between 2017 and 2022, a total of 39 breakwaters, in seven different areas, occupying 0.061 km^2 in total, have been constructed to protect the coastlines from erosion (Figure 26).

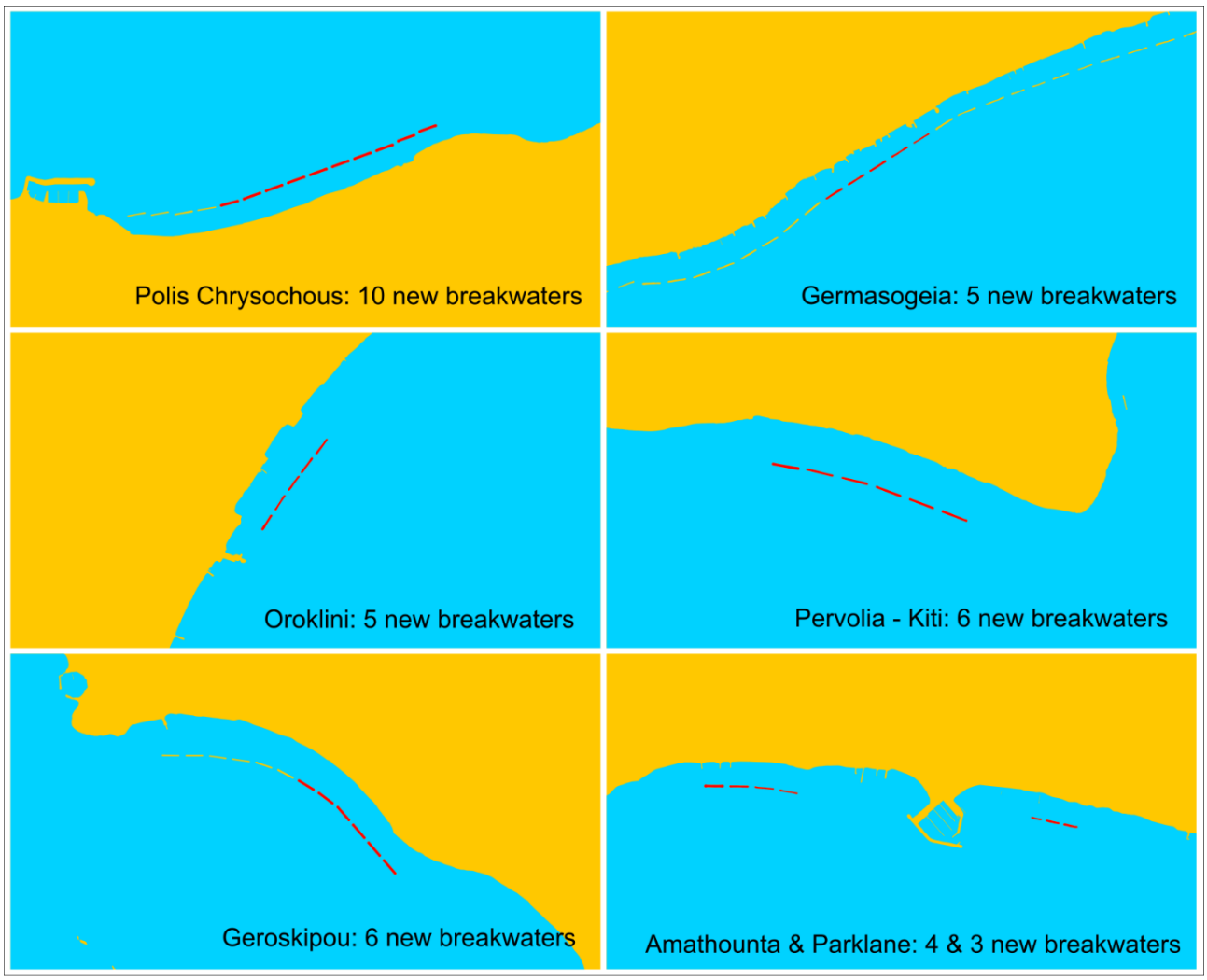

Figure 26. New breakwaters (in red color) constructed between 2017-2022.

Through the analyses of environmental studies and the application of mathematical models related to breakwater projects for coastal protection, it has been determined that when comparing various breakwater projects, the effects in terms of hydrographic changes (such as water flow, erosion, and sediment transport) and environmental changes (effects on marine ecosystems, coastal habitats, and water quality), are quite similar across different areas in Cyprus. This could imply that the underlying physical and environmental processes affected by breakwaters follow similar patterns across different environments, possibly due to the general nature of how breakwaters interact with coastal dynamics.

The following brief descriptions consider the impacts of each construction based on the SEA and mathematical simulations, as they were submitted for approval to the regulatory authorities.

Polis Chrysochous: According to the SEA, the creation of ten breakwaters aimed at protecting and improving the coastline of Polis Chrysochous. These structures are designated to mitigate coastal erosion, enhance coastal stability, and improve the overall environmental quality of the area. The construction of breakwaters in Polis Chrysochous had no negative effects on the local marine fauna and flora, including the turtles that frequent the area. The breakwaters have also served as artificial reefs, providing shelter for specific marine species. Sediment

accumulation due to the breakwaters has improved beach quality, making access to water easier by mixing previously existing coarse beach material with finer transported sediments. The low-level design of the breakwaters ensures continuous seawater renewal behind them, preventing any negative impact in water quality. As a result, the municipal beach of Polis Chrysochous remains a Blue Flag-certified beach in Pafos area.

Germasogeia: The project in this area involved the construction of five detached parallel breakwaters using natural boulders. According to the results from the models, during periods of strong wave activity, rip currents may develop at the ends of the breakwaters, posing potential risks to swimmers. These issues are spatially confined to the breakwater endpoints and are limited in duration, occurring only a few days each year when large waves are present. The EIA study indicated that the construction of the local project resulted in indirect and short-term impacts. The area where the breakwaters were built in Germasogeia was characterized by low biodiversity, mainly due to the lack of complex substrates suitable for colonization and the establishment of biocommunities. The constantly shifting sandy substrate, influenced by currents and tidal energy, was not conducive to these biological processes. The placement of the breakwaters covered marine substrates, such as *Cymodocea nodosa* and *Posidonia oceanica* communities, as well as the benthic community, with boulders and other materials. Additionally, turbidity in the area's waters negatively affected both fauna and flora. Suspended particles hindered photosynthesis in stationary organisms like algae, leading to their degradation. However, this turbidity lasted only a few weeks, after which water clarity returned, and the environmental effects were expected to be reversible. The loss of some ecosystems due to the construction was expected to be offset by the creation of new ecosystems that developed on and around the breakwaters.

Oroklini: In the research and evaluation of coast protection arrangements, mathematical simulations were used to assess the evolution of the coastline. The study proposed removing the existing vertical breakwaters and replacing them with parallel detached breakwaters. This approach was suggested to enhance coastal protection and improve the stability and development of the coastline. According to the SEA, negligible impacts were expected during the construction of the project, such as turbidity and the coverage of small percentage of benthic communities. These effects were estimated to be temporary and short-term, with their duration depending on the currents and the length of the construction period. The biocommunities of the protected species *Posidonia oceanica* which were found in the area, were not expected to be impacted by the projects as they are situated at a distance from the installation site. Over time, new biocommunities are expected to develop around breakwaters, contributing to the support and enhancement of the surrounding ecosystem.

Pervolia-Kiti: As in previous cases involving breakwater projects, the environmental study for this project indicated that there would be limited degradation of the marine environment during constructions. However, this impact has been expected to be mitigated after the completion of the project. Once the project was finalized, the ecosystem was expected to recover, with the area likely becoming enriched by new organisms that would settle around the breakwaters. The dynamic energy of the waves would be reduced, thereby protecting the area from erosion.

Geroskipou: According to the results of the coastal engineering study and the mathematical simulation in the study area, wave changes were not expected to have negative effects. According to the simulation models, the proposed projects did not appear to have an impact on the sea currents of the area due to their distance from the coast. According to the SEA, no evidence emerged to indicate that there would be a significant environmental problem during the construction and operation of the project that could not be managed with appropriate measures in place. Regarding the impact on marine ecosystems, during the construction phase of the proposed projects it was expected that these were focused on embankments for the creation of detached breakwaters and any local pollution resulting from the operation of floating construction equipment.

Amathounta: Mathematical simulations indicated that current velocities would decrease following the construction of the projects. The coastal environment was affected by changes in water flow and currents resulting from the construction of the breakwaters, which altered both the coastline and the area's morphology. The effect of coastal works on sediment transport was greater than their impact on coastal hydrodynamic circulation. The impacts on the execution of the project were temporary and reversible. Regarding the environmental study, negative impacts were expected only during construction on the seabed and the benthic ecosystem, which consequently affected the species and habitats in the marine areas where the breakwaters were constructed. While some ecosystems were lost due to breakwater construction, it was expected that new ecosystems would form around and on breakwaters.

Parklane beach: The SEA report for this specific project was not available, thus further analysis of the hydrological and environmental impacts of the project could not be conducted.

Regarding all the projects mentioned above, it was observed that the impacts on hydrographic features and the ecological effects on benthic organisms resulting from the breakwaters were similar across all areas. The hydrographic changes associated with the natural loss of seabed based on EIA's results (Table 44), indicates that the negative impacts of new structures are minimal and do not affect larger-scale marine ecosystems. The extent of the assessment area that could potentially experience hydrological alterations due to development, is 0.214 km^2, which corresponds to the total area occupied by all constructions, with no zone of influence defined during the SEAs. This finding suggests that the total area impacted by all marine projects conducted from 2017 to 2022 is negligible, given that it corresponds to 0.00022% of the MRU. However, the long-term ecological impacts of hard coastal works are difficult to predict quantitatively in a specific area, due to the variability of ecological systems (Anton, 2019).

Given that no TVs have been set, GES cannot be determined at this time. In the upcoming programming period of 2023-2028, there will be monitoring in the areas where the projects are developed. However, it is not yet determined whether this will cover all areas or only certain ones. We expect that this monitoring will provide a clearer understanding of the hydrographic alterations and the extent of the impacts on benthic habitats, resulting from these projects. Essentially, a dense network of hydrographic monitoring stations will be established, and corresponding programs will

be implemented to monitor all the necessary parameters to understand the impact of each project constructed during the next reference period.

Table 44. Summary of the predicted hydrographic changes due to new infrastructure.

Activity	Type of development	Hydrographic changes
Tourism and leisure infrastructure	Agia Napa Marina: New marina including construction works and a new breakwater	The impact on the water circulation within the marina harbour was considered to be negligible with limited environmental impacts. Sediment movement of minor significance.
Transport infrastructure	Vasilikos Jetty/trestle (access bridging on piled structures)	The project is still ongoing and thus not assessed.
Coastal defence and flood protection	New breakwaters	The changes in Hydrodynamics are of low overall significance, with minimal environmental impacts that are primary restricted to the construction phase. Sediment movement is negligible, and alterations in currents and sediment dynamics are minor and reversible, resulting in limited and insignificant long-term environment effects.

D7C2: Spatial extent of each benthic habitat type adversely affected (physical and hydrographical characteristics and associated biological communities) due to permanent alteration of hydrographical conditions

Criterion D7C2 of the GES Decision is defined as "*Spatial extent of each benthic habitat type adversely affected (physical and hydrographical characteristics and associated biological communities) due to permanent alteration of hydrographical conditions".* According to the GES Decision, the D7C2 is expressed as "*the extent of each habitat type adversely affected in square kilometres (km^2) or as a proportion (percentage) of the total natural extent of the habitat in the assessment area".* The outcomes of assessment of Criterion D7C1 (the distribution and an estimate of the extent of hydrographic changes) shall be used to assess Criterion D7C2. To be able to address D7C2, the broad habitat types must be known. Although habitat maps have been developed for the 0-250 m depth zone, sediments were not classified to the broad habitat types (e.g. coarse sediment, mixed sediment etc.). Therefore, at this point, Criterion D7C2 status is considered unknown (Table 45).

Table 45. Summary of D7 assessment methodology and results.

	Criterion	Indicator	Feature	TV	GES
D7: Permanent alteration of hydrographical conditions does not adversely affect marine ecosystems	D7C1 (Secondary): Spatial extent and distribution of permanent alteration of hydrographical conditions (e.g. changes in wave action, currents, salinity, temperature) to the seabed and water column, associated in particular with physical loss of the natural seabed	CY.7.1: Extent of marine area affected by permanent alterations (km^2)	Hydrographical changes	Not set	Unknown
	D7C2 (Secondary): Spatial extent of each benthic habitat type adversely affected (physical and hydrographical characteristics and associated biological communities) due to permanent alteration of hydrographical conditions. Member States shall establish threshold values for the adverse effects of permanent alterations of hydrographical conditions, through regional or subregional cooperation	CY.7.2: Extent of adverse effect per habitat type in each assessment area (km^2)	Hydrographical changes	Not set	Unknown

3.3.7 Nutrient and organic matter enrichment (eutrophication) (D5)

MSFD directive addresses human-induced eutrophication through specific Criteria. The Republic of Cyprus has selected five Criteria to be assessed (D5C1, D5C2, D5C6, D5C7 and D5C8) which are addressed below.

D5C1: Nutrient concentrations are not at levels that indicate adverse eutrophication effects

Methodology

Criterion D5C1 of the GES Decision is defined as "*Nutrient concentrations are not at levels that indicate adverse eutrophication effects. The Threshold Values are as follows: (a) in coastal waters, the values set in accordance with Directive 2000/60/EC; (b) beyond coastal waters, values consistent with those for coastal waters under Directive 2000/60/EC. Member States shall establish those values through regional or subregional cooperation".*

Cyprus monitors nitrates and phosphates in coastal waters but has not set TVs for nutrients, yet. Monitoring stations are established in the following coastal waterbodies and nutrients are monitored in a monthly to twice a year basis: CY_3-C2, CY_5-C1, CY_7-C1-HM, CY_8-C1, CY_11-C2, CY_12-C2-HM, CY_13-C2, CY_14-C2-HM, CY_15-C2, CY_16-C2, CY_18-C2, CY_19-C3, CY_20-C3 και CY_22-C3 (Figure 27).

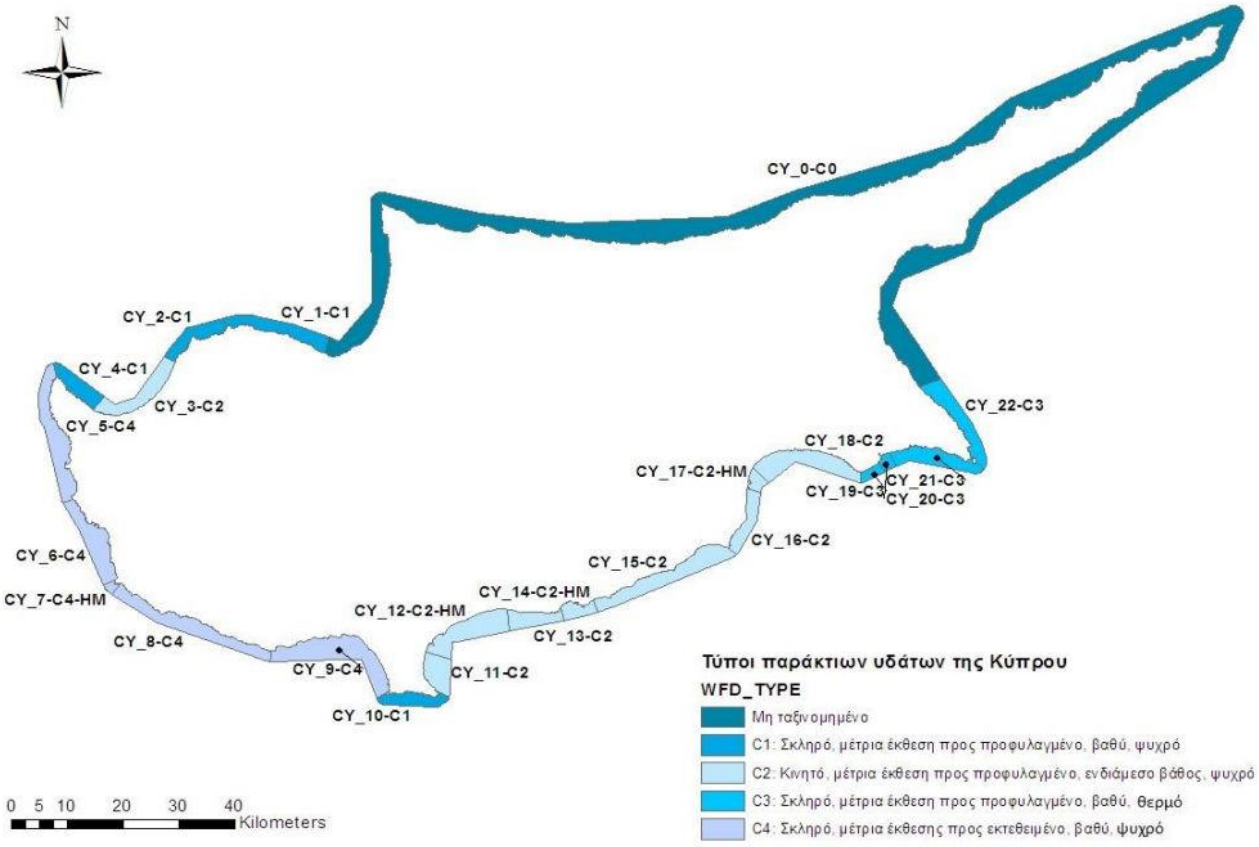

Figure 27. WFD coastal waterbodies (Antoniadis et al., 2020).

Furthermore, all marine waters of Cyprus are monitored using satellite reanalysis data from Copernicus marine service for the first 200 m of depth. Analysed data covered both the territorial waters and the EEZ of Cyprus, for four 6-year periods, 1999-2004, 2005-2010, 2011-2016, and 2017-2022. The maximum depth of 200 m selected for this assessment, is based on the understanding that this depth corresponds to the euphotic zone in the Mediterranean (e.g. IUCN, 2019). This depth range ensures that the assessment covers the most biologically active part of the marine ecosystem, in terms of photosynthesis and primary production. For the estimation of the annual value of each parameter per depth, the annual median of all values within the territorial waters and EEZ was considered from a 0.042×0.042° sampling grid.

TVs for nitrates and phosphates are expected to be determined in 2025, through the DFMR procured project "*Provision of Services for the review of Coastal Water Bodies of The Republic of Cyprus and their Monitoring Programs, based on The Water Framework Directive* (2000/60/EC)", Tender procedure No.: 06/2023. Therefore, criterion D5C1 status is considered unknown (Table 53).

Results

I. Coastal waters

Concerning nutrient monitoring in coastal waters, the average values of nitrates and phosphates are shown for each waterbody in Table 46, along with the average values for the reporting period 2017-2022.

Table 46. Average concentrations of nutrients per coastal waterbody.

Watebody		Year	NO_3^- (µmol/l)	Avg 2017-22	PO_4^{3-} (µmol/l)	Avg 2017-22
CY_3-C2	Chrysochou Bay	2018	2.14	1.09	0.27	0.20
		2019	1.26		0.33	
		2020	0.57		0.13	
		2021	0.39		0.05	
CY_5-C4	Akamas	2018	4.37	1.92	0.10	0.15
		2019	1.00		0.32	
		2020	0.52		0.15	
		2021	1.05			
		2022	2.65		0.03	
CY_7-C4-HM	Pafos city	2017	1.72	1.48	0.11	0.56
		2018	0.99		0.17	
		2019	2.23		0.06	
		2020	0.99		1.88	
CY_8-C4	Pafos South	2017	1.26	2.59	0.01	0.11
		2018	0.95		0.04	
		2019			0.16	
		2020	5.55		0.25	
CY_11-C2	Limassol Bay - South	2018	0.94	0.94	0.22	0.22
CY_12-C2_HM	Limassol Bay	2017	3.15	1.48	0.03	0.10
		2018	1.25		0.10	
		2019	0.97		0.18	
		2020	0.96		0.07	
		2021	1.05			
CY_14-C2_HM	Vasilikos Port	2017	0.70	1.12	0.14	0.14
		2018	1.30		0.14	

Watebody		Year	NO_3^- (µmol/l)	Avg 2017-22	PO_4^{3-} (µmol/l)	Avg 2017-22
		2019	1.07		0.19	
		2020	1.54		0.15	
		2021	0.97		0.07	
CY_15-C2	Zygi-Cape Kiti	2017	1.62	1.18	0.01	0.12
		2018	0.69		0.17	
		2019	1.10		0.26	
		2020	1.57		0.07	
		2021	0.93		0.07	
CY_16-C2	Larnaca Bay - West	2018	1.44	0.98	0.18	0.10
		2019	1.19		0.13	
		2020	0.86		0.13	
		2021	1.02		0.03	
		2022	0.38		0.03	
CY_18-C2	Larnaca Bay - Northeast	2017	2.37	1.25		0.11
		2018	1.66		0.22	
		2019	1.34		0.19	
		2020	0.98		0.07	
		2021	0.72		0.03	
		2022	0.45		0.03	
CY_19-C3	Cape Pyla	2019	1.95	1.47	0.31	0.14
		2020	2.42		0.08	
		2022	0.05		0.03	
CY_20-C3	Cape Pyla - AquaFarm	2018	1.02	1.64	0.11	0.20
		2019	0.40		0.42	
		2020	1.59		0.24	
		2022	3.55		0.03	
CY_22-C3	Protaras	2017	0.89	0.98	0.16	0.23
		2018	1.52		0.39	
		2019	0.96		0.30	
		2020	0.46		0.07	
		2021	1.05			
MEDIAN 2017-2022			**Nitrates (µmol/l)**		**Phosphates (µmol/l)**	
			1.25		0.14	

II. Marine waters

Concerning the marine waters (whole MRU), the median values for nitrates and phosphates have been calculated based on satellite Mediterranean biogeochemistry reanalysis data from Copernicus marine service for six-year cycles. The results are presented in Table 47 and Figures 28 and 29.

Table 47. Median values of nitrates and phosphates in µmole/l per six-years cycles.

	1999_2004	2005_2010	2011_2016	2017-2022
Nitrates	0.920	0.887	0.795	0.878
Phosphates	0.014	0.015	0.013	0.014

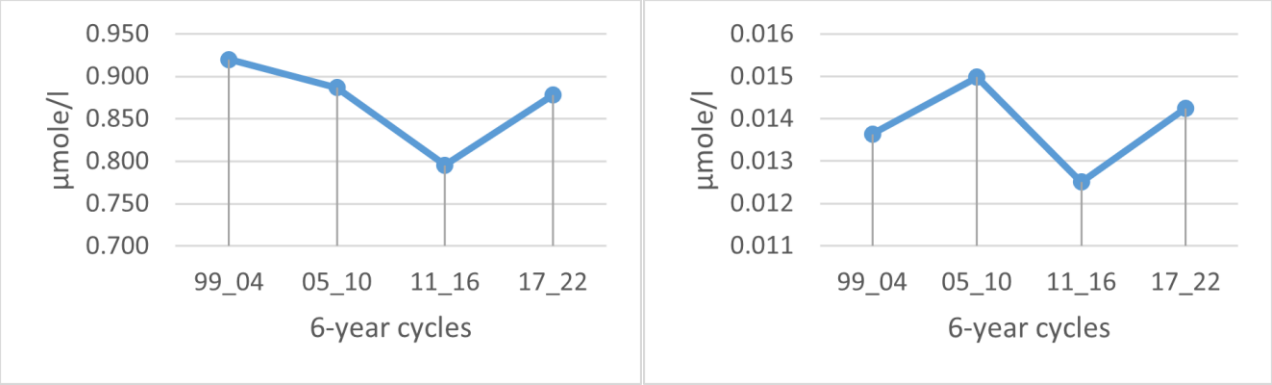

Figure 28. Trend of median (i) nitrates and (ii) phosphates concentrations.

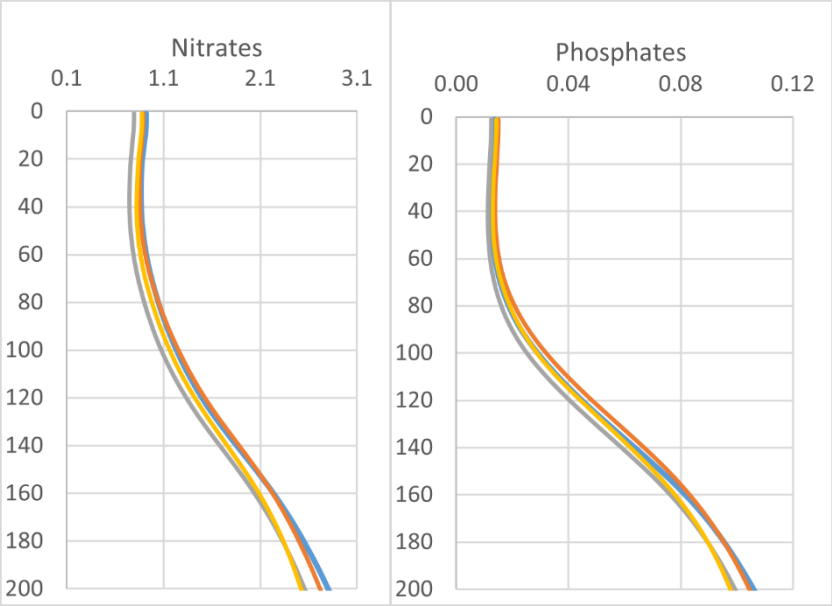

Figure 29. Distribution of nitrates and phosphates concentrations in µmole/l (x axis) in the marine waters of Cyprus, from 1 to 200 m depth, for four six-year periods, 1999-2004 (blue), 2005-2010 (orange), 2011-2016 (grey) and 2017-2022 (yellow).

D5C2: Chlorophyll-a concentrations are not at levels that indicate adverse effects of nutrient enrichment

Methodology

Criterion D5C2 of the GES Decision is defined as "*Chlorophyll-a concentrations are not at levels that indicate adverse effects of nutrient enrichment*". The TVs are as follows: (a) in coastal waters, the values set are in accordance with Directive 2000/60/EC; (b) beyond coastal waters, values are consistent with those for coastal waters under Directive 2000/60/EC. MS shall establish those values through regional or sub-regional cooperation.

Cyprus monitors chlorophyll-a in coastal waters in 13 monitoring stations covering 13 water bodies and the results are assessed compared to the Commission Decision (EU) 2024/721 (High-Good 0.29, Good-Moderate 0.53 for coastal waters Type IIIE). Also, the marine waters of Cyprus are monitored based on satellite Mediterranean biogeochemistry reanalysis data from Copernicus marine service for the first 200 m of the water column.

Results

When examining chlorophyll-a (µg/l, 90%ile), all coastal waters of Cyprus were found to be in High status (Table 48) and therefore, Criterion "*D5C2: Chlorophyll-a concentrations are not at levels that indicate adverse effects of nutrient enrichment*" is in GES (Table 53).

Table 48. Average concentrations of chlorophyll-a in Cyprus coastal waters (blue: High Ecological Status).

Water body		Chlorophyll - *a* (µg/l, 90%ile)							
		Avg 2011-2016	2017	2018	2019	2020	2021	2022	Avg 2017-2022
CY_3-C2	Chrysochou Bay	0.035	0.02	0.04	0.1	0.01	0.01		0.036
CY_5-C1	Akamas West	0.055	0.06	0.01	0.04				0.037
CY_7-C1_HM	Pafos city	0.15	0.34	0.17					0.250
CY_8-C1	Pafos South	0.19	0.16	0.05					0.100
CY_11-C2	Limassol Bay-South	0.05		0.09		0.02			0.055
CY_12-C2_HM	Limassol Bay	0.12	0.08	0.07	0.11	0.06	0.02	0.02	0.060
CY_14-C2_HM	Vasilikos Port	0.13	0.15	0.14	0.09	0.045	0.05	0.02	0.080
CY_15-C2	Zygi-Cape Kiti	0.11	0.19	0.11	0.07	0.04	0.03	0.01	0.075
CY_16-C2	Larnaca-West	0.04	0.03	0.03	0.09	0.025	0.02	0.02	0.035
CY_18-C2	Larnaca Bay-Northeast	0.09	0.07	0.03	0.1	0.025	0.02	0.02	0.044
CY_19-C3	Cape Pyla	0.16	0.09	0.09	0.03				0.070
CY_20-C3	Cape Pyla-AquaFarm	0.08	0.1		0.06				0.080
CY_22-C3	Protaras	0.055	0.04	0.11	0.08	0.02	0.025		0.055

Based on satellite Mediterranean biogeochemistry reanalysis data from Copernicus marine service, the 90th percentile chlorophyll-a concentration values were calculated per six-year cycles and the results are shown in Table 49 and Figure 30. The distribution of chlorophyll-a for the euphotic zone of the marine waters of Cyprus for the four periods can be seen in Figure 31. The concentrations of chlorophyll-a are generally lower in the open sea compared to the coastal areas, but no TVs have been set yet for the open sea, therefore, criterion D5C2 status is considered unknown.

Table 23. 90th percentile values of chlorophyll-a in µg/l per six-years cycles.

Chl-a			
1999-2004	2005-2010	2011-2016	2017-2022
0.052	0.053	0.049	0.051

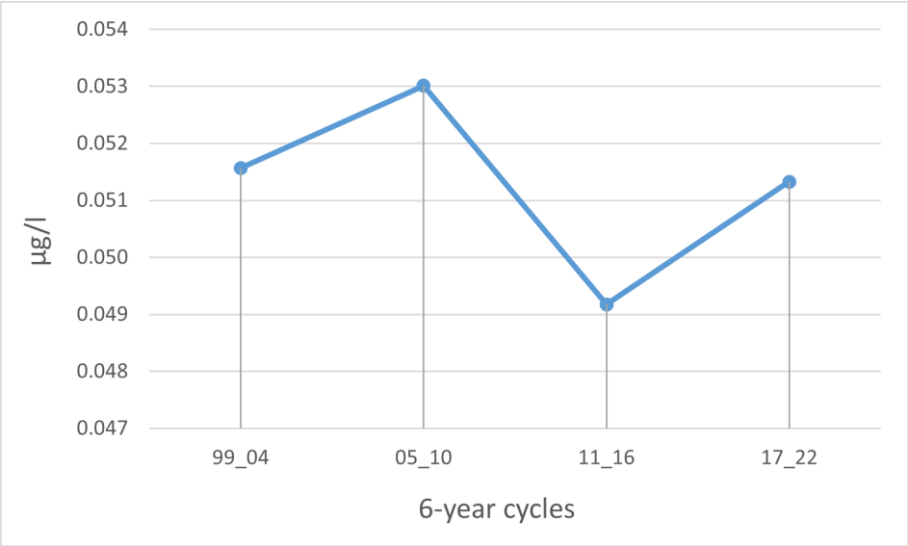

Figure 30. Trend of 90th-percentiles of chlorophyll-a concentrations.

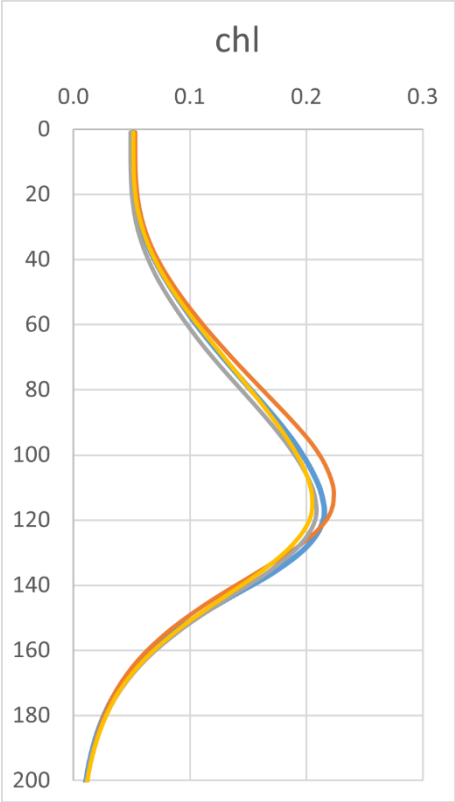

Figure 31. Distribution of chlorophyll-a concentrations in µg/l, in the marine waters of Cyprus, from 1 to 200 m depth, for four six-year periods, 1999-2004 (blue), 2005-2010 (orange), 2011-2016 (grey) and 2017-2022 (yellow).

D5C6: The abundance of opportunistic macroalgae is not at levels that indicate adverse effects of nutrient enrichment

Methodology

Criterion D5C6 of the GES Decision is defined as "*The abundance of opportunistic macroalgae is not at levels that indicate adverse effects of nutrient enrichment*". The Republic of Cyprus assesses the macroalgae in seven stations covering six water bodies (CY_5, 7, 8, 19, 20, 22 - Figure 27) and applies the Ecological Evaluation Index (EEI-c) that was developed by Orfanidis et al. (2011). The

methodology for the estimation of EEI-c, includes macroalgae sampling along three quadrats per station, laboratory analyses of the samples (classification of macroalgae at lowest taxonomic level possible and estimation of percentage cover), and estimation of the EEI-c by applying a mathematical formula. Information on the EEI-c can be found at eei.gr/EN/use-of-eei.html.

The reporting unit of Criterion D5C6, as set in the GES Decision, is "*Extent of adverse effects in square kilometres (km^2)*". The adverse effects refer to the "Good-Moderate boundary" for Ecological Quality Ratios being 5.84±0.70 SD for the EEI-c, which corresponds to 0.48 for the EQR Cyprus (2024/721/EC).

Results

The Ecological Status of the six examined water bodies according to the estimation of the EEI-c Biotic Index for the period 2017-2022, was found to be in High Condition. In the previous reporting period 2011-2016, the ecological status was also found to be in High Condition. As a result, the Extent of adverse effects is 0 km^2. Therefore, the Criteria D5C6 "*The abundance of opportunistic macroalgae is not at levels that indicate adverse effects of nutrient enrichment*" is in GES (Tables 50 and 53).

Table 50. EEI-c results and GES estimation (blue: High Ecological Status; green: Good Ecological Status).

MSFD	Years	Water bodies					
		CY_5-C1 Akamas west	CY_7-C4 HM Pafos city	CY_8-C4 Pafos south	CY_19-C3 Cape Pyla	CY_20-C3 Cape Pyla - Aquafarm	CY_22-C3 Protaras
Reporting 2011-2016	2011	H			H	G	
	2012	H			H	G	
	2013	H	G	H	H	H	
	2014	H	H	H	H	H	
	2015		H	H	H	H	
	2016				H	H	
Extent of adverse effects in km^2		0	0	0	0	0	
GES		D5C6 in GES					
Reporting 2017-2022	2017	10	8.37	8.16	8.93	8.51	
	2018	9.12	9.645	10	7.72	9.61	
	2019	10	9.8	10	10	7.69	
	2020	10	9.175	9.37	10	9.965	9.56
	2021	9.82	8.91	8.26	8.96	8.7	9.3475
	2022	9.93			9.84	10	9.335
	Average	9.81	9.18	9.16	9.24	9.08	9.41
Extent of adverse effects in km^2		0	0	0	0	0	0
GES		D5C6 in GES					

D5C7: The species composition and relative abundance of macrophyte communities, achieve values that indicate that there is no adverse effect due to nutrient and organic enrichment

Methodology

Criterion D5C7 of the GES Decision is defined as *"The species composition and relative abundance of macrophyte communities, achieve values that indicate that there is no adverse effect due to nutrient and organic enrichment".* Macrophyte communities refer to perennial seaweeds and seagrasses such as fucoids, eelgrass and Neptune grass found in benthic habitats.

The Republic of Cyprus assesses *P. oceanica* meadows in five stations covering five different water bodies (CY_4, 12, 14, 15, 22 - Figure 27), and it applies the *P. oceanica* Rapid Easy Index (PREI) that was developed by Gobert et al. (2009). Due to its catastrophic nature, PREI is applied once every six years. Specifically, 30 *P. oceanica* shoots are removed from each station and analysed in the laboratory (biometric analyses - average leaf area coverage, dry weight of epiphytes, dry weight of leaves). PREI is estimated by applying specific mathematical formulas as described in Gobert et al. (2009). Furthermore, on an annual basis the shoot density (number of shoots at 20x20 cm quadrats) per sampling station is estimated and classified into ecological status categories as a secondary index (UNEP/MAP-RAC/SPA, 2015).

The reporting unit of Criterion D5C7, as set in the GES Decision, is "*Extent of adverse effects in square kilometres (km^2)*". The adverse effects refer to the "Good-Moderate boundary" for Ecological Quality Ratios, which is set to 0.55 for Cyprus (2024/721/EC) and as regards to the shoot counts, this is set to the 372 shoots/m^2 for the 15-depth zone that is applied in Cyprus (UNEP/MAP-RAC/SPA, 2015).

Results

MSFD and WFD are assessed in six-year cycles that however do not coincide. The MSFD 2017-2022 assessment period overlaps with the WFD 2013-2019 and 2020-2026 assessment periods. For the MSFD 2017-2022 assessment period, PREI was assessed at three of the five water bodies found to be in Good (Limassol) and High (Kavo Gkreko and Vasiliko bay) Ecological Status (Table 51). The water bodies of Akamas and Cape Kiti were assessed in 2016 and 2023 and were found to be in High and Good Environmental Status respectively. Furthermore, the results of the annual shoot densities for the water bodies of Akamas and Cape Kiti were found to be in High Ecological Status (Table 51).

Given the above, the Ecological Status of the examined water bodies for 2017-2022 are considered to be in Good and High Ecological Status. As a result, the extent of adverse effects is 0 km^2. Therefore, Criterion D5C7 "*The species composition and relative abundance or depth distribution of macrophyte communities achieve values that indicate there is no adverse effect due to nutrient enrichment including via a decrease in water transparency"* is in GES (Table 53).

Table 51. PREI and Shoot Density Class results and GES estimation (blue: High Ecological Status; green: Good Ecological Status).

	Years	PREI Index					SHOOT DENSITY CLASS	
		CY_22-C2 Kavo Gkreko	CY_12-C2-HM Limassol Bay	CY_14-C2 Vasilikos Bay	CY_4-C1 Akamas	CY__15-C2 Cape Kiti	CY_4-C1 Akamas	CY_15-C2 Cape Kiti
MSFD Reporting 2011-2016	2011				0.922		563.9	
	2012							
	2013	0.961	0.676					
	2014							
	2015		0.733					
	2016			0.769	0.824	0.728	386.1	529
	Average	0.961	0.705	0.769	0.873	0.728	475.0	529
Extent of adverse effects in km^2		0	0	0	0	0	0	0
GES		D5C7 in GES						
MSFD Reporting 2017-2022	2017							498
	2018	0.965						
	2019			0.818				
	2020		0.693	0.863			556.4	
	2021							
	2022	1.000					566.7	
	Average	0.983	0.693	0.840			561.6	498
2023		0.958				0.776		445
Extent of adverse effects in km^2		0	0	0	0	0	0	0
GES		D5C7 in GES						

D5C8: The species composition and relative abundance of macrofaunal communities achieve values that indicate that there is no adverse effect due to nutrient and organic enrichment

Methodology

The Republic of Cyprus assesses the benthic macrofauna communities in 10 stations covering nine different water bodies (CY_3, 11, 12, 14, 15, 16, 18, 21, 22 - Figure 27), and it applies the BENTIX index developed by Simboura and Zenetos (2002). BENTIX is applied at least once every six years according to the WFD cycles. Specifically, from each station three replicate sediment samples are collected with a Van-Veen grab of 0.1 m^2 surface (or 5 replicates with a 0.05 m^2 grab sampler). Sediment is passed through 1 mm sieves and all organisms are sorted and classified into the lowest taxonomic level, by using the latest taxonomic keys and literature, and counted. BENTIX is estimated at the station level via the BENTIX add-in xl by using average abundances. More information on BENTIX can be found at hcmr.gr/en/the-bentix-index.

The reporting unit of Criterion D5C8, as set in the GES Decision, is “Extent of adverse effects in square kilometres (km^2)”. The adverse effects refer to the “Good-Moderate boundary” for Ecological Quality Ratios which for Cyprus is set to 0.58 (2024/721/EC) which corresponds to BENTIX 3.5 for general substrates, and BENTIX 3 for naturally stressed muddy habitats.

Results

For the MSFD reporting period 2017-2022, BENTIX was assessed at nine water bodies which were found to be in Good and High Ecological Status (Table 52). As a result, the extent of adverse effects is 0 km^2. Therefore, Criterion D5C8 "*The species composition and relative abundance of macrofaunal communities, achieve values that indicate that there is no adverse effect due to nutrient and organic enrichment*" is in GES (Table 53).

Table 52. BENTIX results and GES estimation (blue: High Ecological Status; green: Good Ecological Status; yellow: Moderate Ecological Status).

