



BLUEPRINT FOR SITE-SPECIFIC CONSERVATION OBJECTIVES FOR MARINE NATURA 2000 SITES IN THE EUROPEAN SEA BASINS

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Methods Protocol

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1. BACKGROUND

Site-Specific Conservation Objectives (SSCOs) are a fundamental instrument for translating the objectives of the EU Nature Directives into **clear, site-level conservation requirements**. They provide the ecological basis for determining what condition a protected habitat or species should attain or maintain at a particular Natura 2000 site and, consequently, for identifying the conservation measures required to achieve that condition. Key terms and acronyms used in this protocol are defined in Annex 1.

Under **Article 6(1) of the Habitats Directive (92/43/EEC)**, Member States must establish the necessary conservation measures for Special Areas of Conservation (SACs), corresponding to the ecological requirements of the natural habitat types in Annex I and species in Annex II that are present on the site. Article 6(2) establishes the obligation to avoid deterioration of habitats and significant disturbance of species for which sites have been designated. Articles 6(3) and 6(4) establish the safeguards governing plans and projects that may significantly affect Natura 2000 sites ([Council of the European Communities, 1992](#)).

The European Commission consequently considers site-specific conservation objectives to be an essential precursor to effective site management. Objectives should be based on the **ecological requirements of the protected features**, define their desired conservation condition using appropriate attributes and targets, and provide a sufficiently clear basis for conservation measures and the assessment of plans and projects. The Commission's guidance emphasises that objectives should be **specific, measurable, realistic, consistent and comprehensive**, while remaining sufficiently flexible to reflect the ecological characteristics and conservation importance of individual sites ([European Commission, 2019](#)).

This role has also been reinforced by the Court of Justice of the European Union (CJEU). The Court has held that conservation objectives must be established **beforehand and specifically for the protected site**, and that they provide the reference framework against which the implications of plans and projects are assessed under Article 6(3). Objectives that are general or insufficiently precise cannot provide an adequate basis for such assessment ([Court of Justice of the European Union, 2020, 2023, 2024](#)).

Accordingly, the purpose of SSCO is to define, for each relevant qualifying feature, the **site-specific conservation condition that should be maintained or restored**, together with measurable attributes and targets that allow progress towards that condition to be assessed. An SSCO is therefore not simply a statement of aspiration. It should provide a transparent link between the ecological requirements of the feature, the condition required at the site, the evidence used to define that condition, the target to be achieved, and the monitoring and conservation measures required to support its achievement. For policymakers and competent authorities, this distinction is important. Well-defined SSCO provide a common ecological reference point for **site management**,



monitoring, conservation measures, pressure assessment and Appropriate Assessment (AA), while also making explicit where evidence is strong, where uncertainty remains, and where further monitoring or research is required.

1.1. DISTINGUISHING SITE-SPECIFIC CONSERVATION OBJECTIVES FROM FAVOURABLE CONSERVATION STATUS

A central principle of this protocol is the distinction between *Favourable Conservation Status (FCS)* and the *conservation condition of a protected feature at an individual Natura 2000 site*. FCS is a wider-scale conservation concept defined by the Habitats Directive. For natural habitat types, favourable status relates to the condition and long-term prospects of the habitat across its natural range, including the stability or expansion of its natural range and area, the maintenance of the structures and functions necessary for its long-term persistence, and the conservation status of its typical species. For species, FCS concerns, among other factors, the viability of populations, the maintenance of their natural range, and the availability of sufficiently large habitats to maintain populations in the long term ([Council of the European Communities, 1992](#)).

FCS is therefore **not synonymous with the condition of an individual Natura 2000 site**. It is assessed at the appropriate wider geographical level, including national and biogeographical scales, whereas SSCO define the conservation condition required at a particular protected site. The relationship is consequently one of contribution rather than equivalence, requiring each site to be managed so that its protected features contribute appropriately to the maintenance or restoration of FCS and the coherence of the Natura 2000 network. The Commission's guidance explicitly describes site-level objectives as defining the desired condition of features at the site in order to maximise the site's contribution to achieving FCS at the appropriate level ([European Commission, 2019](#)). The methodological hierarchy adopted in this protocol and that should guide site managers is therefore as follows:

Favourable Conservation Status → site contribution → site-specific conservation condition → measurable SSCO targets → monitoring and conservation measures.

In practical terms, FCS provides the wider conservation context while the ecological contribution expected from an individual site is expressed through a site-specific conservation condition. That condition is translated into measurable SSCO targets, and monitoring and conservation measures are used to assess and support achievement of those targets.

