ADAPTIVE MANAGEMENT PLAN FOR RED CORAL (Corallium rubrum) IN THE GFCM COMPETENCE AREA

THIRD PART- THE MANAGEMENT of red coral

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ABBREVIATIONS AND ACRONYMS

BRP	Biological Reference Point
CBD	The Convention on Biological Diversity
CITES	The Convention on International Trade in Endangered Species of Wild Fauna and Flora
CoP	Conference of Parties
CPUE	Catch per unit effort
CPCs	Contracting Parties and Cooperating non-Contracting Parties of GFCM
EAF	Ecosystem Approach to Fishery
FAO	Food and Agriculture Organization of the United Nations
GFCM	General Fisheries Commission for the Mediterranean
IUCN	International Union for Conservation of Nature
LRP	Limit Reference Point
MCS	Monitoring Control and Surveillance
MED-PAN	Network of managers of Marine Protected Areas in the Mediterranean
MoU	Memorandum of Understanding
MP	Management Plan
MPA	Marine Protected Area
MSY	Maximum Sustainable Yield
NGO	Non-Governmental Organization
NMP	National Management Plan
OY	Optimum Yield
Oob	Operational Objective
PaRP	Precautionary Reference Point
RACMED	Regional Advisory Council for the Mediterranean
RMP	Regional Management Plan
ROV	Remotely Operated underwater Vehicle
RP	Reference Point
SAC	Scientific Advisory Committee
SC	Sub Committee
TAC	Total Allowable Catch
TRP	Target Reference Point
UNCLOS	United Nations Convention on the Law of the Sea
UNEP-MAP	United Nations Environment Programme - Mediterranean Action Plan
VMS	Vessel Monitoring System

SUMMARY

The present document has been prepared to gather together all the available information useful for the first preliminary draft of a regional management plan (RMP) for red coral (*Corallium rubrum*) in the GFCM competence area.

It is prepared according to the Recommendation GFCM/35/2011/2 on the exploitation of red coral in the GFCM Competence Area that states:

"Scientific and technical knowledge acquired through the actions stipulated under paragraphs 3 (c), 5, 7 and 9 above shall be taken into account by SAC with a view to develop an adaptive regional management plan" (Paragraph 10)

and the Recommendation GFCM/36/2012/1 on further measures for the exploitation of red coral in the GFCM area that states:

"In addition to substantiate the Terms of Reference provided in the 2012 Work Plan of its Sub-Committee for Marine Environment and Ecosystems, and pending the development of a regional management plan for red coral, as requested by the Recommendation GFCM/35/2011/2..." (Paragraph 6)

"The GFCM Secretariat is requested to take actions in support of the SAC with a view to put into operation, not later than 31 May 2013, the adaptive regional management plan." (Paragraph 7).

Three parts compose it:

'FIRST PART – BACKGROUND INFORMATION' contains data related to the distribution, biology, fishery, and legal instruments dealing with red coral

'SECOND PART – SOCIO-ECONOMIC ASPECTS' summarizes the main socio-economic data related to the red coral fishery

'THIRD PART – MANAGEMENT of red coral' contains the proposed the management for red coral

All three parts complement each other; only the combination of the three can give a complete picture of the past and present aspects concerning *C. rubrum*.

The present document 'THIRD PART- THE MANAGEMENT of red coral' is divided in three main sections:

A NEW APPROACH MANAGEMENT OF RED CORAL
THE REGIONAL MANAGEMENT PLAN FOR RED CORAL
THE NATIONAL MANAGEMENT PLAN FOR RED CORAL

The first section contains the description of the proposed new management approach for red coral. It briefly describes the principles that inspired the drafting of the plan and the general framework a 'standard' plan should

follows. Furthermore, it provides information on the data needed for an effective management of natural resources.

The second section contains the text of the proposed Regional Management Plan for red coral.

However, considering that two different typologies of plans, the Regional and several National Management plans, are supposed to coexist and possibly to complement each other, sections 2 and 3 specify their application as well as their reciprocal relationships.

Finally, it is worth pointing out that section 3 includes the framework of a National Management Plan; any GFCM Recommendation does not provide this for but the authors of the present documents included it in order to provide a sort of 'good' template of a management plan to be applied at the national level.

A 'NEW' MANAGEMENT APPROACH FOR RED CORAL

THE GENERAL FRAMEWORK OF A 'STANDARD' MANAGEMENT PLAN

In general terms the Technical Guidelines on Fisheries Management (FAO, 1997) describe a management plan as "a formal or informal arrangement between a fisheries management authority and interested parties which identifies the partners in the fishery and their respective roles, details the agreed objectives for the fishery and specifies the management rules and regulations which apply to it and provides other details about the fishery which are relevant to the task of the management authority".

However, a well-designed plan should identify also the background to the fishery, including all major stakeholders, the agreed objectives (covering the economic, social and ecological components for the fishery) and the specific rules and regulations that apply (FAO, 2003).

In particular, the framework of a 'standard' Management Plan, in line with the above indications, is supposed to comprise at least 11 parts:

- I. Area of operation of the fishery and under which jurisdiction it falls
- II. History of fishing and management
- III. Goals and broad objectives
- IV. Operational objectives
- V. Indicators, Reference Points, and associated Limit, Target, and Threshold Reference Points
- VI. Decision rules (with the definition of stakeholder's role and degree of participation, if applicable)
- VII. Recovery plan
- VIII. Management measures
- IX. MCS system (Monitoring, Control, Surveillance)
- X. Implementation and enforcement mechanisms
- XI. Assessment of performance and reviewing system

Apart from some general parts (I and II), the description of the contents expected for points from III to XI is provided in the following paragraphs. Further indications can be found in several Guidelines and Technical papers for instance:

- FAO Fishery Resources Division and Fishery Policy and Planning Division. Fisheries management. FAO Technical Guidelines for Responsible Fisheries. No. 4. Rome, FAO. 1997
- FAO A fishery manager's guidebook. Management measures and their application. Cochrane, K.L. (ed.) FAO Fisheries Technical Paper. No. 424. Rome, FAO. 2002
- FAO Fisheries Department. The ecosystem approach to fisheries. FAO Technical Guidelines for Responsible Fisheries. No. 4, Suppl. 2. Rome, FAO. 2003.
- Hoggarth, D.D.; Abeyasekera, S.; Arthur, R.I.; Beddington, J.R.; Burn, R.W.; Halls, A.S.; Kirkwood, G.P.; McAllister, M.; Medley, P.; Mees, C.C.;

Parkes, G.B.; Pilling, G.M.; Wakeford, R.C.; Welcomme, R.L. Stock assessment for fishery management – A framework guide to the stock assessment tools of the Fisheries Management Science Programme (FMSP). FAO Fisheries Technical Paper. No. 487. Rome, FAO. 2006

- FAO A Fishery Manager's Guidebook Second Edition (Eds KL. Cochrane and SM. Garcia) - FAO & Wiley-Blackwell 2009
- FAO. Fisheries management. 4. Marine protected areas and fisheries. FAO Technical Guidelines for Responsible Fisheries. No. 4, Suppl. 4. Rome, FAO. 2011

GOALS AND BROAD OBJECTIVES (III)

Firstly, goals and management objectives must be specified.

Fishery management has three main aims (goals): sustain the stock, sustain the fishery, and sustain the employment. Because they can potentially conflict, a delicate balance and priorities among them should be set.

In absolute terms, the over-riding goal of fisheries management is the long-term sustainable use of the fisheries resources (Code of Conduct, Paragraph 7.2.1).

Management objectives are targets that are actively sought and provide a direction for management action. These should focus on achieving long-term sustainable use of the fisheries resources (Code of Conduct, Paragraph 7.2.1), along with any further aims related to the social and economic status of each fishery. They are usually put in place and modified infrequently, typically being reviewed only every five years or longer

OPERATIONAL OBJECTIVES (IV)

The broad objectives should be further developed into explicit "operational objectives."

An operational objective should be SMART: S – specific and easily understood; M – meaningful and written in terms of what will be accomplished, not how to go about it; A – agreed, with stakeholders' responsibilities defined; R – realistic and relevant; and T – time-bound, that is, defined within a limited time period (FAO, 2011).

The operational objectives that need to be considered fall into four main categories: biological, ecological, economic, social, and institutional (Table 1). Many reasonable objectives will be mutually incompatible. The trade-offs between them must have been agreed upon and the conflicts and contradictions resolved (FAO, 2002).

Table 1 Examples of fishery goals and operational objectives (from FAO, 2002)

Domain	Goals	Operational objectives
Biological	To maintain the target species at or above the levels necessary to ensure their continued productivity	To maintain the stock at all times above 50% of its mean unexploited level
Ecological	To minimize the impacts of fishing on the physical environment and on non-target (bycatch), associated and dependent species	To maintain all non-target, associated and dependent species above 50% of their mean biomass levels in the absence of fishing activities
Economic	To maximize the net incomes of the participating fishers	To stabilize net income per fisher at a level above the national minimum desired income
Social	To maximize employment opportunities for those dependent on the fishery for their livelihoods	To include as many of the existing participants in the fishery as is possible given the biological, ecological and economic objectives listed above

Different data may provide information to select the operational objectives (Table 2)

Table 2 Some basic data requirements for providing information to fisheries managers and decision makers (from FAO, 2002)

Objective(s)	Data Requirements
Biological	Total landings by major species per fleet per year Total effort by fleet per year Length and/or age composition of landings for major species Areas fished by each fleet
Ecological	Impact of fishing gear and activities on the physical habitat Changes in critical habitats brought about by non-fishing activities
Economic	Average income per person year Costs per person per year Destination of landings from each fisherman, and a measure of the dependence on the fishery of other sectors of the community (e.g. processors, wholesalers etc.)
Social Institutional	Total number of fishers employed Total number of people employed in fishing Dependence of fishers for their livelihoods

INDICATORS AND REFERENCE POINTS (V)

To monitor the progress of the fishery and to measure the performance of management in achieving the objectives, "indicators" and "reference points" are needed.

Indicators show the state of the fishery

Reference points (RP) are particular values of indicators and show the states you would like to achieve or avoid. Reference points are values of indicators defined on some technical basis, which are believed to represent important changes in the fishery system (Caddy, 2004).

Indicators and RPs should be used in combination with each other to express the operational objectives in ways that can be estimated in quantitative fisheries assessments (Table 3).

A reference point is an estimated value derived through an agreed scientific procedure, which corresponds to the state of the resource and of the fishery, and which can be used as a guide for fisheries management.

Two types of reference points should be used: conservation, or limit reference points and management, or target reference points:

- **Limit reference points** (LRPs) indicate situations that are undesirable and to be avoided at all costs; they set boundaries which are intended to constrain harvesting within safe biological limits;
- **Target reference points** (TRPs) correspond to situations considered as desirable and to be achieved on average; they are intended to meet management objectives.

Recognizing the uncertainty in the stock assessment process, the management plan may also include '**precautionary' reference points** (PaRPs): these provide thresholds at which initial actions can be taken to reduce the risk that the limits may be broken.

When information for determining reference points for a fishery is poor or absent, provisional reference points shall be set.