MSFD	Year	CY_3-C2 Chrysochou Bay	CY_11-C2 Limassol Bay south	CY_12-C2-HM Limassol Bay	CY_14-C2-HM Vasilikos Bay	CY_15-C2 Zygi - Cape Kiti	CY-16-C2 Larnaca Bay - West	CY-18-C2 Larnaca Bay - East	CY_21-C2 Agia Napa	CY_22-C2 Protaras
MSFD Reporting 2011-2016	2011									
	2012									
	2013			3.48						3.83
	2014				4.37				4.86	4.61
	2015	3.20	3.60	2.76	3.17	3.46	3.30	3.01		
	2016						3.26	3.11		
	Average Bentix	3.20	3.60	3.12	3.77	3.46	3.28	3.06	4.86	4.22
	Average EQR	0.60								
Extent of adverse effects in km^2		0	0	0	0	0	0	0	0	0
GES		D5C8 in GES								
MSFD Reporting 2017-2022	2017	3.57		3.86	3.52		3.75	3.96		
	2018			4.28			4.25	3.48		3.94
	2019	3.72					4.19	4.20	4.49	4.57
	2020	3.30	3.88	4.18						
	2021				3.80	3.37	2.88	3.36		4.32
	2022						2.56	3.56		
	Average Bentix	3.53	3.88	4.11	3.66	3.37	3.53	3.71	4.49	4.28
	Average EQR	0.64								
Extent of adverse effects in km^2		0	0	0	0	0	0	0	0	0
GES		D5C8 in GES								

Table 53. Overall GES assessment for D5.

Descriptor	Criterion	Indicator	Feature/Element	TV	GES
D5: Human-induced eutrophication is minimised, especially adverse effects thereof, such as losses in biodiversity, ecosystem	D5C1 (Primary): Nutrient concentrations [Dissolved Inorganic Nitrogen (DIN), Dissolved Inorganic Phosphorus (DIP) are not at levels that indicate adverse eutrophication effects	CY.5.1: Concentration of nutrients in water column (µmol/l)	DIN (Total inorganic nitrogen) Dissolved Inorganic Phosphorus (DIP)	Not set	Unknown
	D5C2 (Primary): Chlorophyll a [in water] concentrations are not at levels that indicate adverse effects of nutrient enrichment	CY.5.2: 90%ile Chlorophyll - *a* (µg/l)	Chlorophyll-a	"Good-Moderate boundary" > 0.53	In GES

Descriptor	Criterion	Indicator	Feature/Element	TV	GES
degradation, harmful algae blooms and oxygen deficiency in bottom waters	D5C6 (Secondary): The abundance of opportunistic macroalgae is not at levels that indicate adverse effects of nutrient enrichment	CY.5.6: Ecological Evaluation Index (EEI-c) [Macroalgae]	Benthic habitats - opportunistic macroalgae	"Good-Moderate boundary"	In GES
	D5C7 (Secondary): The species composition and relative abundance or depth distribution of macrophyte communities achieve values that indicate there is no adverse effect due to nutrient enrichment including via a decrease in water transparency, in coastal waters	CY.5.7.1*:* Rapid Easy Index (PREI) [*P. oceanica*]	Benthic habitats - macrophyte communities	"Good-Moderate boundary"	In GES
	D5C7 (Secondary): The species composition and relative abundance of macrofaunal communities, achieve values that indicate that there is no adverse effect due to nutrient and organic enrichment	CY.5.7.2: Annual shoot densities of *P. oceanica*	Benthic habitats - macrophyte communities	"Good-Moderate boundary"	In GES
	D5C8: The species composition and relative abundance of macrofaunal communities achieve values that indicate that there is no adverse effect due to nutrient and organic enrichment	CY.5.8: BENTIX index [Zoobenthos]	Benthic habitats - macrobenthic communities	"Good-Moderate boundary"	In GES

3.3.8 Contaminants in the environment (D8)

D8C1: Concentrations of chemical contaminants in water, biota or sediments

Methodology

Criterion D8C1 of the GES Decision is defined as "*Within coastal and territorial waters, the concentrations of contaminants do not exceed the following threshold values: (a) for contaminants set out under point 1(a) of criteria elements, the values set in accordance with Directive 2000/60/EC; (b) when contaminants under point (a) are measured in a matrix for which no value is set under Directive 2000/60/EC, the concentration of those contaminants in that matrix established by Member States through regional or subregional cooperation; (c) for additional contaminants selected under point 1(b) of criteria elements, the concentrations for a specified matrix (water, sediment or biota) which may give rise to pollution effects"*. Furthermore, MS shall establish these concentrations through regional or subregional cooperation, considering their application within and beyond coastal and territorial waters. Beyond territorial waters, the concentrations of contaminants do not exceed the following TVs: (a) for contaminants selected under point 2(a) of criteria elements, the values as applicable within coastal and territorial waters; (b) for contaminants selected under point 2(b) of criteria elements, the concentrations for a specified matrix (water, sediment or biota) which may give rise to pollution effects. MS shall establish these concentrations through regional or subregional cooperation.

The Republic of Cyprus monitors the concentrations of contaminants in fish, sediment and seawater through its national monitoring programs. Cyprus has set seven coastal monitoring stations for Priority Substances and other contaminants in seawater and 26 stations of the MEDITS programme (Figure 32) are used for measurements of heavy metals. In addition, Cyprus has set seven coastal monitoring stations for sediment, where 10 heavy metals and PAHs (Polycyclic Aromatic Hydrocarbons) are measured in it. Fish specimens are collected from local fishermen in three areas (Larnaca, Limassol and Pafos), and their flesh is analysed for heavy metals, PAHs, PCBs and other Priority Substances by the State General Laboratory of the Ministry of Health, which is accredited for this type of analyses. The samplings and analyses of seawater, sediment and biota, are implemented following the Guidance Documents, developed by WFD and UNEP/MAP.

To assess whether D8C1 is in GES, the median value of contaminants per matrix, was calculated per year, taking into consideration all stations and seasons. Following that, the average value of the medians for the years 2017-2022 was calculated. These average values were compared to the TVs included in the Priority Substances Directive (2008/105/EC) or in the MED POL Programme of UNEP/MAP, where appropriate, to assess whether D8C1 is in GES.

According to GES Decision and Article 8a(1)(a) of Directive 2008/105/EC, D8C1 contains two Indicators:

- Indicator 8.1. Concentration of ubiquitous, persistent, bio accumulative and toxic substances (uPBTs)

- Indicator 8.2. Concentration of non-ubiquitous, persistent, bio accumulative and toxic substances (non-uPBTs)

Furthermore, many other contaminants were measured in different matrices to assess possible pollution in the marine environment, without any relevant TVs available yet. Therefore, status was not determined for these contaminants in this reporting cycle.

Figure 32. Marine litter sampling stations (red: only coastline, green: coastline and shallow seabed, blue: only shallow seabed, yellow: deep seabed - MEDITS).

Results

1. Contaminants in biota

Fish specimens of the species *Boops boops* and *Mullus barbatus* were collected during 2017-2022 from local fishermen in three areas in Cyprus (Larnaca, Limassol and Pafos) and their flesh was analysed for Priority Substances, UNEP/MAP substances and other contaminants. These two species of fish are considered local and non-migrating fish, so they can be used for the assessment of contaminants at local level.

Boops boops

The average value for mercury (Hg) in *Boops boops* was found to be higher than the TV set in the Priority Substances Directive (2008/105/EC) and thus was not in GES (Table 54). For PAHs, the average values in *Boops boops* for the period 2017-2022 were lower than the TV of the same Directive, thus it was in GES (Table 34). Other Organic Pollutants that were also measured in the *Boops boops* specimens, without tracing any of them during the period 2020-2022, were the following: 1,3-hexachlrobutadiene, a-HCH, Aldrin, b-HCH, CB101, CB138, CB153, CB180, CB28, CB52, cis Heptachlor epoxide, DDT, Dicofol, Dieldrin, Endrin, HCB, Heptachlor, Heptachlor epoxide, Lindane, opDDD, opDDE, opDDT, PCBs, ppDDD, ppDDE, ppDDT, trans Heptachlor epoxide.

Mullus barbatus

The average value for Hg in *Mullus barbatus* was found to be higher than the TV set in the Priority Substances Directive (2008/105/EC) and thus it was not in GES (Table 54). For PAHs, the average values in *Mullus barbatus* for the period 2017-2022 were lower than the TV of the same Directive, thus it was in GES (Table 60). Other Organic Pollutants that were also measured in the *Mullus barbatus* specimens, without tracing any of them during the period 2020-2022, were the following: 1,3-hexachlrobutadiene, a-HCH, Aldrin, b-HCH, CB101, CB138, CB153, CB180, CB28, CB52, cis Heptachlor epoxide, DDT, Dicofol, Dieldrin, Endrin, HCB, Heptachlor, Heptachlor epoxide, Lindane, opDDD, opDDE, opDDT, PCBs, ppDDD, ppDDE, ppDDT, trans Heptachlor epoxide.

Table 54. Assessment of GES for heavy metals (mg/kg ww) and PAHs (µg/kg ww) in *Boops boops* and *Mullus barbatus* (PSD-TV: Priority Substances Directive Threshold Values; Average 2017-2022: Red - Not in GES, Green - In GES).

Species	Heavy metal / PAH	2019	2020	2021	2022	Average 2017-2022	PSD-TV
Boops boops	**As**	0.005	4.2	4.85	4.4	3.36	
	Cd	0.002	0.0046	0.0075	0.01	0.006	
	Cr		0.017	0.035	0.015	0.022	
	Cu	0.045	0.5	0.495	0.4	0.36	
	Fe		5.7	5.95	5.1	5.58	
	Hg	0.0025	0.03	0.045	0.04	0.029	0.02
	Ni	0.025	0.008	0.025	0.025	0.02	
	Pb	0.0075	0.002	0.0022	0.002	0.0034	
	Zn		8	9.9	8.3	8.7	
	Benzo (a) anthracene		0.085	0.065	0.065	0.07	
	Benzo (a) pyrene		0.075	0.06	0.06	0.063	5
	Benzo (b) fluoranthene		0.075	0.06	0.06	0.063	
	chrysene		0.08	0.06	0.06	0.065	
	Total PAHs		0.315	0.245	0.245	0.262	5
Mullus barbatus	**As**		19.95	19.5	20.05	19.83	
	Cd		0.001	0.002		0.0015	
	Cr		0.017	0.0165	0.015	0.016	
	Cu		0.42	0.51	0.51	0.48	
	Fe		5.4	8.2	6.15	6.58	
	Hg		0.13	0.35		0.24	0.02
	Ni		0.025	0.025	0.025	0.025	
	Pb		0.005	0.002	0.007	0.004	
	Zn		3.65	4.9	3.65	4.06	
	Benzo (a) anthracene		0.085	0.065	0.065	0.071	
	Benzo (a) pyrene		0.075	0.06	0.06	0.065	5
	Benzo (b) fluoranthene		0.075	0.06	0.06	0.065	
	chrysene		0.08	0.06	0.127	0.089	
	Total PAHs		0.315	0.245	0.245	0.268	5

2. Seawater

The average value of the medians for the years 2017-2022 was calculated for the contaminants in water and is presented in Table 55. The samples were analysed for Priority Substances, substances required by UNEP/MAP and other contaminants.

Table 55. Average values of annual medians in seawater in µg/l (EQSD-TV: Environmental Quality Standards Directive Threshold Values; Average 2017-2022: Red - Not GES, Green - In GES).

Station	Acenaphthene	Alachlor	Anthracene	Atrazine	benzo (a) anthracene	benzo (a) pyrene	benzo (ghi) perylene	benzo (k) fluoranthene	benzo(b) fluoranthene
CY_12-C2 Limassol	0.01	0.025	0.01	0.01	0.01	0.01	0.01	0.01	0.01
CY_14-C2 Vasilikos	0.01	0.025	0.01	0.015	0.01	0.01	0.01	0.01	0.01
CY_16-C2 Larnaca West	0.01	0.025	0.01	0.005	0.01	0.01	0.01	0.01	0.01
CY_17-C2 Larnaca Port	0.01		0.01	0.005	0.01	0.01	0.01	0.01	0.01
CY_18-C2 Larnaca East	0.01	0.025	0.01	0.005	0.01	0.01	0.01	0.01	0.01
CY_22-C3 Protaras	0.01		0.01	0.005	0.01	0.01	0.01	0.01	0.01
CY_3-C2 Polis Chrysochous									
MEDITS 1									
MEDITS 2									
MEDITS 3									
MEDITS 4									
MEDITS 5									
MEDITS 6									
MEDITS 7									
MEDITS 8									
MEDITS 9									
MEDITS 10									
MEDITS 11									
MEDITS 12									
MEDITS 13									
MEDITS 14									
MEDITS 15									
MEDITS 16									
MEDITS 17									
MEDITS 19									
MEDITS 20									
MEDITS 21									
MEDITS 22									
MEDITS 23									
MEDITS 24									
MEDITS 25									
MEDITS 27									
MEDITS 28									
AvG 2017-22	0.01	0.025	0.01	0.0075	0.01	0.01	0.01	0.01	0.01
AvG 2012-16									
PSD-TV		0.3	0.1	0.6	1.7×10^{-4}	1.7×10^{-4}	1.7×10^{-4}	1.7×10^{-4}	1.7×10^{-4}

Table 55. (continued)

Station	Cd	Chlorfenviphos	Chlorpyriphos	chrysene	Cr	Cu	dibenzo (a,h) anthracene	Dicofol	Dimoxystrobin	Diuron
CY_12-C2 Limassol	0.5	0.01	0.025	0.01	0.1	1.375	0.01	0.025	0.005	0.005
CY_14-C2 Vasilikos	0.5	0.015	0.025	0.01	0.3875	0.95	0.01	0.025	0.005	0.005
CY_16-C2 Larnaca West	0.5	0.005	0.025	0.01			0.01	0.025	0.005	0.005
CY_17-C2 Larnaca Port	0.5	0.005		0.01			0.01		0.005	0.005
CY_18-C2 Larnaca East	0.5	0.005	0.025	0.01	0.35	2	0.01	0.025	0.005	0.005
CY_22-C3 Protaras	0.5	0.005		0.01	0.35	2.7	0.01		0.005	0.005
CY_3-C2 Polis Chrysochous	0.5				3.95	1.65				
MEDITS 1	0.5									
MEDITS 2	0.5									
MEDITS 3	0.5									
MEDITS 4	0.5									
MEDITS 5	0.5									
MEDITS 6	0.5									
MEDITS 7	0.5									
MEDITS 8	0.5									
MEDITS 9	0.5									
MEDITS 10	0.5									
MEDITS 11	0.5									
MEDITS 12	0.5									
MEDITS 13	0.5									
MEDITS 14	0.75									
MEDITS 15	0.5									
MEDITS 16	0.5									
MEDITS 17	0.5									
MEDITS 19	0.5									
MEDITS 20	0.5									
MEDITS 21	0.5									
MEDITS 22	0.5									
MEDITS 23	0.5									
MEDITS 24	0.5									
MEDITS 25	0.5									
MEDITS 27	0.5									
MEDITS 28	0.5									
AvG 2017-22	0.507	0.0075	0.025	0.01	1.0275	1.735	0.01	0.025	0.005	0.005
AvG 2012-16	0.5	0.005	0.005		2	2				0.005
PSD-TV	0.2	0.1	0.03				1.7×10^{-4}	3.2×10^{-5}		0.2

Table 55. (continued)

Station	Fe	fluoranthene	fluorene	Hg	Imazalil	indeno (1,2,3-cd) pyrene	Isoproturon	Metaflumizone	Naphthalene	Ni
CY_12-C2 Limassol	2.25	0.01	0.01	0.05	0.005	0.01	0.005	0.005	0.15	2
CY_14-C2 Vasilikos	2.5	0.01	0.01	0.0425	0.005	0.01	0.005	0.005	0.155	2
CY_16-C2 Larnaca West		0.01	0.01	0.0425	0.005	0.01	0.005	0.005	0.15	2
CY_17-C2 Larnaca Port		0.01	0.01		0.005	0.01	0.005	0.005	0.15	2
CY_18-C2 Larnaca East	2	0.01	0.01	0.0425	0.005	0.01	0.005	0.005	0.15	2
CY_22-C3 Protaras	2.5	0.01	0.01	0.05		0.01	0.005		0.15	2
CY_3-C2 Polis Chrysochous	9.65			0.075						2
MEDITS 1				0.035						2
MEDITS 2				0.035						2
MEDITS 3				0.035						2
MEDITS 4				0.035						2
MEDITS 5				0.035						2
MEDITS 6				0.035						2
MEDITS 7				0.035						2
MEDITS 8				0.035						2
MEDITS 9				0.0675						2
MEDITS 10				0.0575						2
MEDITS 11				0.035						2
MEDITS 12				0.035						2
MEDITS 13				0.0775						2
MEDITS 14				0.0775						2
MEDITS 15				0.0775						2
MEDITS 16				0.0675						2
MEDITS 17				0.0725						2
MEDITS 19				0.035						2
MEDITS 20				0.035						2
MEDITS 21				0.0575						2
MEDITS 22				0.035						2
MEDITS 23				0.035						2
MEDITS 24				0.035						2
MEDITS 25				0.035						2
MEDITS 27				0.035						2
MEDITS 28				0.035						2
AvG 2017-22	3.78	0.01	0.01	0.046	0.005	0.01	0.005	0.005	0.15	2
AvG 2012-16	2.2			0.05			0.005		1	2
PSD TV		0.0063		0.07		1.7×10^{-4}	0.3		2	8.6

Table 55. (continued)

Station	Pb	Penconazole	phenanthrene	Prochloraz	pyrene	Simazine	Tebuconazole	Tetraconazole	Trifluralin	Trimethoprim	Zn
CY_12-C2 Limassol	1	0.005	0.01	0.005	0.01	0.01	0.005	0.005			2.375
CY_14-C2 Vasilikos	1	0.005	0.015	0.005	0.01	0.015	0.005	0.005	0.025		1.8
CY_16-C2 Larnaca West	1.5	0.005	0.01	0.005	0.01	0.005	0.005	0.005	0.025	0.005	
CY_17-C2 Larnaca Port	2	0.005	0.01	0.005	0.01	0.005	0.005	0.005		0.005	
CY_18-C2 Larnaca East	1	0.005	0.01	0.005	0.01	0.005	0.005	0.005	0.025	0.005	3.925
CY_22-C3 Protaras	1	0.005	0.01		0.01	0.005	0.005			0.005	10
CY_3-C2 Polis Chrysochous	1										6.05
MEDITS 1	2										
MEDITS 2	2										
MEDITS 3	2										
MEDITS 4	2										
MEDITS 5	2										
MEDITS 6	2										
MEDITS 7	2										
MEDITS 8	2										
MEDITS 9	2										
MEDITS 10	2										
MEDITS 11	2										
MEDITS 12	2										
MEDITS 13	2										
MEDITS 14	4.5										
MEDITS 15	2										
MEDITS 16	2										
MEDITS 17	2										
MEDITS 19	2										
MEDITS 20	2										
MEDITS 21	2										
MEDITS 22	2										
MEDITS 23	2										
MEDITS 24	2										
MEDITS 25	2										
MEDITS 27	2										
MEDITS 28	2										
AvG 2017-22	1.909	0.005	0.01	0.005	0.01	0.0075	0.005	0.005	0.025	0.005	4.83
AvG 2012-16	1					0.005			0.015		
PSD TV	1.3					1			0.030		

3. Sediment

The average value of the medians for the years 2017-2022 was calculated for the contaminants and is presented in Table 56. UNEP/MAP has set TVs for Hg, Pb and ΣPAHs for the Eastern Mediterranean sub-region (UNEP/MED IG.26/6, Decision 26/3: The 2023 Mediterranean Quality Status Report and a Renewed Ecosystem Approach Policy in the Mediterranean). The average values are compared to the TVs and the results are shown in Table 56. The values of the contaminants measured in the previous MSFD cycle 2012-2016 are also shown in the same table.

Table 56. Average values of annual medians in sediments in mg/kg dw. Al and Fe in %.

Year	2017	2018	2019	2020	2021	2022	2017 - 2022	2012 - 2016	UNEP/MAP TV	GES
Al						3.2	3.2			Unknown
As		12	9.5	11	19	8	11.9			Unknown
Cd	3.7	2	1.75	2	0.5	5	2.49	2.46		Unknown
Cr	98.4	82	71.5	92.5	20	157.5	86.98	94.35		Unknown
Cu	44.5	43	30.5	52	12	69.5	41.91	57.36		Unknown
Fe	3.1	2.8	1.7	2.9	0.5	2.85	2.3	2.68		Unknown
Hg	0.015	0.015	0.015	0.037	0.0115	0.0225	0.019	0.015	0.15	In GES
Ni	47.4	43	36.5	73.5	12	76	48.06	52.35		Unknown
Pb	44.2	32	14.5	53.5	14	42.5	33.45	28.25	46.7	In GES
Zn	54.4	53	31.5	58.5	23	75	49.23	64.03		Unknown
Anthracene		<LOQ	<LOQ	<LOQ			<LOQ		4.022	In GES
Benzo(a)pyrene		<LOQ	<LOQ	<LOQ			<LOQ			
Benzo(b)chrysene		<LOQ	<LOQ				<LOQ			
Benzo(b)fluoranthene		<LOQ	<LOQ	<LOQ			<LOQ			
Benzo(g,h,i)perylene		<LOQ	<LOQ	<LOQ			<LOQ			
Benzo(k)fluoranthene		<LOQ	<LOQ	<LOQ			<LOQ			
Fluoranthene		<LOQ	<LOQ	<LOQ			<LOQ			
Indeno(1,2,3,c,d)pyrene		<LOQ	<LOQ	<LOQ			<LOQ			

As indicated in the methodology, D8C1 contains two indicators according to GES Decision and Article 8a(1)(a) of Directive 2008/105/EC:

- Indicator 8.1.1 Concentration of ubiquitous, persistent, bio accumulative and toxic substances (uPBTs)

  Based on the data analyses for the period 2017-2022, the overall results of the assessment for the Indicator 8.1.1 *"Concentration of ubiquitous, persistent, bio accumulative and toxic substances (uPBTs)"*, are presented in Table 57. The substances were found to be either in GES or unknown status due to the absence of TVs. Only Hg in biota was found to be not in GES. Additionally, some priority substances were not measured, so no data are available. These substances are Tributyltin compounds, Perfluorooctane sulfonic acid and its derivatives (PFOS) (measured for D9), Dioxins and dioxin-like compounds (measured for D9) and Hexabromocyclododecane (HBCDD).

- Indicator 8.1.2 Concentration of non-ubiquitous, persistent, bio accumulative and toxic substances (non-uPBTs)

  Based on the data analyses for the period 2017-2022, the overall results of the assessment for the Indicator 8.1.2 *"Concentration of non-ubiquitous, persistent, bioaccumulative and toxic substances (non-uPBTs)"* are presented in Table 58. The substances were found to be either in GES or unknown status due to the absence of TVs. Additionally, some priority substances were not measured, so no data are available. These substances are Benzene, Carbon-tetrachloride, C10-13 Chloroalkanes, 1,2-Dichloroethane, Dichloromethane, Di(2-ethylhexyl)-phthalate (DEHP), Endosulfan, Tetrachloro-ethylene, Trichloro-ethylene, Trichloro-benzenes, Trichloro-methane, Quinoxyfen, Aclonifen, Bifenox, Cybutryne, Cypermethrin, Dichlorvos and Terbutryn.

Table 57. Concentration of ubiquitous persistent, bio accumulative and toxic substances (uPBTs).

Priority Substances	Substance	Matrix	GES	Comments
5	Brominated diphenylethers	Biota	Unknown	
21	Mercury and its compounds	*Boops boops*	Not in GES	
		Mullus barbatus	Not in GES	
		sediment	In GES	
		water	In GES	
28	Benzo(a)pyrene	*Boops boops*	In GES	
		Mullus barbatus	In GES	
		sediment	In GES	
		water	In GES	
	Benzo(b)chrysene	sediment	In GES	
	Benzo(b)fluoranthene	*Boops boops*	In GES	
		Mullus barbatus	In GES	
		sediment	In GES	
		water	In GES	
	Benzo(g,h,i)perylene	sediment	In GES	
		water	In GES	
	Benzo(k)fluoranthene	sediment	In GES	
		water	In GES	
	Dibenzo(a,h)anthracene	water	In GES	
	Total PAHs (Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(ghi)perylene, Indeno(1,2,3-cd)pyrene)	*Boops boops*	In GES	
		Mullus arbatus	In GES	
30	Tributyltin compounds	water	Unknown	No data
35	Perfluorooctane sulfonic acid and its derivatives (PFOS)	Biota	Unknown	No data
37	Dioxins and dioxin-like compounds	Biota	Unknown	No data
43	Hexabromocyclododecane (HBCDD)	Biota	Unknown	No data
44	Heptachlor and heptachlor epoxide	*Boops boops*	In GES	
		Mullus barbatus	In GES	

Table 58. Concentration of non-ubiquitous persistent, bio accumulative and toxic substances (non-uPBTs).

Priority Substances	Substance	Matrix	GES	Comments
1	Alachlor	water	In GES	
2	Anthracene	sediment	Unknown	
		water	In GES	
3	Atrazine	water	In GES	
4	Benzene	water	Unknown	No data
6	Cadmium and its compounds	*Boops boops*	Unknown	
		Mullus barbatus	Unknown	
		sediment	Unknown	
		water	Unknown	
6a	Carbon-tetrachloride	water	Unknown	No data
7	C10-13 Chloroalkanes	water	Unknown	No data
8	Chlorfenvinphos	water	In GES	
9	Chlorpyrifos	water	In GES	
9a	Aldrin	*Boops boops*	In GES	
		Mullus barbatus	In GES	
	Dieldrin	*Boops boops*	In GES	
		Mullus barbatus	In GES	
	Endrin	*Boops boops*	In GES	
		Mullus barbatus	In GES	

Priority Substances	Substance	Matrix	GES	Comments
9b	Total DDT (DDT,p,p'+DDT,o,p'+DDE,p,p'+DDD,p,p')	*Boops boops*	In GES	
		Mullus barbatus	In GES	
10	1,2-Dichloroethane	water	Unknown	No data
11	Dichloromethane	water	Unknown	No data
12	Di(2-ethylhexyl)-phthalate (DEHP)	water	Unknown	No data
13	Diuron	water	In GES	
14	Endosulfan	water	Unknown	No data
15	Fluoranthene	sediment	In GES	
		water	In GES	
16	Hexachlorobenzene	*Boops boops*	In GES	
		Mullus barbatus	In GES	
17	Hexachlorobutadiene	*Boops boops*	In GES	
		Mullus barbatus	In GES	
18	alpha-HCH	*Boops boops*	In GES	
		Mullus barbatus	In GES	
	Beta-HCH	*Mullus barbatus*	In GES	
19	Isoproturon	water	In GES	
20	Lead and its compounds	*Boops boops*	Unknown	
		Mullus barbatus	Unknown	
		sediment	In GES	
		water	Unknown	
22	Naphthalene	water	In GES	
23	Nickel and its compounds	*Boops boops*	Unknown	
		Mullus barbatus	Unknown	
		sediment	Unknown	
		water	In GES	
28	Indeno(1,2,3,-cd)pyrene	sediment	In GES	
	ΣPAH9:anthracene;benzo[a]anthracene;benzo[ghi]perylene;benzo[a]pyrene;chrysene;fluoranthene;indeno[1,2,3-cd]pyrene;pyrene;phenanthrene	sediment	In GES	
29	Simazine	water	In GES	
29a	Tetrachloro-ethylene	water	Unknown	No data
29b	Trichloro-ethylene	water	Unknown	No data
31	Trichloro-benzenes	water	Unknown	No data
32	Trichloro-methane	water	Unknown	No data
33	Trifluralin	water	In GES	
34	Dicofol	*Boops boops*	In GES	
		Mullus barbatus	In GES	
		water	Unknown	
36	Quinoxyfen	water	Unknown	No data
38	Aclonifen	water	Unknown	No data
39	Bifenox	water	Unknown	No data
40	Cybutryne	water	Unknown	No data
41	Cypermethrin	water	Unknown	No data
42	Dichlorvos	water	Unknown	No data
45	Terbutryn	water	Unknown	No data
	Acenaphthene	water	Unknown	
	Aluminium and its compounds	sediment	Unknown	
	Arsenic and its compounds	*Boops boops*	Unknown	
		Mullus barbatus	Unknown	
		sediment	Unknown	
	Benz(a)anthracene	*Boops boops*	In GES	
		Mullus barbatus	In GES	
		water	Unknown	
	Chromium and its compounds	*Boops boops*	Unknown	

Priority Substances	Substance	Matrix	GES	Comments
		Mullus barbatus	Unknown	
		sediment	Unknown	
		water	Unknown	
	Chrysene	*Boops boops*	In GES	
		Mullus barbatus	In GES	
		water	Unknown	
	Copper and its compounds	*Boops boops*	Unknown	
		Mullus barbatus	Unknown	
		sediment	Unknown	
		water	Unknown	
	Dimoxystrobin	water	Unknown	
	Fluorene	water	Unknown	
	Gamma-HCH (Lindane)	*Boops boops*	In GES	
		Mullus barbatus	In GES	
	Imazalil	water	Unknown	
	Iron and its compounds	*Boops boops*	Unknown	
		Mullus barbatus	Unknown	
		sediment	Unknown	
		water	Unknown	
	Metaflumizone	water	Unknown	
	Penconazole	water	Unknown	
	Phenanthrene	water	Unknown	
	Prochloraz	water	Unknown	
	Pyrene	water	Unknown	
	Tebuconazole	water	Unknown	
	Tetraconazole	water	Unknown	
	Trimethoprim	water	Unknown	
	Zinc and its compounds	*Boops boops*	Unknown	
		Mullus barbatus	Unknown	
		sediment	Unknown	
		water	Unknown	

D8C3: Significant acute pollution events

Methodology

Criterion D8C3 of the GES Decision is defined as "*The spatial extent and duration of significant acute pollution events are minimised*". The Shipping Deputy Ministry of the Republic of Cyprus monitors acute pollution events that occur in Cyprus marine waters, based on MARPOL 73/78 (N.57/1989). CleanSeaNet of the European Maritime Safety Agency (EMSA), the Joint Rescue Coordination Centre (JRCC) and the DFMR, participate in the detection, evaluation and response to any incidents. After an incident has been reported, the Shipping Deputy Ministry, JRCC, and DFMR, visit and check the reported area to identify the pollution and assess the situation. Then they decide how to proceed on measures for the management of the pollution created.

No method has been agreed yet on EU level or in Regional Seas for the assessment of acute pollution events, so Cyprus cannot assess GES based on this Criterion (Table 60).

Results

The results of monitoring for acute pollution events for the years 2017-2022 are shown in Table 59. Only six incidents of such events were identified in the assessment area and period. In all cases, direct measures were applied, and penalties were imposed to the vessels causing the pollution, as per Cyprus Legislation. It is noted that different kinds of discharges or leaks have been identified, in terms of the material or substance discharged or its quantity. Oil residues were identified in three incidents, sewage effluents in two incidents, and cement residues in one incident. The most significant event was the leakage of oil in a power plant in Syria that extended to an area of around 560 nm², including part of the EEZ of Cyprus, and reached as close as 12.3 nm from Cyprus coasts.

Table 59. Information on the acute pollution events for the period 2017-2022 (LCA: Larnaca; LIM: Limassol).

A/A	1	2	3	4	5	6
Operational activity	Innocent Passage	Movement of vessels in/out of port limits	Anchorage	Innocent Passage	Innocent Passage	
Incident description	Discharge into the sea of effluents containing sewage/black water (1000x30m)	Lot of cement dusted at sea	Sewage waste at sea	Oil residues in the sea (area of 1.30 nm²)	Oil residues in the sea (area 2.33 nm²)	Oil sheen (area 562.37 nm²)
Reported / Detected by	Paralimni Naval Station	JRCC	VTS Limassol	CleanSeaNet /EMSA	CleanSeaNet/ EMSA	CleanSeaNet/E MSA
Year / Month	31/12/2019	04/10/2019	03/08/2019	18/02/2020	25/03/2020	29/08/2021
Cause / Reason for incident		Cleaning Cargo System	Animals sewage leakage to the deck and then to the sea via scuppers.			Powerplant from Syria
Consequences / Effects						
Procedure reference	MARPOL 73/78 (N.57/1989)	MARPOL 73/78 (N.57/1989)	MARPOL 73/78 (N.57/1989)	MARPOL 73/78 (N.57/1989)	MARPOL 73/78 (N.57/1989)	MARPOL 73/78 (N.57/1989)
Documentation / reporting						
Response to incident						
Penalties / Sanctions	After investigation a penalty was confirmed	After investigation a penalty was confirmed	After investigation a penalty was confirmed	After investigation a penalty was confirmed	After investigation a penalty was confirmed	
Penalty amount	€ 2,000	€ 8,000	€ 8,000	€ 5,000	€ 5,000	
City / Bay	LCA	LCA	LIM	LIM	LIM	
Position (Lat Lon)	35 01N 034 12E	34 24N 033 30E	Limassol anchorage	34.55690 33.06916	34.43454 33.05060	Distance from Cyprus 12.325 nm

Table 60. GES assessment summary for D8.

Descriptor	Criterion	Indicator	Feature/Element	TV	GES
D8: Concentrations of contaminants are at levels not giving rise to pollution effects	D8C1 (Primary): Within coastal and territorial waters, the concentrations of contaminants do not exceed the following threshold values: (a) for contaminants set out under point 1(a) of criteria elements, the values set in accordance with Directive 2000/60/EC; (b) when contaminants under point (a) are measured in a matrix for which no value is set under Directive 2000/60/EC, the concentration of those contaminants in that matrix established by Member States through regional or subregional cooperation; (c) for additional contaminants selected under point 1(b) of criteria elements, the concentrations for a specified matrix (water, sediment or biota) which may give rise to pollution effects	C.Y. 8.1.1: Concentration of ubiquitous, persistent, bio accumulative and toxic substances (uPBTs)	See Table 57	OOAO	Not in GES
		CY. 8.1.2: Concentration of non-ubiquitous, persistent, bio accumulative and toxic substances (non-uPBTs)	See Table 58	OOAO	In GES
	D8C3 (Primary): The spatial extent and duration of significant acute pollution events are minimised	CY. 8.3: Number of spills and illegal discharges	See Table 59	Not set	Unknown

3.3.9 Contaminants in seafood (D9)

D9C1: Contaminants in fish and other seafood for human consumption

Methodology

Criterion D9C1 of the GES Decision is defined as "*The level of contaminants in edible tissues (muscle, liver, roe, flesh or other soft parts, as appropriate) of seafood (including fish, crustaceans, molluscs, echinoderms, seaweed and other marine plants) caught or harvested in the wild (excluding fin-fish from mariculture) does not exceed: (a) for contaminants listed in Regulation (EC) No 1881/2006, the maximum levels laid down in that Regulation, which are the Threshold Values for the purposes of this Decision; (b) for additional contaminants, not listed in Regulation (EC) No 1881/2006, threshold values, which Member States shall establish through regional or subregional cooperation*".

The Republic of Cyprus (Ministry of Health and Veterinary Services, Ministry of Agriculture, Rural Development and Environment) monitors the contaminants in seafood harvested in the sea of Cyprus, based on Regulation (EC) No 1881/2006 and its amendments. Fish specimens are collected from the local market and directly from local fishermen. These specimens are analysed by the State General Laboratory of the Ministry of Health, which is accredited for this kind of analyses. The PFOS, PFOA, PFNA and PFHxS analyses are performed in the National Centre of Scientific Research "Demokritos", Athens, Greece. The contaminants measured according to the Regulation (EC) No 1881/2006 are the following:

- Lead, Cadmium and Mercury in tissues of *Boops boops, Xiphias gladius, Thunnus spp., Spicara smaris, Parapenaeus longirostris* and *Myliobatoidei*.
- Sum of dioxins, Dioxins and dioxin-like compounds, Non-dioxin like PCBs, PFOS, PFOA, PFNA and PFHxS in tissues of *Thunnus spp*.

For the assessment of D9C1, the values of each sample, for each parameter, are compared to the maximum levels for certain contaminants in food, Annex I of the Regulation. Furthermore, a proportion threshold of ≥90% of samples achieving TV is applied. This means that more than 90% of samples analysed for one contaminant must be above the relevant threshold defined in the Regulation.

Finally, the total GES is assessed, based on the proportion (%) of substances in Good Status. The threshold set in this case is "≥ 90% of substances to be in good status in order to achieve GES". This means that more than 90% of substances assessed must be in Good Status.

Results

The results of the assessment for the different contaminants are shown in Table 61. According to the above methodology, the proportion threshold of ≥90% of samples achieving TV was achieved by all species for every contaminant, except for "Mercury and its compounds" in *Xiphias gladius*, for which 75% of samples were below the threshold of 1 mg/kg WW and 25% of samples were above the 1 mg/kg WW, as defined by the Regulation.

Table 61. Assessment of contaminants.

Contaminant	Species	GES (≥90% of samples below T.V.)
Lead and its compounds	*Boops boops*	100% - In GES
Lead and its compounds	*Xiphias gladius*	100% - In GES
Lead and its compounds	*Thunnus spp.*	100% - In GES
Lead and its compounds	*Spicara smaris*	100% - In GES
Lead and its compounds	*Parapenaeus longirostris*	100% - In GES
Lead and its compounds	*Myliobatoidei*	100% - In GES
Cadmium and its compounds	*Boops boops*	100% - In GES
Cadmium and its compounds	*Spicara smaris*	100% - In GES
Cadmium and its compounds	*Parapenaeus longirostris*	100% - In GES
Cadmium and its compounds	*Myliobatoidei*	100% - In GES
Cadmium and its compounds	*Thunnus spp.*	100% - In GES
Cadmium and its compounds	*Xiphias gladius*	100% - In GES
Mercury and its compounds	*Boops boops*	100% - In GES
Mercury and its compounds	*Spicara smaris*	100% - In GES
Mercury and its compounds	*Parapenaeus longirostris*	100% - In GES
Mercury and its compounds	*Myliobatoidei*	100% - In GES
Mercury and its compounds	*Xiphias gladius*	75% - Not in GES
Mercury and its compounds	*Thunnus* spp.	100% - In GES
Sum of dioxins (WHO-PCDD/F-PCB-TEQ)	*Thunnus* spp.	100% - In GES
Dioxins and dioxin-like compounds (7 PCDDs + 10 PCDFs + 12 PCB-DLs)	*Thunnus* spp.	100% - In GES
Non-dioxin like PCBs (sum of 6 PCB: 28, 52, 101, 138, 153 and 180)	*Thunnus* spp.	100% - In GES
Perfluorooctane sulfonic acid (PFOS) and its derivatives	*Thunnus* spp.	100% - In GES
Perfluorooctanoic acid (PFOA)	*Thunnus* spp.	100% - In GES
Perfluorononanoate (PFNA)	*Thunnus* spp.	100% - In GES
Perfluorohexane sulfonate (PFHxS)	*Thunnus* spp.	100% - In GES
Proportion (%) of substances in Good Status - Overall status		**96% - In GES**

Based on the above, 96% (24 of 25) of the contaminants in seafood are in good status and the threshold "≥90% of substances to be in good status in order to achieve GES" is achieved.

As a result, Criterion D9C1 "*The level of contaminants in edible tissues (muscle, liver, roe, flesh or other soft parts, as appropriate) of seafood (including fish, crustaceans, molluscs, echinoderms, seaweed and other marine plants) caught or harvested in the wild (excluding fin-fish from mariculture) does not exceed: (a) for contaminants listed in Regulation (EC) No 1881/2006, the maximum levels laid down in that Regulation, which are the Threshold Values for the purposes of this Decision; (b) for additional contaminants, not listed in Regulation (EC) No 1881/2006, threshold values, which Member States shall establish through regional or subregional cooperation*", is in GES (Table 62).

Table 62. GES assessment summary for D9.

Descriptor	Criterion	Indicator	Feature / Element	TV	GES
D9: Contaminants in fish and other seafood for human consumption	D9C1 (Primary): The level of contaminants in edible tissues (muscle, liver, roe, flesh or other soft parts, as appropriate) of seafood (including fish, crustaceans, molluscs, echinoderms, seaweed and other marine plants) caught or harvested in the wild (excluding fin-fish from mariculture) does not exceed: (a) for contaminants listed in Regulation (EC) No 1881/2006, the maximum levels laid down in that Regulation, which are the Threshold Values for the purposes of this Decision; (b) for additional contaminants, not listed in Regulation (EC) No 1881/2006, threshold values, which Member States shall establish through regional or subregional cooperation	C.Y. 9.1: Concentrations of contaminants (µg/l) in seafood	See Table 61	≥ 90% of samples below T.V.	In Ges

3.3.10 Marine Litter (D10)

"*Marine litter (marine debris) is any persistent, manufactured or processed solid material discarded, disposed of or abandoned in the marine and coastal environment" (UNEP, 2005).* Marine littering and plastic pollution are threatening the oceans, marine animals and human health. When plastic litter is disposed on land, plastic often ends up in the marine system and disintegrates into microplastics that can easily be integrated to the food web. It is important, not only because of its direct environmental impacts, but also due to the effects of marine litter on economic activities such as tourism and fisheries, on which, islands like Cyprus are directly dependent.

The Republic of Cyprus has selected four Criteria to be assessed, D10C1-D10C4, which are described below.

D10C1: The composition, amount and spatial distribution of litter on the coastline, in the surface layer of the water column, and on the seabed, are at levels that do not cause harm to the coastal and marine environment.

Methodology

I. Marine litter on the coastline

Criterion D10C1 of the GES Decision is defined as "*The composition, amount and spatial distribution of litter on the coastline, in the surface layer of the water column, and on the seabed, are at levels that do not cause harm to the coastal and marine environment*".

The Republic of Cyprus assesses marine litter on the coastline since 2018, in seven beaches (Makronissos beach in Ammochostos, Alykes-Airport beach in Larnaca, Governor's beach in Limassol, Faros Pafou, Lara beach, Sideronissia and Polis Chrysochous in Pafos) (Figure 32).