This distinction prevents an important methodological error, which is that an Article 17 conservation-status assessment, favourable reference value, biogeographical reference condition, or other wider-scale benchmark should not automatically be treated as a site-specific conservation objective. Such information may provide important context or evidence for establishing an SSCO, but it must be interpreted in relation to the ecological requirements, role and characteristics of the particular site.



The distinction is equally important when selecting ecological parameters. A parameter may be appropriate for assessing FCS at national or biogeographical scale but may not, by itself, adequately describe the condition of a feature within an individual site. Conversely, a site-level parameter may be essential for maintaining the ecological integrity of a qualifying habitat or species even if it is not used directly in Article 17 reporting.

The protocol therefore evaluates parameters primarily according to their ability to describe the ecological requirements and site-specific conservation conditions of the qualifying feature, while retaining the wider FCS context as an important reference for interpreting relevance and network contribution.

1.2. RATIONALE FOR A MARINE SSCO METHODOLOGY

Marine Natura 2000 sites require particular methodological consideration because their ecological condition is shaped by processes that operate across multiple spatial and temporal scales. Marine habitats and species are influenced by *hydrodynamic processes, sediment transport, depth, substrate, water quality, productivity, seasonal variability, disturbance regimes and climate variability*. Many marine species also move between protected sites and areas outside the Natura 2000 network, while pressures such as fishing, shipping, offshore energy development, pollution and climate change may operate across national or site boundaries.

These characteristics create a methodological challenge. SSCO must remain specific to the protected feature and site, as required by the Nature Directives and relevant case law, while at the same time recognising that the ecological processes determining the condition of that feature may extend beyond the site's boundaries. Recent Commission guidance on marine fishing and Natura 2000, for example, recognises that conservation measures necessary to achieve site objectives may in some circumstances need to operate outside individual site boundaries or across multiple sites, particularly where pressures such as fishing affect mobile species or marine habitats ([European Commission, 2025](#)).

The appropriate response is not to create a separate objective system for every wider ecosystem process. Instead, this protocol considers wider-scale processes ***only where there is evidence that they are necessary to maintain the qualifying feature at the site***. Connectivity, movement, recruitment, hydrodynamic exchange, sediment dynamics, food-web relationships and other ecosystem processes may therefore be incorporated where their relevance to the site's conservation condition can be demonstrated.

This approach is particularly important for highly mobile marine species (Annex 2) whose conservation cannot always be represented adequately by a static site-level abundance target. Hence, where appropriate, the SSCO methodology should instead consider the site's role within a broader ecological network, including habitat use, connectivity, pressure exposure and the contribution of the site to the species' wider conservation requirements.



Climate change further reinforces the need for this scale-aware approach. The Commission's 2026 guidance confirms that SSCOs should remain site-specific while taking account of climate-related pressures, ecological change and the role of sites within the wider Natura 2000 network. It also emphasises that climate considerations should be incorporated where supported by evidence rather than used as a basis for prematurely lowering conservation ambition ([European Commission, 2026](#)). The resulting methodological principle is therefore that *Marine SSCOs should be site-specific in their objectives, but scale-aware in their evidence base*.

1.3. NEED FOR A STANDARDISED AND EVIDENCE-BASED APPROACH

Although the legal principles governing Natura 2000 are common across the European Union, approaches to defining SSCOs have developed through different national and regional practices. Consequently, variation can occur in the *attributes and parameters selected, the treatment of reference conditions and thresholds, the formulation of targets, the handling of uncertainty, and the links between objectives, monitoring and conservation measures*.

A harmonised methodology can improve transparency, consistency and reproducibility without requiring identical ecological targets across sites. This is particularly important for marine Natura 2000, where ecological characteristics and data availability can differ substantially among sea basins, Member States and individual sites.

The purpose of standardisation is therefore to establish a **common decision process rather than uniform ecological values**. The Commission similarly emphasises that SSCOs should follow a coherent structure while being established on a case-by-case basis according to the ecological requirements and circumstances of the protected features and sites ([European Commission, 2025](#)). Therefore, under this protocol, each SSCO should be capable of demonstrating a clear evidence chain as follows:

Qualifying feature → required site condition → measurable attributes → validated parameters → reference condition/threshold → site-specific target → monitoring → conservation measures.