Both reference points and indicators are commonly based on agreed scientific procedures and/or models.

Many reference points are connected with the maximum sustainable yield concept, based on a model, which assumes that the annual net growth in abundance and biomass of a stock increases as the biomass of the stock increases, until a certain biomass is reached at which this net growth, or surplus production, reaches a maximum (**MSY**). This biomass is referred to as B_{MSY}, and the fishing mortality rate, which will achieve MSY, is similarly referred to as F_{MSY}. (Tables 3 and 4).

Reference points may also be set at arbitrary values ('common sense RP') which are not explicitly based on models but which are nevertheless agreed with the stakeholders.

Reference points are required for each of the biological, ecological, social, and economic operational objectives of the fishery.

Table 3. Examples of different types of indicators and reference points used to guide fishery management actions

	Purpose	Categories and examples
Indicators	Measure the current position of the fishery for a range of different dimensions or criteria	• State, e.g. stock biomass, *B*now ; total catch • Pressure, e.g. fishing effort; fishing mortality, *F*now • Response, e.g. quota allowed; size limit set; % of total area set aside as MPAs
Performance indicators	Measure the current state of the fishery, relative to the associated reference points	• *B*now / B_{MSY} • *F*now / F_{MSY}
Conceptual reference point	Used to define decision control rule frameworks that guide management actions	• Limit reference points (LRPs) identify situations to be avoided, e.g. *B*lim , *F*lim • Target reference points (TRPs) identify values to aim at, e.g. MSY • Precautionary reference points (PaRPs), trigger management actions before a LRP is reached, and should be set according to the uncertainty in the analysis and the risk tolerance of the fishery stakeholders, e.g. *B*pa , *F*pa
Technical reference points	Provide explicit mathematical definitions and/or procedures for quantifying the conceptual reference points	• MSY-based, e.g. B_{MSY}, F_{MSY}, as proposed by UNCLOS etc • Proxies for MSY, e.g. $F_{0.1}$, *F*max • Protection of reproductive capacity, e.g. *F*%SPR, • Economic and social, e.g. F_{MEY}

Table 4. Main categories of single-species stock assessment methods and their characteristics (FAO, 2002).

Method	Main Information Required	Comments
A. Production models	-Annual catch -Annual index of abundance e.g. CPUE or biomass estimate	- Do not consider age structure of catch or population - Estimate parameters and variables such as MSY, effort at MSY, mean unexploited stock size, biomass time series etc. - Caution should be used, especially when fitting with equilibrium methods - Good estimates require good data contrast in effort and biomass
B. Size and age-based models Yield and biomass per-recruit	-Natural mortality rate -Age/size at recruitment to fishery - Selectivity of gear for different age/size classes -Mean size at sexual maturity	- The Beverton and Holt per-recruit models assume knife-edge selectivity and constant fishing mortality and natural mortality for all ages. The general models avoiding these assumptions are preferred. - Assume the stock is in equilibrium i.e. that the biomass and age –structure are constant from year to year. - Assume that recruitment is constant from year to year, which is likely to be false at high fishing mortalities when low spawning biomass may reduce recruitment.

It is encouraged the use of a broad range of indicators and RP to reflect the life histories and fishery characteristics, ideally within a transparent fisheries harvest law understood and agreed to by managers and stakeholders (Caddy, 2004)

DATA NEEDED VS DATA AVAILABLE

Collection of appropriate data is essential for the stock assessment, the identification of reference points, the setting of limits and actions. Initially, if data is poor, conditions uncertain, the management should be highly precautionary. In the data poor situation the management controls should be simple and robust, commensurate to the available data and easily collectable. When further data are collected, management should allow for increased exploitation levels (still sustainable). Moving from low to high exploitation levels can be seen as an incentive for fishers to provide good data (Pilling *et al.*, 2008)

In general according to Hoggarth *et al*. 2006, three main categories of data are useful for a stock assessment:

- **Catch and effort data** are usually obtained by catches at port, or by the submission of logbooks. Catch and effort data may be used directly in

biomass dynamic models because, under certain conditions, CPUE gives an index of abundance. When time series and effort information are available, they may provide indication of trends in resource abundance (carefully interpreted!).

- **Data on size** are important for gauging possible changes to exploited populations over time, and for monitoring the outcomes of management interventions in relation to size. Size data can signal important changes (truncation of age classes and increasing, or heavy predominance of, small colonies in catches) that could be fishery induced and may warrant management attention. In long-lived species such as the red coral, loss of larger individuals may substantially affect reproductive output and may need management action.
- **Other biological** parameters of individuals and populations obtained through specific biological studies. Data on population demographics, especially density, abundance, size structure, and morphology (branching pattern), as well as certain life history traits (e.g. growth rates, reproductive strategy, and longevity), must be taken into consideration when developing fisheries management strategies as these provide indicators of the status of populations.

VALIDATION OF DATA

The verification or validation of data is essential to ensure that it is accurate, complete and gives a true indication of the state or value of the factors under consideration. The problems associated with the collection of fisheries data mean that the risks of collecting erroneous or inappropriate data are very high without careful and statistically valid design and monitoring of sampling approaches (FAO, 1997).

Different types of data will need to be verified in different ways (FAO, 1997). Some examples of methods to validate data include: checking logbooks against landings data (e.g. sales notes); sampling catches for species composition; comparing landings statistics with certificates of origin, trade and commodity production statistics (e.g. processed fish) and similar sources of information; inspecting data collection methods by statistical staff; interviews with fishers; observer schemes; reporting from sea on retained catch on entering and leaving the fishing zones; developing and implementing the use of vessel monitoring systems such as transponders to monitor the position, catch and activities of vessels; and instituting airborne and shipboard surveillance, associated with the boarding of vessels (FAO, 1997).

Adequate training and supervision of staff involved in monitoring are essential if the data collected are to be valid. It is important that they are prepared for this with adequate training and that every effort is made to maintain morale and an awareness of the role of their task (FAO, 1997).

According to FAO (2009) the type of data available permit to identify three main different starting situations, leading to different approaches, priorities

and strategies to be implemented when planning the management of a given resource.

CASE A – no data/poor data

(No knowledge other than qualitative data from markets)

The priority actions are to:

- Apply conservative and precautionary approach (FAO Code and CBD).
- Avoid fishing pressure increase until a knowledge base is established.
- Develop knowledge base, at least for regular documentation of landings and effort information.
- Conduct interviews to assess fishery status, and collect information on traditional ecological knowledge for fishery history.
- Encourage traditional customary use of biological resources compatible with sustainable use and conservation.
- Identify possible critical habitat/species from published literature and consultation.
- Assess potential of MPAs/temporal measures as management tools.

Case B – medium data

(Short- or long-term catch data. Length by year data. No effort data. No local biological studies)

- Apply conservative and precautionary approach (FAO Code and CBD).
- Avoid increase in fishing pressure until knowledge base strengthened.
- Assess length and catch data for any changes in length over time; declining average length or catches might signal overfishing.
- Consider reductions in effort if substantial declines in length or catch.
- Collect fishing effort data.
- Strengthen knowledge base. Plan for biological and ecological studies on key species.
- Apply traditional knowledge to reconstruct fishing history and assess perceptions on fishery status.
- Identify possible critical habitat/species from published literature and consultation.
- Assess potential of MPAs/temporal measures as management tools.

Case C – rich data

(Species-specific length data, short- or long-term landings and fishing effort data by year by major fishing sectors, biological studies conducted on few major species. Little ecological information)

- Able to move towards more sustainable use of resources.
- Refer to Precautionary Principle, FAO Code, CBD and EAF.
- Apply Biological Reference Points (BRPs) where possible.
- Manage for sustainable yield concomitant with maintenance of biodiversity.
- Assess status from long-term data sets

DECISION RULES (VI)

Reference points should be agreed with stakeholders in advance and used to trigger specific conservation and management actions, also agreed in advance. Stakeholder involvement in fact provides an opportunity to explore and integrate ideas together, generate new options and solutions that may not have been considered individually. Such agreements may be formalized as "harvesting strategies" and "decision control rules." These jointly define how the conceptual and technical reference points will trigger particular actions at different states of the fish stocks or other economic or environmental indicators.

Both the harvesting strategies and the control rules should be clearly specified in mathematical or logical terms, and should show what management action will be taken, depending on the positions of the indicators relevant to the reference points.

When precautionary or limit reference points are approached, measures should be taken to ensure that they will not be exceeded. If such reference points are exceeded, recovery plans should be implemented immediately to restore the stocks.

Appropriately widespread consultation should be undertaken with the interested parties (Stakeholders) during the process of formulating or amending the fisheries management plan (FAO, 1997). In this context, Stakeholder involvement can increase stability in a complex environment and expand capacity rather than diminish it under changing circumstances. All of these issues are becoming increasingly important in the context of a marine planning to avoid incompatible uses, resolve conflicts and move toward ecosystem-based management.

Two types of stakeholders are generally defined (The World Bank, 1996)

1) Primary stakeholders who are directly affected (positively or negatively) by proposed interventions/policies; either because they depend on it for their livelihoods or they are directly involved in its exploitation in some way.

2) Secondary stakeholders who are indirectly affected by proposed interventions/policies. Secondary stakeholders include those who have technical expertise and/or links to primary stakeholders, e.g. non-governmental organizations (NGOs), various intermediary or representative organizations, and technical and professional bodies. They often represent public interests

Stakeholder involvement as the participation of stakeholders in policy-making, planning and management processes, can generally take place, among others, in three broadly defined ways (Sen and Nielsen, 1996):

- **Instructive stakeholder involvement**. Where government is the decision-maker, but mechanisms exist for limited exchange of information with other stakeholders. This tends to be government informing stakeholders about decisions they plan to make.
- **Consultative stakeholder involvement**. Where government remains the decision-maker, but there are formal and informal mechanisms for consultation with stakeholders. Stakeholders have some degree of influence over outcomes.
- **Cooperative stakeholder involvement**. Where all primary stakeholders and government work together as partners in the decision-making process. Secondary stakeholders play a consultative role.

Working with local stakeholders is not necessarily easy and requires special training and skills. In particular, when the 'co-management' option is adopted, it requires compromise, respect and trust among stakeholders and a commitment to transparency, empowerment and communication, all of which may take time to develop, especially against a background of top-down regulation and control. Methods that enable this are therefore crucial.

Although there are clear benefits, experiences with 'co-management' have shown that it is neither simple nor quick to establish (Hoggarth *et al*. 2006). For instance, 'co-management' requires that government agencies and researchers adopt a new way of thinking, develop new skills, and find new ways of interacting with other stakeholders.

RECOVERY PLAN (VII)

A recovery plan may be considered a specialized control rule, which applies when the stock is outside safe biological limits.

States and sub regional or regional fisheries management organizations and arrangements should, on the basis of the best scientific evidence available, inter alia, determine the action to be taken if they are exceeded.

MANAGEMENT MEASURES (VIII)

Once operational objectives, reference points, a harvesting strategy and decision control rules have been technically defined and agreed, a management strategy can be developed (FAO, 2002).