Samplings are implemented following the "*Guidance on Monitoring of Marine Litter in European Seas*", developed by the EU MSFD Technical Group for Marine Litter (TSG-ML), according to which, all marine litter items greater than 2.5 cm are collected along one or two 100 m transects from each beach, classified to categories according to the Joint List of Litter Categories for Marine Macrolitter Monitoring, and counted. The total number of marine litter items for each of the categories (artificial polymer materials, rubber, cloth/textile, paper/cardboard, processed/worked wood, metal, glass/ceramics, chemicals, undefined, and food waste) are estimated.

The reporting unit of Criterion D10C1, as set in the GES Decision, is the "*amount of litter per category in number of items per 100 metres (m) on the coastline*". Furthermore, the TV to reach GES for the coastline was set to 20 items per 100 m and adopted at the 2022 Marine Strategy Coordination Group (MSCG) meeting (14/11/2022).

To calculate whether D10C1 is in GES for the coastline, the median of the marine litter per category and of the total densities of marine litter along the 100 m transect, considering all the beaches and seasons, were calculated per year. Following that, the average value of the medians for the years 2018-2022 was compared to the TV of 20 items/100 m beach, to assess whether D10C1 is in GES.

II. Marine litter in the surface layer of the water column

The monitoring program for collecting data on marine litter in the surface layer of the water column has not yet started, therefore, the status is considered unknown.

III. Marine litter on the seabed

Criterion D10C1 of the GES Decision is defined as "*The composition, amount and spatial distribution of litter on the coastline, in the surface layer of the water column, and on the seabed, are at levels that do not cause harm to the coastal and marine environment"*. The reporting unit of Criterion D10C1, as set in the GES Decision, is the "*amount of litter per square kilometre (km^2)".* The TV to reach GES for the seabed of the Mediterranean was set to 38 items per km^2 in the framework of the Barcelona Convention, UNEP/MAP level (Decision UNEP/MED IG.26/22). In accordance with the assessment methodology, in 2016, the Integrated Monitoring and Assessment Programme of the Mediterranean Sea and Coast (IMAP, Ecological Objective 10), established reference values and environmental objectives, in collaboration with the Contracting Parties of the Barcelona Convention for Common Indicator 23, which covers the seabed litter, as well as floating microplastics. As a result of the process, in the Quality Status Report (QSR) published in 2023, UNEP/MAP updated the reference values and established the TVs, with 38 items/km^2 being the approved TV for the total of seabed litter.

The Republic of Cyprus assessed the marine litter on the seabed through three methods:

A. Shallow depths (<30 m) via scuba diving,
B. Depths 0-800 m via the MEDITS programme, and
C. Optical method in deep-sea areas with the use of ROV in the framework of Eratosthenes one-off research project.

Details on each of the methodologies and the results are presented below. To assess whether D10C1 is in GES for the overall seabed, the average value of the amount of litter per km^2 in the three methods was considered.

A. Shallow depths (<30m) - scuba diving

The Republic of Cyprus assessed the marine litter on the seabed at depths less than 30 m between the years 2018 and 2019, in six coastal areas (Kavo Gkreko MPA and Makronissos beach in Ammochostos, Alykes-Airport beach in Larnaca, Governor's beach in Limassol, Faros beach, Lara beach, and Polis-Limni in Pafos) (Figure 32), as part of the projects MELTEMI (Marine Litter Transnational Legislation Enhancement and Improvement Project) and RECONNECT **(**Regional Cooperation for the Transnational Ecosystem Sustainable Development Project), funded by Interreg V-B Balkan-Mediterranean European 2014-2020. Samplings were carried out following the Protocol "*Guidance on Monitoring of Marine Litter in European Seas*", developed by the TSG-ML, according to which all marine litter items greater than 2.5 cm are collected by scuba divers along one or two 100 m transects covering 4 m in width on both sides, classified to categories according to the Joint List of Litter Categories for Marine Macrolitter Monitoring, and counted. The Density (D) of marine litter items for each of the categories (artificial polymer materials, rubber, cloth/textile, paper/cardboard, processed/worked wood, metal, glass/ceramics, chemicals, undefined, and food waste) and the total of all categories were calculated for each transect line/s. In order to estimate the total densities of marine litter per km^2, the total densities for the surveyed area were also converted to km^2.

The reporting unit of Criterion D10C1, as set in the GES Decision, is the "*amount of litter per square kilometre (km^2)*". The TV to reach GES for the seabed has been set to 38 items per km^2 at the UNEP/MAP level (Decision UNEP/MED IG.26/22).

To calculate whether D10C1 was in GES for the shallow seabed, the median of the marine litter per category and of the total densities of marine litter were estimated per year, considering all seabed areas and seasons. Following that, the average value of the medians for the years 2018-2019 was compared to the TV, being 38 items/km^2, to assess whether D10C1 was in GES.

B. Depths 0-800m - MEDITS trawl surveys

The Republic of Cyprus assessed marine litter in the period 2017-2022 in 26 trawling stations of the MEDITS Programme on the seabed of national waters. At each of the investigated sites, all marine litter items collected during the hauls, were recorded according to the MEDITS Protocol.

Abundance of marine litter on the seabed (items/km^2) was assessed for the total and for each one of the categories artificial polymer materials, rubber, cloth/textile, paper/cardboard, processed/worked wood, metal, glass/ceramics, other and undefined. The Density (D) of marine litter items for each of the categories and the total, were estimated for each haul. To estimate the total densities of marine litter per km^2, the coverage of each haul was also estimated (swept-area method). The reporting unit of Criterion D10C1, as set in the GES Decision, is the "*amount of litter*

per square kilometre (km^2)". The TV to reach GES for the seabed was set to 38 items per km^2 by UNEP/MAP.

Furthermore, to define each of the GES classes (very good, good, moderate, poor or bad environmental status), a comparison of the abundances of marine litter collected per haul with the defined TV for the period 2017-2022 was made. For this, a GES class is applied to the haul according to the ranges defined by UNEP/MAP, based on the difference between the collected abundance and the approved TV. If the abundance of marine litter collected is half of the TV (x < 0.5*TV), the haul is considered to be in a very good environmental status, if it falls between half of the TV and the TV (0.5*TV > x < 1*TV), it is considered to be in good environmental status, if it falls between the TV and twice the TV (1*TV > x < 2* TV), it is considered to be in a moderate environmental status, if it falls between two and five times the TV (2*TV > x < 5*TV), it is considered to be in poor environmental status, and if it is greater than five times the TV (x > 5*TV), it is considered to be in bad environmental status (Table 63).

Table 63. GES classes defined by the Barcelona Convention UNEP/MAP, according to the TV approved for total seabed marine litter (38 items/km^2).

Ranges	GES Class
x < 0.5*TV	Very good
0.5*TV > x < 1* TV	Good
1*TV > x < 2* TV	Moderate
2*TV > x < 5*TV	Poor
x > 5*TV	Bad

To assess whether D10C1 for the seabed is in GES, the average of the median values of the marine litter densities, per category, per year, considering all the sampled seabed sites, was estimated. In total, 156 hauls were included in the calculations. This value was compared with the TV (38 items/km^2), to assess whether the D10C1 was in GES.

C. Deep Sea - ROV visual survey

The Republic of Cyprus assessed deep sea marine litter at 11 sites on the Eratosthenes Seamount, in the framework of the Eratosthenes Project, between the 30 December and 7 January 2021 (Figure 33). At each of the investigated sites, the seafloor was visually inspected using an ROV along gridded transects, covering an area of 100x100 m (1 ha). On site, all seabed marine litter items were photographed and recorded. All ROV videos were also post-reviewed by two independent observers and all marine litter items greater than 2.5 cm were counted, identified and classified into categories, according to the Joint List of Litter Categories of the TSG-ML guidelines. The Density (D) of marine litter items for each of the categories (artificial polymer materials, rubber, cloth/textile, paper/cardboard, processed/worked wood, metal, glass/ceramics, chemicals, undefined, and food waste) and in total, were calculated for each transect line.

To assess whether D10C1 is in GES for the deep seabed of the Eratosthenes seamount, the median value of the marine litter density per category and in total were estimated, considering all the surveyed seabed sites. This value was compared to the TV of 38 items/km^2, to assess whether D10C1 was in GES.

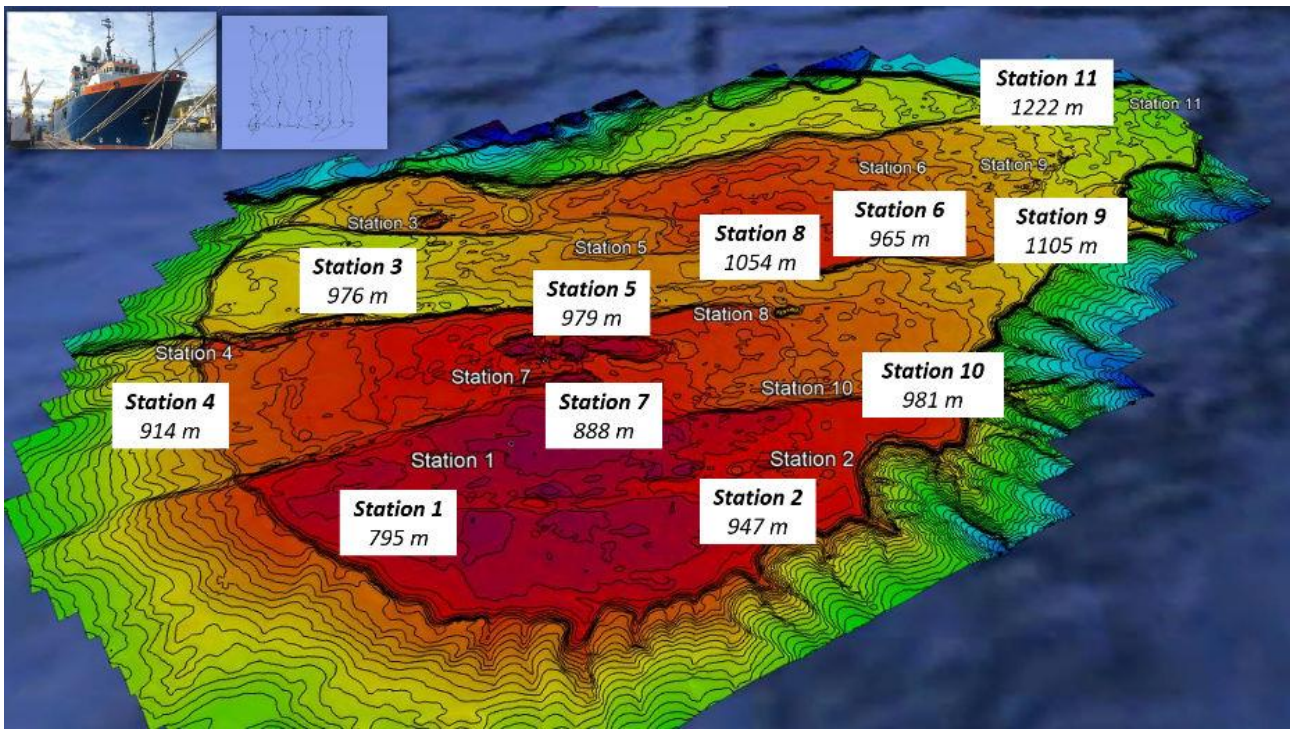

Figure 33. Location of sampling stations on the Eratosthenes seamount.

Results

I. Marine litter on the coastline

The number of items per 100 m on the coastline for the period 2018-2022, was found to be 282 (Table 64). As a result, Criterion D10C1 "*The composition, amount and spatial distribution of litter on the coastline, in the surface layer of the water column, and on the seabed, are at levels that do not cause harm to the coastal and marine environment*" was not in GES (Table 68).

Table 64. Marine litter items on the coastline reported and assessed for the reporting period 2017-2022.

Litter	2018	2019	2020	2021	2022	Average 2018-2022	GES (<20 items)
Plastic	117	156	335	397	155	232	Not in GES
Chemicals	0	0	1	2	0	1	
Cloth / textiles	3	3	3	6	4	4	
Food waste	0	0	0	0	0	0	
Glass / ceramics	6	2	14	5	3	6	
Paper / cardboard	2	1	2	9	3	3	
Metal	8	14	11	21	8	12	
Rubber	1	5	3	6	0	3	
Total marine litter	143	210	353	521	185	282	

II. Marine litter in the surface layer of the water column

Not assessed (see above).

III. Marine litter on the seabed

A. Shallow depths (<30m) by scuba diving

The number of items on the shallow seabed for the period 2018-2019 was found to be 5,000 items/km^2 (Table 65). Plastic items constituted 63% of the total, followed by metallic items (29%), while the remaining categories ranged between 1-3% (Figure 34). Examples of marine litter items collected from the seafloor are presented in Figure 35. Kavo Gkreko presented the highest number of litter recorded (Figure 36).

Based on the above, Criterion D10C1 "*The composition, amount and spatial distribution of litter on the coastline, in the surface layer of the water column, and on the seabed, are at levels that do not cause harm to the coastal and marine environment*" was not in GES.

Table 65. Assessment of GES in shallow seabed of Cyprus for the years 2018-2019.

Marine litter categories		Plastic	Chemicals	Glass / ceramics	Metal	Paper / cardboard	Rubber	TOTAL	Sampling survey area (km^2)	Total densities / km^2	Average of medians (items / km^2)	GES (<38 items / km^2)
Faros Pafou	(10/18)	4	0	0	0	0	0	4	0.0016	2500	5000	Not in GES
	(01/19)	0	0	0	0	0	0	0	0.0016	0		
	(03/19)	1	0	0	0	0	0	1	0.0016	625		
	(10/19)	0	0	0	0	0	0	0	0.0016	0		
Lara	(10/18)	11	0	1	4	2	0	18	0.0016	11250		
	(01/19)	0	0	0	0	0	0	0	0.0016	0		
	(03/19)	6	0	0	0	0	0	6	0.0016	3750		
	(10/19)	0	0	0	0	0	0	0	0.0016	0		
Governors beach	(19/3/19)	6	0	0	0	0	0	6	0.0016	3750		
Makronissos	(13/03/2019)	5	1	0	0	0	0	6	0.0016	3750		
Alikes	(13/03/2019)	1	0	0	0	0	0	1	0.0016	625		
Kavo Gkreko	Cyclops Cave (L1) (10/18)	16	0	2	22	0	2	42	0.0008	52500		
	Cyclops Cave (L2) (10/18)	9	0	0	2	0	0	11	0.0008	13750		
	Cyclops Cave (L3) (10/18)	6	0	0	1	0	0	7	0.0008	8750		
	Ayioi Anargyroi (L1) (10/18)	7	1	0	11	0	0	19	0.0008	23750		
	Ayioi Anargyroi (L2) (10/18)	25	0	1	12	1	0	39	0.0008	48750		
	Ayioi Anargyroi (L3) (10/18)	6	2	1	2	0	0	11	0.0008	13750		
	The Canyon (L1) (11/18)	4	0	1	0	0	0	5	0.0008	6250		
	The Canyon (L2) (11/18)	19	0	0	3	1	0	23	0.0008	28750		
	The Canyon (L3) (11/18)	9	0	0	0	1	0	10	0.0008	12500		

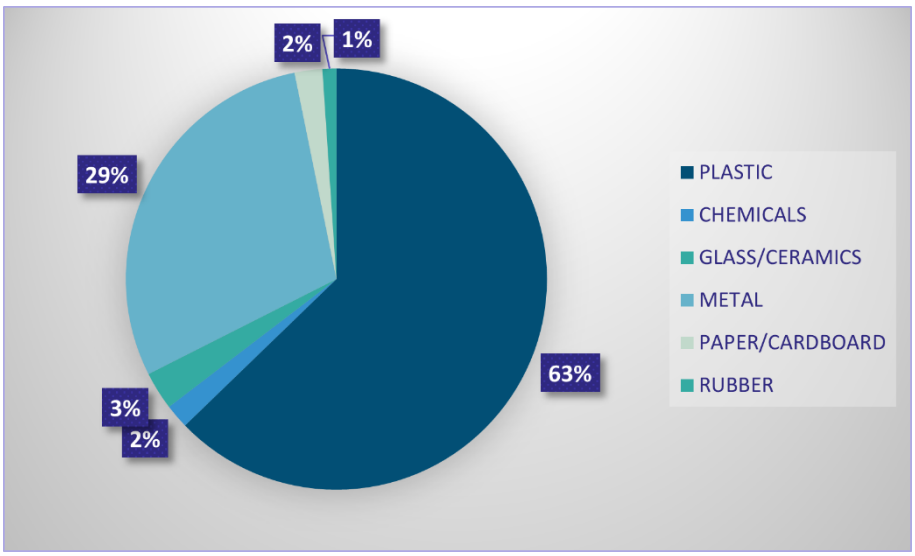

Figure 34. Percentage (%) of total marine litter recorded in shallow seabed per category for the period 2017-2022.

Figure 35. Examples of marine litter recorded in the seabed of Kavo Gkreko area as part of the RECONNECT Project (photos by MER Lab Ltd).

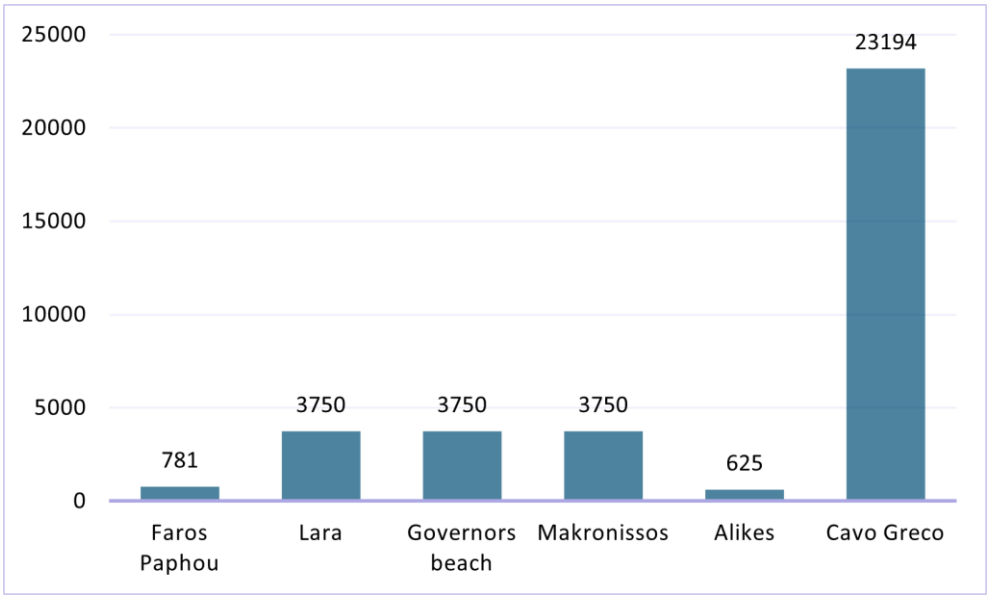

Figure 36. Marine litter average abundance on seabed per area for the period 2017-2022.

B. Depths 0-800m - Trawl surveys (MEDITS Programme)

The number of items on the seabed in 2017-2022 MEDITS surveys, was found to be 72 ± 56.6 items/km^2 (Tables 66 and 67). As a result, Criterion D10C1 "*The composition, amount and spatial distribution of litter on the coastline, in the surface layer of the water column, and on the seabed, are at levels that do not cause harm to the coastal and marine environment*" was not in GES (TV = 38 items/km^2). Of all types of seabed litter, 40.2% belonged to the plastic category, followed by categories glass/ceramic (17%), cloth and textile (8.5%), processed wood (8%), other (5.8%), paper and cardboard (5.6%), metal (5%), unspecified (5%), and rubber (4.7%) (Figure 37).

Table 66. Seabed marine litter environmental status based on MEDITS results for the period 2017-2022.

Haul	Depth(m)	Plastic	Rubber	Metal	Glass/Ceramic	Cloth (textile)/ Natural fibres	Wood processed (palettes, etc)	Paper & cardboard	Other	Unspecified	Median 2017-2022	Survey area (km^2)	items/km^2	Average (items/km^2	GES (<38items/km^2)
1	0-50	15	1	2	2	4					24	0.41445	58	72	Not in GES
2	50-100	4		4	1	1					10	0.4446	22		
3	100-200	8		1.5	11.5	1			1		23	0.457066	50		
4	200-500	93	1	6	23	7			17	1	148	0.962512	154		
5	0-50	13	1	3	23	4			17	1	62	0.469959	132		
6	50-100	10		1		1.5					12.5	0.421008	30		
7	50-100	22		1		4			2		29	0.439916	66		
8	50-100	8	1		1	1			1		12	0.420776	29		
9	0-50	7.5		1	2	2.5					13	0.43359	30		
10	50-100	30	1	1.5	1	8	8	1	1	1	52.5	0.24255	216		
11	50-100	25		5.5	1	5.5		15	1		53	0.4656	114		
12	0-50	8		1		1.5					10.5	0.49808	21		
13	50-100	17	1	2	1	4	18		5	1	49	0.422649	116		
14	100-200	4		1	1	2			1		9	0.564468	16		
15	100-200	14		1	1	3	1	2			22	0.44968	49		
16	500-800	68	1	9	4.5	6	1.5		3	10	103	0.709688	145		
17	500-800	40	1	3	1	7		1	1	1	55	0.755424	73		
19	500-800	60	2	4.5	3	11	3		1	1	85.5	0.971741	88		
20	100-200	13				2		2	1		18	0.53703	34		
21	200-500	18	1	4.5	44	13	2		2		84.5	1.160915	73		
22	200-500	23	1	7	31.5	8			3	3	76.5	1.087104	70		
23	100-200	8		1		1		1	1		12	0.460318	26		
24	50-100	3				1			1	1	6	0.41726	14		
25	0-50	5		1		1	1	1	4		13	0.47039	28		
27	50-100	5	1	1	1	2.5	1		1		12.5	0.484704	26		
28	500-800	61	21	2	28	20		2	1	8	143	0.754905	189		

Table 67. Seabed marine litter environmental status class.

Range	Status Class	No. of hauls	% of hauls	% of hauls
x < 0.5*TV	Very good	11	42.3	55.7%
0.5*TV > x < 1* TV	Good	4	15.4	
1*TV > x < 2* TV	Moderate	4	15.4	42.3%
2*TV > x < 5*TV	Poor	7	26.9	
x > 5*TV	Bad	0	0	

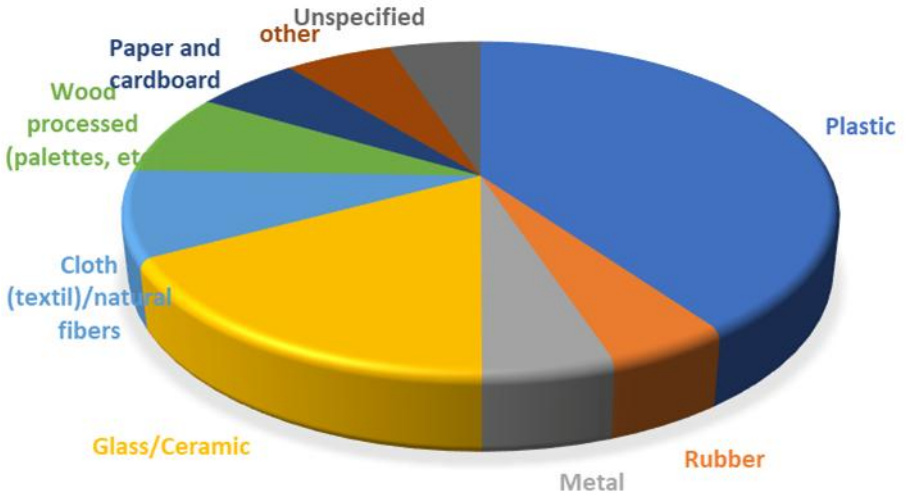

Figure 37. Categories of litter on the seabed (items/km^2) quantified during the MEDITS 2017-2022 surveys.

Finally, the overall litter density by depth zone (items/km^2) was estimated as follows, 0-50 m: 52.8, 50-100 m: 68.3, 100-200 m: 31.3, 200-500 m: 89.2 and 500-800 m: 123.7 (Figure 38).

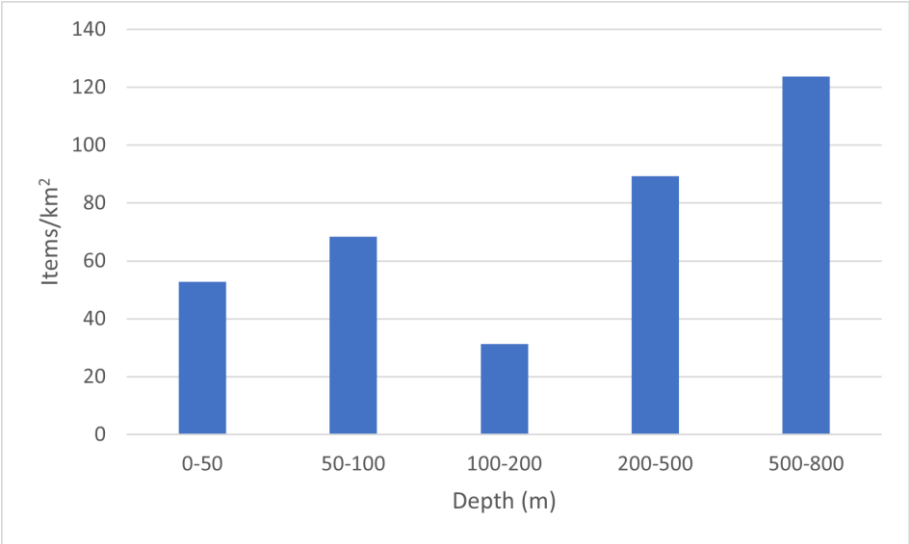

Figure 38. Marine litter on the seabed (items/km^2) per depth zone in MEDITS 2017-2022 surveys.

C. Deep Sea - Visual Surveys (ROV)

The number of items in the surveyed sites of Eratosthenes Seamount ranged between 700 and 2,100 items per km^2 (7-21 items/ha) (Rousou et al., in preparation). The median density was estimated to 1,200 items/km^2, which exceeded the TV of 38 items per km^2 (Table 68). The majority of items were plastics (44%), followed by metallic items (32%) (Figure 39). Representative marine litter items are shown in Figure 40.

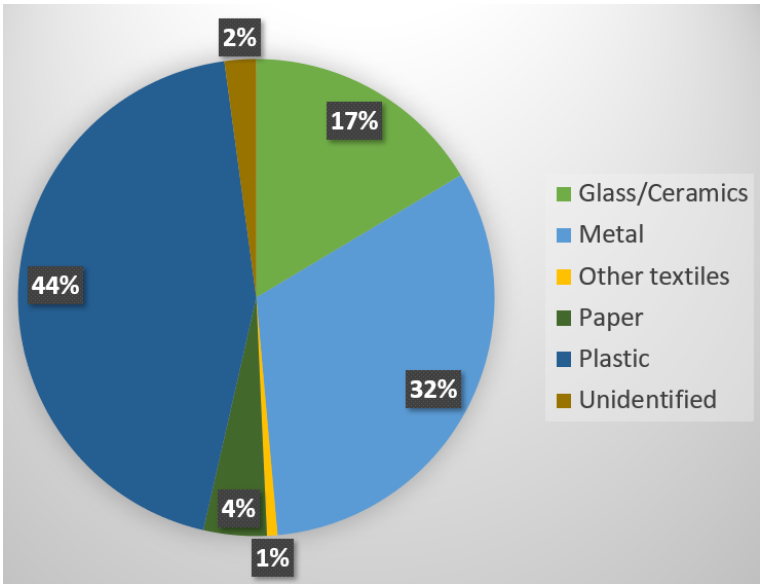

Figure 39. Percentage of marine litter items per category present on the Eratosthenes seamount.

As a result, Criterion D10C1 "*The composition, amount and spatial distribution of litter on the coastline, in the surface layer of the water column, and on the seabed, are at levels that do not cause harm to the coastal and marine environment*", was not in GES.

Table 68. Marine litter per category recorded at the Eratosthenes Seamount.

	Eratosthenes Seamount										
	St.1	**St.2**	**St.3**	**St.4**	**St.5**	**St.6**	**St.7**	**St.8**	**St.9**	**St.10**	**St.11**
Glass/Ceramics	4	0	5	2	0	2	5	1	2	0	2
Metal	3	8	2	3	3	11	2	5	2	4	2
Other textiles	0	0	0	0	0	1	0	0	0	0	0
Paper	0	0	0	4	1	0	0	0	0	0	1
Plastic	5	13	0	3	5	3	7	6	6	12	2
Unidentified	0	0	0	0	0	3	0	0	0	0	0
Total Densities items/ha	12	21	7	12	9	20	14	12	10	16	7
Total Densities items/km^2	1200	2100	700	1200	900	2000	1400	1200	1000	1600	700
Median value (items/km^2)	1200										
GES (<38itmes/km^2)	Not in GES										

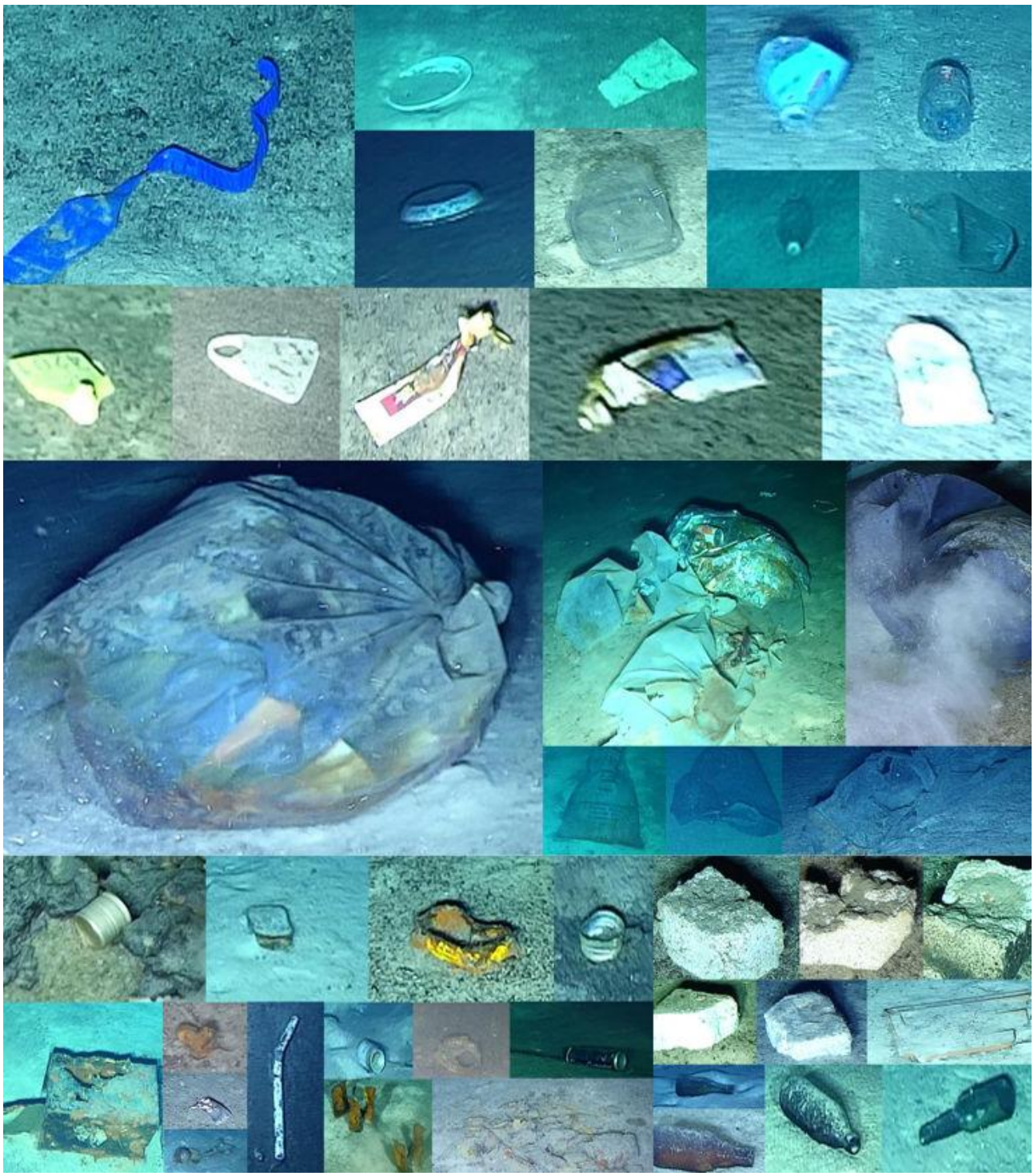

Figure 40. Examples of marine litter items recorded on the Eratosthenes Seamount.

GES Status Assessment for marine litter on the seabed

To assess the status on the seabed, the average density/km^2 values of the three types of seabed monitoring surveys were estimated and data are presented in Table 69. Based on the overall results, marine litter on the seabed is not in GES.

Table 69. GES assessment of marine litter on the seabed.

Seabed data	Median value (items/km²)	GES (<38 items/km²)	Average value (items/km²)	GES (<38 items/km²)
Shallow Depths (<30m) Scuba diving	5,000	Not in GES	2,090	Not in GES
Depths 0-800m Trawl surveys (MEDITS Programme)	72	Not in GES		
Deep Sea Visual Surveys (ROV)	1,200	Not in GES		

Overall status assessment for D10C1

The overall assessment summary of D10C1 is presented in Table 70.

Table 70. Marine macro-litter GES assessment.

	TV	2017-2022	GES
Marine litter on the coastline	GES: <20 items/100m transect line	282	Not in GES
Marine litter on surface layer of the water column	Not set	-	Unknown
Marine litter on the seabed	GES: <38items/km²	2,090	Not in GES

D10C2: The composition, amount and spatial distribution of micro-litter on the coastline, in the surface layer of the water column, and in seabed sediment, are at levels that do not cause harm to the coastal and marine environment.

Criterion D10C2 of the GES Decision is defined as "*The composition, amount and spatial distribution of micro-litter on the coastline, in the surface layer of the water column, and in seabed sediment, are at levels that do not cause harm to the coastal and marine environment"*. The reporting unit of Criterion D10C1, as set in the GES Decision, is the "*per kilogram (dry weight) (kg) of sediment for the coastline and for seabed*".

Furthermore, no TVs have been defined by the EU for micro-litter yet. In addition, in the framework of the Barcelona Convention, the content of microplastics in beach sand has not yet been defined as a Common Indicator for the assessment of the status of the marine environment and, consequently, no TVs exist to evaluate the results obtained in Cyprus.

In the following sections, information on the micro-litter methodologies and results, where available for the reporting period 2017-2022, is presented, however criterion D10C2 status is considered unknown at this point due to the lack of TVs.

Methodology

I. Micro-litter on the coastline

The Republic of Cyprus monitors micro-litter seasonally at six beaches (Makronissos beach in Ammochostos, Alykes-Airport beach in Larnaca, Governor's beach in Limassol, Faros beach, Lara

beach and Polis Chrysochous in Pafos) (Figure 32) by applying the methodology of TSG ML "*Guidance on Monitoring of Marine Litter in European Seas*". It should be noted that micro-litter sampling on beaches in Cyprus began in 2021, so the data collected do not cover the entire assessment period of 2017-2022. Specifically, five sampling points were defined along one 100 m transect line above the last high tide line. At each sampling point, a 0.5x0.5 m metallic quadrant was positioned on the beach and the contained sand up to 1 cm deep was collected. Five such samples were collected per 100 m of beach, per season. Each sand sample was then passed through a 5 mm metallic sieve and was subsequently homogenized. Then, 100 g of each sample underwent a separation process by flotation in a NaCl solution, to remove organic matter. The following parameters were then measured in each sample:

- Total number of microplastics per kg
- Number of fragments per kg
- Number of fibres per kg
- Number of pellets per kg
- Items per colour per kg

II. Micro-litter in the surface layer of the water column

The monitoring program for collecting micro-litter data on the surface layer of the water column started in 2023, therefore, data will be presented in the next reporting cycle.

III. Micro-litter on the seabed

Micro-litter seabed sampling for shallow depths (<30 m) via scuba diving began in 2024 and therefore no data are available for this cycle. However, micro-litter in the deep-sea were assessed in the framework of the Eratosthenes Project.

The Republic of Cyprus, assessed micro-litter at seven sites of Eratosthenes Seamount, in the framework of the Eratosthenes Project, between the 30 December and 7 January 2021. At each site, sediment samples were collected with a Van-Veen grab and stored in the freezer. Laboratory sediment post-processing analysis included drying and filtration of the sediment. Filters were then analysed using an infrared imaging microscope and an image processing software, according to GESAMP (2019). Analyses included the estimation in each sample of the number of micro-litter particles: (i) per kg, (ii) per size (20-500, 500-1000, 1000-5000 μm), (iIi) per colour; (iv) per shape (fragments; fibres; films; foam; beads) and (v) per type of polymer material (Castro et al., 2020; GESAMP, 2019).

Results

I. Micro-litter on the coastline

The average density of items on the coastline for the period 2021-2022 was found to be 221 items/kg of dry beach sand (Table 71), which is equivalent to 663 particles/m^2 of beach. Of the six beaches included in the monitoring program, the one with the highest average concentration of microplastics was Polis-Limni beach, with a value of 257.5 particles/kg, equivalent to 772.5 particles/m^2, followed by Larnaca airport beach with 233.2 particles/kg, equivalent to 700

particles/m^2 (Figure 41). The beach with the lowest concentration was Governor's beach, with 133.6 particles/kg (equivalent to 401 particles/m^2). Regarding the morphology of the microplastics, the majority were fragmented particles (63%) and fibres (27%) (Figure 42). Regarding colour classification, black particles were the most abundant (43%), followed by blue (22%) and white (20%) particles (Figure 43).

As no TVs have been defined for D10C2, either at the EU or UNEP/MAP level, its status is considered unknown (Table 73).

Table 71. Assessment of microplastics in Cyprus beaches for the period 2021-2022.

Beach	Year	items/kg				Average 2021-2022	Median	Items/m^2
		Median values						
		Fragments	Fibers	Other	Total			
Polis-Limni	2021	46.6	117.5	0	145	257.5	221	663
	2022	202.5	53.3	114.1	370			
Faros	2021	273.3	47.5	36.6	357.5	222.5		
	2022	77.5	8	2	87.5			
Makronissos	2021	150	75	0	200	219.1		
	2022	118.3	103.75	16.25	238.3			
Larnaca airport	2021	225.8	90.8	0	265.5	233.2		
	2022	155.2	31.5	14.2	201			
Governor's	2021	133.3	83.3	0	197.5	133.6		
	2022	59.7	8.6	1.3	69.7			
Lara	2021	60	76.2	73.7	210	183.7		
	2022	145	12.5	0	157.5			

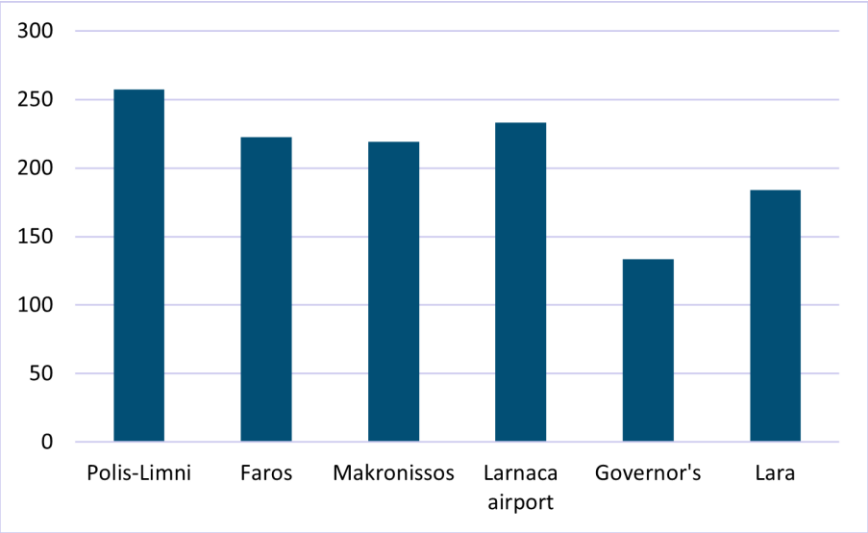

Figure 41. Average concentration (items/kg of sand) of microplastics on the sampled beaches of Cyprus during 2021-2022.

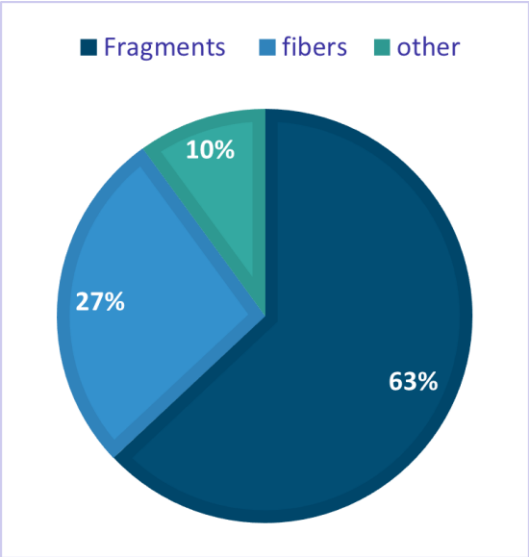

Figure 42. Percentages of microplastic particle types on the sampled beaches of Cyprus during 2021-2022.