This chain provides a common structure for developing objectives while allowing the ecological content of each objective to remain site-specific. Accordingly, each SSCO should, wherever scientifically and operationally feasible:

- i) Relate directly to a qualifying feature for which conservation objectives are required;
- ii) Define an ecological condition required at the site, based on the feature's ecological requirements;
- iii) Use measurable attributes and validated parameters that adequately represent that condition;
- iv) Be supported by the best available evidence, with the strength and limitations of that evidence explicitly recorded;
- v) Distinguish reference conditions, thresholds and site-specific targets, recognising that these have different methodological and policy functions;



Site-Specific Conservation Objectives

- vi) Specify the desired direction of change, including whether the objective is to maintain or restore the relevant condition;
- vii) Define a measurable target wherever sufficient evidence permits, or explicitly identify an evidence gap where a defensible numerical target cannot yet be established;
- viii) Specify how achievement will be monitored, including the indicator, method, spatial and temporal scale and frequency where appropriate; and
- ix) Provide a clear basis for identifying conservation measures and assessing relevant pressures and plans or projects under Article 6.

This structure also supports transparency for decision-makers. Where evidence is insufficient to establish a robust numerical target, the absence of a target should not be concealed through the use of an arbitrary value borrowed from another site, habitat, species or geographical region. Instead, the uncertainty should be explicitly documented and translated into an appropriate evidence-gap or monitoring requirement.

1.4. REFERENCE CONDITIONS, THRESHOLDS AND SITE-SPECIFIC TARGETS

A further methodological distinction is required between reference condition, threshold/reference value, current site condition and conservation target. A reference condition describes the ecological state against which the condition of a feature may be interpreted. Depending on the feature and evidence available, it may represent a natural or minimally disturbed state, a historical condition, an ecologically appropriate benchmark, or another scientifically justified reference. A threshold or reference value, by contrast, may represent a recognised boundary, limit or benchmark established through legislation, technical guidance, scientific evidence or another authoritative source.

Neither should automatically be treated as the conservation target for a particular Natura 2000 site. The site-specific target is the desired condition to be maintained or achieved for the qualifying feature at that site. It should be derived from the ecological requirements of the feature, the site's conservation role, available evidence, relevant reference conditions and thresholds, current condition, pressures and the level of restoration or maintenance required. The Commission's guidance specifically recommends defining desired conservation conditions through attributes and targets rather than relying solely on general descriptions of conservation intent. ([European Commission, 2021](#)).

This distinction is central to the methodology because the same numerical value can have different meanings depending on its origin and application. An external environmental quality threshold may represent a minimum acceptable condition under another regulatory framework; it does not necessarily represent the ecological condition required for a particular Natura 2000 feature. Conversely, a site-specific ecological target may be more demanding than an external regulatory threshold where the evidence demonstrates that a higher level of protection is required. The protocol therefore requires the source, purpose, geographical applicability and evidential basis of every reference value or threshold to be recorded explicitly before it is considered for use in an SSCO.



2. AIM, OBJECTIVES, SCOPE AND RELEVANCE

2.1. OVERALL AIM

The aim of this Methods Protocol is to establish a transparent, evidence-based and operationally consistent method for developing Site-Specific Conservation Objectives (SSCOs) for marine Natura 2000 sites. It establishes a common process through which site-specific objectives are developed while retaining the ecological and biogeographical differences between habitats, species, sea basins and individual sites, including:

- identifying the ecological attributes and parameters required to describe the conservation condition of each qualifying habitat or species;
- evaluating and validating candidate parameters;
- establishing appropriate reference conditions and, where available, relevant thresholds or reference values;
- formulating measurable, site-specific conservation targets;
- specifying the monitoring evidence required to assess achievement; and
- linking objectives to conservation measures and their application under the Habitats and Birds Directives.

The protocol, therefore, does not prescribe identical objectives, indicators or numerical targets for all Natura 2000 sites.

2.2. SPECIFIC OBJECTIVES

The protocol has six operational objectives:

Objective 1 – Establish the evidence base

Compile and synthesise the best available scientific, technical and policy evidence on the ecological requirements, conservation condition, pressures, monitoring approaches and management requirements of marine habitats and species protected under the Birds and Habitats Directives.

Objective 2 – Identify candidate conservation parameters

Develop a structured inventory of candidate parameters capable of describing the site-specific conservation condition of qualifying features, including relevant attributes such as:

- extent and distribution;
- structure and composition;
- ecological function;
- population and demographic condition;
- habitat use and occurrence;
- connectivity where demonstrably relevant to the feature and site; and



- pressures where an ecological-state parameter alone cannot provide an adequate management signal.