The management strategy is the sum of all the management measures that are selected to achieve the biological, ecological, economic, and social objectives of the fishery.

Management measures can be classified as follows:

• Technical measures, usually permanent regulations on gear type or gear design, and closed areas and closed seasons;

• Input (effort) and output (catch) controls, e.g. a limit on the total number of vessels in a fishery, or an annual total allowable catch (TAC); and any access rights designed around the input and output controls

TECHNICAL MANAGEMENT MEASURES

Technical measures aim to control the exploitation pattern of the fishery. The main technical measures are size limits, closed seasons, closed areas and gear restrictions or bans. Technical measures are usually designed to protect reproductive potential, prevent growth overfishing, or prevent the use of destructive fishing gears.

Technical measures may either be set with a combination of common sense and limited technical data, or using the output of models. Optimal size limits and the timings of closed seasons can be estimated using analytical models.

INPUT MANAGEMENT MEASURES (FISHING EFFORT CONTROL)

Fishing effort restrictions aim to limit fishing mortality (F) by controlling one or more of the following factors:

1) The total number of vessels in the fishery, e.g. by allocating limited access rights and restricting the number of licenses issued;

2) The effort allowed by each individual vessel, e.g. the number of gear units allowed, the number of trips that may be made each year, or the number of days at sea;

3) The power of individual vessels, e.g. the size or engine power of the vessels, or the types of gear that may be used.

Recommendations on adjustments to fishing effort (e.g. to bring F_{now} closer to F_{MSY} or F_{pa}) can be produced by analytical models (e.g., Beverton and Holt "invariants" methods), or using biomass dynamic models.

OUTPUT MANAGEMENT MEASURES (CATCH CONTROL)

Output controls such as the total allowable catch (TAC) indirectly control the fishing mortality. Approximate catch limits may also be estimated using the Beverton and Holt "invariants" methods or using empirical methods based on resource area and nominal effort measures.

MCS SYSTEM (MONITORING, CONTROL, SURVEILLANCE) (IX)

Monitoring, control and surveillance (MCS) is all about compliance to fishery management measures. Monitoring gathers information on the fishery that is used to assist in developing and assessing appropriate management

measures, while surveillance uses this information to ensure that these controls are complied with.

If a more precise meaning for MCS is required reference should be made to a definition developed by an FAO Expert Consultation in 1981):

(i) Monitoring – the continuous requirement for the measurement of fishing effort characteristics and resource yields;

(ii) Control – the regulatory conditions under which the exploitation of the resource may be conducted; and

(iii) Surveillance – the degree and types of observations required maintaining compliance with the regulatory controls imposed on fishing activities.

The MCS system may be subdivided in 4 different components:

BEFORE FISHING

Control of fishing vessels or fishers before fishing trips, at the time of the issue of a license, through annual frame surveys or through spot checks is a useful and low-cost MCS operation that can facilitate the following:

the checking of gear and effort control mechanisms to ensure that regulations or license conditions are complied with;

if illegal gear is detected or shown then it can often be secured so that it is not possible to use it while fishing;

To gather information for fishery statistics;

DURING FISHING

Fisheries MCS operations carried out at sea can have an impact as a deterrent or for enforcement of all control measures but generally they are most significant for output and technical controls. It is the only method that allows infringements in relation to logbooks, gear types, and catch to be detected on the site of the crime (while fishing).

AT LANDING

The place of landing provides a bottleneck in fishing operations where vessels can be checked, documents such as logbooks collected and the corals being landed can be weighed. Monitoring of landings is one of the most important elements of MCS operations when output controls are in place.

AFTER LANDING

Inspections of markets, transport providers and sales organisations can provide valuable information about the catches. This type of operation generates valuable information for biological and economical crosschecks as well as validation of other MCS information. It is also a viable operation for control of illegal catches, especially undersized

IMPLEMENTATION AND ENFORCEMENT MECHANISMS (X)

The management plan provides details on how the fishery is to be managed and by whom. It should include a management procedure, which gives details on how management decisions are to be made according to developments within the fishery, particularly in response to changes in resource status from year to year. The choice of approach (instructive, consultative, cooperative) will depend on the legal and institutional environment, decision-making processes and the capacity of stakeholder organizations in each country, as already describe in the section "VI Decision Rules." None of these processes are static and are likely to adapt to changes in experience and situation(s) over time.

Finally, it is critical that stakeholders are involved early and continually in all phases of the management, including the planning, plan evaluation, implementation, and post-implementation phase, and not just consulted afterwards. In addition to participating, stakeholders need to be empowered to enable their full engagement. Activities directed to empower stakeholders, including environmental education, capacity development, and social communication, are primarily focused on building constituency for the management plans, and will ultimately aim to establish behaviour and attitude changes so that the process can be sustainable over time.

ASSESSMENT OF PERFORMANCE, REVIEWING SYSTEM AND TIMEFRAME (XI)

ASSESSMENT OF PERFORMANCE

Measuring performance of the MP against the strategic targets should be an annual activity. Successes and failures should be carefully identified, described, and analysed during an internal process and it should involve feedback from all involved interested parties.

In particular, the MCS system will provide the data to measure how close the achievement of the MP is. In fact, the most practical way to estimate compliance is to compare the number of detected infringements in relation to the percentage of the population being sampled. The number of infringements can then be raised to the estimated number in the entire population that is

being sampled on a monthly, seasonal, or annual basis. The resultant estimate may not be completely accurate for many reasons but it does give a reasonable estimate of the level of compliance for a given management measure and can be compared both to the target and across time as a trend for changes in compliance.

REVIEWING SYSTEM AND TIMEFRAME

Factors of importance to fisheries change through time; therefore MPs must be periodically reviewed.

The mechanism for review should be specified in the plan itself.

The review should consider whether monitoring is achieving the quantity and quality of data collection required for the regular updating of management measures.

In general, the reviewing consultation process should parallel the initial process used to develop the plan but is likely to be shorter in time and should only require one draft review document seeking comments from interested parties and the public, and a final draft to be submitted for approval. Major reviews may require public meetings, where interested parties can air their views about the proposed amendments to the plan. Longer-term reviews may provide evidence that an objective set earlier (e.g. recovery to a certain target abundance level by a particular date) is no longer appropriate (FAO, 2003).

Often, plan reviews are motivated by changes in the socioeconomic status of the fishery or the biological status of the fish stock. It is to be expected that, after the initial development of a plan, it will take several years to close the information gaps that may have been identified during its development. Therefore, a major review of an MP is unlikely to happen until several years have passed and people have had time to review and evaluate the need for, and effects of, possible new management regulations MPs therefore must be reviewed whenever it is precautionary to review the plan, not just when new data become available. It is therefore recommended that within the MP a regular schedule for reviews be defined. At a minimum, a plan should be reviewed every five years.

THE REGIONAL MANAGEMENT PLAN FOR RED CORAL (RMP-RC)

BACKGROUND (RMP-RC)

The General Fisheries Commission for the Mediterranean (GFCM) has been involved in red coral management since the 1980s. In those years, in response to declining yields and intense international poaching in the Mediterranean region, a first proposal to regulate trade of red coral was advanced by Spain at the 6th meeting of the Conference of the Parties (CoP6) to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in 1987. The proposal was rejected and the GFCM subsequently organized three technical consultations on red coral (Spain 1983, Italy 1988, and Algeria 1989) in order to provide useful guidelines for a more effective management of the resource. However, the suggested measures were implemented sporadically and in different forms in the Mediterranean countries.

More recently, new concerns were raised regarding the sustainability of coral harvest due to past and ongoing exploitation and led to two new proposals to include corals in CITES: one in 2007 presented by the United States of America (USA) and one in 2010 presented by Sweden (on behalf of the European Union) and the USA. In particular, the second proposal presented in 2007 aimed at listing the whole genus of *Corallium* in CITES and the last proposal of 2010 was designed to list the whole Corallidae family. All of them were rejected. A broad discussion about the opportunity (pros and cons) of including *Corallium rubrum* went on among the general public, the scientific community, fishermen and the industry. While it is out of the scope of this document to discuss or comment on the validity of the proposals and/or of their rejections, a list of the main documents related to CITES, FAO and red coral issues is provided in appendices for ease of reference.

After the last proposal was rejected, the GFCM organized two transversal workshops on red coral (16–17 September 2010, Alghero, Italy, and 5–7 October 2011, Ajaccio, France) in order to start a process that would lead to the implementation of a regional management plan (at the GFCM level) and of local management plans (at the national level) for the sustainable management and conservation of this important resource. The results and conclusions of these meetings have been in part translated into binding recommendations, adopted in 2011 and 2012 by the GFCM (Recommendation GFCM/35/2011/2 on the exploitation of red coral in the GFCM competence area and Recommendation GFCM/36/2012/1 on further measures for the exploitation of red coral in the GFCM area).

The full text of the recommendations is reproduced in Appendix A and Appendix B is discussed in the details in the next paragraphs.

FOREWORD (RMP-RC)

The present document is a draft of the regional management plan for red coral (RMP-RC).

It should be presented at the next session of the Subcommittee on Marine Environment and Ecosystems (SCMEE) in February 2013.

On the basis of the discussions held at the SCMEE session, this first draft should be refined to include requirements and needs for the implementation of the RMP-RC.

A revised draft should then be presented to the next session of the Scientific Advisory Committee (SAC), planned in April 2013.

Finally, a final RMP-RC proposal should be presented to the next session of the GFCM in May 2013.

From a practical point of view, the management plan, both at the regional and national level, should translate high-level policy goals into day-to-day management activities, providing for a rigorous set of operational objectives, decision rules, management measures and management performance evaluations.

Once approved in its final form at the GFCM session, the management plan should be implemented starting from the 2014fishing season.

CONTENTS (RMP-RC)

The RMP-RC in the GFCM competence area (is composed of the following parts:

- Definition
- Relationship with national management plans
- Background information
- Principles
- Broad goals and objectives
- Operational objectives
- Reference points and decision rules
- Recovery strategy (potential)
- Management measures
- MCS system
- Implementation and enforcement mechanisms
- Reviewing system and timeframe
- Stakeholder role and involvement
- Conservation and ecosystem-related issues
- Future developments

The RMP-RC has been developed in line with Recommendation GFCM/35/2011/2 on the exploitation of red coral in the GFCM competence area, which stipulates that:

- "*Scientific and technical knowledge acquired through the actions stipulated under paragraphs 3 (c), 5, 7 and 9 above shall be taken into account by SAC with a view to develop an adaptive regional management plan*" (Paragraph 10).

It also takes into account Recommendation GFCM/36/2012/1 on further measures for the exploitation of red coral in the GFCM area, which states that:

- "*In addition to substantiate the Terms of Reference provided in the 2012 Work Plan of its Sub-Committee for Marine Environment and Ecosystems, and pending the development of a regional management plan for red coral, as requested by the Recommendation GFCM/35/2011/2*" (Paragraph 6) and that
- "*The GFCM Secretariat is requested to take actions in support of the SAC with a view to put into operation, no later than 31 May 2013, the adaptive regional management plan*" (Paragraph 7).