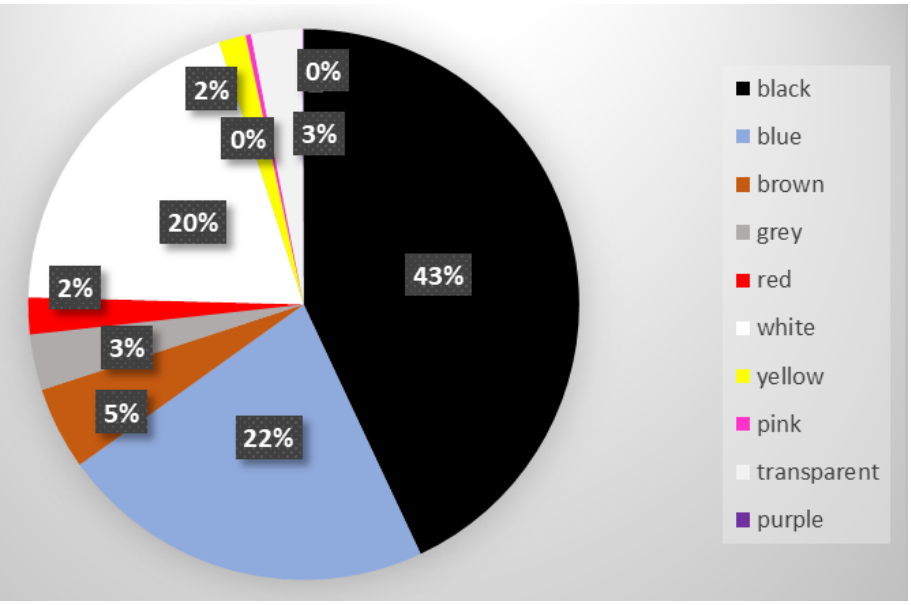

Figure 43. Percentages of microplastic particle colours on the sampled beaches of Cyprus during 2021-2022.

II. Micro-litter in the surface layer of the water column

Unknown (see above).

III. Micro-litter on the seabed

The amount of micro-litter on the Eratosthenes Seamount in the investigated sites ranged between 0 and 170 micro-litter particles/kg (Rousou et al., in preparation) (Table 72). The majority of micro-litter consisted of fragments (94%), 97% of the micro-litter was black in colour and more than half of the microliter (58%) ranged in size from 20 to 500 μm (Figure 44). As noted, the status cannot be estimated due to the absence of TVs.

Table 72. Assessment of microplastics on the Eratosthenes Seamount

Station	Micro-litter particles/kg
1	100
2	100
4a	80
4b	100
7	70
9	100
10	170
11	0
Median	100

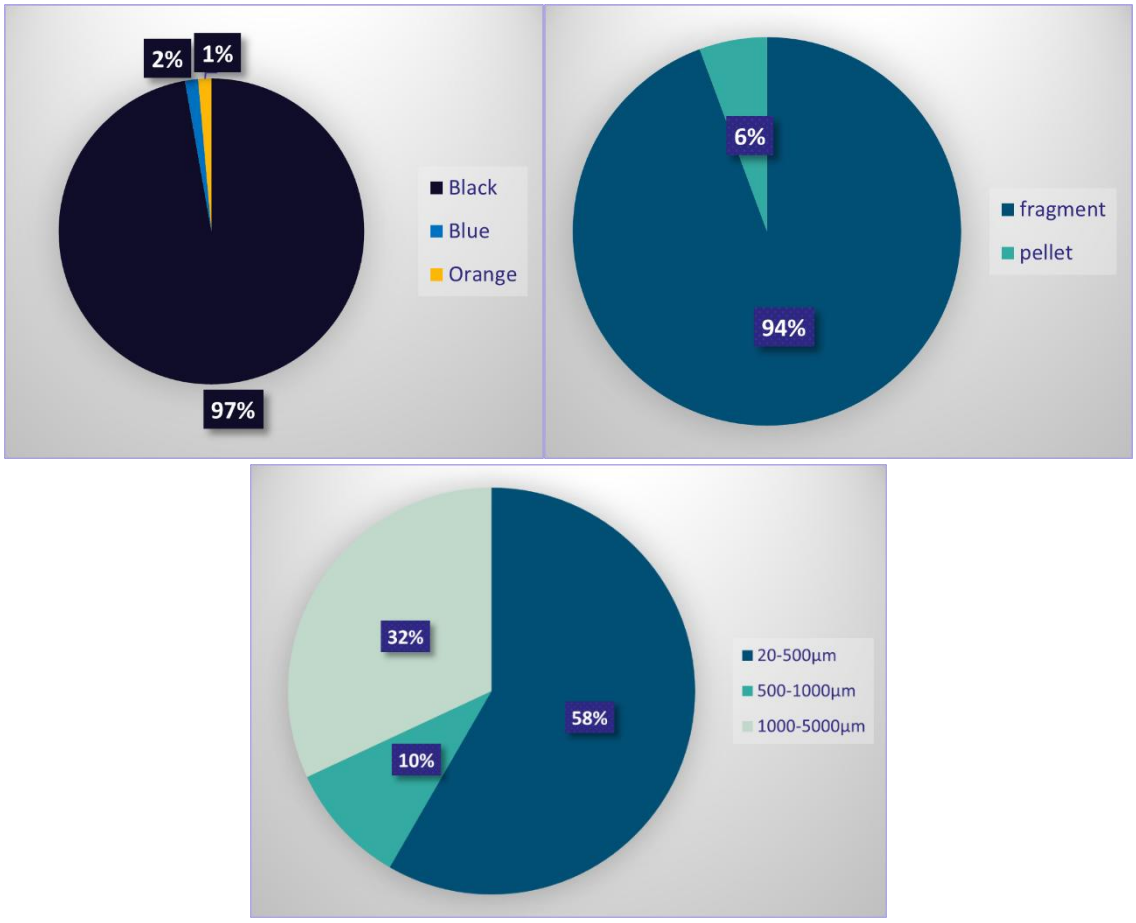

Figure 44. Percentage by colour, type and size, of microliter particles on the Eratosthenes Seamount.

D10C2 status assessment

The overall assessment of D10C2 is presented in Table 73. As previously mentioned, due to the lack of TVs, its status is considered unknown.

Table 73. GES assessment for micro-litter on the coastline, surface layer of the water column and seabed.

	TVs	2017-2022	GES
Micro-litter on the coastline	Not set	221/kg 663/m^2	Unknown
Micro-litter on the surface layer of the water column	Not set	-	Unknown
Micro-litter on the seabed	Not set	100//kg	Unknown

D10C3: The amount of litter and micro-litter ingested by marine animals is at a level that does not affect the health of the species concerned

Criterion D10C3 of GES Decision is defined as "*The amount of litter and micro-litter ingested by marine animals is at a level that does not adversely affect the health of the species concerned*". There are seven species of sea turtles, of which the Mediterranean is home to populations of two species, the loggerhead sea turtle (*Caretta caretta*) and the green sea turtle (*Chelonia mydas*). The loggerhead sea turtle has been assigned as an indicator in both OSPAR and the Barcelona Convention, as well as in MSFD, to assess GES on a Mediterranean and European scales. According to the protocol developed within the MSFD and updated within the framework of the EU project INDICIT, the Indicator "*marine litter ingestion by sea turtles*" consists of quantifying litter and micro-litter found in the digestive tract during necropsies (mostly found stranded or caught incidentally by fishermen) or excreted by live animals in rescue centres after one to two months, evaluating in turn the residence time of the ingested litter (and micro-litter) in the individual.

Methodology

I. Macro-litter ingested by sea turtles

The Republic of Cyprus assessed marine litter during the period 2021-2022 in deceased specimens of *Caretta caretta* (three in 2021 and six in 2022) and *Chelonia mydas* (11 in 2021 and 14 in 2022). All specimens were collected from the sea and beaches of the Republic of Cyprus and at each of the investigated specimens, all marine litter items were recorded according to the MSFD Protocol.

Parameters examined

Amount of marine litter ingested by marine animals

- amount of litter/micro-litter in grams (g) and
- number of items per individual for each species in relation to size (weight or length, as appropriate) of the sampled individual

A D10C3 TV has not yet been defined, at either the UNEP/MAP or EU level (Table 75).

II. Micro-litter ingested by sea turtles

The national programme for micro-litter ingested by sea turtles started in 2024 and therefore no data are available for the years 2017-2022.

Results

I. Macro-litter ingested by sea turtles

A total of 34 individuals (9 *Caretta caretta* and 25 *Chelonia mydas*) were analysed in the years 2021-2022. For the year 2021, the number of items per individual was not assessed, so only data on the weight of marine litter per individual were collected. Total mean concentrations for 2021-2022 of 1.12±1.92 g/individual have been estimated, with a maximum value of 6 g/individual and a minimum of 0. For the year 2022, mean concentrations of 7±10 items/individual have been estimated, with a maximum value of 27 items/individual and a minimum of 0. Most of the individuals were incidental bycatch on fishing gear or died under unknown circumstances. Of the 34 individuals analysed in the study, only 13 ingested marine litter (38.2% in total, 50% in 2021, 30% in 2022), all of which were plastics.

Regarding the samples collected in 2021, after sorting and analysis of litter in the gastrointestinal tract of the turtles, waste of plastic origin (total dry mass 9.27 grams) was found in 7 turtles. Based on the classification of plastics, 4.91 g were sheet residues while the remaining 4.36 g were in the form of thread. No litter of the categories industrial plastic, foam, scrap and other plastics were found. Most of the litter in 2021 was above 25 mm (87%) in size, while no litter below 5 mm in size was found. Most of the litter was white or clear (70%), 16% dark coloured and 14% light coloured.

Regarding the samples collected in 2022, litter of plastic origin (total dry mass 5.26 g) was found in six turtles. Based on the classification of plastics, 5.11 g were sheet residues, 0.07 g were in the form of thread and 0.08 g corresponded to other plastics. No litter of industrial plastic, foam or scrap was found. In addition, a non-plastic litter of 0.1 g corresponding to aluminium foil was found in one turtle (Figure 45, Table 74).

Figure 45. Sheet form ingested marine litter on the left and thread form ingested marine litter on the right.

Table 74. Weight, Curved Carapace Length standard (CCLst), weight of litter found and total items per individual in 2021 and 2022.

Species	Year	CCLst(cm)	WEIGHT (kg)	Debris weight (g)	Total	PLASTIC
Caretta caretta	2021	68.5	30			NO
		64.6	31.5	2.47		
		69.8	40			NO
	2022	70	32	-	-	NO
		69.5	38.5	-	-	NO
		67	25.5	-	-	NO
		48.5	13.4	-	-	NO
		27.5	2.35	0.04	1	
		63.5	25.05	0.81	27	
Chelonia mydas	2021	28.9	2.2			NO
		27.7	2.5	0.03		
		32.2	3.4			NO
		30.2	3.5	6.46		
		34.4	3.8	0.26		
		35.8	5.5			NO
		35.1	5.6	0.02		
		36.6	6.5	0.02		
		45.8	10.5	0.01		
		54.2	14.5			NO
		76.6	29.5			NO
	2022	16.7	0.5	-	-	NO
		56	14.2	0.01	3	
		23.5	2.3	0.9	5	
		29	3.05	-	-	NO
		42.5	7.8	-	-	NO
		50	9.7	3.3	4	
		37	6.25	-	-	NO
		55.5	21.35	-	-	NO
		53.5	17.35	0.2	2	
		43.5	10.9	-	-	NO
		57	18.7	-	-	NO
		45	11.6	-	-	NO
		38	7.1	-	-	NO
		35.5	6.6	-	-	NO

D10C4: The number of individuals of each species which are adversely affected due to litter, such as by entanglement, other types of injury or mortality, or health effects.

Methodology

Criterion D10C4 of the GES Decision is defined as "*The number of individuals of each species which are adversely affected due to litter, such as by entanglement, other types of injury or mortality, or health effects*". MS shall establish that list of species to be assessed and the TVs through regional or subregional cooperation. As mentioned in D10C3, the loggerhead sea turtle (*Caretta caretta*) has been assigned as an indicator in both OSPAR and the Barcelona Convention, as well as in MSFD, to assess GES on a Mediterranean and European scales. The reporting unit for D10C4 is the "number

of individuals affected (lethal; sub-lethal) per species". It is noted that no TVs have been defined yet.

DFMR collects information on sea turtles, cetaceans and Mediterranean monk seal sightings and strandings from DFMR staff, citizens etc., and records them, among other data, into an internal electronic database (Thetis database), which is not publicly available. Furthermore, the cause of death, where possible, is recorded when analysing macro- and micro-litter in deceased sea turtle specimens (see D10C3 for more information).

Results

No *Caretta caretta* individuals were recorded, to have died due to entanglement, other types of injury or mortality, or health effects attributed to marine litter, between 2017 and 2022. Furthermore, regarding the sea-turtle specimens analysed in 2021 and 2022, the cause of death could only be identified in nine out of 20 turtles. In five of them, there were obvious signs of direct human-caused injuries (e.g. head or shell injuries from boat propellers) and in the remaining four, signs of swelling in the neck existed, which may be related to entrapment in fishing nets. In any case, the amount and mass of plastics found in the gastrointestinal tract of six turtles, especially in relation to the total contents of their gastrointestinal tract, was too small to seriously affect the health of the animals and contribute to their death.

Given the above, although no TVs have been defined for D10C4, we consider D10C4 to be in GES, as no *Caretta caretta* individuals died due to marine litter (Table 75).

Table 75. Overall GES assessment for D10.

Descriptor	Criterion	Indicator	Feature/Element	TV	GES
D10: Properties and quantities of marine litter do not cause harm to the coastal and marine environment	D10C1 (Primary): The composition, amount and spatial distribution of litter on the coastline, in the surface layer of the water column, and on the seabed, are at levels that do not cause harm to the coastal and marine environment	CY.10.1.1: Amount of litter per category in number of items: per 100 metres (m) on the coastline	Macrolitter (all)	20 items per 100m	Not in GES
		CY.10.1.2: Amount of litter per square kilometre (km^2) of seabed	Macrolitter (all)	38 items per km^2	Not in GES
	D10C2 (Primary): The composition, amount and spatial distribution of micro-litter on the coastline, in the surface layer of the water column, and in seabed sediment, are at levels that do not cause harm to the coastal and marine environment	CY.10.2.1: Amount of micro-litter per kilogram (dry weight) (kg) of sediment [for coastline and for seabed]	Artificial polymer materials	Not set	Unknown
		CY.10.2.2: Amount of micro-litter per square meter (m^2) in surface layer of the water column	Artificial polymer materials	Not set	Unknown
	D10C3 (Secondary): The amount of litter and micro-litter ingested by marine animals is at a level that does not adversely affect the health of the species concerned	CY.10.3.1: Amount of litter/micro-litter in grams (g) per individual for each species	Litter and micro-litter in species	Not set	Unknown
		CY.10.3.2: Number of marine litter items per individual for each species	Litter and micro-litter in species; *Caretta caretta*	Not set	Unknown
	D10C4 (Secondary): The number of individuals of each species which are adversely affected due to litter, such as by entanglement, other types of injury or mortality, or health effects	CY.10.4: Number of individuals affected (lethal; sub-lethal) by marine litter per species	*Caretta caretta*	Not set	GES

3.3.11 Underwater noise and other forms of energy (D11)

MSFD calls for the assessment of underwater noise as a pressure on the environmental status of marine waters. Underwater noise constitutes the most widely introduced type of energy in the marine environment and should be addressed with a view to achieve GES in terms of MSFD Descriptor 11 "Introduction of energy, including underwater noise is at levels that do not adversely affect the marine environment". For the purposes of MSFD, noise is defined as "anthropogenic sound that has the potential to cause negative impacts on the marine environment, including component biota but not necessarily the whole environment". Effects of increased levels of underwater noise are known for a variety of marine fauna, mainly cetaceans, sea turtles, fish and some invertebrates (such as decapod crustaceans) which rely on sound for various biological functions such as communication, navigation, orientation and detection of predators and prey. Such effects can range from exposures causing no adverse impacts, to behavioural disturbances, to loss of hearing, and in the worst case, to mortality.

Tasker et al. (2010) identifies various anthropogenic activities which can result in the introduction of underwater noise in the marine environment. The type of anthropogenic noise generated by these activities can be classified into impulsive and continuous. Impulsive noise is, typically brief, characterised by a large change in amplitude over a short time and containing a wide frequency range (commonly referred to as broadband). Such noise is generated by explosions, airguns and pile-driving. Continuous can be broadband or more tonal, continuous or intermittent, with typically only small fluctuations in amplitude. Sources of continuous noise include shipping, construction (e.g. drilling and dredging). As a result of its strategic location in the eastern corner of the Mediterranean Sea, Cyprus constitutes an important hub for the shipping industry. Cyprus also provides a comprehensive range of maritime services and facilities. Therefore, shipping in Cyprus may constitute one of the most important sources of continuous sound in the marine environment (see Chapter 3.2).

On a local scale, underwater noise constitutes a relatively new environmental science field in Cyprus, for which available data is very limited, making the status assessment required by the Directive very challenging.

D11C1: The spatial distribution, temporal extent, and levels of anthropogenic impulsive sound sources do not exceed levels that adversely affect populations of marine animals

Criterion D11C1 of the Commission Decision (EU) 2017/848 is defined as "*The spatial distribution, temporal extent, and levels of anthropogenic impulsive sound sources do not exceed levels that adversely affect populations of marine animals*" and "*the duration per calendar year of impulsive sound sources, their distribution within the year and spatially within the assessment area, and whether the threshold values set have been achieved*".

According to Borsani et al. (2023), the threshold for the impulsive noise for short- and long-term exposure is:

> *For short-term exposure (1 day, i.e., daily exposure), the maximum proportion of an assessment/habitat area utilized by a species of interest that is accepted to be exposed to*

impulsive noise levels higher than the Level of Onset of Biologically adverse Effects (LOBE), over 1 day, is 20% or lower (≤ 20%).

For long-term exposure (1 year), the average exposure is calculated. The maximum proportion of an assessment/habitat area utilized by a species of interest that is accepted to be exposed to impulsive noise levels higher than LOBE, over 1 year on average, is 10% or lower (≤ 10%).

To assess this criterion, all available data on impulsive noise generated by specific activities in the marine environment of the Republic of Cyprus were collected for the assessment period. Specifically, a very limited amount of data was obtained from companies involved in offshore exploration and exploitation of hydrocarbons and similar activities, after permission by the competent authorities, i.e. the Ministry of Energy, Commerce and Industry (MECI), as well as the Department of Environment, which regulates the EIA procedures and grants permits for relevant activities at sea. The data were requested and provided in line with the "Underwater noise register template for the Mediterranean Region", which is uploaded in the "Joint register of impulsive underwater noise in the Mediterranean Sea Region". This web-GIS site was created in the framework of the QUIETMED project (http://www.quietmed-project.eu), funded by DG Environment, as a joint tool to provide and share information regarding underwater anthropogenic impulsive sound in support of the implementation of the second cycle of the MSFD in the Mediterranean Sea region. Nevertheless, the collected data at this point were not considered sufficient to assess the status on the basis of criterion D11C1. Therefore, at this point, criterion D11C1 cannot be assessed and its status is considered unknown (Table 78).

It is noted that in the near future, underwater sound data collection and submission to the authorities, in the framework of oil and gas exploration related environmental studies, will be obligatory based on newly introduced terms of the relevant issued license.

D11C2: The spatial distribution, temporal extent and levels of anthropogenic continuous low frequency sound do not exceed levels that adversely affect populations of marine animals

Methodology

Criterion D11C2 of the Commission Decision (Eu) 2017/848 is defined as "*The spatial distribution, temporal extent and levels of anthropogenic continuous low-frequency sound do not exceed levels that adversely affect populations of marine animals".*

According to the MSFD Directive, sound levels should be measured in terms of annual average, or other suitable metric agreed at regional or subregional level, of the squared sound pressure in each of two 1/3-octave bands, one centred at 63 Hz and the other at 125 Hz, expressed as a level in decibels in units of dB re 1 µPa, at a suitable spatial resolution in relation to the pressure. This may be measured directly, or inferred from a model used to interpolate between, or extrapolated from, measurements. MS may also decide at regional or subregional level to monitor for additional frequency bands. Moreover, it is assumed that habitat degradation induced by continuous underwater noise increases with the proportion of habitat exposed to noise and the duration of such exposure, being therefore associated with an increased likelihood of negative effects occurring at the population level for a species of interest.

According to Borsani et al. (2023), the threshold for continuous noise is set at *20% of the target species habitat having noise levels below LOBE in all months of the assessment year, in agreement with the conservation objective of the 80% of the carrying capacity/habitat size*.

Following the above, and in the framework of the QUIETSEAS[1] project (https://quietseas.eu/), countries were requested to provide on a voluntary basis and under the scope of MSFD D11 (and EcAp Ecological Objective 11), data concerning continuous noise levels in the Mediterranean and Black Seas. These data were needed to assess the environmental status of the Mediterranean and Black Seas relative to underwater noise pollution levels. The consortium of the project was made up of 10 entities, including the Republic of Cyprus, as well as relevant stakeholders of the Common Implementation Strategy (TG Noise) and Regional Sea Conventions (Barcelona - UNEP/MAP, OSPAR). This project was built on the work developed by the QUIETMED (2017-2019) and QUIETMED2 (2019-2021) projects, funded in previous MSFD calls. Continuous noise data requested were provided as GIS-readable underwater sound maps. The specifications on metadata were defined during the QUIETMED project and are extensively analysed in the document best practice guidelines on acoustic modelling and mapping (QUIETMED Deliverable 3.3). Five metadata groups were necessary, referred to as Map ID Layers (see structure in Table 76).

Based on the above suggested methodology, a sound propagation model was developed, and shipping noise maps were produced for Cyprus. Shipping noise was modelled for a period of two months, January and July of 2021, as these months represented the two extreme scenarios, January for the minimum and July for the maximum expected ship traffic in the area. The RANDI 3 model (Ross, 1978, Breeding et al, 1996) was used to compute maps of statistical source levels (SLs), based on vessel presence, size and speed, according to ship tracking system AIS (Automatic Identification System). The sound pressure generated by each vessel was computed separately, and then summed up to obtain a noise map representing the noise conditions for all vessels together. For the estimation of the propagation of sound waves, environmental drivers were also quantified through several coefficients (bathymetry, sound speed profile, sediment type and sediment thickness database). The produced maps show noise levels in percentile N, i.e. the noise level exceeded for N% of the time of the study period. Therefore, levels expressed in percentile for each point of the study area show how much time a noise level is exceeded over the study period. The model's specifications are shown in detail in Table 76.

[1] *The QUIETSEAS Project was funded by DG Environment of the European Commission within the call "DG ENV/MSFD 2020". The QUIETSEAS project aimed to enhance cooperation among MS in the Mediterranean Sea Region to implement the third Cycle of the Marine Directive and in particular to support Competent Authorities and strengthen cooperation and collaboration in the Mediterranean Sea and Black Sea regions.*

Table 76. Specifications of the continuous underwater sound propagation model developed for Cyprus.

Item	Description
Map ID Layer 1: Shipping information form	
Source of ship data (Position, size, speed)	AIS data supplied by Spire-Group. Include Satellite AIS data
Source depth approximation	7 meters for all ships (Scrimger and Heitmeyer, 1991)
Source Level model for emission levels and spectrum	RANDI 3.1 (Ross, 1978, Breeding et al, 1996)
Map ID Layer 2: Environment form	
Bathymetry	Emodnet Digital Terrain Model Resolution = 100 m
Sound speed profile	Copernicus Marine Environment Monitoring Service (CMEMS)
Geoacoustic properties of the bottom	SHOM Database
ID Layer 3: Computational scheme	
Approach ▪ Temporal or probabilistic approach (sensu QUIETMED Deliverable 3.3)	Temporal approach with computation of 90-100 noise screenshots (1 every 8 h for the number of days of the period), which represent the sample size used for averaging the shipping sound values over the period.
Acoustic propagation model	Parabolic equation - RAM (Collins, 1996)
Model setup ▪ Angular resolution ▪ Maximum propagation distance from source ▪ Horizontal resolution ▪ Vertical resolution ▪ Nb of frequencies for each source	 ▪ 1° ▪ 100 km ▪ 100 m ▪ 10 m ▪ 1/3 octave band centred at 63 Hz
Model output and metrics	Median SPL values in dB re 1µPa (i.e., the 50th Percentile)
ID Layer 4: Calibration and validation form	
Estimation of uncertainty	The model used was calibrated in the Western Mediterranean Sea, where the maximum observed deviance was 5 dB re 1µPa, which is considered acceptable. Calibration data are needed for the maritime zone of Cyprus; however, the same range of deviance can be expected for the estimations produced under the scope of this assignment
ID Layer 5: Results, formatting and displaying form	
Assessment period	January 2021 and July 2021
Spatial grid resolution	0.01° (decimal degrees)
Metrics	Sound Pressure Levels (SPL) in dB re 1µPa.
Sample size	January: 90 noise maps, July: 93 noise maps
Depth layer shown in the map	Surface layer (0-10 m)
Vertical averaging	No vertical averaging applied
Statistics in grid cells	50th percentile, i.e., the median noise level

According to the National Marine Fisheries Service (NMFS), the National Oceanic and Atmospheric Administration (NOAA), the Washington State Department of Transport (WSDT), and ACCOBAMS (Borsani *et al*., 2023), 120 dB re 1µPa in the 1/3 band centred on 63 Hz, is considered as a possible sound level threshold of behavioural disturbance for marine mammal in general. Based on this, an evaluation was done by estimating the fraction of the area where monthly median noise levels exceeded this threshold (120 dB). This was applied separately on the whole assessment area (MRU), the distributional range of target species, the bottlenose dolphin (see D1C4 criterion - Chapter 3), and its habitat (see D1C5 criterion - Chapter 3).

Results

Figure 46 shows the monthly median shipping noise in the MRU estimated by the model for January and July 2021. Both maps, especially the one for July, highlight the coastal zone near Limassol where

the biggest and busiest commercial port in Cyprus is situated. However, it should be noted that these are only snapshots and may not present the same picture that continuous monitoring would. In addition, it should also be noted that all recreational and other vessels without AIS are not included in this analysis and thus possibly a significant source of continuous noise in the area is missed. Future monitoring programs are expected to be continuous and to also include important noise sources not considered in the present analysis.

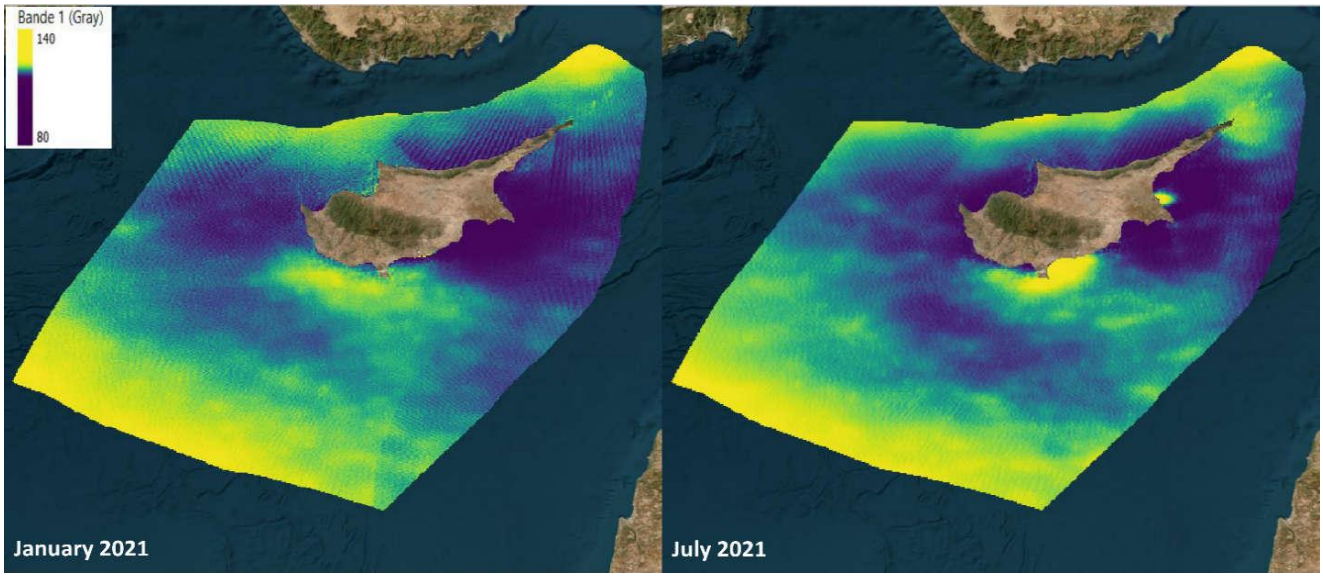

Figure 46. Monthly median shipping sound in one third (1/3) octave band centred on 63 Hz, median (50% exceedance level). Colour scale represents shipping sound level (SPL in dB re 1µPa) in the MRU. Resolution of the maps (grid cell size) is 0.01x0.01° (approximately 900 x 1100 m XY).

Figure 47 shows the areas within the MRU above and below the suggested TV of 120 dB re 1µPa, for the two months assessed. The fraction of the area where noise levels exceeded this threshold in the assessment area (MRU), the distributional range and the habitat of the bottlenose dolphin, are given in Table 77.

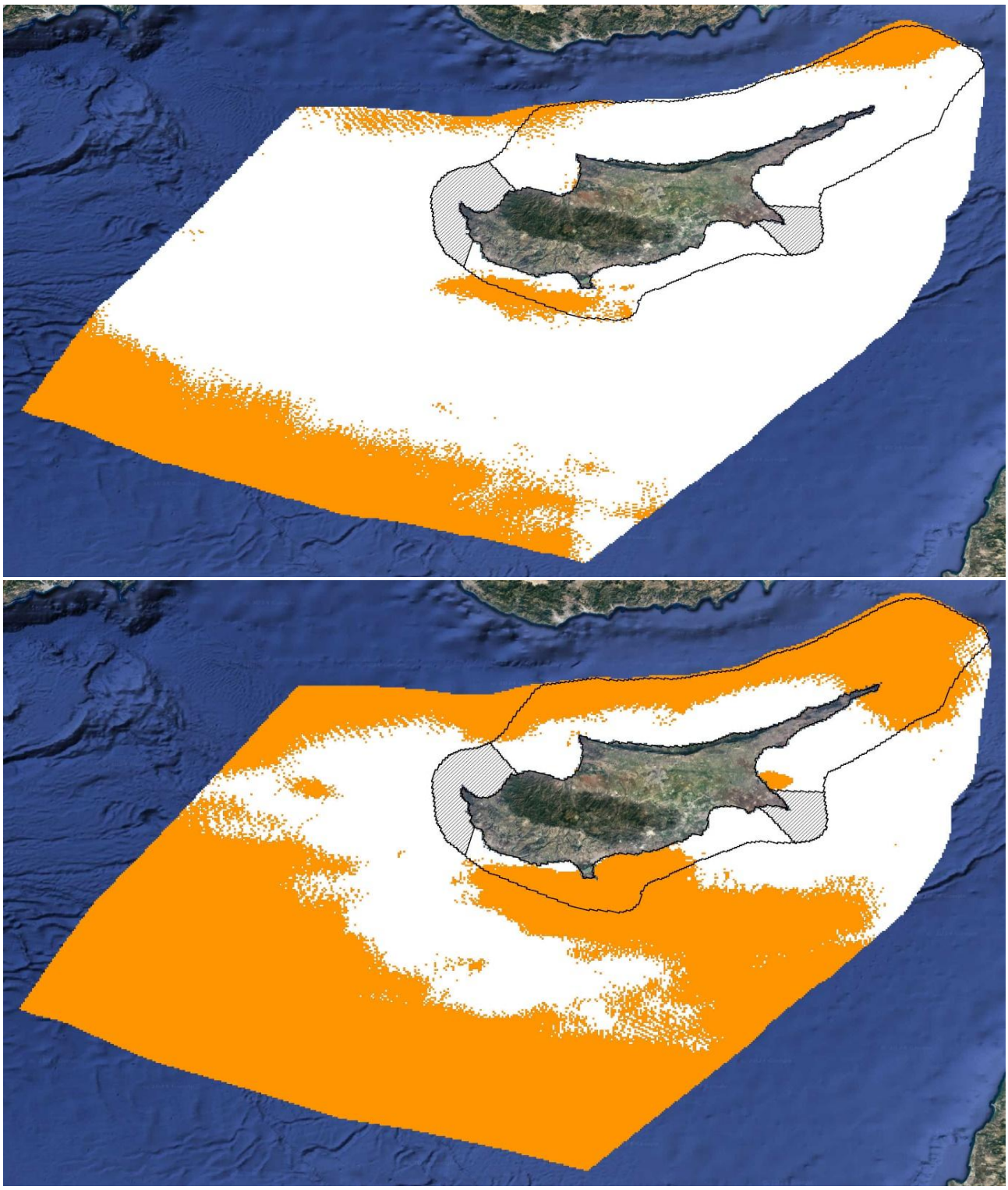

Figure 47. Area within the MRU above (orange) and below (white) the suggested limit of 120 dB re 1µPa, for January (up) and July (down) 2021. The distributional range (area within black border) and habitat (striped areas) of *Tursiops truncatus* are also shown.

As LOBE for the bottlenose dolphin has not yet been regionally or sub-regionally set, this evaluation is not considered an assessment and consequently criterion D11C2 is not assessed (Table 78).

Table 77. Area percentage below and above the suggested limit of 120 dB re 1µPa, for January and July 2021, in the assessment area (MRU), the distributional range and the habitat of *Tursiops truncatus*.

Area	Noise level	% area	
		Jan 21	Jul 21
MRU	≤120 dB	80	37
	>120 dB	20	63
Range	≤120 dB	88	50
	>120 dB	12	50
Habitat	≤120 dB	100	100
	>120 dB	0	0

Table 78. Overall GES assessment for D11.

Descriptor	Criterion	Indicator	Element	TV	GES
D11: Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment.	D11C1 (Primary): The spatial distribution, temporal extent, and levels of anthropogenic impulsive sound sources do not exceed levels that adversely affect populations of marine animals.	CY.11.1: Proportion of days and geographical distribution where loud, low, and mid-frequency impulsive sounds exceed levels that are likely to entail significant impact on marine animals.	Sound	For short-term exposure (1 day, i.e., daily exposure), the maximum proportion of an assessment/habitat area utilised by a species of interest that is accepted to be exposed to impulsive noise levels higher than the Level of Onset of Biologically adverse Effects (LOBE), over 1 day, is 20% or lower (≤ 20%). For long-term exposure (1 year), the average exposure is calculated. The maximum proportion of an assessment/habitat area utilised by a species of interest that is accepted to be exposed to impulsive noise levels higher than LOBE, over 1 year on average, is 10% or lower (≤ 10%).	Unknown
	D11C2 (Primary): The spatial distribution, temporal extent and levels of anthropogenic continuous low-frequency sound do not exceed levels that adversely affect populations of marine animals.	CY.11.2: Ambient noise level within the 1/3 octave bands 63 and 125 Hz (centre frequency) (re 1µPa RMS; average noise level in these octave bands over a year).	Sound	20% of the target species habitat having noise levels below LOBE in all months of the assessment year, in agreement with the conservation objective of the 80% of the carrying capacity/habitat size.	Not assessed

3.3.12 Climate change

The Mediterranean Sea is considered a hot-spot for climate change due to the rapid warming in both the air and the sea which is consider greater than the global average (Giorgi 2006; Adloff et al., 2015; Marba, 2015; United Nations Environment Programme/Mediterranean Action Plan and Plan Bleu, 2020; Noto, 2022).

Impacts of climate change on the coastal and marine environment, include, among others: (i) extreme weather events, flooding and erosion due to the sea-level rise, and (ii) hydrographic alterations mainly because of the seawater temperature and salinity increase (United Nations Environment Programme/Mediterranean Action Plan and Plan Bleu, 2020; Wang, 2024).

Climate change is expected to have significant effects on the intensity and frequency of occurrence of extreme weather events, consequently affecting sea levels, circulation patterns, currents and waves in oceans and seas around the world (Samaras et al. 2021). The Mediterranean Sea is particularly sensitive to climate variability, which can cause complex hydrological changes and alternating circulation patterns (Kassis et al., 2021). Changes in the strength, direction, and patterns of surface currents are brought about by increases in ocean temperature, which have an influence on surface currents overall. The dynamics of upwelling, the transfer of nutrients, and the dispersion of marine species are all impacted by these changes, in addition to having a considerable influence on the climates of particular locations and marine ecosystems. These changes also have an impact on both of these aspects (Wang, 2024).

Sea level rise due to climate change accelerates erosion, leading to land loss and significant changes in coastal landscapes. This has serious consequences for coastal areas, including the destruction of vital ecosystems like beaches, sand dunes, and marshes (Wang, 2024). Coastal flooding is on the rise in many areas around the world. The risk of coastal flooding is expected to further increase in the future, as tides, surges and waves will be significantly affected by climate change and the consequent increase of extreme weather events (Samaras et al, 2021).

Climate change is also a significant driver of Marine Heatwaves (MHWs), which in turn threaten the health of marine ecosystems and habitats that depend on them. Globally, this increase has been found to be driven by the mean Sea Surface Temperature (SST) increase, caused by climate change. Over the past four decades, MHWs have increased in duration, frequency, and intensity (Frölicher et al., 2018; Oliver et al., 2018; Spillman et al., 2021). Future climate change is expected to cause an even further increase of the marine heatwaves (Darmaraki et al., 2019; Frölicher et al., 2018; Laufkötter et al., 2020; Hoogenboom, 2023). Hoogenboom (2023), based on a literature study and the SST analysis, qualitative predictions of future MHWs for the coastal waters of Cyprus were found to be 1.2 per year, as compared to 2.7 for the full Mediterranean, however the average duration of MHWs in Cyprus (19.4 days) was 3.4 days longer than the average of the Mediterranean (16 days).

Furthermore, Zodiatis et al. (2023) based on the assessment of 20 years of in-situ monitoring data, an increase of the temperature and salinity of the Levantine Surface Water (LSW) and of the subsurface Modified Atlantic Water (MAW) has been observed. Furthermore, the Eastern Mediterranean Transient Water (EMTW) is shown to occupy the deep cavities in the vicinity of the

Eratosthenes seamount while its upper boundary was found to be lifted to shallower depths over a period of two decades.

Methodology

The MSFD addresses climate change as a horizontal issue. In 2022, the EC published the Common Implementation Strategy (CIS) Guidance Document No. 19 (EC, 2022) with recommendations on how climate change could be addressed. Specifically, the following are suggested:

1. Monitoring and analysis of climate change-derived variations as background environmental conditions
2. Identification of indicator species/habitats (or other parameters)
3. Monitoring of indicator species/habitats (or other parameters)
4. Considering the effects due to climate change variability in the establishment of the TVs of the selected indicators (such as habitat regression, or mass mortality of species)

Furthermore, it is recommended to establish an expert group dedicated to climate change that will, among others, develop a common minimum set of parameters for background environmental conditions (including e.g. pH) and appropriate assessment approaches through EU or (sub)regional cooperation (EC, 2022).

For the scope of the current report, it was considered appropriate to focus on the analysis of climate change-derived variations as background environmental conditions. Specifically, climate change was evaluated through the examination of hydrological changes, by collecting information from Copernicus, an initiative of the European Space Agency. The Satellite reanalysis data from Copernicus marine service covered both the territorial waters and EEZ of Cyprus (MRU). These data encompassed various parameters, including: (i) sea temperature and salinity, (ii) pH, and (iii) dissolved oxygen, measured at standard depths from 1 to 200 m depth, for four six-year periods, 1999-2004, 2005-2010, 2011-2016, and 2017-2022. The maximum depth of 200 m that was selected for this assessment, is based on the understanding that this depth corresponds to the euphotic zone in the Mediterranean (e.g. IUCN, 2019)). This depth range ensures that the assessment covers the most biologically active part of the marine ecosystem, in terms of photosynthesis and primary production. This assessment is based on annual parameters collected over four consecutive six-year periods, rather than on seasonal assessments. For the estimation of the annual value of each parameter per depth, the median of all values within the MRU was considered from a 0.042×0.042° survey grid. In addition, presence and duration of heatwaves were assessed by Hoogenboom (2022) for the period 01/01/1982 - 23/12/2022 and are presented in the results.

Results

<u>Temperature (°C) and Salinity (psu)</u>

Sea temperatures in Cyprus range between 16°C and 26°C. Due to the warm climate, evaporation rates are high, impacting the salinity levels of seawater. The average salinity in the Eastern Mediterranean exceeds 37.7 psu, and in the coastal waters it reaches about 39.1 psu. This elevated salinity is among the highest in the Mediterranean Sea. Furthermore, the Levantine basin experiences very limited freshwater inflow due to the absence of large rivers discharging into the

Levantine Sea. This contributes to the high salinity and the overall balance of the marine environment, making the Levantine Sea a distinctive marine environment with particular ecological and hydrological dynamics. Zodiatis et al. (2015) found that, the high rates of the summer heating and evaporation transform the upper surface layer of the SE Levantine into the most saline (up to 39.6-39.79 psu) and warmest (28-30.7°C) surface waters in the Mediterranean (LSW), as observed during the summer CYBO and HaiSec cruises from 1995 to 2015. Given these conditions, we anticipate that the annual mean values will be higher, as elevated summer temperatures and salinity are expected to influence the overall yearly rates.