Objective 3 – Evaluate and prioritise parameters

Assess candidate parameters against predefined criteria covering:

- ecological relevance;
- evidential strength;
- policy relevance;
- transferability and spatial applicability;
- monitoring and management feasibility; and
- data availability.

Parameters that do not adequately represent a required ecological dimension are identified as evidence or structural gaps, rather than being treated as equivalent to suitable parameters with insufficient data.

Objective 4 – Formulate conservation objectives

For each accepted parameter, an auditable chain is established moving from evidence acquisition through to site-specific targets and monitoring specifications.

Objective 5 – Validate the method

Subject the parameter-selection and objective-setting process to structured expert and stakeholder validation, with particular attention to scientific validity, legal coherence, transferability, monitoring feasibility, uncertainty and implementation by competent authorities.

Objective 6 – Produce a harmonised SSCO blueprint

Integrate the validated evidence, parameters, objective-setting rules, monitoring requirements, uncertainty provisions and decision rules into a practical blueprint that can be applied consistently across European marine Natura 2000 sites.

2.3. SCOPE AND RELEVANCE OF THE METHODS PROTOCOL

2.3.1. Scope

This Methods Protocol establishes the methodological procedure for developing the **SSCO Blueprint**. It is intended to provide a transparent and reproducible pathway from ecological evidence to site-specific conservation objectives while allowing the resulting objectives to reflect the ecological characteristics and conservation importance of individual marine Natura 2000 sites.

The protocol covers:

- evidence identification and verification, including scientific literature, legislation, technical guidance, monitoring programmes and other authoritative sources;

- identification of ecological requirements for qualifying habitats and species;
- selection and validation of candidate attributes and parameters;
- assessment of parameter relevance, measurability, transferability, feasibility and evidence strength;
- identification and evaluation of reference conditions and thresholds;
- assessment of current site condition where appropriate evidence is available;
- formulation of measurable site-specific targets and desired directions of change;
- specification of monitoring requirements;
- identification and documentation of evidence gaps and uncertainty;
- consideration of connectivity, highly mobile species and wider ecological processes where demonstrably relevant;
- alignment of objectives with the conservation measures required under the Nature Directives; and
- quality assurance, expert validation and transparent change control.

The protocol does not prescribe identical ecological targets for all Natura 2000 sites, nor does it assume that a single parameter or threshold can adequately describe the condition of every habitat or species. Rather, it establishes a consistent process for determining *which attributes and parameters are relevant, what evidence supports them, how their condition should be interpreted, and how that evidence should be translated into a defensible site-specific objective*.

It also distinguishes clearly between **conservation objectives** and **conservation measures**. SSCOs define the ecological condition to be maintained or achieved; conservation measures are the actions used to achieve those objectives. This distinction is particularly important for marine sites, where the measures required to achieve a site objective may involve fisheries management, spatial management, pollution control, restoration, regulation of activities, or measures extending beyond the geographical boundary of the individual site ([European Commission, 2025](#)). In terms of **geographical scope**, the methodology is intended for application across the European marine regions and sea basins, while allowing site-level objectives to reflect differences in:

- habitat and species ecology;
- biogeographical setting;
- environmental conditions;
- conservation status;
- pressure regime;
- spatial configuration;
- data availability; and
- monitoring capacity.

2.3.2. Policy relevance

The protocol is designed specifically to support implementation of the **EU Birds Directive (2009/147/EC)** and **Habitats Directive (92/43/EEC)** for marine Natura 2000 sites. Its primary application is to:



- **Special Protection Areas (SPAs)** designated under the Birds Directive;
- **Sites of Community Importance (SCIs) and Special Areas of Conservation (SACs)** designated under the Habitats Directive; and
- qualifying marine habitats and species for which site-specific conservation objectives are required.

The protocol is therefore **harmonised at the level of process and evidence standards, not by imposing uniform ecological values across sites**. Other EU policies and instruments - including the Marine Strategy Framework Directive (European Parliament & Council of the European Union, 2008), Nature Restoration Regulation (European Parliament & Council of the European Union, 2024) and EU Biodiversity Strategy for 2030 (European Commission, 2020) - may provide relevant evidence, monitoring information or complementary management context. They do not, however, replace the legal basis or purpose of SSCOs under the Birds and Habitats Directives.

2.4. RELEVANCE FOR BIODIVERSITY CONSERVATION

SSCOs are required to be sufficiently specific to guide conservation measures for the qualifying features of an individual Natura 2000 site. The methodology adopted here, therefore, places the **qualifying feature and its ecological requirements** at the centre of objective development. For marine habitats and species, this requires particular attention to:

- spatially variable habitat condition;
- seasonal and interannual variability;
- population structure and demographic processes;
- habitat use and distribution;
- physical and biological connectivity where relevant;
- pressures operating inside and outside site boundaries; and
- the distinction between maintaining existing good condition and restoring degraded condition.