The RMP-RC defines all management measures that are applicable at the regional level and necessary for the sustainable management of the red coral resource in the GFCM competence area.

The RMP-RC is in line with the provisions of the Guidelines on a general management framework and presentation of scientific information for multiannual management plans for sustainable fisheries in the GFCM area (hereafter the "GFCM Guidelines"), adopted by the GFCM in 2012 (fully reproduced as Appendix C of this document).

However considering that the GFCM Guidelines explicitly refers to the mainly management of demersal and small pelagic stocks ("*GFCM may develop and adopt multi-annual management plans for fisheries exploiting demersal and small pelagic stocks*"), it is worth stressing that red coral, a sessile, slow growing species, poses additional, different and new challenges, which implies that not all the indications and provisions included in the GFCM Guidelines should be applied or strictly followed for its management.

RELATIONSHIP WITH NATIONAL MANAGEMENT PLANS (RMP-RC)

Considering that Recommendation GFCM/36/2012/1, Paragraph 5, states that "*the adaptive regional management plan [is] based, whenever available, on national plans*" the following paragraphs define the contents and area of coverage of the RMP-RC versus NMPs.

The provisions contained in the RMP-RC apply to red coral banks within the GFCM competence area while NMPs provide for the management of red coral banks within the territorial waters of each specific country.

According to point 7 of the GFCM Guidelines, the adoption of the RMP-RC does not prevent GFCM Contracting Parties, Cooperating non-Contracting Parties, Entities or Fishing Entities cooperating non-contracting (CPCs) to develop their own NMPs, provided that the objectives and measures therein are not less stringent or in contradiction with GFCM measures.

Therefore, the NMPs should contain not only all the management measures provided for by the RMP-RC but also any other regulation which is necessary for the sustainable management of the red coral resource at the national level.

Within GFCM priorities and strategies, action could be taken to assess the progress or capacity of GFCM member countries to formulate national management plans, and identify where national action, technical assistance or capacity strengthening might be needed.

BACKGROUND INFORMATION (RMP-RC)

Background information are provided in two separate files ”First Part - Background information” and “Second part – socio-economic aspects”, which form an integral part of the RMP-RC. These parts present data on the main threats and environmental issues related to red coral and coralligenous biocoenosis as well as on the biology, fishery, past and present management and production of *C. rubrum* at the regional and national level. Socio-economic aspects related to the red coral fishery are described and analysed and a brief summary of the main international legal instruments international legal frameworks regarding red coral and its management is also provided.

It is worth mentioning that, despite the importance of the socio-economic aspects of the red coral fishery, for the exploitation of the resource, it is quite difficult to retrieve reliable, independent and up-to-date information on these. . Therefore, socio-economic information provided here should not be regarded as exhaustive and could be greatly improved in the future with other information from interested countries and stakeholders and with further analysis by socio-economic experts and scientists.

PRINCIPLES (RMP-RC)

In general, the RMP-RC is in line with the six Lisbon Principles (Costanza *et al*., 1998) aiming at promoting a sustainable governance of oceans:

- **Responsibility principle** – Responsibility to use resources in an ecologically sustainable, economically efficient and socially just manner;
- **Scale-matching principle** – Decision-making at the scale of governance which has the most relevant ecological information, which considers actors, and which internalizes costs and benefits;
- **Precautionary principle** – Need to take uncertainty about potentially irreversible impacts into account by erring on the side of caution;

- **Adaptive management principle** – Monitoring social, economic and ecological systems because they are dynamic and have some level of uncertainty; learning-by-doing;
- **Full-cost allocation principle** – Need to identify and allocate all internal and external costs and benefits (social and ecological) of alternative uses of resources;
- **Participation principle** – Importance of full stakeholder participation in the formulation and implementation of decisions about environment and resources

In particular, the RMP-RC recalls the FAO principle according to which "fisheries management should aim at achieving the optimal and sustainable utilization of the natural resource for the benefit of humanity, while maintaining biodiversity" (FAO, 2011).

The RMP-RC is based on available scientific information on *C. rubrum* and other related coral species, which help determinate how the fishery should be managed to ensure its sustainability (FAO, 2011).

In other words, "the resource system should be managed, not for products and commodities but for resilience, defined as the capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity and feedback" (FAO, 2011).

GOALS AND BROAD OBJECTIVES (RMP-RC)

The main goal of the RMP-RC is to keep red coral stocks at a sustainable level.

The broad objective is to develop a responsible management strategy for the red coral resource within the GFCM area.

In accordance with the GFCM Guidelines (point 2), the RMP-RC is aimed at counteracting overfishing (reported to occur in many areas, especially for shallow populations) and at preventing it in areas where the resource is not fully exploited while ensuring long-term yields. It also intends, to the extent possible, to maintain stocks size at levels that can produce the optimum sustainable yield while keeping low the risk of stocks falling outside safe biological limits.

OPERATIONAL OBJECTIVES (RMP-RC)

The broad objectives defined above are further developed into detailed **operational objectives (Oob)** which describe the primary tasks of red coral fisheries management.

The choice of the operational objectives proposed in this document has been determined by the data that are or will be available in the near future (within

1-2 years) at the GFCM level through the data collection framework as provided for by Recommendations GFCM/35/2011/2 and GFCM/36/2012/1.

Over the coming years, it is expected that the quantity as well as the quality of data will increase. Any new and reliable information should lead to a review of the current operational objectives and possibly to the development of new objectives. This is also in line with Recommendation GFCM/35/2011/2 (paragraph 10) which insist on the need to develop an adaptive regional management plan based on the best available scientific and technical knowledge.

However, based on the precautionary principle according to which "the absence of adequate scientific information should not be used as a reason for postponing or failing to take conservation and management measures" (FAO Code of conduct for responsible fisheries, 1995), the implementation of the RMP-RC should not be postponed.

In line with point 8 of the GFCM Guidelines, the goals and objectives of the RMP-RC foresee the definition of reference points as well as correlated target, threshold (precautionary) and limit reference points.

The provisional operational objectives of the RMP-RC are the following:

RMP-RC Oob1: To control that the legal size limit for harvesting red coral colonies is enforced at the GFCM level;

RMP-RC Oob2: To maintain the same catch level as that of the three previous years in order to keep the fishery working while waiting for a consistent assessment of red coral populations based on sound scientific information.

The rationale behind the choice of **RMP-RC Oob**1 is the need to have an indicator for the performance of management measures already in place at GFCM level.

The choice of **RMP-RC Oob**2 is based on the need to maintain red coral fisheries at their current level of exploitation, assuming that it is sustainable.

RMP-RC Oob2 is temporary as it is foreseen that the level of exploitation could change if future data collected within the GFCM data collection framework show that the current fishing effort is above a sustainable level.

REFERENCE POINTS AND DECISION RULES (RMP-RC)

In order to measure the management performance in in the achievement of objectives, reference points (RP) have been defined for each Oob.

Each RP has three values associated:

Target reference point (TRP), corresponding to a situation considered as desirable and to be achieved on average;

Limit reference point (LRP), indicating a situation that is undesirable and to be avoided at all costs;

Threshold or Precautionary reference point (PRP), i.e. a threshold to which initial actions can be taken to reduce the risk of breaking the limit.

In line with point 9 of the GFCM Guidelines, targets, thresholds and limit reference points have been defined along with a range of management actions based on available scientific and socio-economic data on the resource. However, considering the peculiarity of the red coral resource and the structural lack of reliable and up-to-date data on the actual yields and populations status in many areas of the distribution range, it is worth pointing out that the reference points that are frequently used in fisheries management (as advised at points 11-13 of the GFCM Guidelines) can hardly be applied. In any case, the proposed reference points reflect the paucity of information and should be regarded as provisional ones. A revision could be made on the basis of SAC advice and GFCM deliberations (point 13).

Each Oob is also associated to a decision control rule.

The decision control rule defines which management actions should be taken depending on the position of the indicator that is relevant to the reference point.

The value of the TRP for **RMP-RC Oob**1 has been defined on the basis of the current size limit set by GFCM Recommendations which foresee a10% allowance in live weight for undersized colonies.

The value of the LRP for **RMP-RC Oob**1 has been defined on the basis of the TRP and further increased by 10%. A 20% share of undersized coral colonies in landings, which corresponds to the double of the current value, is considered as the limit situation to be avoided.

The value of the PRP for **RMP-RC Oob**1 has been defined on the basis of the LRP as an early warning indicating that the values are approaching of the limit. It is calculated according to an intermediate value between the TRP and the LRP, i.e. an allowance of 15% of undersized colonies. It provides a threshold for initial actions in order to reduce the risk of breaking the limit.

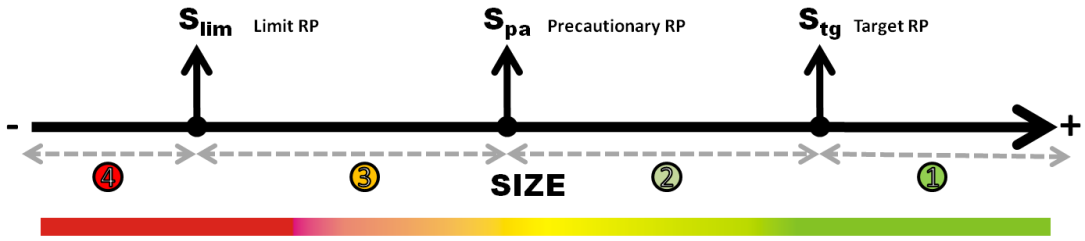
The decision control rule for **RMP-RC Oob**1 is shown at Figure 1, together with the reference point, target, limit and precautionary RP.

It provides that actions should be undertaken by the GFCM when the share of undersized colonies in landing data is above the currently allowed value,

calling interested CPCs for a stricter implementation of this management measure through stronger enforcement at the national level.

The 10%, 15%, and 20% values have been defined according to common sense but could be modified on the basis of scientific evidence or agreements among all stakeholders.

GOAL	OBJECTIVE	INDICATOR	REFERENCE POINTS	Precautionary RP
TO KEEP RED CORAL STOCKS AT A SUSTAINABLE LEVEL	Control that the size limits are enforced	SIZE=S (average size landing data)	Target= S_{tg} (90% of landings is at average size = legal size limit LS) Limit=S_{lim}= (80% of landings is at average size = legal size limit LS)	Threshold= S_{pa}=(85% of landings is at average size = legal size limit LS)



Decision control rule		
1	(Snow≥Stg)	No action
2	(Spa<Snow<Stg)	Recommend stricter controls
3	(Slim<Snow<Spa)	Recommend stricter controls Surveys to evaluate the actual size structure
4	(Snow<Slim)	Recommend stricter controls Surveys to evaluate the actual size structure Evaluate the possibility to close the fishing

Figure 1 – Decision control rule, target, limit, and precautionary RP for RMP

The value of the TRP for **RMP-RC Oob**2 has been defined assuming that average catches for the three previous years were at a sustainable level.

The value of the LRP for **RMP-RC Oob**2 has been defined on the basis of the TRP and further increased by 20%. The 20% share of total catches in the GFCM area is considered as the limit situation to be avoided.