Furthermore, based on the results (Figure 48), an increase in both temperature (0.6°C) and salinity (0.15 psu) has been observed during the 2017-2022 period compared to the earlier 1999-2004 period. These results are closely linked to the effects of climate change. According to Hoogenboom (2023 and references cited within), considering the increase in temperature, it becomes evident by the warming trend of the sea surface temperature (SST) in the Mediterranean basin of 0.38°C per decade over the last four decades and the long lasting MHW days which increase faster in the Levantine basin.

pH

The pH of sea water is a measure of its alkalinity or acidity. pH is an important property of aqueous solutions, because it affects chemical and biochemical properties such as chemical reactions, equilibrium conditions, and biological toxicity (Marion, 2011). The Mediterranean Sea is very special in terms of carbon dioxide (CO2) dynamics, global carbon cycle and anthropogenic CO2 drawdown and storage. Its waters are characterized by high alkalinity compared to other oceans. The acidification level in the Mediterranean Sea reflects the excessive increase of atmospheric CO2 and therefore the invasion of the sea (Hassoun, 2015). As sea water pH decreases, making the ocean more acidic, it can threaten the health of marine ecosystems. The acidification process has been brought about because of the oceans absorbing carbon dioxide, which has far-reaching implications, especially for marine organisms that rely on calcium carbonate for the formation of their shells and skeletons. These organisms are particularly vulnerable to the effects of this process. These changes, pose a threat to the delicate balance of marine ecosystems and the services that they offer (Wang, 2024). The pH of sea water is affected by the concentration of CO2 dissolved in water, water temperature, carbonate and bicarbonate concentrations and organic material decomposition process. Seawater pH is typically limited to a range between 7.5 and 8.4 (Khan, 2020). pH distribution along depth, in Cyprus' waters is illustrated in Figure 48, according to which a decline on the ph values is observed for the period 2017-2022.

Dissolved Oxygen -DO (mmol/m3)

Oxygen levels are influenced by different factors including temperature, photosynthesis, mixing and stratification, respiration, decomposition. Throughout the six-year assessment period, no significant differences in DO levels were observed (Figure 48). As expected, higher DO concentrations were found near the surface. A peak in DO concentration during the 2017-2022 period is observed at a depth of 80 m. These findings are consistent with past recordings ("*Surficial waters were saturated with dissolved oxygen, and a shallow oxygen maximum (oversaturated) was present at about 80 m depth. Oversaturation was attributed mainly to the physical process of rapid capping and trapping*

of oxygen in the Atlantic water (AW) mass, with only 28% of the excess oxygen originating from biological production.") (Kress, 2001).

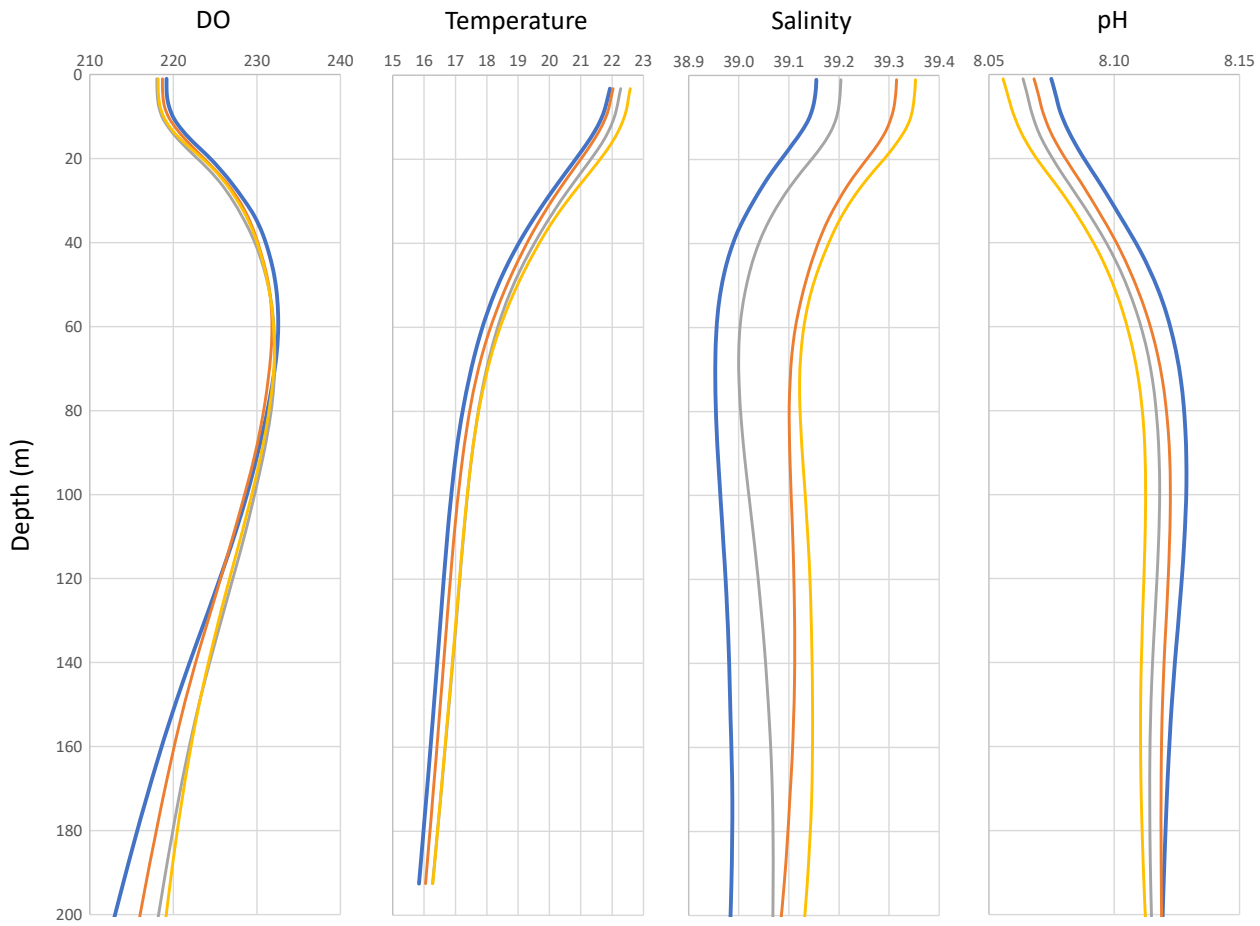

Figure 48. Estimations of physical and biochemical parameters of sea water in the MRU, from 1 to 200 m depth, for four six-year periods, 1999-2004 (blue), 2005-2010 (orange), 2011-2016 (grey) and 2017-2022 (yellow). For the estimation of the annual value of each parameter per depth, the median of all values within the MRU was considered from a 0.042×0.042° sampling grid. Parameters are mole concentration of dissolved molecular oxygen in sea water (DO) [mmol/m3], sea water salinity [0.001] and sea water potential temperature (°C).

State of the marine environment

Marine species (D1)

According to the GES Decision the following criteria are related to Species groups of birds, mammals, reptiles, fish and cephalopods:

- D1C1 - The mortality rate per species from incidental by-catch is below levels which threaten the species, such that its long- term viability is ensured. *(Primary for Habitats Directive Species, Secondary, if decided for any other species).* D1C1 is presented in Chapter 3.3.1.
- D1C2 - The population abundance of the species is not adversely affected due to anthropogenic pressures, such that its long-term viability is ensured. *(Primary for Habitats Directive Species, Secondary, if decided for any other species).*
- D1C3 - Primary for commercially exploited fish and cephalopods and secondary for other species: The population demographic characteristics (e.g. body size or age class structure, sex ratio, fecundity, and survival rates) of the species are indicative of a healthy population which is not adversely affected due to anthropogenic pressures.
- D1C4 - The species distributional range and, where relevant, pattern is in line with prevailing physiographic, geographic and climatic conditions. *(Primary for species covered by Annexes II, IV or V to Directive 92/43/EEC and secondary for other species).*
- D1C5 - The habitat for the species has the necessary extent and condition to support the different stages in the life history of the species. *(Primary for species covered by Annexes II, IV or V to Directive 92/43/EEC and secondary for other species).*

3.3.12.1 Birds (D1B)

MSFD Directive addresses species groups of birds, mammals, reptiles, fish and cephalopods (Descriptor 1) through specific Criteria. The Republic of Cyprus has selected two Criteria to be assessed, D1C1 and D1C2, as described below.

D1C1: The mortality rate per species from incidental by-catch is below levels which threaten the species, such that its long-term viability is ensured.

See Chapter 3.3.1.

D1C2: The population abundance of the species is not adversely affected due to anthropogenic pressures, such that its long-term viability is ensured.

Methodology

Criterion D1C2 of GES Decision (is defined as "*The population abundance of the species is not adversely affected due to anthropogenic pressures, such that its long-term viability is ensured*". As described in Chapter 3.3.1 (D1C1), Audouin's Gull (*Larus audouinii*) and the Mediterranean Shag (*Gulosus aristotelis desmarestii*) were selected to be assessed in this Criterion. Their population is currently being assessed in the framework of Birds Directive (2009/147/EC, Art. 12) and relevant data are expected be available in Spring 2025. Also, TVs for these species have already been set as FRVs in accordance with Birds Directive, to 50 pairs for *Gulosus aristotelis desmarestii* and 20 pairs for *Larus audouinii* (thresholds set at national level - GFS, 2016).

Results

Although TVs have been set, no assessment was conducted due to the lack of population estimates for the two species selected. The overall GES assessment for D1B is shown in Table 79.

Table 79. GES assessment for birds (D1B)

Descriptor	Criterion	Indicator	Element	TV	GES
D1B: Species groups of seabirds	D1C2 (Primary): The population abundance of the species is not adversely affected due to anthropogenic pressures, such that its long-term viability is ensured	CY1.2: Population abundance (number of indiv.)	*Gulosus aristotelis desmarestii*	GES: ≥50 pairs	Unknown
			Larus audouinii	GES: ≥20 pairs	Unknown

3.3.12.2 Mammals - Cetaceans (D1M)

In order to assess Criteria D1C2, D1C4, and D1C5, data from two separate surveys were used, DFMR's "*Acoustic and visual survey for cetaceans in the marine waters of the Republic of Cyprus between 2016 and 2017*" and the "*ACCOBAMS Survey Initiative (ASI) - Estimates of abundance and distribution of cetaceans, marine mega-fauna and marine litter in the Mediterranean Sea between 2018 and 2019"*. Incidental visual sightings by DFMR personnel, scientists and citizens, recorded in DFMR's Thetis database, were also taken into consideration as they confirm the presence of certain species in the area, however they were not used in the assessment.

<u>DFMR survey</u>

Aim of the 2016-2017 acoustic and visual survey was to assess the distribution and population size of all eight cetacean species present in the marine waters of Cyprus (Table 80). The study covered the marine waters of Cyprus up to 50 nm offshore, focusing on both coastal species, like the bottlenose dolphin, as well as those species more often seen offshore. The survey covered three seasons (Summer: August 2016, Winter: November 2016, Spring: May 2017) for both the visual and acoustic assessments. The visual surveys involved observers scanning the sea using binoculars

(Boisseau et al., 2017), while the acoustic surveys were conducted using a towed hydrophone array capable of detecting the anticipated cetacean species via the appropriate frequencies.

Table 80. Cetacean species recorded in Cyprus. All species are listed in Annex I of the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS) and one species (*) is included in Annex IV of the EU Habitats Directive 92/43/EEC.

Species Group	Scientific name	English name
Baleen whales	*Balaenoptera physalus*	Fin whale
Small-toothed cetaceans	*Steno bredanensis*	Rough-toothed dolphin
Small-toothed cetaceans	*Grampus griseus*	Risso's dolphin
Small-toothed cetaceans	*Stenella coeruleoalba*	Striped dolphin
Small-toothed cetaceans	*Tursiops truncatus* *	Common bottlenose dolphin *
Small-toothed cetaceans	*Pseudorca crassidens*	False killer whale
Deep-diving toothed cetaceans	*Ziphius cavirostris*	Cuvier's beaked whale
Deep-diving toothed cetaceans	*Physeter macrocephalus*	Sperm whale

Five species were recorded during the visual survey (316 individuals in 27 sightings - Table 81, Figure 49) and six species were recorded during the acoustic survey, some of which were also confirmed visually (Figure 50).

Table 81. Sightings during the 2016-2017 visual survey.

Month	Species	Sightings	Mean group size	Estimated individuals for all sightings
Aug. 2016	*Sperm whale*	3	2 - 4	8
	Striped dolphin	2	4 - 6	10
	Unidentified dolphin	3	1	2
Total		8		20
Nov. 2016	*Striped dolphin*	1	40-60	50
Total		1		50
May 2017	*Sperm whale*	1	4	4
	Striped dolphin	8	3-40	145
	Common bottlenose dolphin	3	3-15	29
	Rough-toothed dolphin	2	15-20	37
	Risso's dolphin	2	3-20	22
	Unidentified dolphin	2	1-14	9
Total		18		246

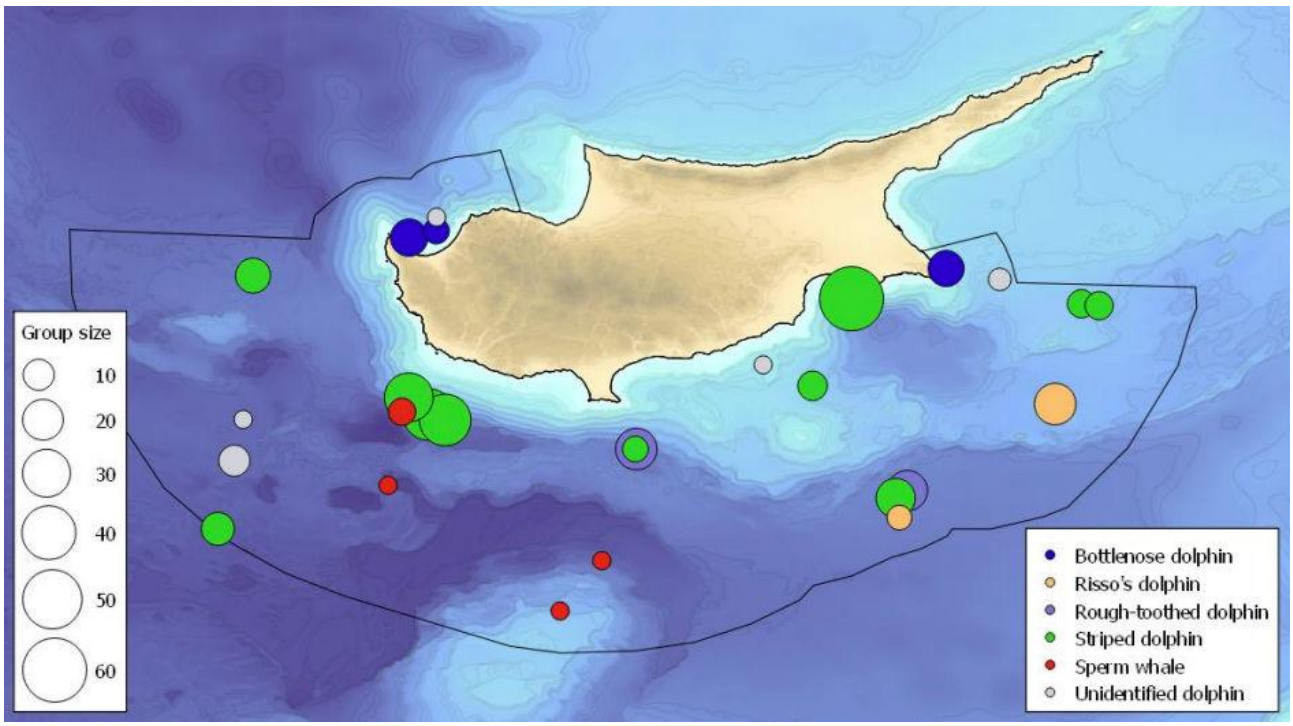

Figure 49. Sightings during the 2016-2017 visual survey (Boisseau et al., 2017).

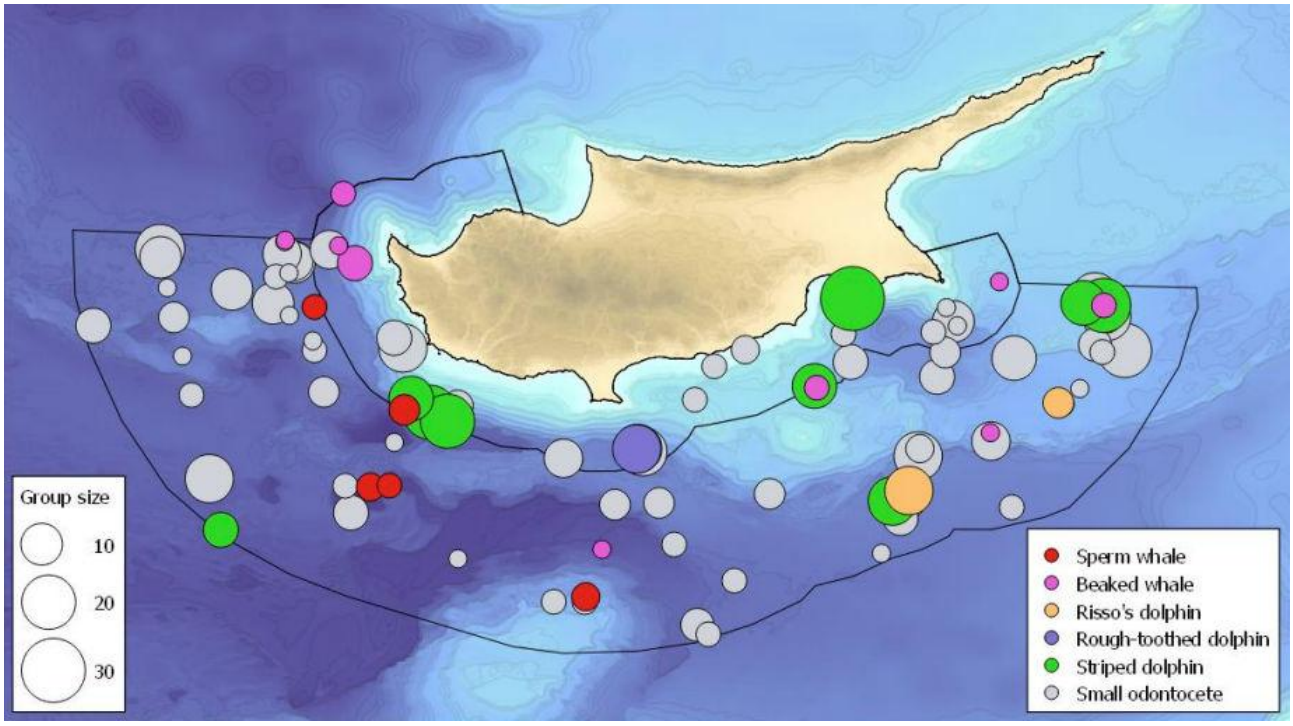

Figure 50. Detections during the 2016-2017 acoustic survey (Boisseau et al., 2017).

It is noted that the findings of the above survey, along with information from other research and scientific publications, contributed to the proposal and declaration in 2021 of "Oceanid" (CY4000024) as a Special Protection Area (SPA) in the European Ecological Natura 2000 Network (Figure 51).

Figure 51. Special Protection Area (SPA) “Oceanid” (CY4000024).

ACCOBAMS survey

The Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and contiguous Atlantic area (ACCOBAMS) is the first agreement on cetacean conservation binding the Countries of these sub-regions and enabling them to work together on a matter of general interest. In recognizing the need for robust data on the conservation status of cetacean populations in the Mediterranean and Black Sea ecosystem, ACCOBAMS proposed a synoptic survey of the entire ACCOBAMS region, the ACCOBAMS Survey Initiative (ASI). In June and July of 2018, the ASI survey was carried out for the whole Mediterranean Sea, by combining aerial and vessel-based visual survey methods and passive acoustic monitoring (PAM). The ASI survey followed the ASI regional protocol and methodology based on line-transect distance sampling (ACCOBAMS, 2021). A total of 32 main blocks were originally created, and subsequently divided into smaller sub-blocks (Figure 52).

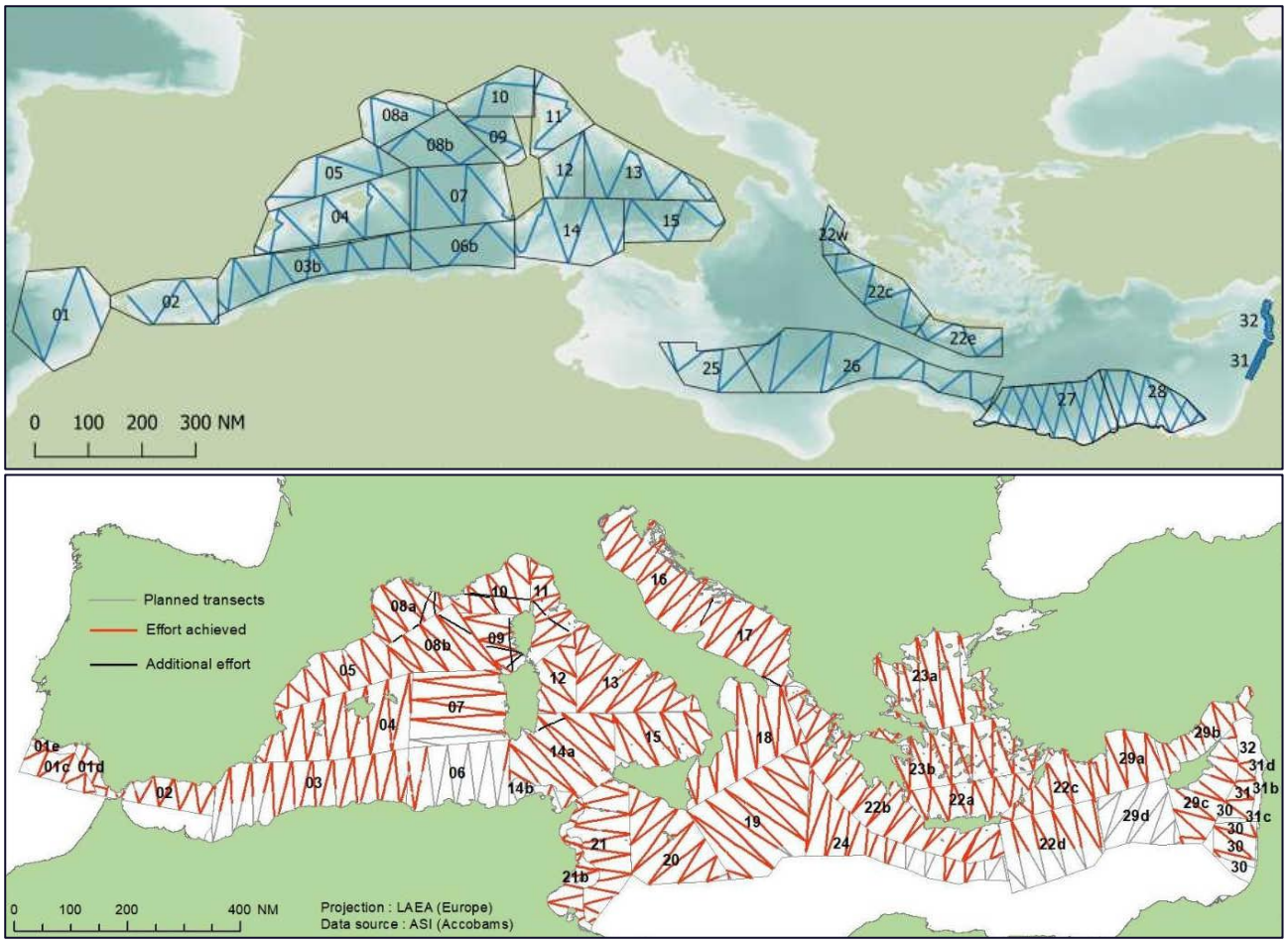

Figure 52. ASI sampling subareas 1-32 with vessel survey tracks (up - in blue) and aerial survey tracks (down - in red) (ACCOBAMS, 2021).

The only two species detected by ASI in Cyprus marine waters (by aerial means), both in low abundances, were the bottlenose dolphin and the group “striped and common dolphins”, even though, most probably the common dolphin as *D. delphis* has never been recorded visually or acoustically in Cyprus (ACCOBAMS, 2021 - Figure 53).

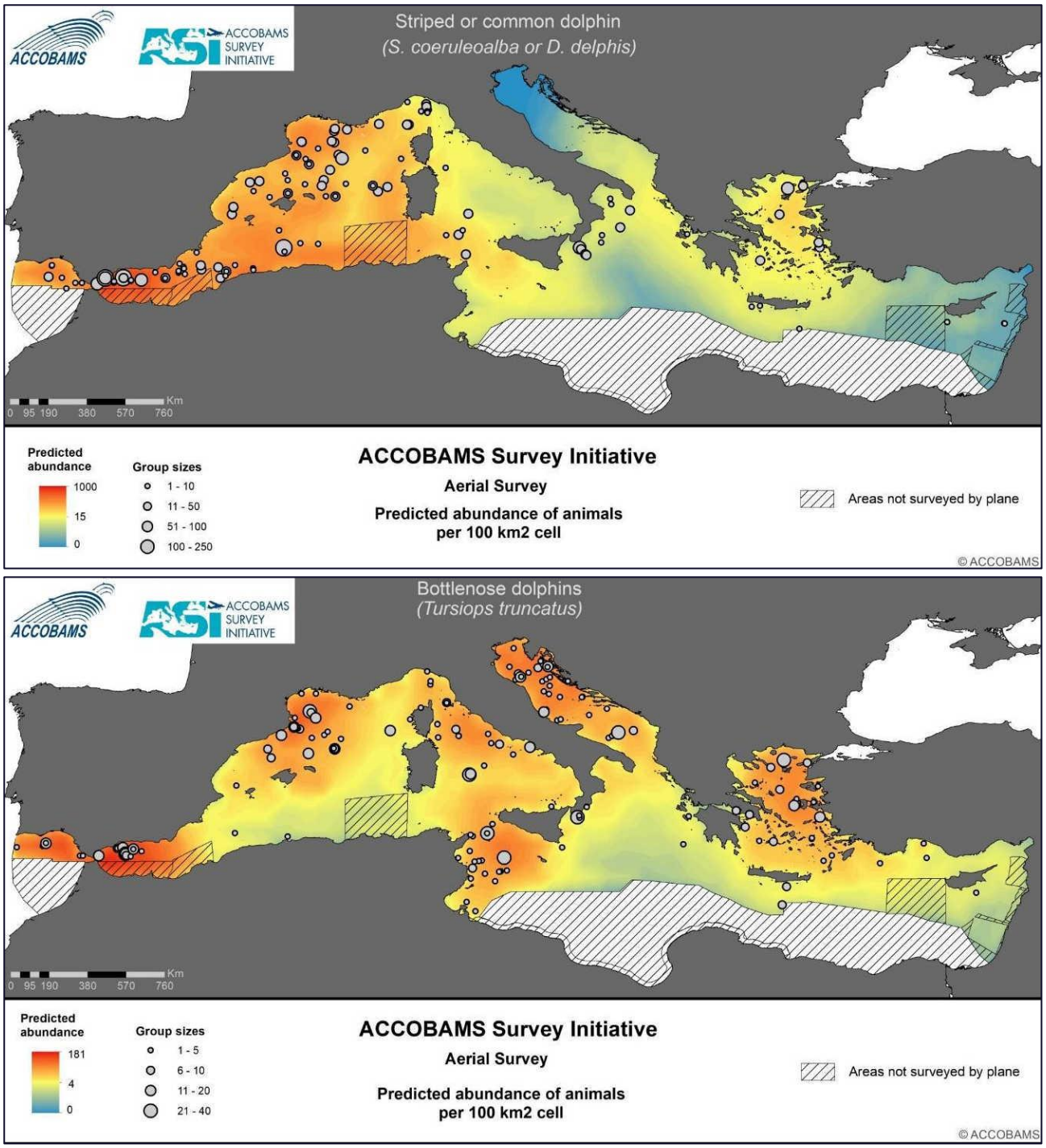

Figure 53. ASI predicted abundance of striped or common dolphins (up) and bottlenose dolphins (down) (ACCOBAMS, 2021).

Thetis national database

DFMR records cetacean sighting and stranding reports by DFMR officers, scientists and citizens. Data include information on location, species, number and status of individuals (healthy, injured, deceased), etc. In the period 2017-2022, the sightings of 243 individuals and the strandings of 11 individuals were recorded in the database (Table 82, Figure 54). Although these records can be considered very reliable, as they have been validated by the DFMR, the fact that they are randomly collected from various sources and they represent a very small fraction of the actual events that

take place (at least for sightings), lead to the conclusion that they can only be useful in confirming the presence of species in the area but cannot be used for further abundance or other estimations.

Table 82. Thetis database records of sightings and strandings (number of individuals) in 2017-2022 (* = approximate number).

		Ammochostos			**Larnaca**				**Limassol**					**Pafos**			**Total**
		2017	**2020**	**2021**	**2017**	**2018**	**2021**	**2022**	**2017**	**2018**	**2020**	**2021**	**2022**	**2017**	**2021**	**2022**	
sightings	Bottlenose dolphin			5		3		6	10	2	10	7	3				46
	Cuvier's beaked whale						1										1
	Risso's dolphin														10		10
	Sperm whale		1		3								1			1	6
	Striped dolphin		*100					*80									180
	Total		**101**	**5**	**3**	**3**	**1**	**86**	**10**	**2**	**10**	**7**	**4**		**10**	**1**	
	Total by area		**106**		**93**				**33**					**11**			**243**
strandings	Bottlenose dolphin	1							1				1				3
	Cuvier's beaked whale												1			1	2
	Striped dolphin								1	1	1		1	1	1		6
	Total	**1**							**2**	**1**	**1**		**3**	**1**	**1**	**1**	
	Total by area	**1**			**0**				**7**					**3**			**11**

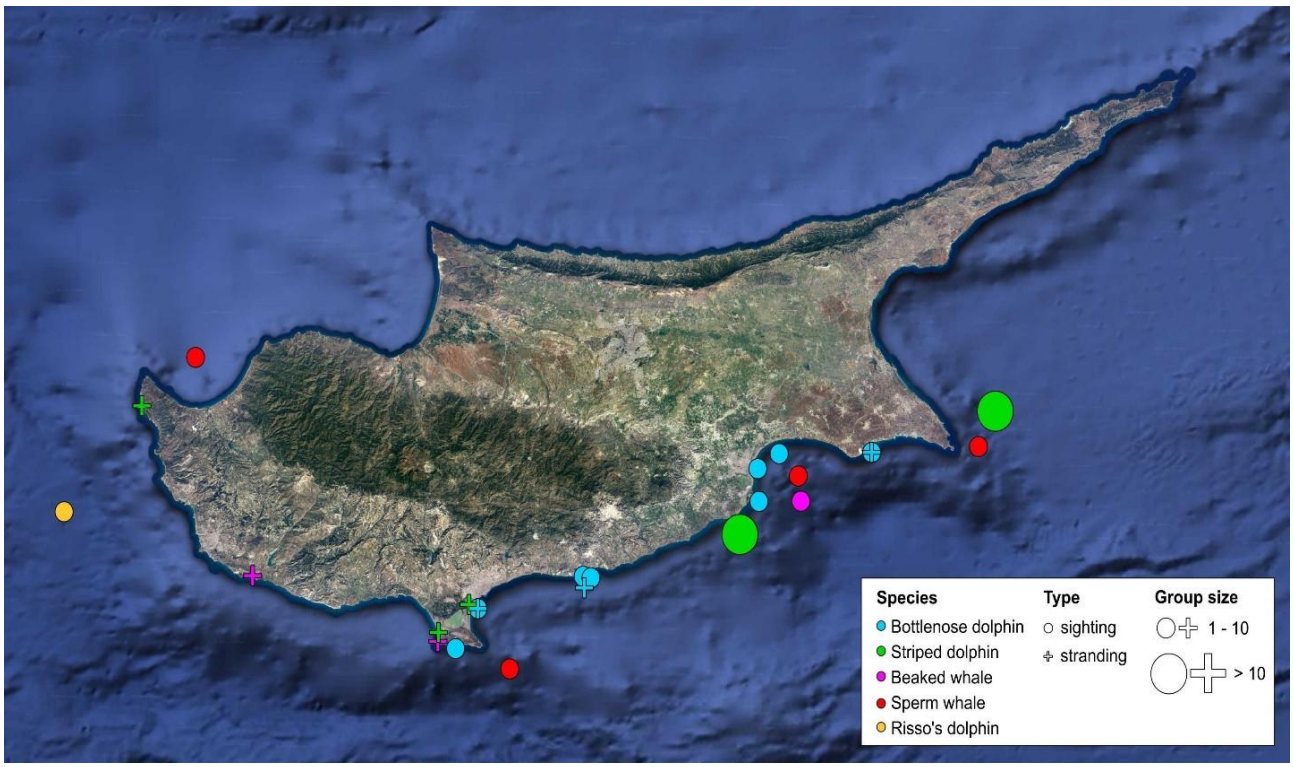

Figure 54. Thetis database records of sightings and strandings in 2017-2022.

Selection of species for assessing GES Criteria

As indicated above, eight species have been recorded in the marine waters of Cyprus, of which the most common are *Tursiops truncatus*, *Stenella coeruleoalba*, *Steno bredanensis*, and *Ziphius cavirostris*. However, only the bottlenose dolphin (*Tursiops truncatus*) was selected to be used to assess the status of marine mammals in Cyprus, as this species: (i) satisfies the criteria listed in EU's Commission Decision 2017/848/EU[1]), (ii) is included in the Guidance for Assessments under Article 8 of the Marine Strategy Framework Directive (Walmsley et al., 2017), and (iii) is included in the EU Habitats Directive (92/43/EEC). In the following sections, the assessment methodology and results of each Criteria corresponding to *Tursiops truncatus,* are presented.

D1C1: The mortality rate per species from incidental by-catch is below levels which threaten the species, such that its long-term viability is ensured.

See Chapter 3.3.1.

[1]*mcc.jrc.ec.europa.eu/main/dev.py?N=19&O=361&titrechap=D1%20Biological%20diversity&titre_page=Criteria%20&%20methodological%20standards*

D1C2: The population abundance of the species is not adversely affected due to anthropogenic pressures, such that its long-term viability is ensured.

Methodology

Criterion D1C2 of the 2017 GES Decision (2017/848/EU) is defined as "*The population abundance of the species is not adversely affected due to anthropogenic pressures, such that its long-term viability is ensured".*

The reporting unit of Criterion D1C2, as set in 2017/848/EU is equal to "population", which corresponds to the FRV that is reported under the Habitats Directive (92/43/EEC). Within 2017/848/EU, the unit of measurement for the population criterion is the abundance (number of individuals or biomass in tonnes) per species.

The Republic of Cyprus has defined the FRV for the population of the common bottlenose dolphin (*Tursiops truncatus*) in the assessment area (MRU) to be 30 to 100 individuals, based mainly on extrapolation from a limited amount of data.

To assess whether Criterion D1C2 is in GES, given that the common bottlenose dolphin is considered a highly mobile species, the recorded abundance of the assessed species in at least one survey shall be more than 30 individuals.

Results

Based on the results of the National survey carried out between 2016 (max 33 individuals) and 2017 (max 1-5 individuals), the highest number of common bottlenose dolphins was 33 individuals (Boisseau et al., 2017). Consequently, Criterion D1C2 is in GES (Table 83).

D1C4: The species distributional range and, where relevant, pattern is in line with prevailing physiographic, geographic and climatic conditions.

Criterion D1C4 of the 2017 GES Decision (2017/848/EU) is defined as *"The species distributional range and, where relevant, pattern is in line with prevailing physiographic, geographic and climatic conditions".*

The reporting unit of Criterion D1C4, as set in 2017/848/EU, is equal to "Range", which corresponds to the range FRV that is reported under the Habitats Directive (92/43/EEC). Based on the national survey, the scientific literature, and expert judgement, for the period 2007-2018 the distributional range surface area was defined, in line with the explanatory notes and guidelines for reporting under Article 17 of the Habitats Directive (eionet.europa.eu) and was estimated to cover an area of 19,654 km^2 (Figure 55). However, to analyse the progression of this range throughout the years and define its status, further research is needed and thus the status is still considered not assessed (Table 83).

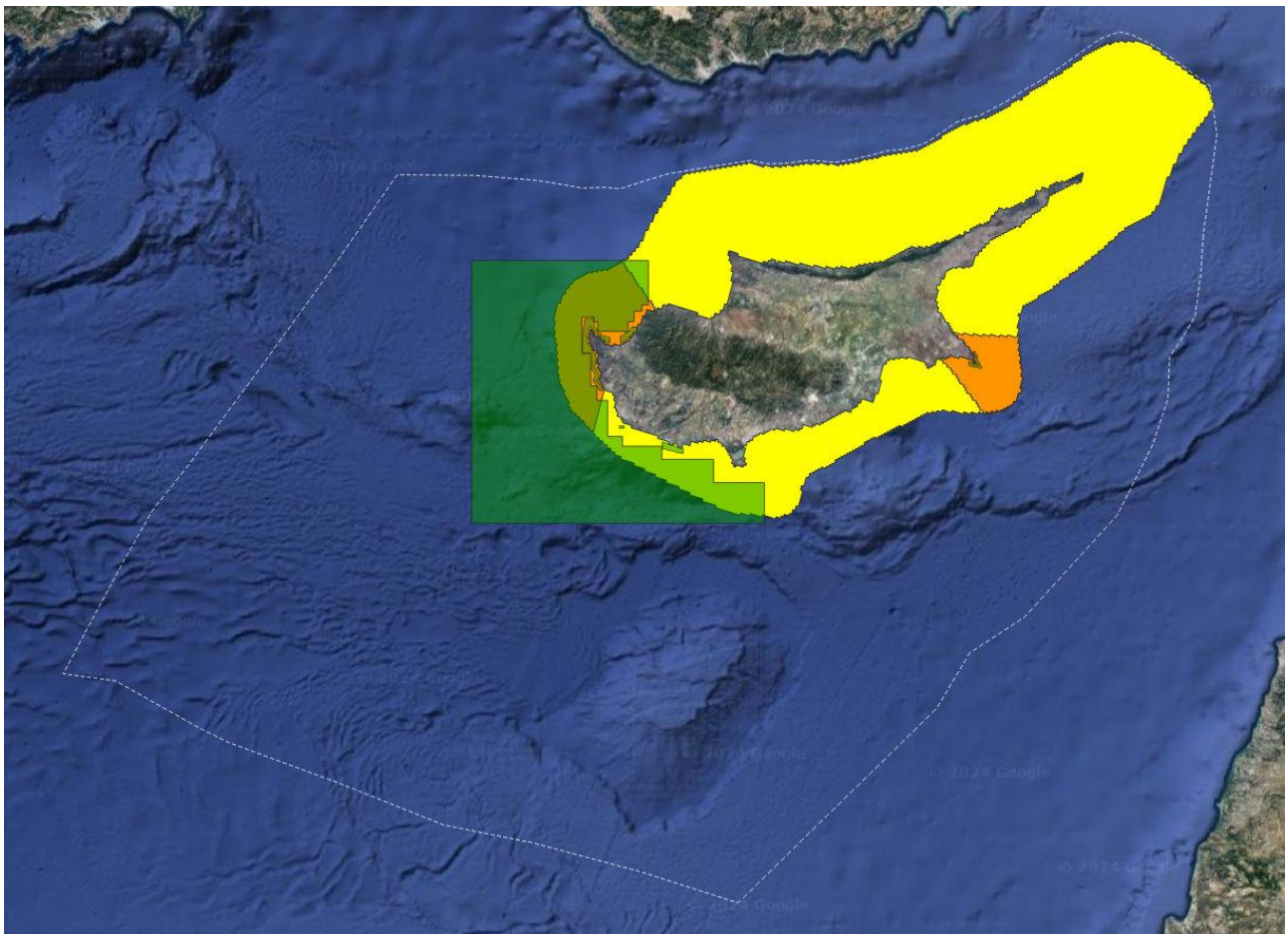

Figure 55. Distributional range (yellow + orange areas = 19,654 km^2) and habitat (orange areas = 2,276 km^2) of *Tursiops truncatus* in the MRU (defined by white dashed line = 98,058 km^2). N2K sites are also shown (transparent green polygons = 8,462 km^2 in total).

D1C5: The habitat for the species has the necessary extent and condition to support the different stages in the life history of the species.

The reporting unit of Criterion D1C5, as set in 2017/848/EU, is equal to "Extent". The area recognized as habitat of *T. truncatus* in the framework of Habitats Directive (92/43/EEC - reporting under Article 17) is shown in Figure 55 (extent = 2,276 km^2).