Highly mobile species and cross-boundary ecological processes are incorporated where they are necessary to understand or maintain the conservation condition of the qualifying feature. Similarly, ecosystem health and cumulative pressures may provide supporting evidence where they have a demonstrated relationship with the ecological condition of a qualifying feature or with a pressure affecting it.

The overall methodological principle is for the protocol to **move from legal and ecological requirements to evidence, from evidence to measurable attributes and validated parameters, and from those parameters to site-specific conservation targets that can be monitored and acted upon**. This evidence-to-objective pathway provides the foundation for the subsequent phases of the protocol, namely **evidence assessment, parameter evaluation, expert validation, objective formulation, stakeholder review and finalisation of the harmonised SSCO Blueprint**.

The subsequent blueprint is therefore meant to **determine how an SSCO should be developed but does not predetermine the ecological condition of a site or substitute for the competent authority's site assessment.**

3. METHODOLOGICAL FRAMEWORK

The core methodology is the process by which evidence is converted into site-specific conservation objectives. The overriding principle adopted by this protocol is that every SSCO must be traceable from the ecological requirement of the qualifying feature to an explicit site-specific target and the evidence required to assess it. The methodology is centred on the following question: *What ecological condition must be maintained or restored for each qualifying feature at x Natura 2000 site, and what measurable evidence and targets are required to demonstrate that condition?*

The approach represents a single evidence-to-objective protocol, organised into four sequential but iterative phases: Rapid Evidence Assessment, parameter evaluation and validation, objective formulation, and stakeholder validation of the Blueprint. Connectivity and highly mobile species (HMS) assessment and supporting health/ecosystem elements are additional considerations within the single SSCO development process, where necessary (Table 1).

Table 1. The core methodological stages for SSCOs development

Stage	Main task	Principal output
I. Evidence assessment	Identify and synthesise relevant evidence	Candidate parameter and evidence inventory
II. Parameter evaluation and validation	Test ecological and operational suitability; validate with experts	Validated and prioritised parameter set, with assumptions and gaps
III. Objective formulation	Convert validated evidence into objectives	SSCOs with targets, monitoring specifications and evidence chains
IV. Stakeholder validation	Test the draft Blueprint with stakeholders and finalise	Final harmonised SSCOs Blueprint

Figure 1 represents the principal methodological spine of the protocol, flowing from *Evidence acquisition through parameter validation, objective formulation, and expert/stakeholder validation, with Quality assurance and uncertainty management applied throughout the process.* Supporting analytical approaches and concepts such as ecological connectivity, highly mobile species, ecosystem functioning and cumulative pressures are incorporated where they provide evidence relevant to the conservation requirements of a qualifying feature. Where environmental contaminants, pathogens, disease or other factors associated with health are relevant to the ecological condition of a qualifying feature, they may be considered as supporting evidence or pressure information, if a clear causal or management link to the qualifying feature can be demonstrated.