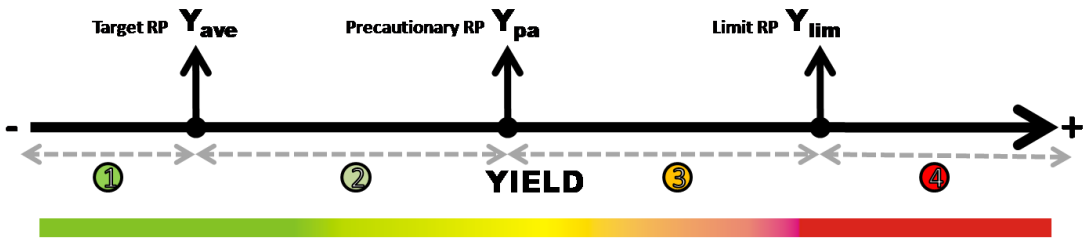
The value of the PRP for **RMP-RC Oob**2 has been defined on the basis of the LRP as an early warning indicating that the limit is approaching. It has been calculated considering that a 10% increase of total landings provides a good threshold for initial actions in order to reduce the risk of breaking the limit.

The decision control rule for **RMP Oob**2 is shown at Figure 2 together with the reference point, target, limit and precautionary RP.

It provides that actions should be undertaken by the GFCM when catches calculated from landing data represent 10% of the average catches in the

three previous years, calling interested CPCs for a stricter implementation of catch control.

GOAL	OBJECTIVE	INDICATOR	REFERENCE POINTS	Precautionary RP
TO KEEP RED CORAL HARVESTING AT A SUSTAINABLE LEVEL	Maintain the average catch level of three previous years	YIELD= Y (database FAO)	Target= Y_{ave} (Average yield past 3 years) Limit=Y_{lim}= Y_{ave}+X	Threshold= Y_{pa}=Y_{ave}+(1/2x)



Decision control rule		
1	($Y_{now} \leq Y_{ave}$)	No action
2	($Y_{ave} < Y_{now} < Y_{pa}$)	Recommend catch control at the national level
3	($Y_{pa} \leq Y_{now} < Y_{lim}$)	Recommend catch control at the national level Surveys to evaluate the actual biomass
4	($Y_{now} \leq Y_{lim}$)	Recommend stricter catch control at the national level Surveys to evaluate the actual biomass Evaluate the possibility to close the fishing

Figure 2- Decision control rule, target, limit, and precautionary RP for RMP Oob2

RECOVERY STRATEGY (RMP-RC)

The GFCM and its CPCs should determine in advance the recovery strategy, i.e. actions to be taken when the stock falls outside safe biological limits. The pre-agreed recovery strategy allows to implement without delay necessary and urgent measures.

MANAGEMENT MEASURES (RMP-RC)

Considering **RMP-RC Oob**1 and **RMP-RC Oob**2 and of their reference points, the management measures already in place as per GFCM Recommendations GFCM/35/2011/2 and GFCM/36/2012/1 are adequate to achieve the objectives.

The current management measures are reported below.

TECHNICAL MEASURES ON GEAR

Recommendation GFCM/35/2011/2

Paragraph 1. Contracting Parties and Cooperating non-Contracting Parties (CPCs) in the GFCM Competence Area shall prohibit the use of any kind of towed gear, irrespective of the specific name, to exploit red coral. The only permitted gear for the harvesting shall be a hammer used by a scuba diver. This provision is without prejudice to stricter measures, which may be adopted or maintained by CPCs.

Paragraph 2. CPCs shall prohibit the use of the Remotely Operated Underwater Vehicles (ROVs) in the GFCM Competence Area for the exploitation of red coral.

Paragraph 3. By way of derogation from paragraph 2, formally granted by a Contracting Party on the basis of a specific fisheries authorisation, the use of ROV may be authorized in zones under national jurisdiction only and subject to the following conditions:

a) In Contracting Parties where ROV is already authorized only for reasons of observation and prospection and provided that ROV models cannot be equipped with manipulator arms or any other device allowing the cutting and harvesting of red coral. Contracting Parties concerned shall provide to the GFCM Secretariat the list of authorizations issued (specifying the date of their issuance) not later than the end of September 2011 and shall ensure that no new authorisation will be granted. The authorisation of ROV for prospection shall only be allowed until 2015, unless scientific advice states otherwise.

b) The provision in paragraph (a) above is without prejudice to Contracting Parties, which have not yet authorised the ROV for prospection and may wish to do so. This authorisation shall be granted only on the basis of scientific results obtained in the context of national management plans and showing no negative impact on the sustainable exploitation of red coral.

c) Within a framework allowing for scientific experimental campaigns both for observation and harvesting during a limited period not extending beyond 2015, carried out under the supervision of national research institutions and/or in collaboration with national, international bodies as well as any other relevant stakeholder. The scientific results of these studies will be presented to the SAC, through the GFCM Secretariat, for its consideration and advice, including the status of the stock, the impact and the advisability of using ROV for direct harvesting of red coral. This derogation shall be without prejudice to stricter measures, which may be adopted or maintained by Contracting Parties.

Paragraph 8. SAC is requested to advise on the status of red coral banks and, no later than 2014, on the impact and adequacy for the continuation of using ROV for the prospection and harvesting of red coral banks.

TECHNICAL MEASURES ON SIZE

Recommendation GFCM/36/2012/1

Paragraph 1. Contracting Parties and Cooperating non-contracting Parties of the GFCM (hereafter referred to as CPCs) shall ensure that red coral colonies whose basal diameter is smaller than 7 mm at the trunk, measured within one centimetre from the base of the colony, is not harvested, retained on board, transhipped, landed, transferred, stored, sold or displayed or offered for sale as raw product.

Paragraph 2. By way of derogation from Paragraph 1, Parties may authorize a maximum tolerance limit of 10% in live weight of undersized (<7 mm) red coral colonies provided that a strict national management framework has been developed ensuring an authorization system and specific monitoring and control programmes are in place.

Paragraph 3. By 31st December 2014 at the latest, the SAC is requested to assess the impact that the implementation of the 10% tolerance margin can have on the size composition of catches and on the sustainability of red coral harvesting.

Paragraph 4. Provisions under paragraphs 1 and 2 above are without prejudice to stricter measures that may be adopted or maintained by CPCs in their national management framework.

TECHNICAL MEASURES ON DEPTH LIMIT

Recommendation GFCM/35/2011/2

Paragraph 4. CPCs shall ensure the prohibition of the exploitation of red coral populations at depth less than 50 m until scientific studies, as validated by GFCM-SAC, indicate otherwise.

Paragraph 5. By way of derogation from paragraph 4, Contracting Parties may authorize exploitation of red coral at less than 50 m provided that an appropriate national management framework has been developed ensuring an authorization system and that only a limited number of red coral banks are exploited by the establishment of adequate spatio-temporal closures. This derogation shall be without prejudice to stricter measures that may be adopted or maintained by Contracting Parties.

If new data provide evidence that the measures already set are no longer appropriate, due amendments to the RMP should be made without delay.

In particular, the size limit imposition is to be regarded a "temporary" measure, fixed at an intermediate value between the request of scientists (10 mm) and that of fishers (traders) (not legal limit). All actions should be undertaken to obtain valid scientific data that confirm the current size limit is "biologically sustainable".

MCS SYSTEM (RMP-RC)

For compliance with the fisheries management measures described above, some monitoring, control and surveillance (MCS) actions are already provided for by GFCM Recommendations GFCM/35/2011/2 and GFCM/36/2012/1. However, other controlling measures, such as the validation of logbook data, observer programmes and standardized scientific data collection programmes, would be necessary to ensure a more complete control system.

DESIGNATED PORTS

Recommendation GFCM/36/2012/1

Paragraph 5. With a view to ensuring adequate monitoring and data gathering needed to set up the adaptive regional management plan based, whenever available, on national plans, the CPCs shall ensure that red coral catches are landed only in a limited number of designated ports with adequate port facilities. The list of designated ports shall be communicated to the GFCM Secretariat no later than 31st January 2013.

LOGBOOK

Recommendation GFCM/35/2011/2

Paragraph 7. CPCs shall ensure that authorized fishermen record and report to national authorities the daily catches and fishing effort by area and depths (e.g. number of fishing days, numbers of diving, etc.) while allowing, whenever the case, comparisons with results of ROV experimental campaigns. This information must be made available to GFCM Secretariat for transmission to SAC for its considerations and advice.

DATA COLLECTION

Recommendation GFCM/36/2012/1

Paragraph 8. In order to collect data on harvesting of red coral, CPCs shall compile data collection forms provided by the Secretariat. CPCs shall return the filled forms by 31st January of each year starting with the 2013 harvesting season.

POST LANDING ACTIONS

Recommendation GFCM/36/2012/1

Paragraph 6. In addition to substantiate the terms of reference provided in the 2012 Work Plan of its Subcommittee for Marine Environment and Ecosystems, and pending the development of a regional management plan for red coral, as requested by the Recommendation GFCM/35/2011/2, the SAC shall also evaluate the feasibility and implications, including services needed and economic consequences, to establish traceability mechanisms including, inter alia, a DNA bar-coding system for red coral.

VALIDATION OF LOGBOOK DATA

A mechanism for the verification or validation of data from logbooks should be implemented to ensure that data are accurate, complete and gives a true picture of the fishery.

Checking logbooks against landings data is suggested to validate the data.

Moreover, a detailed programme of data monitoring at landing (spot or regular monitoring) should be developed and urgently implemented.

Not only should landed colonies be weighted, but also counted and measured in a timely planned and standardized manner by trained personnel. This information is essential to be able to check and validate logbooks. This type of data is also important for the assessment of the stock status.

Adequate training and supervision of staff involved in monitoring are essential if the data collected are to be valid (FAO, 1997).

OBSERVERS PROGRAMMES

Considering that landings monitoring does not enable to detect undersized colonies, transhipped coral or coral sold prior to landing, setting up detailed observers programmes of at sea is highly recommended.

Observers programmes can represent a very effective way to implement and ensure compliance with legal size limits.

Furthermore, observers can provide valuable information for scientific studies if asked to collect biological data.

To perform their task adequately, observers should be provided with specialized training, manuals, suitable equipment and supervision.

STANDARDIZED SCIENTIFIC DATA COLLECTION PROGRAMME

Considering that reliable scientific information is essential to develop meaningful management measures, a standardized data collection programme for red coral in the GFCM area should be urgently planned, adequately funded, and implemented. The design, protocols, and timeframe for sampling as well as the analysis methodologies should be defined according to the allocated budget and priorities by an ad hoc working group.

In general, and according to point 19 of the GFCM Guidelines, the GFCM and its CPCs should, individually and collectively, engage in capacity-building efforts and other research and cooperation activities to improve knowledge on red coral fisheries and exploited stocks and to support the effective implementation of this regional management plan by participating in cooperative arrangements with other international frameworks.

Moreover, in line with point 20 of the GFCM Guidelines, Members and cooperating non-Members should: i) Improve the implementation of data collection and provision to the SAC; ii) Foster research programmes and projects supporting the work of the SAC; iii) Contribute to the training of scientific researchers, including young scientists.