Based on the Habitats Directive and considering the importance of protecting cetaceans and their habitats, some areas have joined the N2K network (CY3000005 - Kavo Gkreko, CY4000010 - Chersonisos Akama, CY4000024 - Oceanid, CY4000001 - Polis/Gialia), following evaluation of the presence of these species, among others. In addition, these MPAs, in accordance with the management plans, ensure that there is a favourable conservation status for *T. truncatus* by protecting the species and its habitat, and setting the base for mitigating the effects of human activities, especially underwater noise (see Chapter 3.3.11 on D11). One of the aims of DFMR is to implement systematic monitoring of the cetacean population that will focus, beyond population and distribution/habitat range estimation, on other threats to vital functions of the species, such as reproduction and availability of food, as well as on the main causes of mortality, including interaction with fisheries.

Generally, *T. truncatus* is usually observed in the coastal zone while sightings in deeper waters seem to be occasional (Gnone et al., 2022). Within the coastal zone, it can inhabit a wide variety of habitats, such as rocky coasts, sandy areas, open waters, etc. (Bearzi et al., 2009), including infrastructures such as ports, fish farms, and channels (Akkaya Bas et al., 2018). In Cyprus, this is in agreement with several reports (some accompanied by videos) by local fishermen and mariners across various local ports. This species is considered a generalist in terms of prey (MacLeod et al., 2006), and thus not strictly related to a specific foraging habitat.

To assess "the conditions which support the different stages in the life history of the species", parameters from D1C1 and D11C2 are considered (see Chapters 3.3.1 and 3.3.11). According to D1C1, no marine mammals have been reported as "dead" in bycatch records and according to D11C2, continuous noise within the habitat of the species is below the suggested limit of 120 dB, both of which suggest a favourable status of the habitat. In conclusion, and also based on the Habitats Directive, the occupied habitat is considered to be sufficient for the long-term survival of the species. However, to analyse the progression of this habitat throughout the years and define its status, further research is needed and thus the status is still considered not assessed (Table 83).

Table 83. GES assessment for cetaceans (D1M)

Descriptor	Criterion	Indicator	Element	TV	GES
D1M: Species groups of marine mammals - cetaceans.	D1C2 (Primary): The population abundance of the species is not adversely affected due to anthropogenic pressures, such that its long-term viability is ensured	CY.1.2: Population abundance (number of indiv.)	*Tursiops truncatus*	GES: > 30 ind.	In GES
	D1C4 (Primary): The species distributional range and, where relevant, pattern is in line with prevailing physiographic, geographic and climatic conditions	CY.1.4: Species distribution range (km^2)	*Tursiops truncatus*	Not set	Not assessed
	D1C5 (Primary): The habitat for the species has the necessary extent and condition to support the different stages in the life history of the species	CY.1.5: Habitat extent for the species (km^2)	*Tursiops truncatus*	Not set	Not assessed

3.3.12.3 Mammals - Mediterranean monk Seal (D1M)

The Mediterranean monk seal *Monachus monachus* is the rarest of the 33 species of seals that exist in the world, and it is considered the most threatened marine mammal in Europe. It has a special preference for the sea caves, the rocky and inaccessible coasts and likes isolation and quietness. Although it spends most of its life in the marine environment, it uses terrestrial habitats for resting, pup bearing and nurturing its young ones.

For the protection of the Mediterranean monk seal, DFMR has established a dedicated monitoring program, both for the species population and for the identification and recording of its potential habitats. The monitoring team consists of specialized staff from DFMR and the Ministry of Agriculture, Rural Development and Environment (MARDE).

Through the monitoring program, as well as the observations records, an increase in the population of the Mediterranean monk Seal in Cyprus has been observed in the last years. In 2010, the population was estimated to be around 7-10 individuals, in 2017 10 individuals and in 2022 18 individuals (Table 84). The most frequent records mainly concern the protected areas of Agios Georgios Alamanou and Akamas Peninsula that includes the Pegeia Sea Caves and Halavro MPAs (Table 85). Agia Napa Sea Caves were recently recognized as an important site for the Mediterranean monk seal population in Cyprus and were established as an MPA in 2023. It is noted that another important site is Akrotiri that is within the British Sovereign Bases area in Limassol.

Table 84. Mediterranean monk seal population in Cyprus on 1/1/2017 and 31/12/2022.

Date	Male				Female			Total			
	Newborn	Adult	Young	Totals	Adult	Young	Totals	Newborn	Adults	Young	Totals
01/01/2017	0	1	0	1	8	1	9	0	9	1	10
31/12/2022	2	0	2	2	9	5	14	2	9	7	18

Table 85. Mediterranean monk seal population in Cyprus in 2022 per area.

Area	Females	Males
Agia Napa	3	1
Ayios Georgios Alamanou	3	0
Akrotiri	4	1
Pegeia Sea Caves	3	1
Halavro	2	0
Total	15	3
Total population	18	

D1C1: The mortality rate per species from incidental by-catch is below levels which threaten the species, such that its long-term viability is ensured.

See Chapter 3.3.1.

D1C2: The population abundance of the species is not adversely affected due to anthropogenic pressures, such that its long-term viability is ensured.

Methodology

Criterion D1C2 of the GES Decision is defined as "*The population abundance of the species is not adversely affected due to anthropogenic pressures, such that its long-term viability is ensured".* The reporting unit of the Criterion D1C2, as set in 2017/848/EU, is equal to "population", which corresponds to the FRV that is reported under the Habitats Directive (92/43/EEC). Within

2017/848/EU, the unit of measurement for the population criterion is abundance (number of individuals or biomass in t) per species.

Results

At current stage, DFMR in collaboration with Mediterranean monk seal experts, are in the process of running meta-data analyses to define the population FRV, as the one reported under Directive 92/43/EEC for the period 2013-2018 was not based on data analysis but instead relied subjectively on expert judgment. Nonetheless, the 100 individuals reported under the Habitats Directive is certainly not an achievable number with the current knowledge of the species and its habitat in Cyprus. A new FRV will be estimated and reported in the next report under the Habitats Directive. Therefore, status cannot be determined at this point and criterion D1C2 for Mediterranean monk seal in considered not assessed (Table 86).

D1C4: The species distributional range and, where relevant, pattern is in line with prevailing physiographic, geographic and climatic conditions.

Criterion D1C4 of the GES Decision is defined as *"The species distributional range and, where relevant, pattern is in line with prevailing physiographic, geographic and climatic conditions"*.

The reporting unit of Criterion D1C4, as set in 2017/848/EU, is equal to "Range", which was calculated using data from the national Mediterranean monk seal monitoring program, the DFMR Thetis database which records sightings and strandings, as well as from scientific literature and expert opinion. Range was set considering the distribution of the species in the area under the effective control of the Government of the Republic of Cyprus, as well as in the occupied areas of the Republic of Cyprus and the British Sovereign Base areas, where the Government of the Republic of Cyprus does not exercise effective control over (Figure 56).

Due to the complete survey and robust data collected since 2010 in Cyprus for the Mediterranean monk seals, regarding its population, range and habitat, there is excellent scientific knowledge. Conservation measures are being taken to ensure the future prospects of the species. The range and habitat of the species are considered to be in Favourable Status, as it was previously assessed under the EU Habitats Directive. Thus, Criterion D1C4 for the Mediterranean monk seal is considered to be in GES (Table 86).

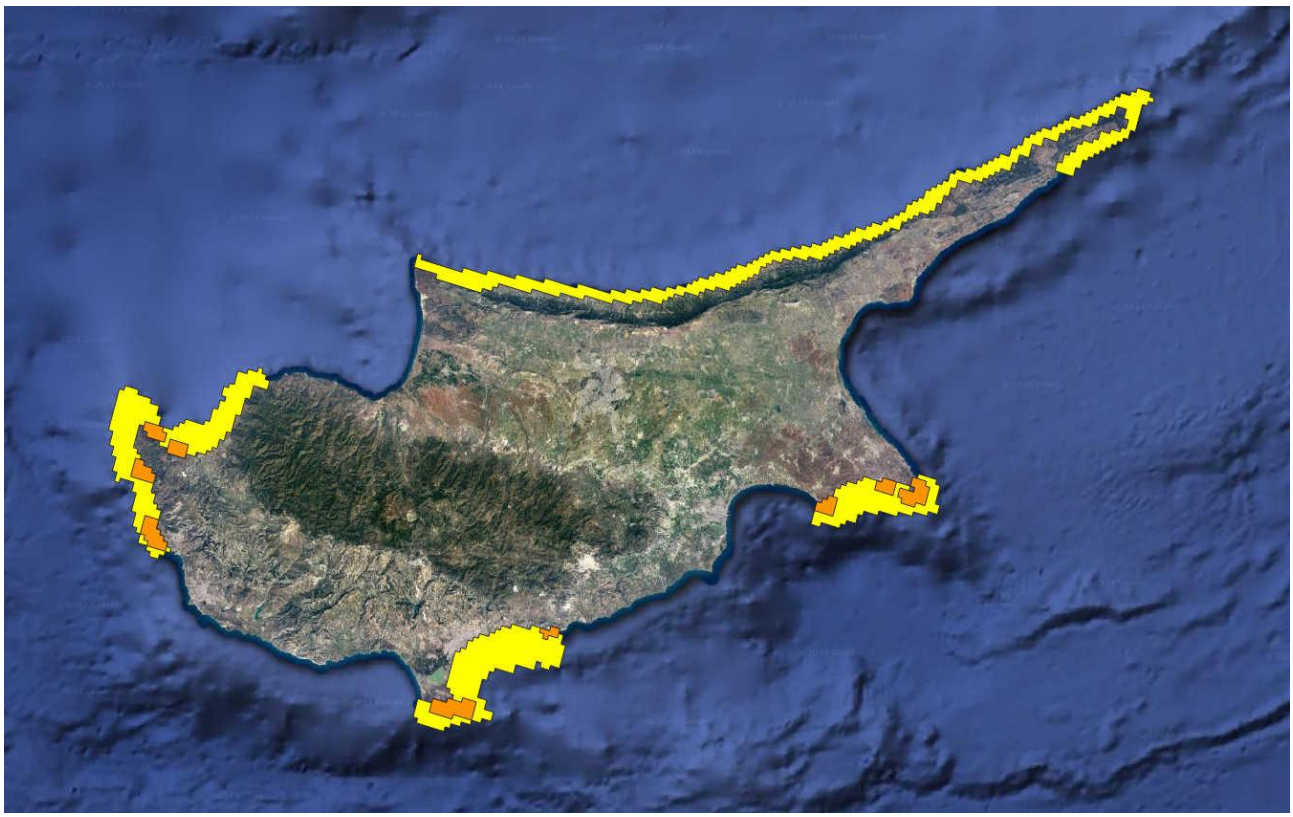

Figure 56. Distributional range (yellow + orange areas = 1,363 km^2) and habitat (orange areas = 153 km^2) of *Monachus monachus* in the MRU (98,058 km^2).

D1C5: The habitat for the species has the necessary extent and condition to support the different stages in the life history of the species.

Methodology

Criterion D1C5 of the GES Decision is defined as "*The habitat for the species has the necessary extent and condition to support the different stages in the life history of the species"*. The reporting unit of Criterion D1C5, as set in 2017/848/EU, is equal to the "habitat for the species".

The Mediterranean monk seal habitat preference is Sea Caves that are used for breeding and resting. According to the Habitats Directive, the habitat shall be sufficient for the survival of the species. In the case of *M. monachus*, all sea caves under the effective control of the Government of the Republic of Cyprus have been identified, mapped and being monitored. Most of them are included in existing or proposed N2K sites and nationally designated MPAs with protection measures such as prohibition of fishing, vessel entering/anchoring etc.

Results

Given the above, most of the population of Mediterranean monk seals in Cyprus is based within protected areas. The FRV for the Mediterranean monk seal habitat, being the number of sea caves that are appropriate for breeding and resting, is reported as Sufficient under the last reporting of the Directive 92/43/ECC (2013-2018). Based on the available data for the years 2017-2022, the FRV for the Mediterranean monk seal habitat is considered Sufficient and thus, D1C5 is considered to be in GES (Table 86).

Table 86. GES assessment for Mediterranean monk Seal (D1M).

Descriptor	Criterion	Indicator	Elements	TV	GES
D1M: Species groups of marine mammals – Mediterranean monk seal	D1C2 (Primary): The population abundance of the species is not adversely affected due to anthropogenic pressures, such that its long-term viability is ensured	CY.1.2: Population abundance (number of indiv.)	*Monachus monachus*	HD FRV	Not assessed
	D1C4 (Primary): The species distributional range and, where relevant, pattern is in line with prevailing physiographic, geographic and climatic conditions	CY.1.4: Species distribution Range (km^2)	*Monachus monachus*	HD FRV	In GES
	D1C5 (Primary): The habitat for the species has the necessary extent and condition to support the different stages in the life history of the species	CY.1.5: Habitat extent for the species (km^2)	*Monachus monachus*	HD FRV	In GES

3.3.12.4 Reptiles - marine turtles (D1R)

There are seven species of sea turtles in the global oceans. In the Mediterranean, the loggerhead sea turtle (*Caretta caretta*), which is the most common species in the region, and the green sea turtle (*Chelonia mydas*) are regularly observed. The leatherback turtle (*Dermochelys coriacea*), the largest sea turtle species in the world, is a rare visitor. In Cyprus, there have been only ≤2 leatherback sea turtle sightings in the last 50 years.

The loggerhead and the green sea turtle are the only species that breed in the Mediterranean. Loggerhead sea turtles nest mainly in Greece, Turkey, Cyprus and Libya. Green sea turtles nest mainly in Cyprus and Turkey. Like all sea turtles, the loggerhead and green sea turtles travel long distances across seas and oceans in search of food. From previous studies, it has been identified that the largest population of adult sea turtles that lay eggs in Cyprus, after the end of the breeding season, migrate from the beaches of Cyprus to areas of North Africa (Egypt, Libya, etc.) where they remain for the next 3-4 years, before they return to the nesting beaches.

The number of nests has been increasing in Cyprus during the last decades. There were only around 250-300 turtle nests on the beaches of Cyprus when the national monitoring program began in 1978. This number grew to around 1,500 nests over the past few years (Figures 57 and 58 - Demetropoulos et al., 2022).

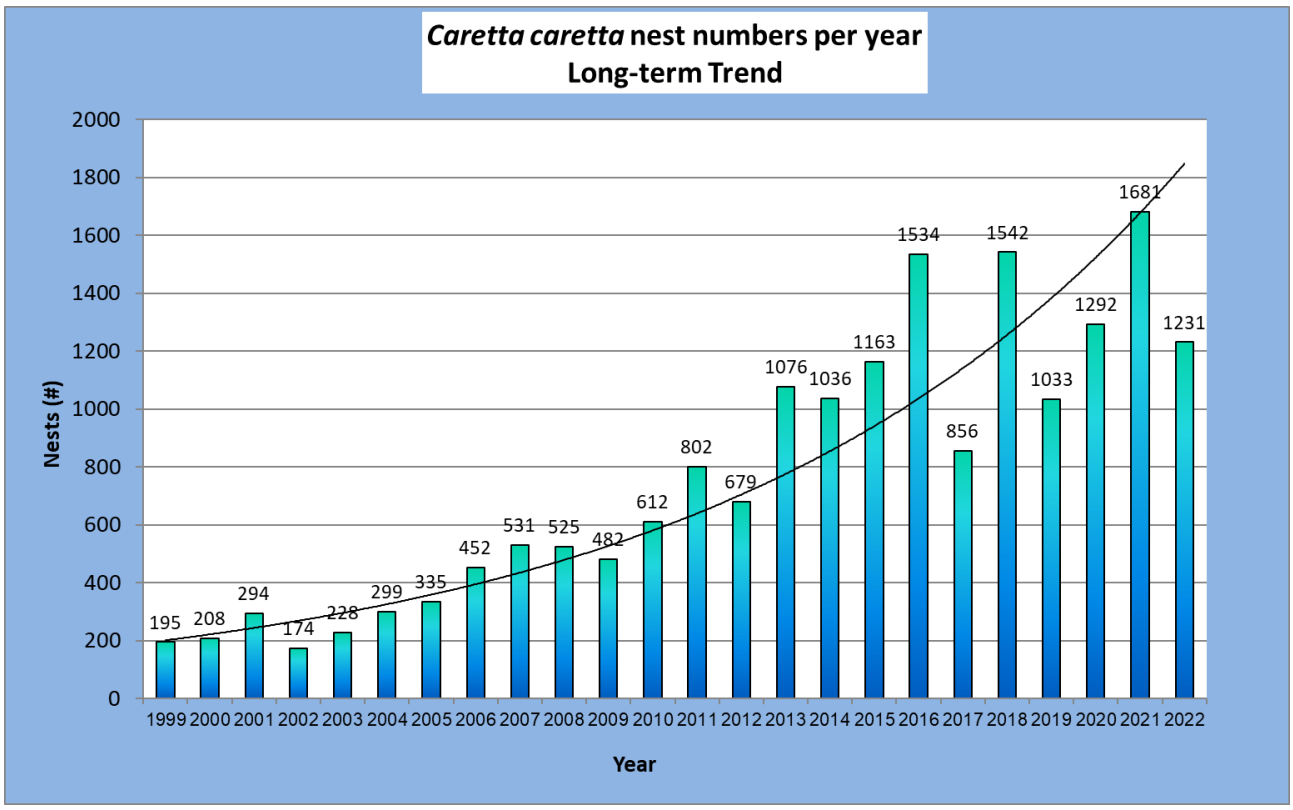

Figure 57. Number of *Caretta caretta* nests per year (Demetropoulos et al., 2022).

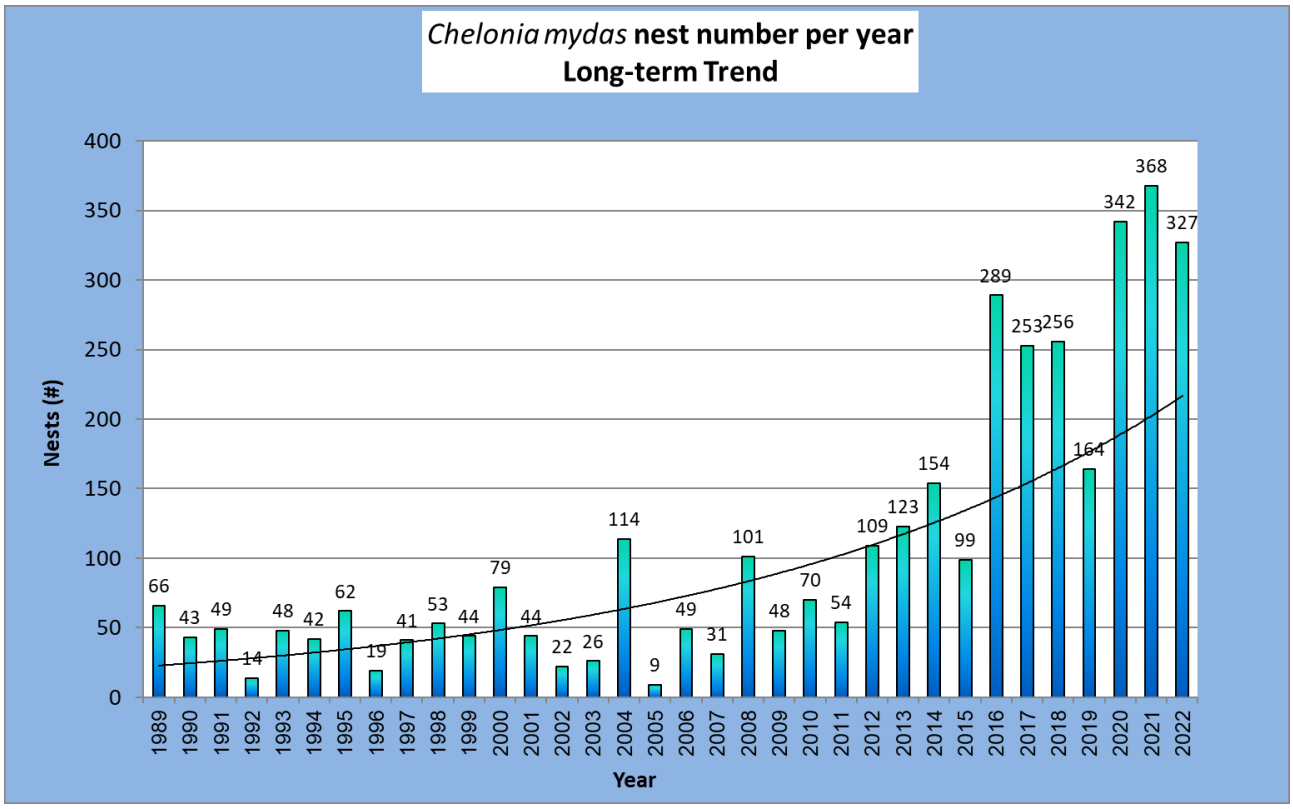

Figure 58. Number of *Chelonia mydas* nests per year (Demetropoulos et al. 2022).

D1C1: The mortality rate per species from incidental by-catch is below levels which threaten the species, such that its long-term viability is ensured.

See Chapter 3.3.1.

D1C2: The population abundance of the species is not adversely affected due to anthropogenic pressures, such that its long-term viability is ensured.

Methodology

Criterion D1C2 of the GES Decision is defined as "*The population abundance of the species is not adversely affected due to anthropogenic pressures, such that its long-term viability is ensured"*. The reporting unit of the Criterion D1C2, as set in 2017/848/EU is equal to "population" which corresponds to the FRV that is reported under the Habitats Directive (92/43/EEC). Within 2017/848/EU, the unit of measurement for the population criterion is abundance (number of individuals or biomass in t) per species.

Results

At the current stage, DFMR in collaboration with the national marine turtle experts, are in the process of running meta-data analyses to re-define the population FRV that will be reported under the Habitats Directive, thus Criterion D1C1 is considered not assessed (Table 87). It is noted that breeding females will be the indicator for the population of marine turtles. The previous FRVs for the loggerhead sea turtle (*Caretta caretta*) was 800 breeding females and for the green sea turtle (*Chelonia mydas*) 200 breeding females.

D1C4: The species distributional range and, where relevant, pattern is in line with prevailing physiographic, geographic and climatic conditions.

Criterion D1C4 of the 2017 GES Decision (2017/848/EU) is defined as *"The species distributional range and, where relevant, pattern is in line with prevailing physiographic, geographic and climatic conditions"*.

The reporting unit of Criterion D1C4, as set in 2017/848/EU, is equal to "Range", which was calculated using data from the long-term marine turtle monitoring program (since 1978), the DFMR Thetis database which records sightings and strandings, as well as scientific literature and expert opinion. Range was set considering the distribution of the species in the area under the effective control of the Government of the Republic of Cyprus, as well as in the occupied areas and the British Sovereign Base areas (Figures 59 and 60).

Due to the long-term monitoring program (since 1978) for sea turtle nesting and the robustness of the data collected, there is excellent scientific knowledge for the marine turtles and their nesting in Cyprus. Additional surveys are planned in order to further examine/verify their feeding grounds and migratory routes. Conservation measures are being taken to ensure the future prospects of the species. The range and habitat of the species are considered to be in Favourable Status as it was

previously assessed under the EU Habitats Directive. Thus, Criterion D1C4 for both species of marine turtles, *Caretta caretta* and *Chelonia mydas*, is considered to be in GES (Table 87).

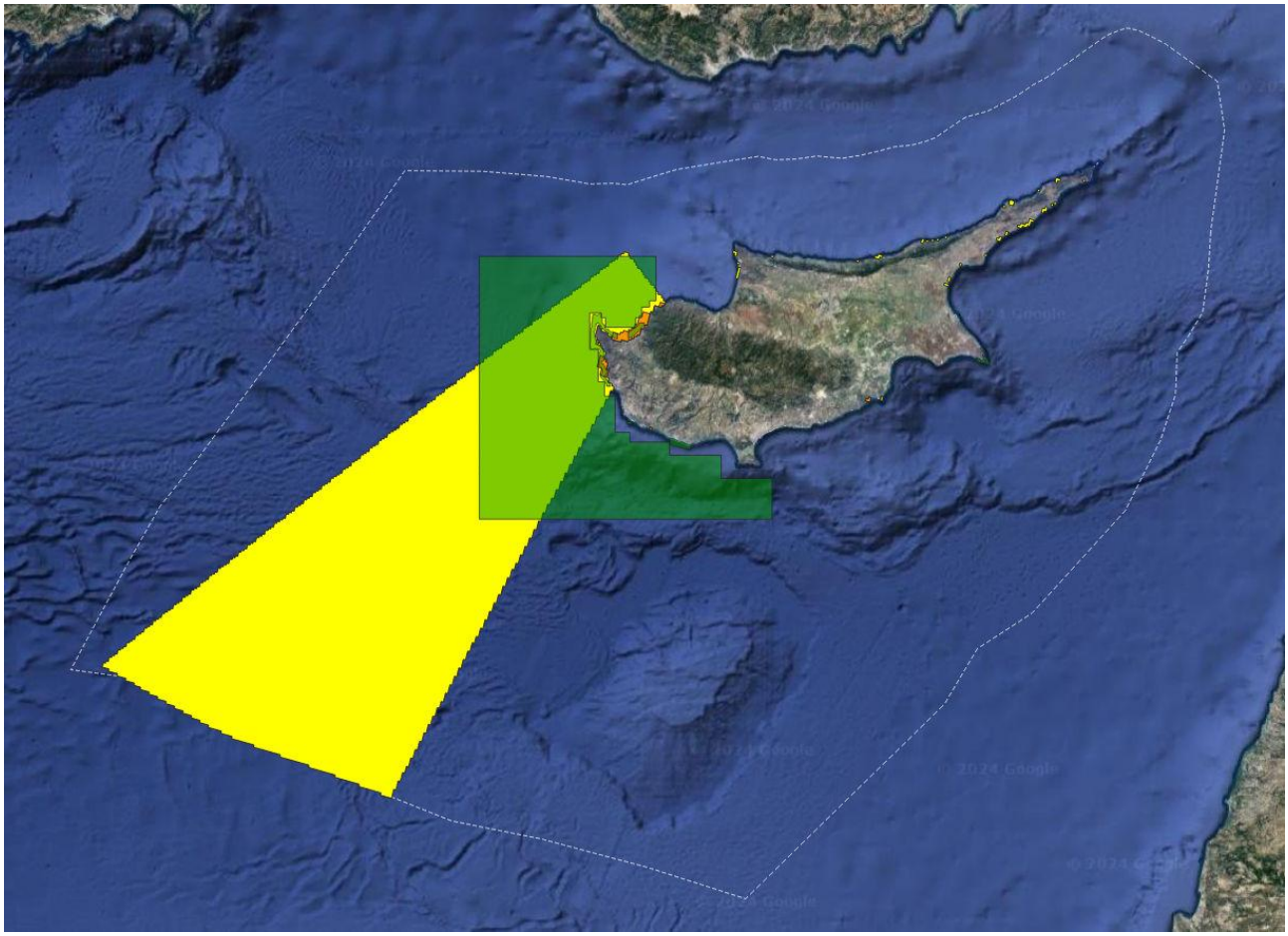

Figure 59. Distributional range (yellow + orange areas = 20,439 km^2) and habitat (orange areas = 105 km^2) of *Caretta caretta* in the MRU (defined by white dashed line = 98,058 km^2). N2K sites are also shown (transparent green polygons = 8,462 km^2 in total).

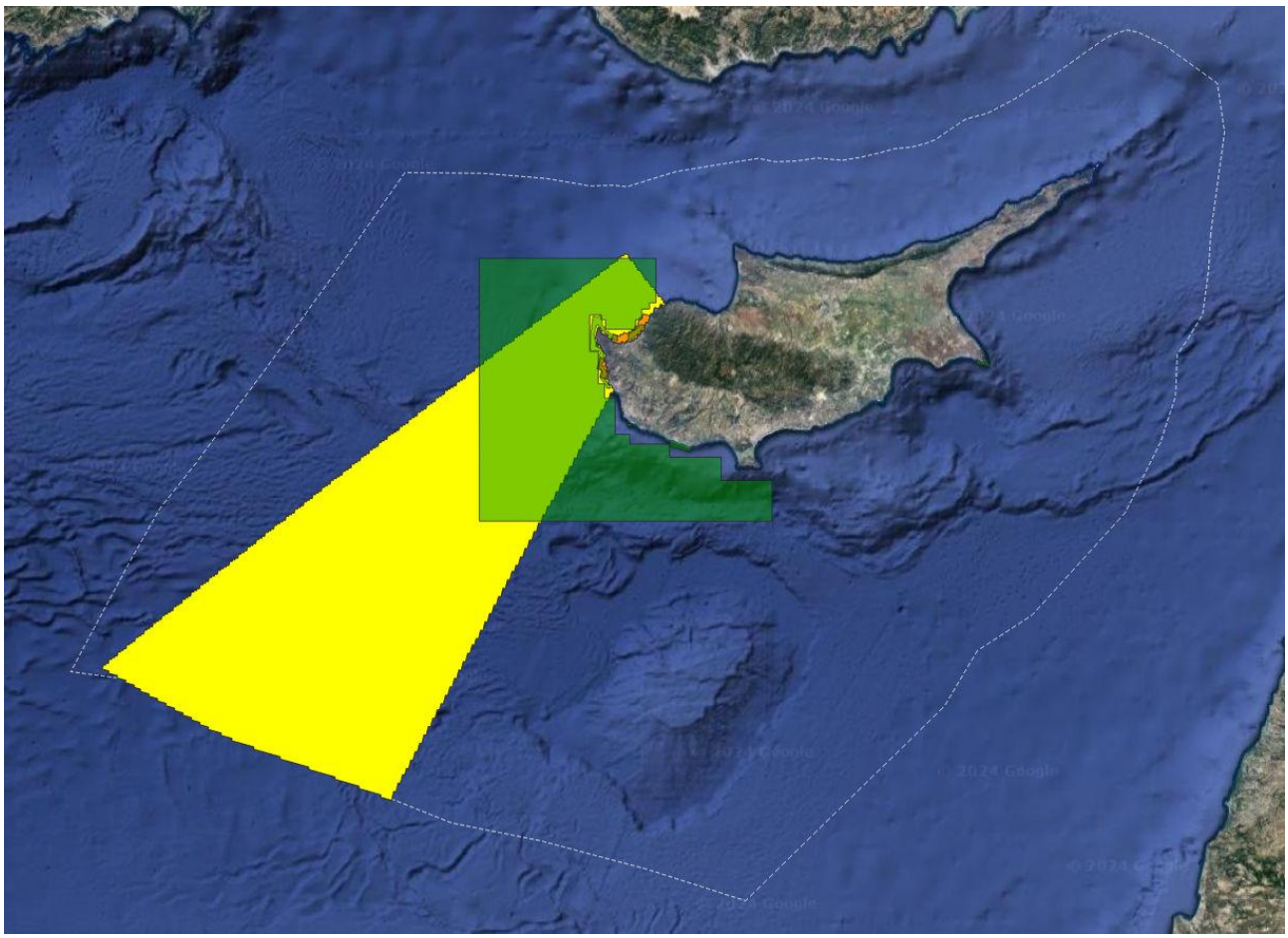

Figure 60. Distributional range (yellow + orange areas = 20,367 km^2) and habitat (orange areas = 91 km^2) of *Chelonia mydas* in the MRU (defined by white dashed line = 98,058 km^2). N2K sites are also shown (transparent green polygons = 8,462 km^2 in total).

D1C5: The habitat for the species has the necessary extent and condition to support the different stages in the life history of the species.

Methodology

Criterion D1C5 of the GES Decision is defined as "*The habitat for the species has the necessary extent and condition to support the different stages in the life history of the species"*. The reporting unit of Criterion D1C5, as set in 2017/848/EU, is equal to "habitat for the species".

All major habitats for the species have been identified, mapped and are being monitored. The habitats include the major nesting beaches for both species, as well as the adjacent sea feeding/breeding ground. These are included in existing N2K sites and nationally designated MPAs with protection and management measures. Thus, most of the nesting population of marine turtles in Cyprus is based within protected areas.

Results

The FRV for the marine turtles' habitat is recorded as "Sufficient" under the last reporting of the Directive 92/43/ECC, thus Criterion D1C5 for both species of marine turtles, *Caretta caretta* and *Chelonia mydas*, is considered to be in GES (Table 87).

Table 87. GES assessment for marine turtles (D1R).

Descriptor	Criterion	Indicator	Element	TV	GES
D1R: Species groups of marine reptiles (turtles)	D1C2 (Primary): The population abundance of the species is not adversely affected due to anthropogenic pressures, such that its long-term viability is ensured	CY.1.2: Population abundance (number of indiv.)	*C. caretta*	HD FRV	Not assessed
			C. mydas		
	D1C4 (Primary): The species distributional range and, where relevant, pattern is in line with prevailing physiographic, geographic and climatic conditions	CY.1.4: Species distribution Range (km^2)	*C. caretta*	HD FRV	In GES
			C. mydas		
	D1C5 (Primary): The habitat for the species has the necessary extent and condition to support the different stages in the life history of the species	CY.1.5: Habitat extent for the species (km^2)	*C. caretta*	HD FRV	In GES
			C. mydas		

3.3.12.5 Fish & Cepahlopods (D1F, D1C)

MSFD Directive addresses species groups of birds, mammals, reptiles, fish and cephalopods (Descriptor 1) through specific Criteria. As described in detail in Chapter 3.3.13 on the assessment of all commercially exploited fish and shellfish (also includes cephalopods), the Republic of Cyprus has selected three Criteria to be assessed, D1C1, D1C2 and D1C3, as described below.

D1C1: The mortality rate per species from incidental by-catch is below levels which threaten the species, such that its long-term viability is ensured.

See Criterion D3C1 in Chapter 3.3.13.

D1C2: The population abundance of the species is not adversely affected due to anthropogenic pressures, such that its long-term viability is ensured.

See Criterion D3C2 in Chapter 3.3.13.

D1C3: The population demographic characteristics (e.g. body size or age class structure, sex ratio, fecundity, and survival rates) of the species are indicative of a healthy population which is not adversely affected due to anthropogenic pressures.

See Criterion D3C3 in Chapter 3.3.13.

3.3.13 Commercially exploited fish and shellfish (D3)

MSFD Directive addresses the exploitation of commercial species through Descriptor 3 *"Populations of all commercially exploited fish and shellfish are within safe biological limits, exhibiting a population age and size distribution that is indicative of a healthy stock"* and specific Criteria.

For the present period, D3 was assessed for previously selected commercial species (Table 88) using three criteria, D3C1, D3C2 and D3C3, as described below. In relation to the previous period, secondary indicators "Harvest rate (trend)" and "SSB or B (trend)" were removed as they were considered less reliable and not essential for the assessment. In addition, species *Dentex dentex*, *Pagrus pagrus* and *Seriola dumerili* were removed from the selected species as they were not well represented in available data, largely because these species are mainly targeted by the recreational fisheries, which are not yet fully monitored (Michailidis et al., 2020).

D3C1: The Fishing mortality rate of populations of commercially-exploited species is at or below levels which can produce the maximum sustainable yield (MSY).

Methodology

Criterion D3C1 of the GES Decision is defined as "*The Fishing mortality rate of populations of commercially exploited species is at or below levels which can produce the maximum sustainable yield (MSY)*".

F/FMSY of 14 selected commercial species (13 fish, one cephalopod) within the study period was used as Indicator for the assessment of this Criterion (Indicator CY3.1), and GES was achieved if F/FMSY ≤ 1 (threshold set by Commission Decision (EU) 2017/848).

F/FMSY was estimated per species (element) in published expert-reviewed GFCM and ICCAT stock assessments, except one ad-hoc assessment for *Merluccius merluccius*. Methods used included the State Space stock assessment Model (SAM), Surplus Production Model in Continues Time (SPiCT), Catch Maximum Sustainable Yield (CMSY), CMSY++, Abundance Maximum Sustainable Yields (AMSY), as well as Bayesian state space surplus production model (JABBA) and VPA2box for large pelagics (Table 88). Detailed reports on the methodologies and results of these assessments are available online at fao.org/gfcm/data/safs, fao.org/gfcm/data/star and iccat.int/en/assess.html.

Results

Criterion D3C1 assessment results per species (element) are given in Table 89. Only five out of 11 species assessed were found to be in GES based on this Criterion.

D3C2: The Spawning Stock Biomass of populations of commercially-exploited species are above biomass levels capable of producing maximum sustainable yield.

Methodology

Criterion D3C2 of the GES Decision is defined as "*The Spawning Stock Biomass of populations of commercially exploited species are above biomass levels capable of producing maximum sustainable yield"*.

B/BMSY of the selected 14 species within the study period was used as Indicator for the assessment of this Criterion (Indicator CY3.2), and GES was achieved if B/BMSY ≥ 1 (threshold set by Commission Decision (EU) 2017/848).

B/BMSY was estimated per species (element) in the stock assessments described above (Table 88).

Results

Criterion D3C2 assessment results per species (element) are given in Table 89. Only three out of 11 species assessed were found to be in GES based on this Criterion.

D3C3: The age and size distribution of individuals in the populations of commercially-exploited species is indicative of a healthy population.

Methodology

Criterion D3C3 of the GES Decision is defined as "*The age and size distribution of individuals in the populations of commercially exploited species is indicative of a healthy population. This shall include a high proportion of old/large individuals and limited adverse effects of exploitation on genetic diver".*

The trend of the mean length of individuals was used as Indicator for the assessment of this Criterion (Indicator CY3.3), and GES was achieved if the trend was stable or positive when comparing the present with the previous six-year assessment period. In cases where the absolute change was smaller than 2%, the trend was considered stable (threshold set at national level).

For D3C3 indicator assessment, the trend of the mean length per species from MEDITS data were used in relation to the previous six-year period.

Results

Criterion D3C3 assessment results, i.e. the mean length trend from the previous to the present six-year period, per species (element) are given in Table 89 and Figure 61. Seven out of 11 species assessed were found to be in GES based on this Criterion.

Table 88. Stock assessment methods used per assessed species (element) for Criteria D3C1 and D3C2 for the present study period (2017-2022) in Cyprus waters. Year in the assessment column refers to the reference year of the stock assessment, not the reporting year.

Species	Assessment
Boops boops	no assessment
Merluccius merluccius	ad hoc AMSY 2020
Mullus barbatus	GFCM SAM 2022
Mullus surmuletus	GFCM SAM 2022
Octopus vulgaris	GFCM SPiCT 2022
Pagellus acarne	GFCM CMSY 2020
Pagellus erythrinus	GFCM SPiCT 2019
Serranus cabrilla	GFCM AMSY 2020
Sparisoma cretense	no assessment
Spicara maena	no assessment
Spicara smaris	GFCM CMSY++ 2022
Thunnus alalunga	ICCAT JABBA 2019
Thunnus thynnus	ICCAT VPA2box 2020
Xiphias gladius	ICCAT JABBA 2018

Table 89. Summary of the D3 assessments per species (Element) and Criterion/Indicator for the present study period (2017-2022) in Cyprus waters.

Descriptor	Criterion	Indicator	Element	TV	GES
D3: Commercial fish and shellfish Populations of all commercially exploited fish and shellfish are within safe biological limits, exhibiting a population age and size distribution that is indicative of a healthy stock	D3C1 (Primary): The Fishing mortality rate of populations of commercially exploited species is at or below levels which can produce the maximum sustainable yield (MSY).	CY3.1: Fishing mortality rate (F/FMSY) of commercially exploited species.	*Boops boops*	GES: ≤ 1	Unknown
			Merluccius merluccius		Not in GES
			Mullus barbatus		Not in GES
			Mullus surmuletus		Not in GES
			Octopus vulgaris		Not in GES
			Pagellus acarne		Not in GES
			Pagellus erythrinus		In GES
			Serranus cabrilla		In GES
			Sparisoma cretense		Unknown
			Spicara maena		Unknown
			Spicara smaris		In GES
			Thunnus alalunga		Not in GES
			Thunnus thynnus		In GES
			Xiphias gladius		In GES
	D3C2 (Primary): The Spawning Stock Biomass of populations of commercially exploited species are above biomass levels capable of producing maximum sustainable yield.	CY3.2: Stock status (B/BMSY) of commercially exploited species.	*Boops boops*	GES: ≥ 1	Unknown
			Merluccius merluccius		Not in GES
			Mullus barbatus		Not in GES
			Mullus surmuletus		Not in GES
			Octopus vulgaris		Not in GES
			Pagellus acarne		Not in GES
			Pagellus erythrinus		In GES
			Serranus cabrilla		In GES
			Sparisoma cretense		Unknown
			Spicara maena		Unknown
			Spicara smaris		Not in GES
			Thunnus alalunga		In GES
			Thunnus thynnus		Not in GES
			Xiphias gladius		Not in GES
	D3C3 (Primary): The age and size distribution of individuals in the populations of commercially	CY3.3: Mean length of individuals (trend).	*Boops boops*	GES: Stable or positive trend	In GES
			Merluccius merluccius		In GES
			Mullus barbatus		In GES
			Mullus surmuletus		In GES
			Octopus vulgaris		Not in GES

Descriptor	Criterion	Indicator	Element	TV	GES
	exploited species is indicative of a healthy population. This shall include a high proportion of old/large individuals and limited adverse effects of exploitation on genetic diversity.		*Pagellus acarne*		In GES
			Pagellus erythrinus		Not in GES
			Serranus cabrilla		In GES
			Sparisoma cretense		In GES
			Spicara maena		Not in GES
			Spicara smaris		Not in GES
			Thunnus alalunga		Unknown
			Thunnus thynnus		Unknown
			Xiphias gladius		Unknown

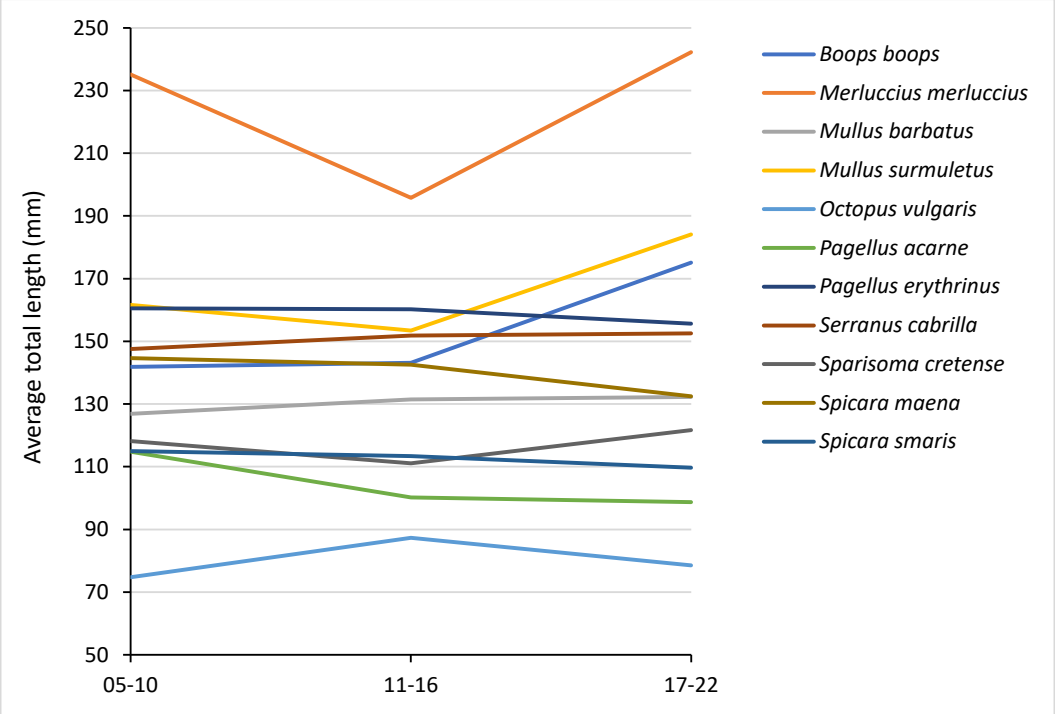

Figure 61. Average individual total length (mm) of selected species per six-year-period, estimated from MEDITS 2005 to 2022 data. Stable or increasing trend from 2011-2016 to 2017-2022 indicates D3C3 GES in the present assessment.