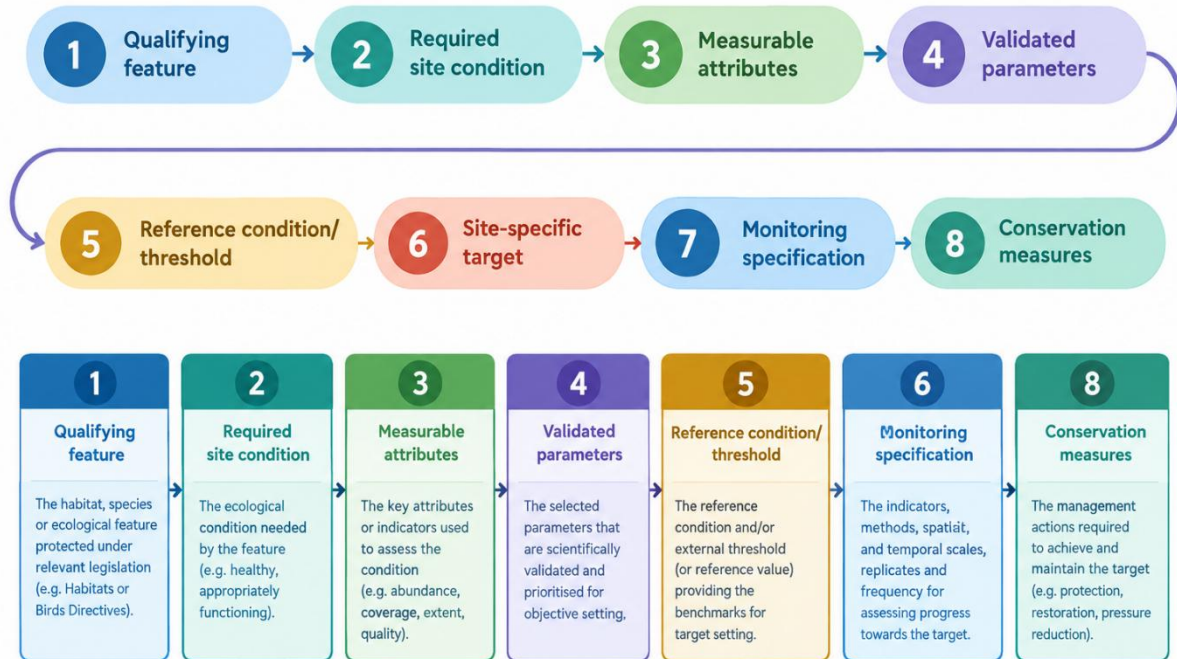


Figure 1. Auditable SSCO methodological chain

3.1. EVIDENCE HIERARCHY

The evidence will be retained in an auditable form throughout, and where insufficient to support a numerical target, a conditional or evidence-gap formulation will be provided. Evidence is not treated as equivalent merely because it is published. An evidence hierarchy is assembled in descending order of authority and relevance as follows:

- EU legislation and legally binding implementing instruments;
- EU-level technical guidance and assessments;
- Regional Sea Convention instruments and assessments;
- national competent-authority guidance and monitoring programmes;
- peer-reviewed scientific literature; and
- other credible technical evidence.

Each value or recommendation is recorded with its *source, context, geographical applicability, methodological basis and verification status*.

The four phases, namely Phase I (Rapid Evidence Assessment, Section 4), Phase II (Parameter evaluation and validation, Section 5), Phase III (Development of the harmonised objectives framework, Section 6) and Phase IV (Final stakeholder engagement workshop, Section 7), are detailed in the subsequent sections.



4. PHASE I: RAPID EVIDENCE ASSESSMENT

4.1. RATIONALE

The REA is designed to systematically identify, evaluate, and synthesise the best available evidence describing the ecological characteristics, conservation requirements, pressures, management interventions, monitoring approaches, and ecological thresholds relevant to marine Natura 2000 habitats and species.

Rapid Evidence Assessments represent an established evidence-synthesis methodology that balances methodological rigour with the practical timeframes required for environmental policy and decision-making (Pullin & Stewart, 2006; Collaboration for Environmental Evidence, 2018). Although less exhaustive than full systematic reviews, REAs employ transparent, reproducible, and predefined procedures that minimise bias while enabling the efficient synthesis of large and diverse bodies of scientific and technical evidence (Arksey & O'Malley, 2005; Government Social Research, 2018). Consequently, they are increasingly adopted to inform environmental management, conservation planning, and policy development where timely yet scientifically robust evidence is required (Collins et al., 2015; Tricco et al., 2018; Haddaway et al., 2015).

Within the context of SSCOs development, the REA serves three complementary purposes. First, it establishes a comprehensive evidence base describing the ecological structure, function, composition, and processes that underpin the conservation status of qualifying habitats and species. Second, it identifies candidate ecological parameters, indicators, and conservation attributes that may be incorporated into Site-Specific Conservation Objectives. Third, it provides the scientific evidence required to evaluate the suitability, transferability, and practical applicability of these parameters during subsequent stages of the methodological framework.

Unlike conventional literature reviews that primarily summarise existing knowledge, the REA functions as an evidence acquisition and decision-support process (Haddaway et al., 2016; James et al., 2016). Evidence generated during this phase forms the primary input to the ecological parameter evaluation framework, expert validation process, and final SSCOs blueprint.

4.2. REVIEW SCOPE

The assessment encompasses all marine habitats and species protected under the EU Habitats Directive (Annex I habitat types and Annex II species) together with marine birds designated under the Birds Directive for which Special Protection Areas (SPAs) have been established or are required. Evidence is synthesised across all European marine regions, including the Baltic Sea, North-East Atlantic, North Sea, Celtic Seas, Mediterranean Sea, Black Sea, and Macaronesian waters where relevant.