IMPLEMENTATION AND ENFORCEMENT MECHANISMS (RMP-RC)

To be effective, the RMP-RC should be fully implemented and enforced.

According to point 6 of the GFCM Guidelines, all GFCM Contracting Parties and Cooperating non-contracting Parties have agreed to cooperate with a view to gradually developing, implementing and enforcing the RMP-RC.

Considering that RMP-RC implementation and enforcement should take into account the specificities of national legal frameworks as well as of economic, social, and cultural aspects, CPCs are request to take measures in order to ensure that the provisions of the RMP-RC are covered under their national legislation. The implementation and rule-enforcement mechanisms of the RMP-RC should be defined through legislation and regulations at the national level. In particular, it is highly desirable that enforcement against poaching, reportedly widespread and alarmingly increasing, be strengthened.

CPCs should also identify, as appropriate, focal points to deal with the implementation, enforcement, and amendment/reviewing process of the RMP-RC.

REVIEWING SYSTEM AND TIMEFRAME (RMP-RC)

The adjustment and revision of the RMP-RC should be made realized in accordance with points 15, 17 and 18 of the GFCM Guidelines.

Moreover, the SAC should provide possibly each year, – or at a longer time scale depending on the surveyed stocks and the availability of data – advice on the status of exploited stocks and on the pressure exerted by fishing activities. It should also monitor the achievement of the RMP-RC objective in order to propose, if necessary, adjustments or revisions (point 15 of the GFCM Guidelines). The review of the RMP should take place every 3–5 years, or at shorter intervals if new data and/or urgent matters require a more timely intervention.

Furthermore, on the basis of SAC advice, should the GFCM, find out that the exploitation rate and spawning stock biomass levels, or any other relevant indicator, are no longer appropriate to achieve the objective(s) of the RMP-RC, the reference levels should be revised in line with point 17 of the GFCM Guidelines.

Should SAC advice indicate that the specific RMP-RC targets are not being met, the GFCM should decide to revise management measures in order to ensure a sustainable exploitation of the resource (point 18). This review should be based on all information gathered in the annual reports prepared by the CPCs and on the compilation of all available data on red coral provided by different sources (scientific community, society, industry, fishers).

CPCs should report annually to GFCM on the implementation, enforcement, and results of the RMP-RC as well as on their national management plans, if existing, on red coral. Any problem and emerging issue, proposals for amendment of the established management measures, should be also reported.

Such reports should be transmitted to the GFCM concurrently with the red coral data forms compiled within the data collection framework. In case of urgent matters arising, specific reports can be submitted separately at any time.

Upon receipt of the reports, the GFCM Secretariat will take action and inform the SAC in order to timely address the questions raised in the working agenda of the competent subcommittees and working groups.

Furthermore, the GFCM Secretariat should timely communicate relevant information to all interested CPCs, partners, and organizations and solicit them to invite, under the terms they have chosen, all relevant stakeholders to provide advice and recommendations.

All interested parties are encouraged to propose amendments to the RMP-RC. International organizations, NGOs, fishers and other stakeholders will have the possibility to submit to the GFCM reports asking for amendments to the RMP-RC based on new information on the status of red coral populations, environment and ecosystems, fisheries and socio-economic aspects. These

documents should clearly illustrate the problem/issue/proposal and possibly recommend adjustments to the RMP-RC.

Adjustments will be made if the new data provide evidence that an objective (measure) that was set earlier is no longer appropriate. The final decision whether to accept such modifications relies upon the Commission (based on SAC advice).

STAKEHOLDER ROLE AND INVOLVEMENT (RMP-RC)

CPCs should ensure a continuous and qualified participation of stakeholders from different red coral fisheries sectors (including fishers and other actors on the commercial, scientific and environmental sector) in all the relevant consultations.

Ad hoc meetings and specific *fora* could be convened by the GFCM whenever necessary in order to address specific and/or urgent issues.

Furthermore, considering:

- The recent Memorandum of Understanding (MoU) between the GFCM and the Regional Advisory Council for the Mediterranean Sea (RACMED) recognizing the need to

  - exchange relevant information concerning fisheries and aquaculture in order to ensure that decision-making in the Mediterranean Sea is informed by the views and the opinions of stakeholders;
  - promoting and strengthen means to ensure the collection of information relating to fisheries and aquaculture of relevance for the development of a more comprehensive framework, bearing in mind the need to reinforce links between stakeholders and scientific advice leading to conservation and management measures in the Mediterranean Sea

- The provisions set forth in Council Regulation (EC) No 1967/2006 – Chapter VII – Article 18 – Paragraph 2 providing that

- "Member States and/or a Regional Advisory Council for the Mediterranean Sea may submit suggestions to the [EU] Commission on matters relating to the setting up of management plans";

RACMED should be promptly involved, as appropriate, and requested to provide inputs and advice on the existing and possible new management measures foreseen by the RMP-RC.

CONSERVATION AND ECOSYSTEM-RELATED ISSUES (RMP-RC)

According to point 3 of the GFCM Guidelines, the RMP-RC is consistent with the precautionary and ecosystem approaches and aims at minimizing the impact of fishing on sensitive habitats such as the coralligenous biocoenosis.

The RMP-RC already provides for technical measures on gear selectivity and depth limits, banning some destructive or highly impacting fishing methods (dragging gears and ROVs) and protecting overharvested shallower red coral populations.

Given that, in some countries, marine protected areas already exist (see "First part – Background information") the opportunity to further extend the protection of other vulnerable populations/sites by setting up new protected areas (both temporarily and permanently) or marine reserve networks should be a priority for CPCs.

In fact, refugia or reserves (that is coral beds protected from exploitation for a period of time) represent a valuable tool both for management and conservation purposes, in order to:

- establish reproduction reserves to favour recruitment into adjacent areas;
- establish control areas that could be used in the future to measure the environmental impact of coral harvesting;
- preserve coral beds as natural beds for research purposes.

FUTURE DEVELOPMENTS (RMP-RC)

Considering that GFCM is committed to strenghten collaboration with other organizations as appropriate, including those with whom MoUs have been signed (see Appendix D), a priority action should be to involve in red coral management and conservation issues the World Conservation Union (IUCN), the United Nations Environment Programme (UNEP-MAP) and the Network of Managers of Marine Protected Areas in the Mediterranean (MEDPAN).

UNEP-MAP and GFCM shall cooperate in:

- Promoting an ecosystem-based approach for the red coral fishery;
- Mitigating the impact of the red coral fishery on marine habitats and species;
- Identifying, protecting and managing marine areas of particular importance for red coral in the Mediterranean Sea;
- Monitoring the status of *Corallium rubrum*, species listed in Annex 3 to the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean.

MEDPAN and GFCM shall cooperate in:

- Fostering the creation and sustaining the functioning of an effective Mediterranean network of marine protected areas, including those pertinent for red coral conservation.

IUCN and GFCM shall cooperate in:

- The development and participation in the implementation of the ecosystem approach to red coral fishery;

- The identification of a representative network of Mediterranean marine restricted fishing areas, including for sensitive habitat for red coral conservation and management.

Cooperation activities may include, for example:

- The exchange of information on technical issues of common interest;The organization, participation and collaboration in joint initiatives, that may include research and conservation projects, reports, seminars, conferences;
- Collaboration in the publication and dissemination, in relevant international fora, of red coral related issues.

Where necessary, GFCM and the above mentioned organizations might establish specific arrangements or projects dealing with red coral.

THE NATIONAL MANAGEMENT PLANS FOR RED CORAL (NMP)

The following pages include the framework of a National Management Plan; any current GFCM Recommendation does not provide this for but it has been included by the authors of the present documents considering that:

- The management of red coral can be effective at the regional level only whether all countries involved in red coral fishery have harmonized regulations;
- The setting up of a National Management Plan for red coral, by all the countries involved in red coral fishery in the GFCM competence area, should be provided for by future binding GFCM Recommendations.

At present, the proposed NMP could be regarded as a sort of 'good' example or template of a management plan for red coral to be applied at the national level.

In particular, considering that reliable stock assessment models should be applied for the proper management of the red coral resource, the following Operational Objectives, References Points and Control Rules proposed for a 'rich data condition' should be implemented and applied also at the regional level as soon as data will be available.

CONTENTS (NMP)

Any NMP should follow the general framework, as described for the RFM, and should contain the following parts:

- Definition
- Relationship with the RMP
- Background information
- Principles
- Goals and broad objectives
- Operational objectives
- Indicators, Reference Points, and associated Limit, Target, and Precautionary Reference Points
- Decision rules
- Recovery strategy (eventual)
- Management measures
- MCS system (Monitoring, Control, Surveillance)
- Implementation and enforcement mechanisms
- Reviewing system and Timeframe
- Ecosystem-related matters (eventual)

DEFINITION (NMP)

The National Management Plan for red coral in the GFCM competence area (NMP) contains all the management measures applicable at the national level,

necessary for a sustainable management of the red coral resource in the country

The development of adaptive national management plan for red coral is requested by the Recommendation GFCM/35/2011/2 and GFCM/36/2012/1.

The NMP should prepared by each CPCs within the GFCM competence area, coherently with the provision of the RFM.

RELATIONSHIP WITH THE RMP

Considering the Recommendation GFCM/36/2012/1 Paragraph 5 stating that 'the adaptive regional management plan [is] based, whenever available, on national plans' the following paragraphs define the respective contents and area of application of the RMP and NMPs.

While the measures contained in the RMP apply to all the CPCs, NMPs applies to the red coral banks occurring within the territorial waters of the State.

The NMPs must contain all the management measures provided for by the RMP as well as additional or stricter regulations respect to the RMP, necessary for a sustainable management of the red coral resource at the national level.

BACKGROUND INFORMATION (NMP)

The background information section should contain data on biology, fishery, past and present management and production, threats and environmental issues related to red coral and coralligenous biocoenosis at the country level.

PRINCIPLES (NMP)

The NMPs should conform to the principles that inspire the RMP (see related section).

GOALS AND BROAD OBJECTIVES (NMP)

The NMP is inspired by the following principles: sustainability, precautionary approach, and ecosystem-based approach to fishery, adaptive and participated approaches.

The National Management Plan (NMP) main goal is to keep red coral stocks at a sustainable level in each specific country.

The National Management Plan (NMP) broad objective is to developing a responsible management strategy for the red coral resource within the national territorial waters.

OPERATIONAL OBJECTIVES (NMP)

The broad objectives defined above are further developed into explicit "operational objectives" (Oob) that are the primary tasks of red coral fisheries management in the country.

The choice of the operational objectives will be determined by the data that are or will be available in the near future (within 1-2 years) at the national level also thanks to the collection data programme required by the Recommendation GFCM/35/2011/2 and GFCM/36/2012/1.

The following paragraphs illustrate some examples of possible operational objectives to be used at the national level. They should be regarded as 'examples'. The choice and number of the Oob contained in each NMP will depend on the quantity and quality of data available in each country.

Table 5 provides a summary of data needs for estimating different indicators and RP.