3.3.14 Marine habitats (D1)

3.3.14.1 Pelagic habitats (D1.6)

D1C6: The condition of the habitat type, including its biotic and abiotic structure and its functions, is not adversely affected due to anthropogenic pressures

Methodology

Criterion D1C6 of the GES Decision is defined as "*The condition of the habitat type, including its biotic and abiotic structure and its functions, (e.g., its typical species composition and their relative abundance, absence of species providing a key function, size structure of species) is not adversely affected due to anthropogenic pressures*". The GES Decision allows MS to define pelagic habitat types through (sub)regional cooperation, following the specifications laid down in the GES Decision for the selection of species and habitats and to agree TVs through (sub)regional cooperation.

The Republic of Cyprus is located in the Mediterranean Sea and is a member of the UNEP RAC/SPA. According to the UNEP/MED WG.548/7 a multidisciplinary group of experts was nominated by the Contracting Parties to define parameters allowing to use phytoplankton and zooplankton for relevant IMAP biodiversity indicators and elaborate the List of Reference of Pelagic Habitat Types in the Mediterranean Sea. The List of Reference for the Pelagic Habitat Types is presented in the Table 90.

Table 90. Reference list of pelagic Habitat Types for the epipelagic layer (0-200m) according to UNEP SPA/RAC (each country should specify the range of CHLa, Salinity, depth and if annual/seasonal values are used).

	Pelagic Habitat Types		**Comments**
A.1.	Reduced salinity water	coastal lagoons	WFD correspondence
A.2.	Variable salinity water - high surface or subsurface CHL (>3 mg/m^3)	estuaries, river plumes	Transitional water (values should be revised)
A.3.	Marine water: neritic - medium surface CHL (0.5-3 mg/m3)	upwellings, re-suspension in shallow waters and outskirts of river plumes	WFD type II, type III
A.4.a	Marine water: oceanic - medium surface CHL (0.5-3 mg/m^3)	upwellings	WFD type III
A.4.b	Marine water: oceanic - low surface CHL (~0.1-0.5 mg/m^3)	Hydrological features (fronts and gyres)	WFD type III
A.5.a.	Marine water: oceanic - very low surface CHL (<0.1 mg/m^3) with deep CHL maximum	euphotic depth > mixed layer depth	WFD type III
A.5.b.	Marine water: oceanic - very low surface CHL (<0.1 mg/m^3) without deep CHL maximum	euphotic depth < mixed layer depth	WFD type III

As indicated in Chapter 3.3.7, and specifically the D5C2, the chl-a concentrations are <0.1mg/m^3 and present a CHL maximum at about 120m depth. Therefore, given the marine waters of Cyprus are classified to the A.5.a. category being "Marine water: oceanic - very low surface CHL (<0.1 mg/m3) with deep CHL maximum".

Regarding the Pelagic Indicators, the following parameters that can be used to effectively use these organisms are addressed in the UNEP/MED WG.548/7: (i) biomass [chl-a, carbon], (ii) abundance (per species/genius or groups), and (iii) size and biovolume; and the abiotic parameters should be measured at the same time to interpret the changes in plankton communities include: (i) water temperature, (ii) salinity, (iii) transparency, (iv) oxygen, (v) turbidity, (vi) pH, (vii) nutrients concentration; (viii) meteorological data (air temperature, precipitation, wind intensity and direction, etc.).

Given the above, the following Pelagic Indicators were selected for Cyprus: (i) Concentration of Chl-a, (ii) Zooplankton abundance (m^{-3}), (iii) Zooplankton Species Richness (S), (iv) Zooplankton Shannon-Wiener (H), (v) Zooplankton Pielou's Evenness (J), (vi) Phytoplankton abundance and (vii) Phytoplankton Biomass. Regarding TVs, these have not yet been defined at sub-regional level.

Finally, as indicated by the UNEP/MED WG nominated experts "Overall, while there has been progress in developing indicators based on phytoplankton and zooplankton, continued research and development are needed to define these indicators and improve their usefulness for assessing and managing pelagic habitats" (UNEP/MED WG.548/7). These were going to be addressed by the ABIOMMED project (www.abiommed.eu) that was funded by the EU, through the Activity 2.

In 2017, before the UNEP Pelagic Habitat Working Group establishment, the Republic of Cyprus started a monitoring programme to collect phytoplankton and zooplankton samples to be able to address the pelagic habitat as requested by the MSFD. The samples were collected from four sampling stations (Figure 62) located at 50 m depth and the zooplankton and chl-a results covering the years 2017-2019 are presented in Vasilopoulou et al. (2022). It is noted that the monitoring programme will be updated for the next reporting cycle, in order to incorporate the EC and UNEP Pelagic Habitat Working Group recommendations. Furthermore, as no TVs have been defined, criterion D1C6 status is considered unknown.

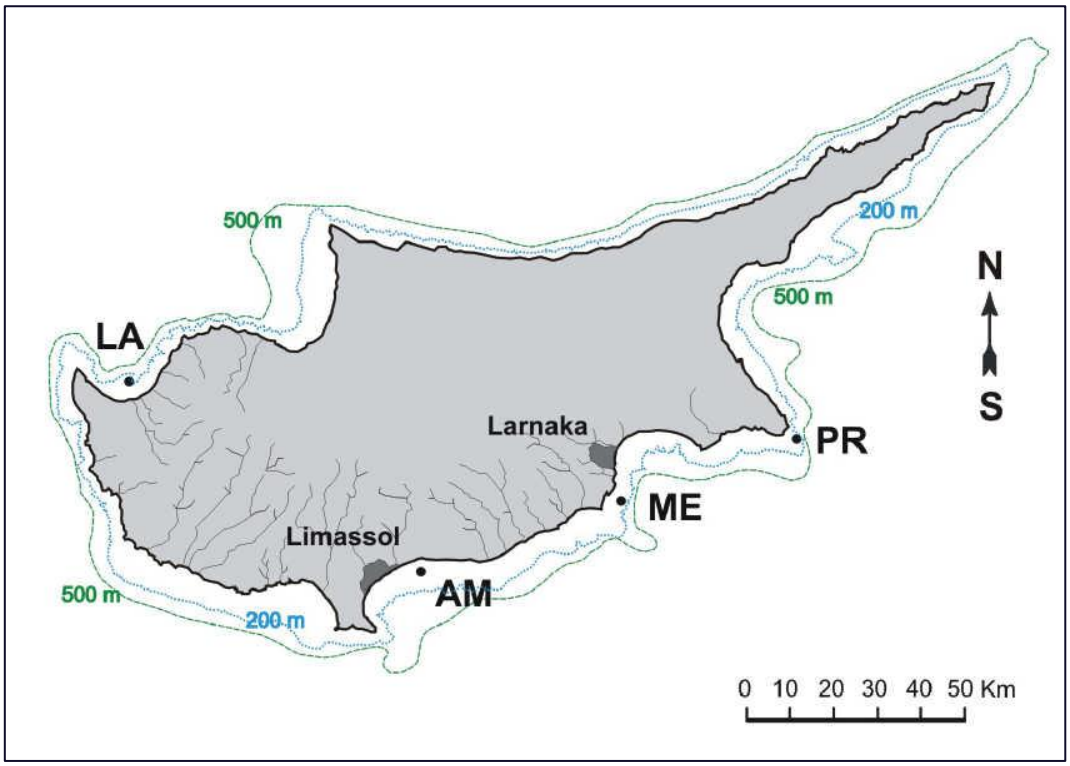

Figure 62. Geographic location of the four sampling sites (LA: Latsi, AM: Amathounta, ME: Meneou, PR: Protaras) in the coastal sampling stations (Vasilopoulou et al., 2022)

Results

According to Vasilopoulou et al. (2022) the total mesozooplankton (sized between 0.2-20 mm) abundance fluctuated between 190.4 and 882.5 individuals m^{-3} (Table 91, Figure 63). A total of 90 holoplanktonic and meroplanktonic taxa were recorded with copepods dominating in the community and accounting for 71.7% of the total mesozooplankton, followed by appendicularians, molluscs, cladocerans, and siphonophores. Regarding the three ecological indices, Species richness (S) fluctuated between 0.236 and 0.611, Shannon- Wiener (H) ranged between 1.633 and 2.733, and Pielou's evenness (J) ranged from 0.565 to 0.849 (Table 91, Figure 64). No statistically significant differences were recorded among the four sampling sites for any of the mesozooplanktonic taxa, though seasonal and interannual differences were recorded for several of them. The same applied for the three ecological indices (S, H and J). Finally, the chlorophyll-a concentrations at the four stations also verified the oligotrophic character of the area and seem to be unaffected by inland inputs. As stated above, as TVs have not yet been set at the sub-regional level, the criterion status is considered unknown at this point (Tables 91 and 92).

Table 91. Zooplankton abundance and diversity results for the period 2017-2019.

Indicators	2017	2018	2019	2017-2019		TV	GES
				Average	St.Dev		
Zooplankton Abundance (m^{-3})	472.126	396.527	554.835	474.496	79.181	-	Unknown
Species Richness index (S)	0.667	0.621	0.780	0.68896	0.081802	-	Unknown
Shannon-Wiener Index (H)	2.827	2.603	2.818	2.749075	0.126812	-	Unknown
Pielou's Evenness index (J)	0.727	0.678	0.688	0.697575	0.026109	-	Unknown

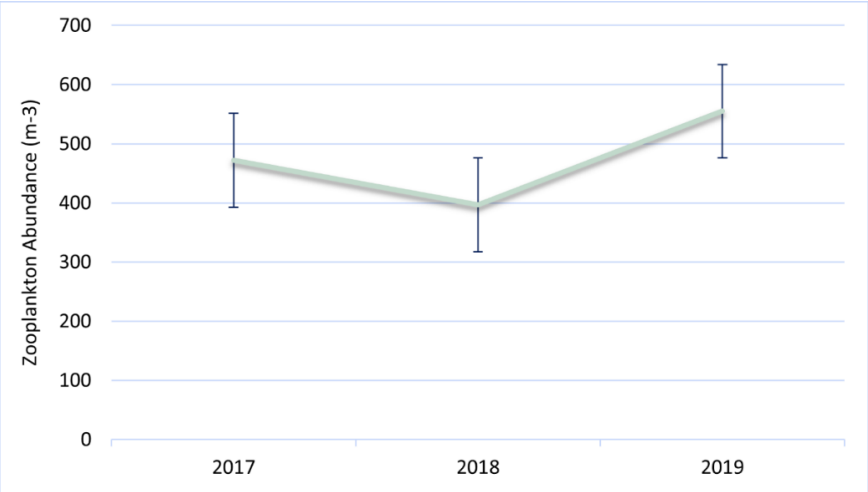

Figure 63. Zooplankton abundance trend.

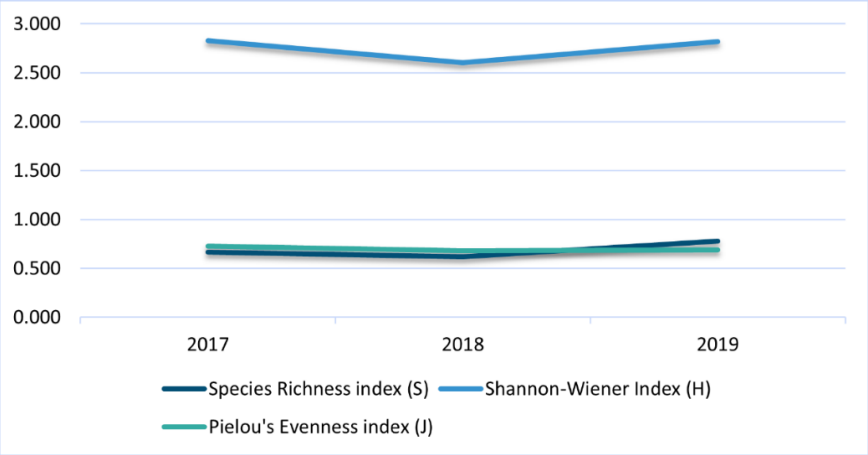

Figure 64. Zooplankton diversity indices trend.

Table 92. Results of the D1.6 evaluation per criteria/indicator for the present study period (2017-2011) in Cyprus waters.

Descriptor	Criterion	Indicator	Feature / Element	TV	GES
D1P: Pelagic habitats	D1C6: The condition of the habitat type, including its biotic and abiotic structure and its functions, is not adversely affected due to anthropogenic pressures	CY.1.6.1: Zooplankton abundance (m^{-3})	Zooplankton communities	Not set	Unknown
		CY.1.6.2: Species richness (S) biodiversity index	Zooplankton communities	Not set	Unknown
		CY.1.6.3: Shannon-Wiener (H) biodiversity index	Zooplankton communities	Not set	Unknown
		CY.1.6.4: Pielou evenness (J) biodiversity index	Zooplankton communities	Not set	Unknown

3.3.14.2 Sea-floor integrity/Benthic habitats (D6, D1)

MSFD Directive addresses seabed integrity through Descriptor 6 *"Sea-floor integrity is at a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected"* and specific Criteria.

For the present period, D6 was evaluated for the physical loss and disturbance of the seabed using two criteria, D6C1 and D6C2, as described below.

D6C1: Spatial extent and distribution of physical loss of the natural seabed

Methodology

Criterion D6C1 of the GES Decision is defined as "*Spatial extent and distribution of physical loss (permanent change) of the natural seabed*". Physical loss refers to the permanent change to the seabed which has lasted or is expected to last for a period of two reporting cycles (12 years) or more.

To evaluate this criterion, the total area of infrastructure built in the present assessment period (2017-2022) was estimated from official data provided by the Land and Survey Department of Cyprus. The total marine area lost due to this infrastructure was used as Indicator (CY.6.1) for this evaluation.

Results

Physical loss due to new infrastructure within the period 2017-2022 was related to the construction of one marina in Agia Napa area (0.14 km^2), one jetty in Vasilikos area (0.013 km^2) and 39 breakwaters in seven different areas around Cyprus (0.061 km^2 in total) (Figure 65). These constructions have directly led to the physical loss of 0.214 km^2, or less than 0.003% of the shelf area seabed, much smaller if the MRU is considered. Nevertheless, as no TVs have been set on an EU or regional/subregional level for this Criterion, this evaluation is not considered an assessment and consequently D6C1 status is not assessed (Table 93).

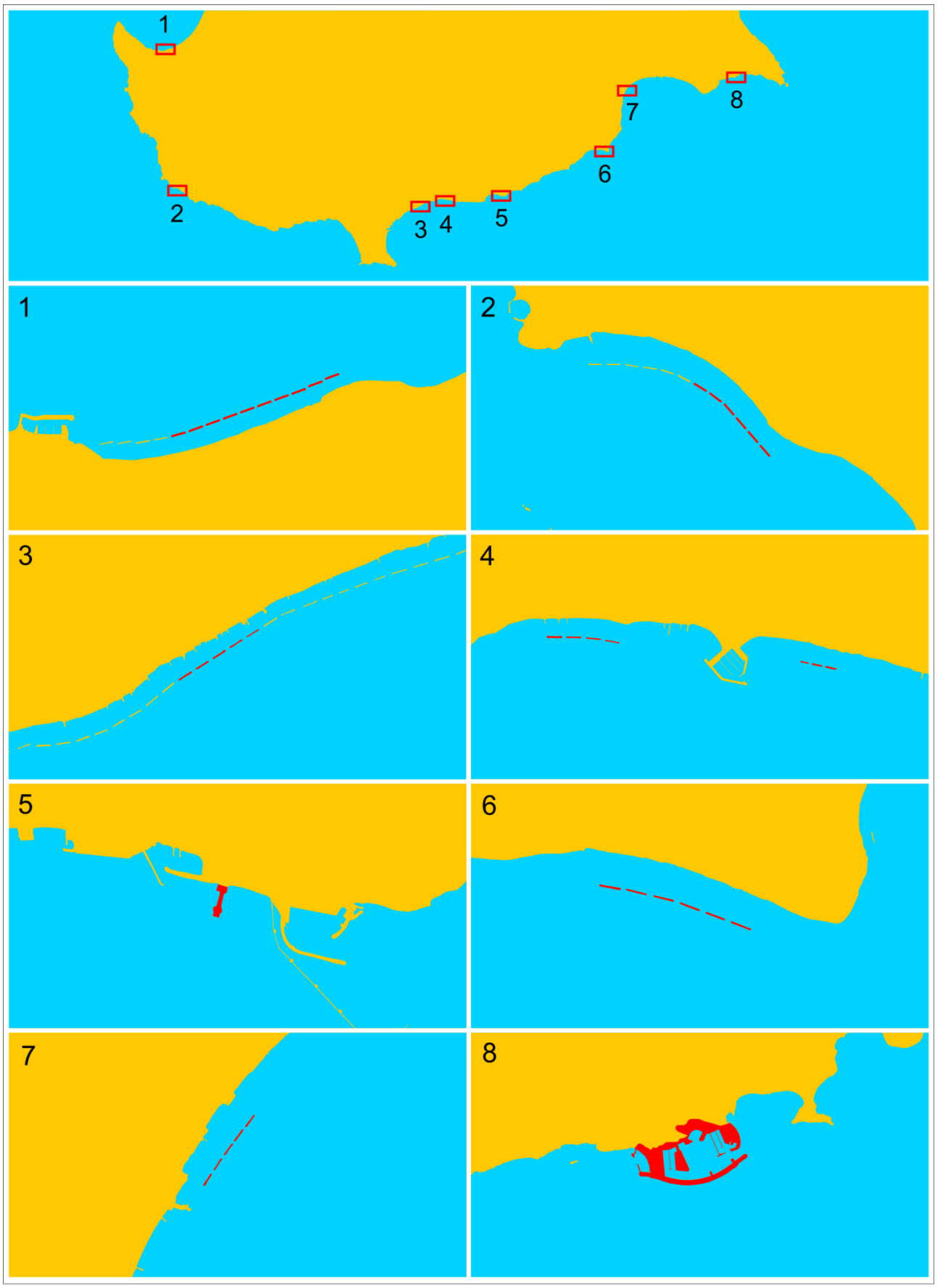

Figure 65. New infrastructure built within the assessment period 2017-2022 (in red colour) leading to physical loss of natural seabed (maps 1-8 width: 3.5 km).

Table 93. Results of the D6 evaluation per element and criteria/indicator for the present study period (2017-2011) in Cyprus waters.

Descriptor	Criterion	Indicator	Element	TV	GES
Descriptor 6: Seabed integrity Sea-floor integrity is at a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected	D6C1 (Primary): Spatial extent and distribution of physical loss (permanent change) of the natural seabed	CY.6.1: Area of natural seabed lost due to new infrastructure	Physical loss of the seabed	Not set	Not assessed
	D6C2 (Primary): Spatial extent and distribution of physical disturbance pressures on the seabed	CY.6.2: Area of natural seabed physically disturbed (trend)	Physical disturbance of the seabed	Not set	Not assessed
	D6C3 (Primary): Spatial extent of each habitat type which is adversely affected, through change in its biotic and abiotic structure and its functions by physical disturbance	CY.6.3: Area of natural seabed adversely affected, by broad habitat type	Not set	Not set	Unknown
	D6C4 (Primary): The extent of loss of the habitat type, resulting from anthropogenic pressures, does not exceed a specified proportion of the natural extent of the habitat type in the assessment area	CY.6.4: Area of natural seabed lost by broad habitat type	Physical loss of the seabed	≤ 2 %	Unknown
	D6C5 (Primary): The extent of adverse effects from anthropogenic pressures on the condition of the habitat type, including alteration to its biotic and abiotic structure and its functions (e.g. its typical species composition and their relative abundance, absence of particularly sensitive or fragile species or species providing a key function, size structure of species), does not exceed a specified proportion of the natural extent of the habitat type in the assessment area	CY.6.5: Area adversely affected (includes lost area)	Adverse effects on the seabed	≤ 25 %	Unknown

D6C2: Spatial extent and distribution of physical disturbance pressures on the seabed

Methodology

Criterion D6C2 of the GES Decision is defined as "*Spatial extent and distribution of physical disturbance pressures on the seabed*". Physical disturbance refers to a change to the seabed from which it can recover if the activity causing the disturbance pressure ceases.

For the evaluation of this Criterion, Vessel Monitoring System (VMS) data from bottom trawlers, active in coastal waters were analysed, specifically, the full position history of all licensed trawlers for national waters in the years 2011 to 2022. VMS data were obtained as constant time (00:20) and space (0.000333°) interval waypoints per vessel, with additional information on speed and direction. These waypoints were further filtered to, as much as possible, only represent trawling activity over the shelf by keeping those within trawling seasons (8/11 - 31/5), trawling speeds (2-4 kt) and coastal trawling grounds (shelf 50-200 m depth). Rectangular buffers were then applied to points, equal to the grid resolution or the distance between them (0.000333x0.000333° or ~60x74m XY), and the

produced area was considered to be the disturbance area of each waypoint. Although this point buffer coverage is not the exact coverage of hauls, it was considered a good proxy of the disturbance area, as VMS ping accuracy and frequency are more or less constant over the years and this approach can be repeated in the future and get comparable results. Consequently, the trend of this disturbance area was used as Indicator for the evaluation of this Criterion (Indicator CY.6.2).

Results

Results indicated that in the period 2017-2022 (trawling seasons 2017/18 to 2021/22), 14.98% of the shelf from 50-200 m depth was disturbed by trawling activities, while the respective percentage for the previous period (2011-2016) was slightly higher at 15.71% (Figures 66 and 67), indicating a slight improvement in relation to this Indicator. It should be noted that this was largely due to the steep drop in effort in seasons 2020/21 and 2021/22 related to the Covid 19 pandemic (Figure 66). In both six-year periods, around 16% of soft substrate (mud/sand) and 5% of hard substrate (reef) over the shelf were disturbed (Table 94). Nevertheless, as no TVs have been set on an EU or regional/subregional level for this Criterion, this evaluation is not considered an assessment and consequently D6C2 status is not assessed (Table 93).

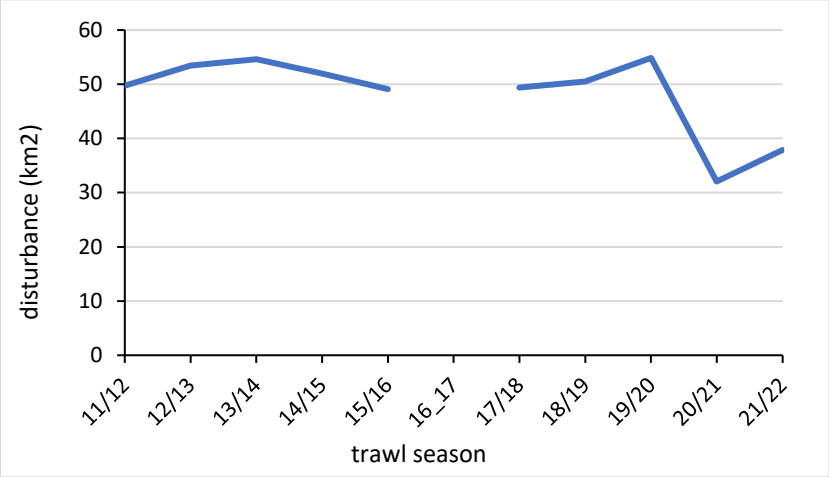

Figure 66. Disturbance area (km^2) from trawling activities over the shelf of Cyprus (depth 50-200 m) for all trawl seasons within the periods 2011-2016 and 2017-2022.

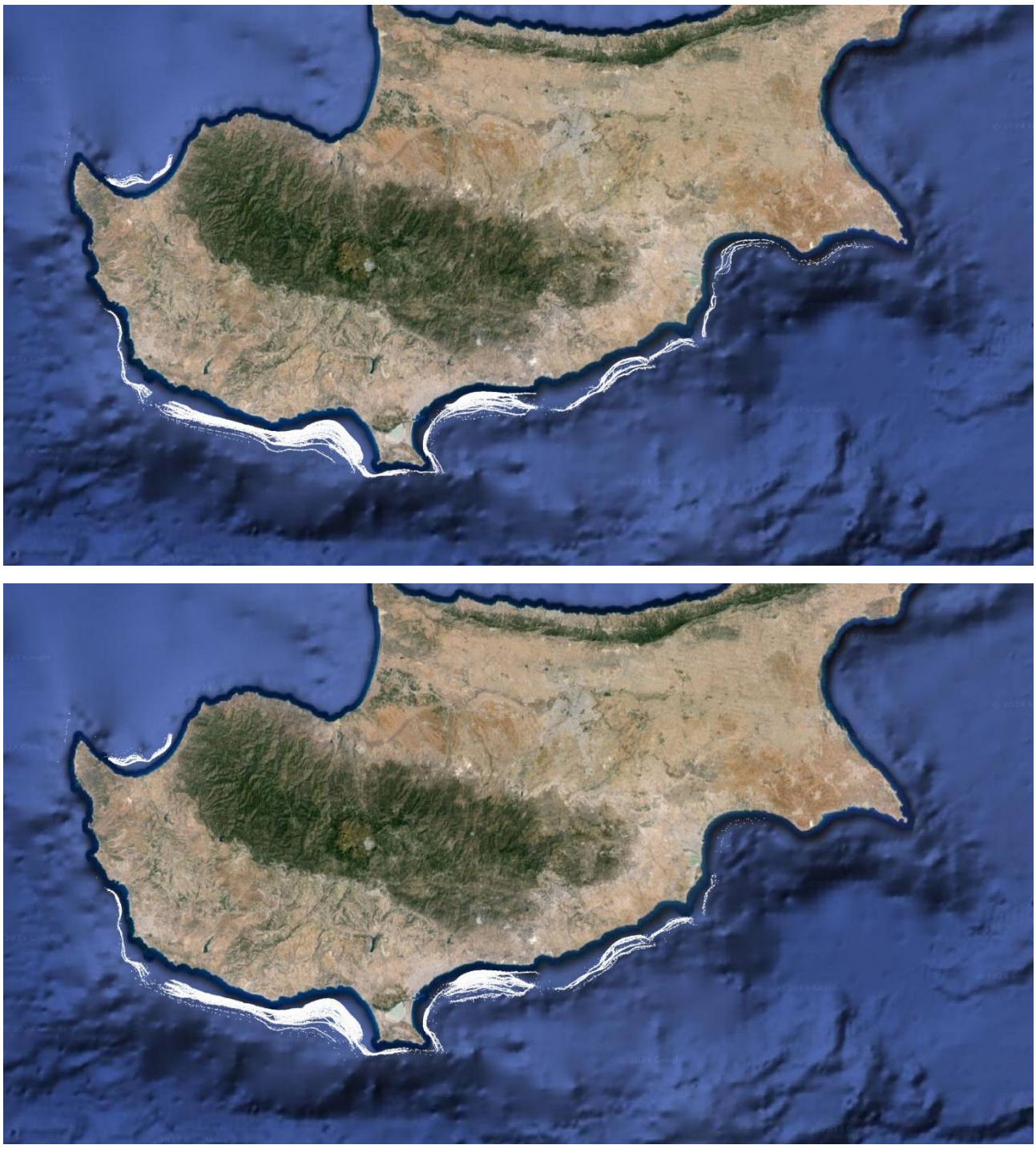

Figure 67. Disturbance area from trawling activities over the shelf of Cyprus (depth 50-200 m) for the periods 2011-2016 (up) and 2017-2022 (down).

Table 94. Disturbance areas (km^2 and % of shelf) in total and per habitat type, for the periods 2011-2016 and 2017-2022.

	Total	Soft substrate	Hard substrate
Disturbance 2011-2016 km^2	144.37	142.20	2.17
Disturbance 2017-2022 km^2	137.68	135.89	1.79
Shelf 50-200m km^2	919.00	882.24	36.76
Disturbance 2011-2016 %	15.71	16.12	5.90
Disturbance 2017-2022 %	14.98	15.40	4.87

D6C3: Spatial extent of each habitat type which is adversely affected, through change in its biotic and abiotic structure and its functions by physical disturbance

Methodology (description)

Criterion D6C3 of the GES Decision is defined as "*Spatial extent of each habitat type which is adversely affected, through change in its biotic and abiotic structure and its functions (e.g. through changes in species composition and their relative abundance, absence of particularly sensitive or fragile species or species providing a key function, size structure of species), by physical disturbance*".

Results

This Criterion was not evaluated due to the lack of data needed, e.g. species composition and relative abundance of each benthic broad or other habitat type. Relevant surveys are already planned for the near future and such data are expected to be available during the next assessment period. It is also noted that no TVs have been set on an EU or regional/subregional level for this Criterion.

D6C4: The extent of loss of the habitat type, resulting from anthropogenic pressures, does not exceed a specified proportion of the natural extent of the habitat type in the assessment area.

Methodology (description)

Criterion D6C4 of the GES Decision is defined as "*The extent of loss of the habitat type, resulting from anthropogenic pressures, does not exceed a specified proportion of the natural extent of the habitat type in the assessment area*".

Results

Although D6C4 TV has been set on an EU level as "*The maximum proportion of a benthic broad habitat type in an assessment area that can be lost is 2% of its natural extent (≤ 2%)*" (Commission Notice C/2024/2078), this Criterion was not evaluated due to the very small extent of the areas related to physical loss (see D6C1 assessment) and the lack of the detailed habitat data needed to proceed to analyses at such scale.

D6C5: The extent of adverse effects from anthropogenic pressures on the condition of the habitat type, including alteration to its biotic and abiotic structure and its functions, does not exceed a specified proportion of the natural extent of the habitat type in the assessment area.

Methodology (description)

Criterion D6C5 of the GES Decision is defined as "*The extent of adverse effects from anthropogenic pressures on the condition of the habitat type, including alteration to its biotic and abiotic structure and its functions (e.g. its typical species composition and their relative abundance, absence of particularly sensitive or fragile species or species providing a key function, size structure of species), does not exceed a specified proportion of the natural extent of the habitat type in the assessment area*".

Results

D6C5 TV has been set on an EU level by Commission Notice C/2024/2078 as follows:

"*The maximum proportion of a benthic broad habitat type in an assessment area that can be adversely affected is 25% of its natural extent (≤ 25%). This includes the proportion of the benthic broad habitat type that has been lost. A benthic broad habitat type is adversely affected in an assessment area if it shows an unacceptable deviation from the reference state in its biotic and abiotic structure and functions (e.g. typical species composition, relative abundance and size structure, sensitive species or species providing key functions, recoverability and functioning of habitats and ecosystem processes).*"

Nevertheless, this Criterion was not evaluated due to the lack of data needed, e.g. species composition and relative abundance of each benthic broad or other habitat type. Relevant surveys are already planned for the near future and such data are expected to be available during the next assessment period.

3.3.15 Marine ecosystems, including food webs (D4, D1)

MSFD Directive addresses food webs through Descriptor 4 (All elements of the marine food webs, to the extent that they are known, occur at normal abundance and diversity and levels capable of ensuring the long-term abundance of the species and the retention of their full reproductive capacity) and specific Criteria. For the present period, D4 was evaluated for the ecosystem's trophic guilds using two criteria, D4C1 and D4C2, as described below.

D4C1: The diversity (species composition and their relative abundance) of the trophic guild is not adversely affected due to anthropogenic pressures.

Methodology

Criterion D4C1 of the GES Decision is defined as *"The diversity (species composition and their relative abundance) of the trophic guild is not adversely affected due to anthropogenic pressures"*.

Detailed ecological (food-web) models have recently been developed for the marine waters of Cyprus, to describe the ecosystem functions, to recognize keystone species and groups, to assess the impact of stressors like fishing and IAS, and to predict the ecosystem response under different ecological or management scenarios (Michailidis et al, 2019; 2023). Ecological models are particularly useful for visualizing the ecosystem complexity and understanding the trade-offs between different management practices, however, they have not managed to replace traditional assessment methods in ecosystem or fisheries management, and probably never will, due to their complexity, huge input data requirements and usually high level of uncertainty. For these reasons, and although it has been suggested that such models could be useful for assessing D4 criteria (e.g. ICES, 2021), we chose to use a simpler and easily repeatable approach. Thus, to evaluate this Criterion, three nekton (fish and cephalopods) trophic guilts were first defined based on species' annual biomass estimations from Cyprus MEDITS data (Bertrand et al., 2002; Spedicato et al., 2019), as well as fractional trophic level (troph) estimations from Fishbase (Froese and Pauly, 2024), Sealifebase (Palomares and Pauly, 2024) and Karachle and Stergiou (2017). We limited our selection only on the species included in the MEDITS reference list (MEDITS Working Group, 2017), for which the total number of individuals, the total weight and the individual length are consistently collected throughout the years. This list (since 2012) includes 88 species for Cyprus, seven cephalopods, seven crustaceans, 32 elasmobranchs and 42 teleosteans (including all species of *Epinephelus* and *Scomber* genera). We chose to focus on benthic and benthopelagic species and exclude pelagic species, as the latter are characterized by low to very low bottom trawl catchability (e.g. Fiorentino et al., 2013). Species' troph values were estimated from Fishbase (for fish) and Sealifebase (for cephalopods and crustaceans) using the rfishbase library in R (Boettiger et al., 2012), which retrieves the median troph value from all available values for each species. This routine retrieves values derived from both actual diet composition studies (parameter DietTroph), as well as values estimated from food items using a randomized MonteCarlo resampling routine (parameter FoodTroph). Although DietTroph is theoretically more reliable, FoodTroph was in many cases more reasonable, possibly because some diet studies were incomplete or biased, therefore we chose to estimate species' troph as the average of available values, including those from Karachle and Stergiou (2017).

All crustaceans, non-nektonic cephalopods (Octopodoidea), species listed as pelagic (neritic or oceanic) in Fishbase, as well as one species with no troph data, were excluded from the analysis. Of the remaining 68 species and based on the classification by Karachle and Stergiou (2017), 28 species were classified as top predators or carnivores with a preference for fish and cephalopods (troph 4.0-4.5), 16 species were classified as medium predators or carnivores with a preference for decapods and fish (troph 3.7-4.0) and 24 species were classified as lower predators or omnivores with a preference for animal material (troph 2.9-3.7) (Table 95). Of these 68 species, only 47 (18 top, 12 medium and 17 lower predators) have been recorded by MEDITS in Cyprus so far (2005-2022) however, all 68 species will be considered in this and future evaluations for consistency.

Table 95. Trophic guilts, species and trophic levels used in D4C1 and D4C2 Criteria evaluations.

top predators	troph
Loligo vulgaris	4.50
Lophius piscatorius	4.50
Hexanchus griseus	4.45
Squalus acanthias	4.44
Rostroraja alba	4.41
Zeus faber	4.40
Lophius budegassa	4.34
Galeorhinus galeus	4.32
Centrophorus granulosus	4.31
Merluccius merluccius	4.31
Todarodes sagittatus	4.30
Dalatias licha	4.27
Epinephelus marginatus	4.26
Squatina oculata	4.26
Heptranchias perlo	4.22
Etmopterus spinax	4.19
Scophthalmus maximus	4.16
Torpedo marmorata	4.15
Polyprion americanus	4.14
Citharus linguatula	4.06
Epinephelus aeneus	4.06
Squatina aculeata	4.06
Squatina squatina	4.06
Glaucostegus cemiculus	4.04
Rhinobatos rhinobatos	4.04
Micromesistius poutassou	4.03
Mustelus mustelus	4.01
Squalus blainville	4.01

medium predators	troph
Sepia officinalis	3.99
Pagellus bogaraveo	3.97
Eutrigla gurnardus	3.94
Raja clavata	3.94
Epinephelus costae	3.87
Scyliorhinus canicula	3.84
Dipturus batis	3.83
Galeus melastomus	3.83
Mustelus punctulatus	3.82
Scyliorhinus stellaris	3.82
Epinephelus caninus	3.77
Chelidonichthys lucerna	3.75
Helicolenus dactylopterus	3.73
Pagellus acarne	3.72
Chelidonichthys cuculus	3.71
Pagrus pagrus	3.71

lower predators or omnivores	troph
Raja miraletus	3.69
Phycis blennoides	3.66
Raja asterias	3.66
Trisopterus capelanus	3.66
Lepidorhombus boscii	3.65
Raja polystigma	3.64
Mustelus asterias	3.61
Myliobatis aquila	3.61
Dipturus oxyrinchus	3.50
Leucoraja circularis	3.50
Raja undulata	3.50
Pagellus erythrinus	3.44
Chelidonichthys lastoviza	3.42
Lithognathus mormyrus	3.42
Mullus surmuletus	3.42
Diplodus vulgaris	3.37
Diplodus annularis	3.35
Diplodus sargus	3.31
Leucoraja melitensis	3.29
Solea solea	3.25
Mullus barbatus	3.22
Diplodus puntazzo	3.15
Oxynotus centrina	3.06
Boops boops	3.01

For the evaluation of this Criterion, four diversity indices were calculated for each trophic guilt, based on the average annual biomass (kg/km^2) of each species estimated using the MEDITS methodology (MEDITS Working Group 2017):

- Species richness (S): The number of species observed.
- Shannon-Wiener (H): Considers both the number of species and their abundance (biomass).

- Simpson Diversity Index (SDI): The probability that two random individuals of the same community belong to different species. The more evenly distributed the species abundances (biomasses), the higher this probability.
- Pielou evenness index (J): Expresses the deviation from the state of equal distribution.

The trends of these biodiversity indices from the previous to the present six-year period were set as indicators for D4C1 evaluation (S: CY.4.1, H: CY.4.2, SDI: CY.4.3, J: CY.4.4).

Results

Criterion D4C1 evaluation results per species (element) are given in Figure 68 and Table 96. Overall, all indices showed a stable or positive trend from previous to present six-year period for all groups, except SDI that showed a negative trend for all groups. Nevertheless, as no TVs have been set on an EU or regional/subregional level for this Criterion, this evaluation is not considered an assessment and consequently criterion D4C1 status remains unknown (Table 96).