The review also adopts an ecosystem-based perspective (McLeod et al., 2005; UNEP, 2011; Long et al., 2015) that considers ecological processes such as ecological connectivity, habitat functioning, trophic interactions, species movements, cumulative pressures, ecosystem resilience,



and environmental health (Costanza et al., 1992) where these influence conservation outcomes at site level.

4.3. EVIDENCE SOURCES

The REA integrates evidence from multiple complementary information sources. Peer-reviewed scientific literature provides the principal evidence base describing ecological processes, habitat characteristics, species ecology, monitoring approaches, and conservation effectiveness. This evidence is complemented by technical reports, guidance documents, monitoring manuals, and scientific assessments produced by European institutions, Regional Sea Conventions, Member State authorities, research organisations, and recognised international conservation bodies.

Additional evidence was obtained from grey literature and from large-scale survey and assessment programmes (e.g., Hammond et al., 2021), including project reports, management plans, technical guidance, monitoring protocols, doctoral theses, and governmental publications where these contain scientifically relevant information unavailable within the peer-reviewed literature.

Relevant legislative documents, policy guidance, and official interpretation manuals are also reviewed (European Commission, 2013; European Topic Centre on Biodiversity and Ecosystems [ETC-BE], 2025) to ensure that ecological parameters remain consistent with existing legal obligations and conservation policy. These include, where applicable, European Commission guidance on Natura 2000 implementation, Article 6 guidance, Article 12 and Article 17 reporting frameworks (European Commission, n.d.-a, n.d.-b), Marine Strategy Framework Directive guidance, the Nature Restoration Regulation, EUNIS habitat interpretation manuals, and associated technical standards.

By integrating these complementary evidence sources, the assessment captures both scientific knowledge and practical conservation experience, thereby strengthening the ecological, legal, and operational foundations of the SSCOs framework.

4.4. FEATURE SELECTION FRAMEWORK

In light of time constraint, a targeted sub-sample of features was selected to support the initial, systematic development of Site-Specific Conservation Objectives (SSCOs), while explicitly retaining the capacity to extend SSCOs formulation to the remaining features at a later stage. To underpin this process, a comprehensive inventory of all Annex I marine and coastal habitats, Annex II marine taxa under the Habitats Directive, and Annex I marine bird species and regularly migratory birds under the Birds Directive was undertaken. The selection of habitats and species for inclusion in the SSCOs Blueprint followed a structured, evidence-based prioritisation framework designed to identify conservation features for which the development of harmonised SSCOs guidance would provide the greatest ecological and policy value. A feature-selection template was created, integrating ecological, legislative, and operational criteria within a standardised decision matrix applied to each qualifying habitat and species ([Annex 3.1](#)). The



feature selection criteria were structured hierarchically, giving primary consideration to **EU-designated priority status**, followed by **EU Article 17 conservation status**, complemented by **vulnerability and conservation assessments under Article 17, OSPAR and the IUCN Red List**, and informed by **expert scientific judgement**. One of the primary sources of information was [BISE](#), the European reference site for accessing data, information and knowledge regarding the status and progress towards EU biodiversity targets.

For Annex I habitats, the template cross-references Habitats Directive feature codes with the updated EUNIS 2022 Level 4–6 habitat classification ([ETC-BE](#), 2022), ensuring consistency with the latest European habitat typology, ecological relevance and operational usability.

Alignment with EUNIS detail levels further enhances comparability across regions and facilitates integration with national monitoring and reporting systems in future iterations of the SSCOs blueprint. It also supports the implementation of the Nature Restoration Regulation which uses the same habitat typology in its Annex II.

This approach translates legally defined habitat types into ecologically meaningful and management-relevant units, effectively bridging statutory habitat typologies with practical monitoring frameworks (Olmeda et al., 2025). As a result, SSCOs will be anchored in habitat attributes that are observable, measurable, and scalable, presenting a potential for informing a transferable SSCOs framework across Member States (Roberts et al., 2003).

The selection template also records the scientific basis for proposed indicators and threshold values, drawing on authoritative sources such as European Environment Agency guidance, ICES assessments (ICES, 2022), Regional Sea Convention methodologies, and Member State monitoring protocols. This transparent, criteria-based approach enables the reproducible selection of representative habitats and species while maintaining full traceability between legislative requirements, ecological evidence, and the proposed conservation objectives.

Application of the selection template resulted in the identification of a focused set of priority habitats and species that collectively represent the principal marine biodiversity components within the EU. The template also serves not only as a feature-selection tool but also as a transparent audit trail linking each inclusion decision to supporting ecological evidence, legislative context, proposed conservation attributes, and monitoring considerations.