Table 5 Summary of data needs and intermediate parameters for selected methods for estimating different fishery indicators (from Hoggarth *et al*. 2006)

Data					Reference points	
Catch	Effort	Length freq.	Age freq.	Intermediate parameters	Method	Indicators
Myr TS						Y_{tg}; Y_{lim}
		1 yr TS				S_{tg} ; S_{lim}
			SS	Growth M Size-weight relationship	Analytic model : Yield per recruits(Y/R) Beverthon and Holt (1957)	A_{tg}; A_{lim}
Myr TS	Myr TS				Production models (Schaeffer model (1957); Fox model (1970); Pella and Tomlinson(1969)	B_{oy}; B_{msy}

Myr Multiyear; TS time series of data; SS single sample

Considering the data available or that will be available in the near future at the national level for red coral in the GFCM competence area, three main different starting situations can be envisaged:

- **Poor data**: size data from landings and short-term catch data (at least 3 running years)
- **Medium data**: size data from landings and medium-term catch and effort data; ; local biological studies (e.g. age, mortality, size-weight relationship)
- **Rich data**: size data from landings and long-term catch and effort data; local biological studies (e.g. age, mortality, size-weight relationship)

It is highly recommended that each country progressively pass from a poor data condition to a rich one when reliable stock assessment models can be applied.

Data collection programs, scientific surveys and studies should be encouraged, planned and adequately financed by each CPC in order to gather crucial information on red coral population at the national level and to set up the proper management strategy.

CPCs should report annually on the actions undertaken to fulfil this recommendation.

The possible operational objectives, indicators and reference points, related to these 4 situations are presented in the next paragraphs.

In a **Poor data** case two operational objectives can be set:

NMP Oob1: Control that the actual size limits are enforced at the national level

NMP Oob2: Maintain the same catch level of three previous years

The rationale of the choice of the **NMP Oob**1 is to have an indicator of the performance at the national level of the size limit imposed at the GFCM level.

The rationale of the choice of the **NMP Oob**2 is to allow the local fisheries to keep on at the actual level of exploitation, supposing it to be sustainable.

The **NMP Oob**2 is temporary, with the prevision that the level of exploitation should be changed if the future data collected by the country within the GFCM collection data framework will reveal that this fishing effort is above the sustainable level.

In a **medium data** case an addition operational objective can be set:

NMP Oob3: Verify that the mean age of the population of a national bank is at an optimal level (OSY) above the MSY.

The rationale of the choice of the **NMP Oob**3 is to regulate the local fisheries at a sustainable level.

In a **rich data** case an addition operational objective can be set:

NMP Oob4: Maintain the biomass at a sustainable level (OSY)

The rationale of the choice of the **NMP Oob**4 is to regulate the local fisheries at a sustainable level.

REFERENCE POINTS AND DECISION RULES (NMP)

To measure the performance of management in achieving the objectives, "reference points" (RP) are fixed for each Oob.

To each RP three values are associated:

Target reference point (TRPs), corresponding to a situation considered as desirable and to be achieved on average;

Limit reference points (LRPs), indicating a situation that are undesirable and to be avoided at all costs.

Precautionary reference point (PaRP): this provides a threshold at which initial actions can be taken to reduce the risk that the limit may be broken.

To each Oob the relative decision control rule is associated. The decision rule defines in advance what management action will be taken, depending on the position of the indicator relevant to the reference point.

The value of TRP for **NMP Oob**1 is chosen on the basis of the actual size limit imposed by the GFCM Recommendations and the relative allowance of 10% in live weight for undersized colonies.

The value of LRP for **NMP Oob**1 is chosen on the basis of the TRP increased by a further 10%. The presence of 20% of undersized coral colonies in the landings, a value double of the current value is considered as the limit situation to be avoided.

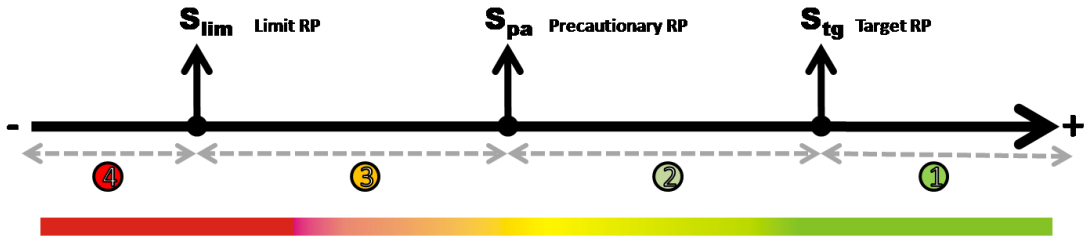
The value of PaRP for **NMP Oob**1 is chosen on the basis of the LRP to represent an early warning of the approaching of the limit. It is fixed considering a value intermediate between the TRP and the LRP that is an allowance of 15% of undersized colonies. This provides a threshold at which initial actions should be taken to reduce the risk that the limit is broken.

The values 10%, 15%, and 20% were chosen arbitrarily, being considered 'common-sense' RP, they can be specified otherwise on the basis of scientific evidence or pre-agreed decisions among all the stakeholders.

The decision control rule for the **NMP Oob**1 is shown in Figure 3 showing also the relative reference point, target, limit and precautionary RP.

It provides that actions at the national level should be undertaken when the % of undersized colonies in landing data is above the actual allowance value, calling the country for a stricter implementation of this management measure through temporary closure of the fishing area to allow the stock to rebuild. The length of the closure will depend on the status of the stock that can be defined only by scientific surveys.

GOAL	OBJECTIVE	INDICATOR	REFERENCE POINTS	Precautionary RP
TO KEEP RED CORAL STOCKS AT A SUSTAINABLE LEVEL	Control that the size limits are enforced	SIZE=S (average size landing data)	Target= S_{tg} (90% of landings is at average size = legal size limit LS) Limit=S_{lim}= (80% of landings is at average size = legal size limit LS)	Threshold= S_{pa}=(85% of landings is at average size = legal size limit LS)



Decision control rule		
1	(Snow≥Stg)	No action
2	(Spa<Snow<Stg)	short temporal closure (X yrs)
3	(Slim<Snow<Spa)	medium temporal closure (Y yrs)
4	(Snow<Slim)	long temporal closure (Z yrs)

Figure 3- Decision control rule for the NMP Oob1 and relative target, limit and precautionary RP.

The value of TRP for **NMP Oob**2 is chosen hypothesizing that the average catches of the previous three years are at a sustainable level.

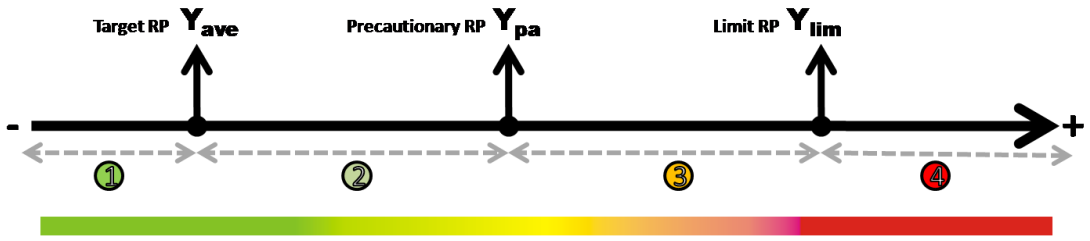
The value of LRP for **NMP Oob**2 is chosen on the basis of the TRP increased by a further 20%. The increasing of 20% of total catches at the national level is considered as the limit undesirable situation to be avoided.

The value of PaRP for **NMP Oob**2 is chosen on the basis of the LRP to represent an early warning of the approaching of the limit. It is fixed considering that an increasing of 10% of total landings provides a good threshold at which initial actions should be taken to reduce the risk that the limit is broken.

The decision control rule for the **NMP Oob**2 is shown in Figure 4 showing also the relative reference point, target, limit and precautionary RP.

The values 10% and 20% were chosen arbitrarily, being considered 'common-sense' RP, they can be specified otherwise on the basis of scientific evidence or pre-agreed decisions among all the stakeholders.

GOAL	OBJECTIVE	INDICATOR	REFERENCE POINTS	Precautionary RP
TO KEEP RED CORAL HARVESTING AT A SUSTAINABLE LEVEL	Maintain the same catch level of five previous years	YIELD= Y (national database)	Target= Y_{ave} (Average yield past 5 years) Limit=Y_{lim}= Y_{ave}+X	Threshold= Y_{pa}=Y_{ave}+(1/2x)



Decision control rule		
1	($Y_{now} \leq Y_{ave}$)	No action
2	($Y_{ave} < Y_{now} < Y_{pa}$)	Small reduction on the effort of W
3	($Y_{pa} \leq Y_{now} < Y_{lim}$)	medium reduction of the effort of Y
4	($Y_{now} \leq Y_{lim}$)	strong reduction of the effort of Z or moratorium

Figure 4 - Decision control rule for the NMP Oob2 and relative target, limit, and precautionary RP.

It provides that actions at the national level should be undertaken when the catches calculated from landing data are 10% of the average catches of the previous 3 years, calling the country for stricter controls on effort at the national level.

The value of TRP for **NMP Oob**3 is the age at Optimal sustainable yield (OMY=MSY-X).

The value of LRP for **NMP Oob**3 is the age at Maximum sustainable yield. The decrease of X of the age of coral colonies in the landing is considered as the limit situation to be avoided.

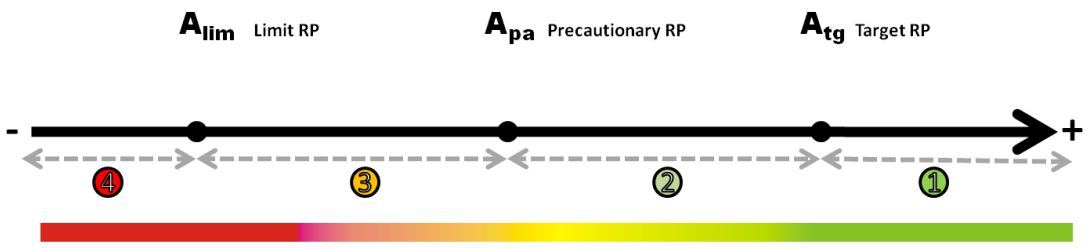
The value of PaRP for **NMP Oob**3 is chosen on the basis of the LRP to represent an early warning of the approaching of the limit. It is fixed considering a value intermediate between the TRP and the LRP, which is a decrease of Y of the age of colonies. This provides a threshold at which initial actions should be taken to reduce the risk that the limit is broken.

The decision control rule for the **NMP Oob**3 is shown in Figure 5 showing also the relative reference point, target, limit and precautionary RP.

It provides that actions at the national level should be undertaken when there is a decrease of the age in the sampled population below a certain value (X) calling the country the for a stricter controls on effort in that specific area.

The values X, Y, W, and Z should be specified on the basis of scientific data pre-agreed among all the stakeholders.