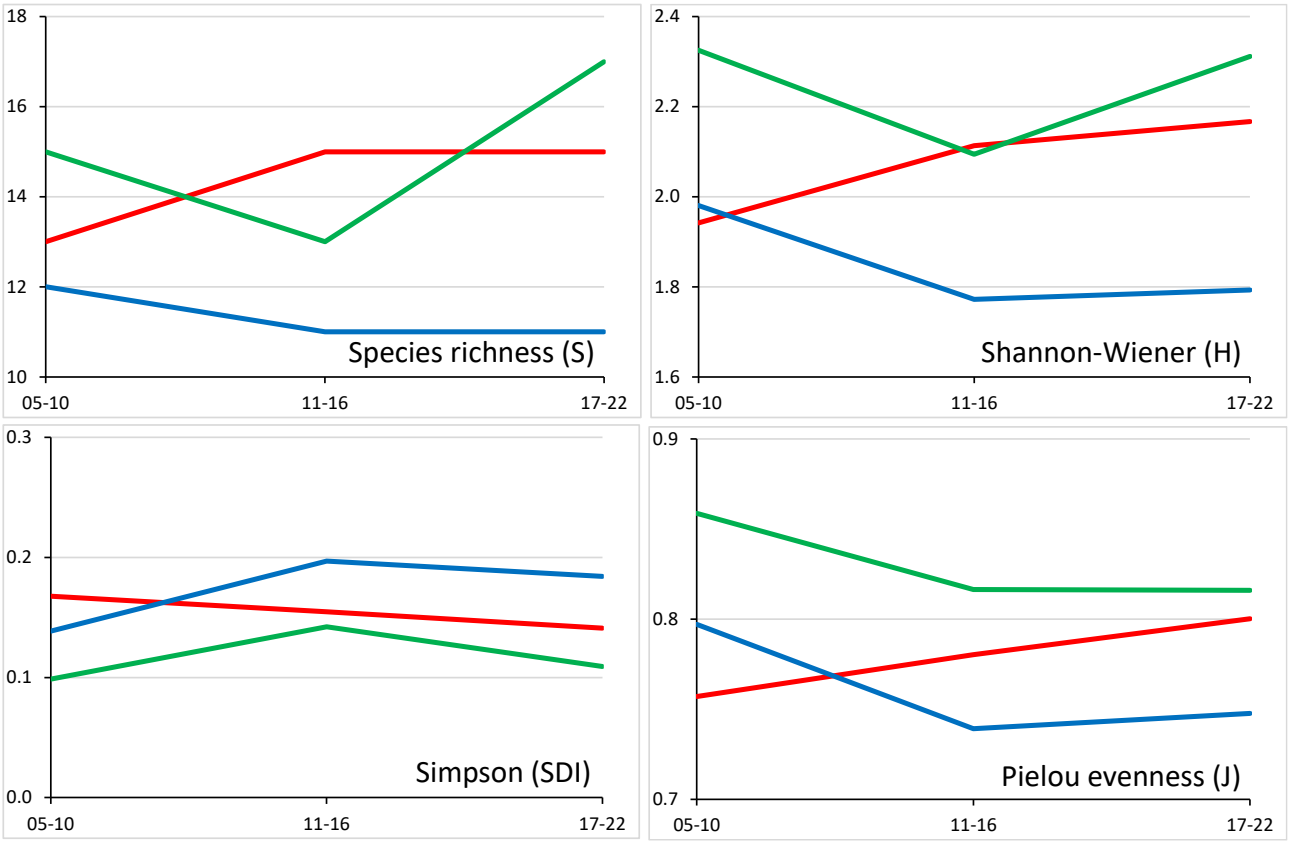

Figure 68. Average biodiversity index value (S, SDI, H, J) of each trophic guilt (red: top predators, blue: medium predators, green: lower predators or omnivores) per six-year-period.

Table 96. Results of the D4 evaluations per guilt (Element) and Criterion/Indicator for the present study period (2017-2011) in Cyprus waters.

Descriptor	Criterion	Indicator	Element	TV	GES
D4: Food webs All elements of the marine food webs, to the extent that they are known, occur at normal abundance and diversity and levels capable of ensuring the long-term abundance of the species and the retention of their full reproductive capacity	D4C1 (Primary): The diversity (species composition and their relative abundance) of the trophic guild is not adversely affected due to anthropogenic pressures	CY4.1.1: Species richness (S) biodiversity index (trend)	Top predators	Not set	Unknown
			Medium predators		Unknown
			Lower predators or omnivores		Unknown
		CY4.1.2: Shannon-Wiener (H) biodiversity index (trend)	Top predators	Not set	Unknown
			Medium predators		Unknown
			Lower predators or omnivores		Unknown
		CY4.1.3: Simpson (SDI) biodiversity index (trend)	Top predators	Not set	Unknown
			Medium predators		Unknown
			Lower predators or omnivores		Unknown
		CY4.1.4: Pielou evenness (J) biodiversity index (trend)	Top predators	Not set	Unknown
			Medium Predators		Unknown
			Lower predators or omnivores		Unknown
	D4C2 (Primary): The balance of total abundance between the trophic guilds is not adversely affected due to anthropogenic pressures	CY.4.2: Relative abundance of trophic guilds	All trophic guilds	Not set	Unknown

D4C2: The balance of total abundance between the trophic guilds is not adversely affected due to anthropogenic pressures.

Methodology

Criterion D4C2 of the GES Decision is defined as "*The balance of total abundance between the trophic guilds is not adversely affected due to anthropogenic pressures*".

The evaluation for this Indicator was based on annual biomass estimations of the three (3) nekton guilts as described in Criterion D4C1, as well as one primary producer guilt (phytoplankton) and one non-fish top predator guilt (Mediterranean monk seal), based on the specifications set by the Decision. Satellite reanalysis data from Copernicus marine service for chl-a were used as proxy of phytoplankton biomass, and national abundance/biomass data were used for the Mediterranean

monk seal. These data were estimated as an average of the years 2017-2022, as well as for the previous two six-year periods (Table 97). Although units of measurement differed between different guilds (mg/m^3 for chl-a, kg/km^2 for nekton, kg total for seals), no standardization conversions were applied (e.g. all t/km^2) as this would require more assumptions and was in fact unnecessary, as the evaluation of this Indicator is based on trends of relative change (Criterion CY.4.2: *"Relative abundance of trophic guilds"*). Consequently, the % change of each guilt from the previous to the present six-year period were estimated to be used for the evaluation.

Results

Criterion D4C2 evaluation indicated that no extreme % change in biomass occurred for any of the guilds from the previous to present six-year period (Table 97). Nevertheless, as no TVs have been set on an EU or regional/subregional level for this Criterion, this evaluation is not considered an assessment and consequently criterion D4C2 status remains unknown (Table 96).

Table 97. Guilt biomass proxy per six-year period and % relative change from previous to present period.

guilt biomass proxy	2005-2010	2011-2016	2017-2022	% change 2017-2022
Chl-a average 0-200m mg/m^3 (from D7)	0.099	0.093	0.095	2.43
Lower predators or omnivores (kg/km^2)	43.4	51.3	75.0	31.62
Medium predators (kg/km^2)	40.7	72.9	65.9	-10.63
Top predators (kg/km^2)	67.6	183.0	255.3	28.33
Mediterranean monk seal (kg total)	-	2920	4150	29.64

3.4 Cost of Degradation

By implementing the Benefit transfer functions of Table 9 ("Ecosystem Services - Benefit Transfer Functions and Specifications for Cyprus" in the Methodology section) for Cyprus, the monetary value of Ecosystem services can be calculated, which can be used to assess the cost of their degradation. Table 98 presents the results only for the MSFD ecosystem services which were classified as applicable for Cyprus Marine environment[1]. The results indicate that the total value of ecosystem services corresponds to €50 million per Year, where €33,019 million refer to Cultural services, and €9,9 and €6,9 million to provisioning and regulating accordingly. All services are classified as of Good Status, except "Wild animals and their outputs" which is Under Pressure, while the status of all ecosystem services had remained stable during the last 10 years.

Table 98. MSFD Cyprus - Levels and Monetary Value of ecosystem services.

MSFD Ecosystem Services		MEA Ecosystem Services Link			Levels			Million Euros Per Year
Code	**Description**	**Cult-ural**	**Provisi-oning**	**Regu-lating**	**Status 10 years ago**	**Status today**	**Short Description of change in the status**	
1. EcosysServ All	All ecosystem services	x	x	x	Good status	Good status	Given that the majority of the ES are in Good condition we consider the All-Ecosystem Services category to be in Good	49.929
1.1 EcosysServ NutrAll	All ecosystem services related to nutrition		x		Moderate status	Moderate status	We consider the ES to be in Moderate Condition as the ES on Aquaculture is in Good and ES on fisheries Under Pressure. We consider that Aquaculture products compensate inadequacies in the Fisheries ES	9.963
1.1.1 EcosysServ NutrSeafoodAnimals	Wild animals and their outputs		x		Under pressure	Under pressure	Fisheries Stocks were and continue to be Under Pressure Therefore based on Expert Judgment, we consider them to be at a Moderate Status.	
1.1.2 EcosysServ NutrAquacAnimals	Animals from in-situ aquaculture		x		Good status	Good status	The Cypriot Aquaculture Sector, according to the Multiannual National Strategic Aquaculture Plan 2021 – 2030 (DFMR 2021), composes more than 80% of the total quantity of Cyprus fishing production and is considered the 3rd most important exported product in value of the Primary Agriculture Sector (DFMR, 2021). Based on DFMR production and mariculture environmental monitoring data, the ES regarding the in-situ aquaculture is considered to be in Good status.	
1.2 EcosysServ MatAll	All ecosystem services related to provision of materials		x			Good status	Category only includes EcosysServMatGenetic	
1.2.1 EcosysServ MatGenetic	Genetic materials from all biota		x			Good status	Genetic studies 10 years age are considered as non-existent or rather low in number. In the last years there has been an increasing trend into carrying out surveys, among others, aiming to investigate the	

[1] The Ecosystem Service with Code "EcosysServWasteTreatment" was classified as applicable, but no data were available for Indicators.

MSFD Ecosystem Services		MEA Ecosystem Services Link			Levels			Million Euros Per Year
Code	Description	Cult-ural	Provisi-oning	Regu-lating	Status 10 years ago	Status today	Short Description of change in the status	
							connectivity of the N2Ks, etc., by examining the DNA, eDNA analyses etc. covering important aspects of the biodiversity conservation.	
2.1 EcosysServ WasteAll	All ecosystem services related to mediation of waste, toxics and other nuisances			x	Good status	Good status	As in all 3 components the Status is Good	
2.1.1 EcosysServ WasteSmel lVisImpacts	Mediation of smell/visual impacts			x	Good status	Good status	No events have been reported by the public regarding smell/visual problems. Therefore, based on Expert Judgment, we consider this to be and remain in Good Status	
2.1.2 EcosysServ WasteRem ovalByOrga n	Filtration/s equestratio n/storage/a ccumulatio n by micro-organisms, algae, plants, and animals			x	Good status	Good status	The chemical and biological condition was assessed through the indicators addressed by the Descriptors 5 and 8 and it generally found to be in Good Condition. Therefore, based on Expert Judgment, we consider this to be and remain in Good Status	
2.1.3 EcosysServ WasteRem ovalByEcos ys	Filtration/s equestratio n/storage/a ccumulatio n by ecosystems			x	Good status	Good status	The chemical and biological condition were assessed through the indicators addressed by the Descriptors 5 and 8 and it generally found to be in Good Condition. Therefore, based on Expert Judgment, we consider this to be and remain in Good Status	6.946
2.2 EcosysServ MainCondA ll	All ecosystem services related to maintenanc e of physical, chemical and biological conditions			x	Good status	Good status	Category includes only EcosysServMainCondChem	
2.2.1 EcosysServ MainCondC hem	Chemical condition of salt waters			x	Good status	Good status	The chemical condition was assessed through the Indicators addressed by the Descriptors 5 and 8 and it generally found to be in Good Condition.	
3.1 EcosysServI nteracPhyA ll	All ecosystem services underpinni ng physical and intellectual interactions	x			Good status	Good status	Based on Expert Judgment, we consider this to be and remain in Good Status	
3.1.1 EcosysServI nteracPhyR ecreat1	Experiential use of plants, animals and land-/seascapes	x			Good status	Good status	Based on Expert Judgment, we consider this to be and remain in Good Status	33.019

MSFD Ecosystem Services		MEA Ecosystem Services Link			Levels			Million Euros Per Year
Code	Description	Cult-ural	Provisi-oning	Regu-lating	Status 10 years ago	Status today	Short Description of change in the status	
	in different environmental settings							
3.1.2 EcosysServInteracPhyRecreat2	Physical use of land-/seascapes in different environmental settings	x			Good status	Good status	Based on Expert Judgment, we consider this to be and remain in Good Status	
3.1.3 EcosysServInteracPhyScientif	Scientific	x			Good status	Good status	In the last decade there has been an increasing trend and interest in carrying our Scientific Research. Therefore, based on Expert Judgment, we consider this to be and remain in Good Status	
3.1.4 EcosysServInteracPhyEducat	Educational	x			Good status	Good status	In the last decade there has been an increasing trend and interest in carrying our Scientific Research. Therefore, based on Expert Judgment, we consider this to be and remain in Good Status	
3.1.5 EcosysServInteracPhyCultur	Heritage, cultural	x			Good status	Good status	The marine environment based on expert Judgment, was and continues to be in Good status, providing entertainment.	
3.1.6 EcosysServInteracPhyEntert	Entertainment	x			Good status	Good status	The marine environment based on expert Judgment, was and continues to be in Good status, providing entertainment to people. Furthermore, Cyprus continues to rank 1st as regards to the Bathing Waters quality.	
3.1.7 EcosysServInteracPhyAesthe	Aesthetic	x			Good status	Good status	Based on Expert Judgment, we consider this to be and remain in Good Status	
3.2 EcosysServInteracSpiAll	All ecosystem services underpinning spiritual, symbolic and other interactions	x			Good status	Good status	Based on Expert Judgment, we consider this to be and remain in Good Status	
3.2.1 EcosysServInteracSpiSymb	Symbolic	x			Good status	Good status	Based on Expert Judgment, we consider this to be and remain in Good Status	
3.2.2 EcosysServInteracSpiExis	Existence	x			Good status	Good status	Based on Expert Judgment, we consider this to be and remain in Good Status	
3.2.3 EcosysServInteracSpiBequ	Bequest	x			Good status	Good status	Based on Expert Judgment, we consider this to be and remain in Good Status	

Chapter 4. Article 10 - Establishment of Environmental Targets

1.1 Environmental Targets

The Government of the Republic of Cyprus has re-evaluated Environmental Targets and has proceeded to the establishment of 13 Environmental Targets that are described in the following section.

CY-T001: Maintain or reduce the number of incidentally caught specimens, as verified through the official data collection processes and analysis of by-catch specimens

Target Purpose	Directly Reduce Existing Pressure in Sea	
Related Criteria or Descriptors	D1C1 "*The mortality rate per species from incidental by-catch is below levels which threaten the species, such that its long- term viability is ensured*." D3: Commercially-exploited fish and shellfish	
Related Measures (PoM, 2023)	M2: Measures for the protection of Sea Turtles M3: Measures for the protection of Cetaceans M14: Implementation of the National Fisheries Legislation, the CFP and International obligations for fisheries (National, European and International Fisheries Policy)	
Related Pressures	Disturbance of species (e.g. where they breed, rest and feed) due to human presence (PresBioDisturbSpp)	Indicators: CY.1.1
	Extraction of, or mortality/injury to, wild species (by commercial and recreational fishing and other activities) (PresBioExtractSpp)	Indicators: CY.1.1, CY.3.1, CY.3.2, CY.3.3, CY_ESA.10, CY_ESA.11, CY_ESA.12, CY_ESA.13, CY_ESA.14, CY_ESA.15, CY_ESA.16, CY_ESA.18
Description	**2017-2022:** Bycatch is assessed using data acquired by the implementation of the National Fisheries Data Collection Program. Based on these data, a limited number of species and individuals of protected fish and sea turtles died as bycatch. However, no cetaceans, seabirds or monk seals were reported to die as incidental bycatch. Specific measures are implemented for this scope. **2023-2028:** Measures will continue to be implemented, and additional measures may be adopted, if and where needed, in order to minimize incidental catches.	
Date when the Target has been officially adopted	10/2024	
Timescale for achievement of the Target	12/2035	

CY-T002: Minimize impacts of human activities on water column and seabed

Target Purpose	Directly Prevent Further Pressure	
Related Criteria or Descriptors	D3: Commercially-exploited fish and shellfish D6/D1: Sea-floor integrity/ Biological Diversity D7: Hydrographical conditions	
Related Measures (PoM, 2023)	M1: Measures for the protection of habitats of Annex I of the Habitats Directive M8: Regulating the disposal of dredged materials M9: Measures to protect the Integrity of the Seabed from projects against Coastal Erosion M10: Measures related to Port Projects and activity in port areas M14: Implementation of the National Fisheries Legislation, the CFP and International obligations for fisheries (National, European and International Fisheries Policy) M39: Integrated Coastal Zone Management M41: Implementation of Maritime Spatial Planning (MSP)	
Related Pressures	Loss of, or change to, natural biological communities due to cultivation of animal or plant species (PresBioCultHab)	Indicators: CY.5.6, CY.5.8, CY_ESA.20, CY_ESA.23
	Hydrographical changes (PresEnvHydroChanges)	Indicators: CY.7.1, CY_ESA.01, CY_ESA.02, CY_ESA.03, CY_ESA.07, CY_ESA.08, CY_ESA.09, CY_ESA.27, CY_ESA.37
	Physical disturbance to seabed (PresPhyDisturbSeabed)	Indicators: CY.6.2, CY_ESA.01, CY_ESA.02, CY_ESA.04, CY_ESA.05, CY_ESA.06, CY_ESA.08, CY_ESA.37, CY_ESA.14
	Physical loss of the seabed (PresPhyLoss)	Indicators: CY.6.1, CY_ESA.01, CY_ESA.02, CY_ESA.08, CY_ESA.37
Description	**2017-2022:** Measures were implemented to protect and manage important marine and coastal habitats. These measures focused on safeguarding natural habitats from harmful human activities, regulating how dredged materials were disposed of to ensure they didn't harm marine life or water quality, and protecting the seabed from being damaged by projects designed to prevent coastal erosion. They also addressed the environmental impacts of port construction and activities in port areas, ensuring they were managed sustainably. Additionally, Maritime Spatial Planning (MSP), was implemented to organize the use of ocean space balancing human activities and environmental protection. **2023-2028:** Measures will continue to be implemented and additional measures, considering Integrated Coastal Zone Management (ICZM), are expected to be adopted during this period, if and where needed, to minimize the possible impacts.	
Date when the Target has been officially adopted	10/2024	
Timescale for achievement of the Target	12/2035	

CY-T003: Ensure/promote sustainable use of the coastal zone

Target Purpose	Directly Prevent Further Pressure	
Related Criteria or Descriptors	D6/D1: Sea-floor integrity/ Biological Diversity D7: Hydrographical conditions	
Related Measures (PoM, 2023)	M9: Measures to protect the Integrity of the Seabed from projects against Coastal Erosion M39: Integrated Coastal Zone Management M41: Implementation of Maritime Spatial Planning (MSP)	
Related Pressures	Disturbance of species (e.g. where they breed, rest and feed) due to human presence (PresBioDisturbSpp)	Indicators: CY.6.1, CY.6.2

	Hydrographical changes (PresEnvHydroChanges)	Indicators: CY.7.1, CY_ESA.01, CY_ESA.02, CY_ESA.03, CY_ESA.07, CY_ESA.09, CY_ESA.27, CY_ESA.37
	Physical disturbance to seabed (PresPhyDisturbSeabed)	Indicators: CY.6.2, CY_ESA.37
	Physical loss of the seabed (PresPhyLoss)	Indicators: CY.6.1, CY_ESA.01, CY_ESA.02, CY_ESA.08, CY_ESA.37
Description	**2017-2022:** Measures were implemented to protect the seabed from damage caused by erosion prevention projects, ensuring its integrity. Additionally, focus was placed on MSP which organized the use of marine areas to balance environmental protection with human activities. **2023-2028:** Measures will continue to be implemented and additional measures, such as ICZM may be adopted, if and where needed, to minimize the potential environmental impacts and ensure sustainable management of coastal and marine areas.	
Date when the Target has been officially adopted	10/2024	
Timescale for achievement of the Target	12/2035	

CY-T004: Minimize inputs of nitrogen and phosphorus-rich substances and of organic matter from point and diffuse sources

Target Purpose	Directly Prevent Further Pressure	
Related Criteria or Descriptors	D1: Biological Diversity D5: Eutrophication	
Related Measures (PoM, 2023)	M15: Implementation of the Urban Wastewater Directive (91/271/EEC) M16: Application of measures in Zones Vulnerable to Nitrogen Pollution. M17: Measures for ship waste management. M18: Measures for the sustainable management of aquaculture M19: Implementation of the Program of Measures of the Cyprus RBMP (Directive 2000/60/EC) M20: Administrative measures for discharges from industrial units M34: European Waste Prevention Week (EWWR) M35: Actions to reduce the consumption of certain single-use plastics M37: Database of Marine data	
Related Pressures	Loss of, or change to, natural biological communities due to cultivation of animal or plant species (PresBioCultHab)	Indicators: CY.5.6, CY.5.7.1, CY.5.7.2, CY.5.8
	Input of nutrients - diffuse sources, point sources, atmospheric deposition (PresInputNut)	Indicators: CY.5.1, CY.5.2, CY_ESA.20, CY_ESA.21, CY_ESA.22, CY_ESA.23, CY_ESA.27, CY_ESA.28, CY_ESA.29, CY_ESA.30, CY_ESA.31, CY_ESA.32, CY_ESA.33
	Input of organic matter - diffuse sources and point sources (PresInputOrg)	Indicators: CY_ESA.20, CY_ESA.21, CY_ESA.22, CY_ESA.23, CY_ESA.27, CY_ESA.28, CY_ESA.29, CY_ESA.30, CY_ESA.31, CY_ESA.32, CY_ESA.33
	Input of water - point sources (e.g. brine) (PresInputWater)	Indicators: CY.8.1.1, CY.8.1.2, CY.8.3, CY_ESA.27, CY_ESA.09
Description	**2017-2022:** Monitoring Programs were implemented in the coastal and offshore waters in the framework of WFD, MSFD, UNEP/MAP MEDPOL Program, Nitrates Directive, NEMPomu, etc. In addition, MARPOL Annexes were followed in all shipping activities, best	

	agriculture practices were implemented for diffuse sources of nutrients to be minimized, and all water discharge permits were issued with obligatory threshold values applying. **2023-2028:** Measures will continue to be implemented, and additional measures may be adopted, if and where needed, to minimize the input of nutrients into the marine environment.
Date when the Target has been officially adopted	10/2024
Timescale for achievement of the Target	12/2035

CY-T005: Minimize systematic and/or intentional introduction of liquid, solid and air synthetic and non-synthetic substances and items

Target Purpose	Directly Prevent Further Pressure	
Related Criteria or Descriptors	D8: Contaminants D9: Contaminants in fish and other seafood D10: Marine litter	
Related Measures (PoM, 2023)	**M8: Regulating the disposal of dredged materials** M10: Measures related to Port Projects and activity in port areas M15: Implementation of the Urban Wastewater Directive (91/271/EEC) M17: Measures for ship waste management. M18: Measures for the sustainable management of aquaculture M19: Implementation of the Program of Measures of the Cyprus RBMP (Directive 2000/60/EC) M20: Administrative measures for discharges from industrial units M21: Actions related to hydrocarbon exploitation activities M22: Action plan to deal with oil pollution (Orpheus Plan) M23: Implementation of the Action Plan for Marine Radioactivity Pollution (Elektra Plan) M24: Implementation of the provisions of the decision Designating the Mediterranean Sea as a “Sulfur Emissions Control Area” (SECA) M25: Compliance with fisheries products quality assurance standards M26: National Action Plan for waste management M27: Measures to raise public awareness of marine litter M28: Mediterranean Coastal Day in all Parties to the Barcelona Convention (regional scale, UNEP-MAP) M29: Cleaning works in riverbeds (estuary areas), where ecologically necessary. M30: Promotion and implementation of “fishing for litter” initiative M31: Knowledge promotion through providing targeted information to professional and recreational fishermen on the effects of marine litter and tools to reduce such pollution from fishing activities M32: Implementation of the “Adopt a Beach” action M33: National Waste Prevention Program 2023-2029 (NWPP) M34: European Waste Prevention Week (EWWR) M35: Actions to reduce the consumption of certain single-use plastics M36: Extended Liability of Producer M37: Database of Marine data	
Related Pressures	Loss of, or change to, natural biological communities due to cultivation of animal or plant species (PresBioCultHab)	Indicators: CY_ESA.20, CY_ESA.23
	Input of other substances (e.g. synthetic substances, non-synthetic substances, radionuclides) - diffuse sources, point sources, atmospheric deposition, acute events (PresInputCont)	Indicators: CY.8.1.1, CY.8.1.2, CY.8.3, CY_ESA.04, CY_ESA.05, CY_ESA.06, CY_ESA.19, CY_ESA.25, CY_ESA.27, CY_ESA.34, CY_ESA.37

	Input of litter (solid waste matter, including micro-sized litter) (PresInputLitter)	Indicators: CY.10.1.1, CY.10.1.2, CY.10.2.1, CY.10.2.2, CY.10.3.1, CY.10.3.2, CY.10.4, CY_ESA.28, CY_ESA.29, CY_ESA.30, CY_ESA.31, CY_ESA.32, CY_ESA.33
	Input of water - point sources (e.g. brine) (PresInputWater)	Indicators: CY.8.1.1, CY.8.1.2, CY.8.3, CY_ESA. 09, CY_ESA.27
	PresPhyDisturbSeabed	Indicators: CY.6.1, CY.6.2, CY_ESA.04, CY_ESA.0 5, CY_ESA.0 6
Description	**2017-2022:** Monitoring Programs were implemented in the coastal and offshore waters in the framework of WFD, MSFD, UNEP/MAP MEDPOL Program, Nitrates Directive, etc. In addition, port reception facilities and MARPOL Annexes were followed in all shipping activities, best agriculture practices were implemented for diffuse sources of nutrients to be minimized, waste management plans for municipal and industrial wastes were applied, recycling programs were implemented in coastal areas, industrial air emissions were regulated by permits issued to relevant industries, and all water discharge permits were issued with obligatory threshold values applying. **2023-2028:** Measures will continue to be implemented, and additional measures will be adopted where needed (e.g. Adopt-a-Beach program), to minimize the insertion of liquid, air and solid pollutants to the marine environment.	
Date when the Target has been officially adopted	10/2024	
Timescale for achievement of the Target	12/2035	

CY-T006: Ensure/promote sustainable use of biological and natural resources

Target Purpose	Directly Reduce Existing Pressure In Sea	
Related Criteria or Descriptors	D1: Biological Diversity D3: Commercially-exploited fish and shellfish D4: Food webs	
Related Measures (PoM, 2023)	M14: Implementation of the National Fisheries Legislation, the CFP and International obligations for fisheries (National, European and International Fisheries Policy) M18: Measures for the sustainable management of aquaculture M20: Administrative measures for discharges from industrial units M21: Actions related to hydrocarbon exploitation activities	
Related Pressures	Extraction of, or mortality/injury to, wild species (by commercial and recreational fishing and other activities) (PresBioExtractSpp)	Indicators: CY.1.1, CY.3.1, CY.3.2, CY.3.3, CY.4.1.1, CY.4.1.2, CY.4.1.3, CY.4.1.4, CY.4.2, CY_ESA.09, CY_ESA.10, CY_ESA.11, CY_ESA.12, CY_ESA.13, CY_ESA.14, CY_ESA.15, CY_ESA.16, CY_ESA.17, CY_ESA.18, CY_ESA.27
Description	**2017-2022:** Measures were implemented to ensure and promote the sustainable use of biological and natural resources, in the framework of an ecosystem-based approach involving policy/regulations, research, education, stakeholder engagement, and economic incentives. **2023-2028:** Measures will continue to be implemented, and additional measures may be adopted, if and where needed, to ensure the sustainability of marine resources.	
Date when the Target has been officially adopted	10/2024	
Timescale for achievement of the Target	12/2035	

CY-T007: Raise awareness on the marine environment

Target Purpose	Indirectly Prevent Further Pressure	
Related Criteria or Descriptors	D1: Biological Diversity D2: Non-indigenous species D3: Commercially-exploited fish and shellfish D4: Food webs D5: Eutrophication D6: Sea-floor integrity D7: Hydrographical conditions D8: Contaminants D9: Contaminants in fish and other seafood D10: Marine litter D11: Energy including underwater noise	
Related Measures (PoM, 2023)	M2: Measures for the protection of Sea Turtles M3: Measures for the protection of Cetaceans M4: Measures for the protection of the Mediterranean Seal M27: Measures to raise public awareness of marine litter M28: Mediterranean Coastal Day in all Parties to the Barcelona Convention (regional scale, UNEP-MAP) M30: Promotion and implementation of "fishing for litter" initiative M31: Knowledge promotion through providing targeted information to professional and recreational fishermen on the effects of marine litter and tools to reduce such pollution from fishing activities M32: Implementation of the "Adopt a Beach" action M33: National Waste Prevention Program 2023-2029 (NWPP) M34: European Waste Prevention Week (EWWR) M35: Actions to reduce the consumption of certain single-use plastics	
Related Pressures	Input or spread of non-indigenous species (PresBioIntroNIS)	Indicators: CY_ESA.44, CY_ESA.45
	Disturbance of species (e.g. where they breed, rest and feed) due to human presence (PresBioDisturbSpp)	
	Extraction of, or mortality/injury to, wild species (by commercial and recreational fishing and other activities) (PresBioExtractSpp)	
	Input of nutrients - diffuse sources, point sources, atmospheric deposition (PresInputNut)	
	Input of organic matter - diffuse sources and point sources (PresInputOrg)	
	Input of other substances (e.g. synthetic substances, non-synthetic substances, radionuclides) - diffuse sources, point sources, atmospheric deposition, acute events (PresInputCont)	
	Input of litter (solid waste matter, including micro-sized litter) (PresInputLitter)	
	Input of anthropogenic sound (impulsive, continuous) (PresInputSound)	
	Input of water - point sources (e.g. brine) (PresInputWater)	
	Hydrographical changes (PresEnvHydroChanges)	
	Physical disturbance to seabed (PresPhyDisturbSeabed)	
	Physical loss of the seabed (PresPhyLoss)	
Description	**2017-2022:** Measures were implemented to raise awareness on the marine environment, including (i) participation in dissemination events and festivals, including the annual European Researchers Night, (ii) addressing MSFD descriptors via social media (e.g. Facebook, YouTube, Instagram), (iii) publishing informational material and articles/reports in scientific journals and local newsletters, (iv) participation in relevant conferences, scientific meetings, radio talks, etc. **2023-2028:** Measures will continue to be implemented, and additional measures will be adopted where needed (e.g. Adopt-a-Beach program), to ensure awareness on the marine environment.	

Date when the Target has been officially adopted	10/2024
Timescale for achievement of the Target	12/2035

CY-T008: Protect/conserve areas of particular natural/cultural value, threatened or endangered species of flora/fauna and habitats

Target Purpose	Indirectly Prevent Further Pressure	
Related Criteria or Descriptors	D1: Biological Diversity D6: Sea-floor integrity	
Related Measures (PoM, 2023)	M1: Measures for the protection of habitats of Annex I of the Habitats Directive M2: Measures for the protection of Sea Turtles M3: Measures for the protection of Cetaceans M4: Measures for the protection of the Mediterranean Seal M5: Establishment of new N2K areas, MPAs and MPAs with artificial reefs (AR) M6: Management measures for N2K areas, MPAs and MPAs with artificial reefs (AR) M7: Establishment of Special Protection Zones SPAs M14: Implementation of the National Fisheries Legislation, the CFP and International obligations for fisheries (National, European and International Fisheries Policy) M40: Cross-border and wider international cooperation for the protection of the marine environment M41: Implementation of Maritime Spatial Planning (MSP)	
Related Pressures	Disturbance of species (e.g. where they breed, rest and feed) due to human presence (PresBioDisturbSpp)	Indicators: CY.1.1, CY.1.2, CY.1.4, CY.1.5, CY.6.2
	Extraction of, or mortality/injury to, wild species (by commercial and recreational fishing and other activities) (PresBioExtractSpp)	Indicators: CY.1.1, CY.3.1, CY.3.2, CY.3.3, CY_ESA.09, CY_ESA.10, CY_ESA.11, CY_ESA.12, CY_ESA.13, CY_ESA.14, CY_ESA.15, CY_ESA.16, CY_ESA.17, CY_ESA.18
Description	**2017-2022:** Measures were implemented to protect and conserve areas of natural and/or cultural value, threatened or endangered species of flora/fauna and habitats, in the framework of an ecosystem-based approach involving policy/regulations, research, education, stakeholder engagement, and economic incentives. **2023-2028:** Protective measures will continue to be implemented, and additional measures will be adopted where needed (e.g. implementation of management measures in N2K areas, update of the strategy and action plan for biodiversity in Cyprus, etc.).	
Date when the Target has been officially adopted	10/2024	
Timescale for achievement of the Target	12/2035	

CY-T009: Improve governmental mechanisms to achieve GES in the marine environment

Target Purpose	Indirectly Prevent Further Pressure	
Related Criteria or Descriptors	D1: Biological Diversity D2: Non-indigenous species D3: Commercially-exploited fish and shellfish D4: Food webs D5: Eutrophication D6: Sea-floor integrity D7: Hydrographical conditions D8: Contaminants D9: Contaminants in fish and other seafood D10: Marine litter D11: Energy including underwater noise	
Related Measures	All	
Related Pressures	Input or spread of non-indigenous species (PresBioIntroNIS)	Indicators: CY_ESA.44, CY_ESA.45
	Loss of, or change to, natural biological communities due to cultivation of animal or plant species (PresBioCultHab)	
	Disturbance of species (e.g. where they breed, rest and feed) due to human presence (PresBioDisturbSpp)	
	Extraction of, or mortality/injury to, wild species (by commercial and recreational fishing and other activities) (PresBioExtractSpp)	
	Input of nutrients - diffuse sources, point sources, atmospheric deposition (PresInputNut)	
	Input of organic matter - diffuse sources and point sources (PresInputOrg)	
	Input of other substances (e.g. synthetic substances, non-synthetic substances, radionuclides) - diffuse sources, point sources, atmospheric deposition, acute events (PresInputCont)	
	Input of litter (solid waste matter, including micro-sized litter) (PresInputLitter)	
	Input of anthropogenic sound (impulsive, continuous) (PresInputSound)	
	Input of water - point sources (e.g. brine) (PresInputWater)	
	Hydrographical changes (PresEnvHydroChanges)	
	Physical disturbance to seabed (PresPhyDisturbSeabed)	
	Physical loss of the seabed (PresPhyLoss)	
Description	**2017-2022:** N/A. **2023-2028:** To improve governmental mechanisms to achieve GES in the marine environment, a new measure was adopted in 2023, concerning the establishment of a National Committee for the Implantation of the MSFD. The measure is expected to be implemented within the period 2023-2028. For the creation of this committee, good practices implemented by other EU member states, as well as those followed for the creation of the new Governance Structure for the Integrated Management of Coastal Zones and Marine Spatial Planning in Cyprus, will be considered. This measure will also concern the strengthening of the bodies responsible for the implementation of the MSFD in terms of personnel, means and any other resources/capabilities that are necessary, including the enforcement of existing and new measures.	
Date when the Target has been officially adopted	10/2024	
Timescale for achievement of the Target	12/2035	

CY-T010: Address climate change impacts on the marine environment

Target Purpose	Indirectly Prevent Further Pressure	
Related Criteria or Descriptors	D1: Biological Diversity	
Related Measures (PoM, 2023)	M40: Cross-border and wider international cooperation for the protection of the marine environment	
Related Pressures		Indicators: CY_ESA.44, CY_ESA.45
Description	Climate change is not a descriptor of the MSFD but is indirectly addressed by some criteria. In the following years, relevant monitoring programs will be established.	
Date when the Target has been officially adopted	10/2024	
Timescale for achievement of the Target	12/2035	

CY-T011: Enhance knowledge on the marine environment through surveys and research

Target Purpose	Improve Knowledge	
Related Criteria or Descriptors	D1: Biological Diversity D2: Non-indigenous species D3: Commercially-exploited fish and shellfish D4: Food webs D5: Eutrophication D6: Sea-floor integrity D7: Hydrographical conditions D8: Contaminants D9: Contaminants in fish and other seafood D10: Marine litter D11: Energy including underwater noise	
Related Measures (PoM, 2023)	M1: Measures for the protection of habitats of Annex I of the Habitats Directive M2: Measures for the protection of Sea Turtles M3: Measures for the protection of Cetaceans M4: Measures for the protection of the Mediterranean Seal M5: Establishment of new N2K areas, MPAs and MPAs with artificial reefs (AR) M23: Implementation of the Action Plan for Marine Radioactivity Pollution (Elektra Plan) M26: National Action Plan for waste management M27: Measures to raise public awareness of marine litter M31: Knowledge promotion through providing targeted information to professional and recreational fishermen on the effects of marine litter and tools to reduce such pollution from fishing activities M35: Actions to reduce the consumption of certain single-use plastics M37: Database of Marine data M41: Implementation of Maritime Spatial Planning (MSP)	
	Input or spread of non-indigenous species (PresBioIntroNIS)	Indicators: CY_ESA.44, CY_ESA.45
	Disturbance of species (e.g. where they breed, rest and feed) due to human presence (PresBioDisturbSpp)	
	Extraction of, or mortality/injury to, wild species (by commercial and recreational fishing and other activities) (PresBioExtractSpp)	
	Input of nutrients - diffuse sources, point sources, atmospheric deposition (PresInputNut)	

	Input of organic matter - diffuse sources and point sources (PresInputOrg)	
	Input of other substances (e.g. synthetic substances, non-synthetic substances, radionuclides) - diffuse sources, point sources, atmospheric deposition, acute events (PresInputCont)	
	Input of litter (solid waste matter, including micro-sized litter) (PresInputLitter)	
	Input of anthropogenic sound (impulsive, continuous) (PresInputSound)	
	Input of water - point sources (e.g. brine) (PresInputWater)	
	Hydrographical changes (PresEnvHydroChanges)	
	Physical disturbance to seabed (PresPhyDisturbSeabed)	
	Physical loss of the seabed (PresPhyLoss)	
Description	**2017-2022:** Measures were implemented to enhance knowledge on the marine environment, including several scientific surveys to collect data on habitats, species (e.g. cetaceans, seabirds, NIS), fisheries, marine litter, etc. **2023-2028:** Measures will continue to be implemented, like new surveys that already started or are planned for the coming years, aiming to cover gaps of knowledge and collect scientific data for the assessment of the marine environment and the identification of additional measures to be applied where needed.	
Date when the Target has been officially adopted	10/2024	
Timescale for achievement of the Target	12/2035	

CY-T012: Reduce levels of continuous underwater noise produced by human activities, especially by marine traffic

Target Purpose	Directly Reduce Existing Pressure in Sea	
Related Criteria or Descriptors	D1: Biodiversity D11C2: The spatial distribution, temporal extent and levels of anthropogenic continuous low-frequency sound do not exceed levels that adversely affect populations of marine animals.	
Related Measures (PoM, 2023)	M3: Measures for the protection of Cetaceans	
Related Pressures	Disturbance of species (e.g. where they breed, rest and feed) due to human presence (PresBioDisturbSpp)	Indicators: CY.1.2, CY.1.5
	Input of anthropogenic sound (impulsive, continuous) (PresInputSound)	Indicators: CY.11.2, CY_ESA.04, CY_ESA.05, CY_ESA.06, CY_ESA.25, CY_ESA.26, CY_ESA.37, CY_ESA.44, CY_ESA.45
Description	**2017-2022:** No measures were implemented to reduce levels of continuous underwater noise produced by human activities; however underwater noise was evaluated through the implementation of a sound propagation model. **2023-2028:** A new survey has been planned for the coming years and is now in the preparation stage, to fill knowledge gaps and collect scientific data needed for the assessment of the marine environment and the identification of additional measures to be applied where needed.	

Date when the Target has been officially adopted	10/2024
Timescale for achievement of the Target	12/2050

CY-T013: Monitor introduction of marine NIS from human activities and mitigate their negative impacts to the degree possible

Target Purpose	Art11 Monitoring	
Related Criteria or Descriptors	D2C1: The number of non-indigenous species which are newly introduced via human activity into the wild, per assessment period (6 years), measured from the reference year as reported for the initial assessment under Article 8(1) of Directive 2008/56/EC, is minimized and where possible reduced to zero. D2C2: Abundance and spatial distribution of established non-indigenous species, particularly of invasive species, contributing significantly to adverse effects on particular species groups or broad habitat types.	
Related Measures (PoM, 2023)	M11: Restrictions in the use of NIS in aquaculture M12: Measures to mitigate negative impacts from Non-Indigenous (Alien) Species M13: Measures to deal with negative impacts from alien species and NIS originating from shipping	
Related Pressures	Input or spread of non-indigenous species (PresBioIntroNIS)	Indicators: CY.2.1, CY.2.2, CY_ESA.25, CY_ESA.37, CY_ESA.44, CY_ESA.45
Description	**2017-2022:** Measures were implemented to monitor the introduction of marine NIS from human activities and mitigate their negative impacts to the degree possible. Specifically, scientific surveys including UVC and trawl surveys (MEDITS) were carried out collecting data on NIS presence and abundance. In addition, and although prevention of NIS introduction and management of their spread is extremely difficult, DFMR continued the implementation of the "Plan for the control of the population of the silver-cheeked toadfish (*Lagocephalus sceleratus*) in the coastal waters of Cyprus" and participated in relevant scientific projects and educational/publicity actions. **2023-2028:** Monitoring surveys have been scheduled for the upcoming years and are now in the preparation stage, aiming to cover gaps of knowledge and collect scientific data for the assessment of the marine environment and the identification of additional measures to be applied where needed. In addition, DFMR will continue to implement the "Plan for the control of the population of the silver-cheeked toadfish (*Lagocephalus sceleratus*) in the coastal waters of Cyprus" and to promote relevant scientific research and educational/publicity actions.	
Date when the Target has been officially adopted	10/2024	
Timescale for achievement of the Target	12/2050	

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