GOAL	OBJECTIVE	INDICATOR	REFERENCE POINTS	Precautionary RP
TO KEEP RED CORAL STOCKS AT A SUSTAINABLE LEVEL	Verify that the mean age of the population at an optimal level (OSY) above the MSY	AGE=A (yield per recruit model Beverthon & Holt 1957)	Target= $A_{tg}=A_{OSY}=A_{MSY}$-x Limit=$A_{lim}=A_{MSY}$	Threshold= $A_{pa}=A_{tg}=A_{MSY}$-1/2x



Decision control rule		
1	(Anow≥Atg)	No action
2	(Apa<Anow<Atg)	Small reduction on the effort of W
3	(Alim<Anow<Apa)	medium reduction of the effort of Y
4	(Anow<Alim)	strong reduction of the effort of Z or moratorium

Figure 5- Decision control rule for the NMP Oob3 and relative target, limit, and precautionary RP.

The value of TRP for **NMP Oob**4 is the biomass at Optimal sustainable yield (OMY=MSY-X).

The value of LRP for **NMP Oob**4 is the biomass at Maximum sustainable yield. The decrease of X of the biomass of coral colonies is considered as the limit situation to be avoided.

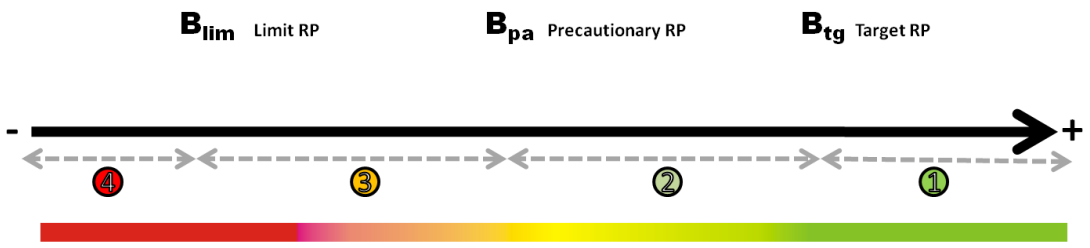
The value of PaRP for **NMP Oob**4 is chosen on the basis of the LRP to represent an early warning of the approaching of the limit. It is fixed considering a value intermediate between the TRP and the LRP, which is a decrease of Y of the biomass. This provides a threshold at which initial actions should be taken to reduce the risk that the limit is broken

The decision control rule for the **NMP Oob**4 is shown in Figure 6 showing also the relative reference point, target, limit and precautionary RP.

It provides that actions at the national level should be undertaken when there is a decrease of the biomass landed in the sampled population below a certain value (X) calling the country the for a stricter controls on effort in that specific area.

The values X, Y, W, and Z should be specified on the basis of scientific data pre-agreed among all the stakeholders.

GOAL	OBJECTIVE	INDICATOR	REFERENCE POINTS	Precautionary RP
TO KEEP RED CORAL STOCKS AT A SUSTAINABLE LEVEL	Maintain the biomass at a sustainable level (OSY)	BIOMASS=B (production model model eg. Schaefer, Fox, Pella and Thomson)	Target= $B_{tg}=B_{OSY}=B_{MSY}$-x Limit=B_{lim}= B_{MSY}	Threshold= $B_{pa}=B_{tg}=B_{MSY}$-1/2x



Decision control rule		
1	(Bnow≥Btg)	No action
2	(Bpa<Bnow<Btg)	Small reduction on the effort of W
3	(Blim<Bnow<Bpa)	medium reduction of the effort of Y
4	(Bnow<Blim)	strong reduction of the effort of Z or moratorium

Figure 6- Decision control rule for the NMP Oob3 and relative target, limit and precautionary RP.

RECOVERY STRATEGY (EVENTUAL) (NMP)

The NMP should contain the detailed description of the recovery strategy that is the actions to be taken when the stock is outside safe biological limits. The pre-agreed recovery strategy will allow to implement without delay the necessary and urgent measures and actions.

Consultations with stakeholder are highly encouraged.

MANAGEMENT MEASURE (NMP)

Considering the previously described Operational Objectives (Oob1, Oob2, Oob3 and Oob4) and the relative RPs, the management measures to be put in place should be decided locally.

The management measures decided at the regional level (defined in the RMP) should be mandatorily implemented and eventually complemented with additional or stricter ones in the NMP.

MCS SYSTEM (NMP)

For the compliance to the previously described fishery management measures the proper Monitoring, control and surveillance (MCS) actions should be decided locally commensurate with the different capabilities of the different country.

The elements of MCS system decided at the regional level (defined in the RMP) should be mandatorily implemented and eventually complemented with additional or stricter ones in the NMP.

The following Figure 7 reports, as a title of example, some actions that can be considered for implementation within the national MCS framework

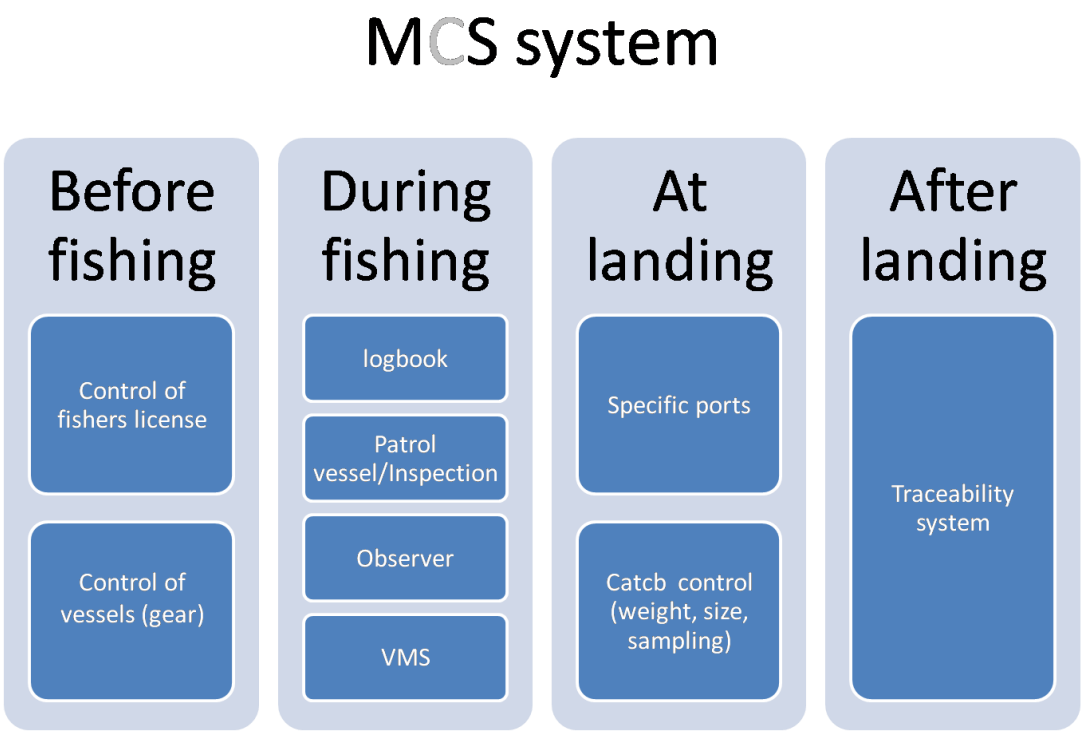


Figure 7 - Elements of the MCS system to be implemented for red coral in the NMP

PATROL VESSELS

The use of fishery patrol vessel is a traditional tool for MCS because it is able to monitor and enforce fisheries legislation on the fishing grounds. Patrol vessels, although costly to buy and to operate, are in many ways irreplaceable.

VMS

VMS monitoring has been recently inserted as an important element of the MCS system in the management plan for precious corals in Taiwan (Huang and Ou, 2010; Chen, 2012; Chang *et al*., 2013).

A Vessel Monitoring System (VMS) provides real-time position, course, and speed data through a communication link directly into a base station. This allows operators to follow all licensed activity as it happens. Fishing in illegal areas, trans-shipments can be indicated through this system.

It also significantly supports the more efficient direction and deployment of patrol vessels. Additional opportunities provided by a VMS include the manual entering of catch and effort data (from logbooks) that can be forwarded through the same system for assisting in management of quotas and stock assessment when timely information is required. VMS can be limiting due to its cost for smaller artisanal that can seldom be burdened with the cost of the required vessel units. This has generally limited the use of VMS to larger commercial vessels although a trend towards less expensive units is emerging.

IMPLEMENTATION AND ENFORCEMENT MECHANISMS (NMP)

This section of the NMP should provide details on how the fishery is to be managed and by whom with details on how management decisions are to be made according to developments within the fishery. TO BE IMPLEMENTED by the each country

REVIEWING SYSTEM AND TIMEFRAME (NMP)

The reviewing of NMP should occur annually or earlier if new data and/or urgent matters require for the anticipation of the process.

The review should be based on all the information coming from the compilation of all the available data on red coral from different source (scientific community, society, industry, fishers) within the country.

Eventual amendments are to be implemented if new data provide evidence that an objective (measure) set earlier is no longer appropriate.

Annually, CPCs should report to GFCM on the implementation, enforcement, and results of their respective NMPs.

These reports are an essential source of information for the updating/reviewing the RMP.

A long-term review every 3-5 years should be necessary to reconfirm the validity of the operational objectives and measures in place, and made major amendments at the plan.

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APPENDICES

APPENDIX A - RECOMMENDATION GFCM/35/2011/2

Recommendation GFCM/35/2011/2 on the exploitation of red coral in the GFCM Competence Area

(http://151.1.154.86/GfcmWebSite/SAC/SCMEE/13/REC_GFCM_35_2011_2_RedCoral.pdf)

APPENDIX B - RECOMMENDATION GFCM/36/2012/1

Recommendation GFCM/36/2012/1 on further measures for the exploitation of red coral in the GFCM area

(http://151.1.154.86/GfcmWebSite/SAC/SCMEE/13/Rec_GFCM36_2012_1_RedCoral.pdf)

APPENDIX C – GFCM GUIDELINES FOR MULTIANNUAL MANAGEMENT PLANS

Guidelines on a general management framework and presentation of scientific information for multiannual management plans for sustainable fisheries in the GFCM area

(http://151.1.154.86/GfcmWebSite/GFCM/36/EU-proposal-Guidelines-Management.pdf)

APPENDIX D - OTHER RELEVANT DOCUMENTS

COUNCIL REGULATION (EC) No 1967/2006

COUNCIL REGULATION (EC) No 1967/2006 of 21 December 2006 concerning management measures for the sustainable exploitation of fishery resources in the Mediterranean Sea

(http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:409:0011:0085:EN:PDF)

MEMORANDA OF UNDERSTANDING BETWEEN FAO (GFCM) AND INTERNATIONAL ORGANIZATIONS

Memorandum of Understanding between GFCM and IUCN
(ftp://ftp.fao.org/fi/DOCUMENT/gfcm/gfcm_32/inf10e.pdf)

Memorandum of Understanding between

- GFCM and UNEP-MAP;
- GFCM and MedPAN;
- GFCM and RACMED

(http://151.1.154.86/GfcmWebSite/GFCM/36/GFCM_XXXVI_2012_Inf.5-e.pdf)