4.5. REVIEW WORKFLOW

The REA follows a structured and sequential workflow consisting of six interconnected stages:

- **Identification of evidence sources** through systematic searches of scientific databases, institutional repositories, and policy documentation.
- **Screening and eligibility assessment** using predefined inclusion and exclusion criteria to ensure relevance and consistency.



- **Data extraction** using standardised templates to capture ecological parameters, conservation measures, monitoring approaches, and supporting evidence.
- **Evidence synthesis**, integrating quantitative and qualitative information across habitats, species, ecological processes, and management themes.
- **Compilation of candidate ecological parameters**, classified according to structural, functional, compositional, supporting, biological-state, and pressure attributes.
- **Transfer of candidate parameters** to the multi-criteria parameter evaluation framework for scoring, validation, and prioritisation.

4.6. SEARCH STRATEGY

The search followed a structured evidence-identification process based on predefined search strings, multiple information sources, and clearly documented search procedures. (PRISMA-ScR; Tricco et al., 2018)

Searches were conducted using combinations of controlled vocabulary, free-text keywords, species names, habitat classifications, ecological concepts, conservation terminology, and policy-related terms. Search strings were adapted where necessary to accommodate the syntax and indexing systems of individual databases (See Annex 4.1).

4.6.1. Scientific Literature

Peer-reviewed scientific literature was retrieved from major multidisciplinary and environmental bibliographic databases, including:

- Web of Science Core Collection
- Scopus
- Google Scholar
- Dimensions
- Crossref
- CORE
- DOAJ
- PubMed

Where appropriate, additional open access specialist databases and document repositories were used to identify influential publications and technical reports not captured during the primary searches, including: Wageningen Environmental Research / European Commission ([CIRCABC](#)), SCANS-III report and resources ([scans3.wp.st-andrews.ac.uk](#)), AEWA / EGMP documents and FRV briefs (Barnacle Goose, EGMP task force papers, International Single Species Management Plans, [egmp.aewa.info](#)), HELCOM Red List & core indicator reports repository ([helcom.fi](#)), OSPAR Quality Status Report 2023 and biodiversity indicator pages (OSPAR Commission, 2023; [oap.ospar.org](#)), EUNIS habitat factsheets ([eunis.eea.europa.eu](#)), JNCC / national Article-17 habitat factsheets ([jncc.gov.uk](#)), MedPAN / RAC/SPA ([medpan.org](#)).



4.6.2. Search Terminology

The search strategy combined three complementary groups of search terms.

- The first group identified the **qualifying conservation features**, including Annex I marine habitats, Annex II marine species, and marine bird species designated under the Birds Directive.
- The second group captured **ecological characteristics and conservation attributes**, and reference values / thresholds, including structural, functional, compositional, and ecosystem-process parameters relevant to favourable conservation status. These include terms relating to habitat condition, ecological integrity, species abundance, demographic processes, ecological connectivity, trophic interactions, ecosystem functioning, recruitment, productivity, resilience, ecosystem health, and environmental quality.
- The third group focused on **management and policy concepts**, including Site-Specific Conservation Objectives, favourable conservation status, Natura 2000, Marine Strategy Framework Directive, monitoring indicators, conservation measures, ecological thresholds, adaptive management, restoration, ecosystem-based management, and environmental assessment.

Search terms were reviewed iteratively against the terminology encountered during screening and extraction. Related expressions were added to subsequent searches where they could identify otherwise missed evidence. For example, studies may describe tissue damage, bleaching, whitening or mortality using different terms and at different levels of severity. These terms were therefore considered during searching, but were not treated as ecologically equivalent without examining their definitions and context in the original source. Any additions to the search terms and the resulting searches were recorded in the search log.

4.6.3. Search Structure

Boolean operators (AND, OR, and NOT), wildcard characters, truncation, phrase searching, and proximity operators were used where supported to optimise search sensitivity while maintaining specificity (Annex 4.1).

Searches were developed using a modular framework combining four principal concepts:

- **Qualifying Feature**
AND
- **Ecological Attribute or Parameter**
AND
- **Conservation or Monitoring Concept**
AND
- **European Marine Policy Context**

This modular structure allowed search strings to be adapted efficiently for different habitats, species groups, and ecological themes while maintaining methodological consistency throughout the review.



Species-specific and habitat-specific searches were undertaken where broad searches returned insufficient evidence or where specialised ecological terminology was required.

4.6.4. Search Documentation

To ensure full reproducibility, every search was documented in a search log (literature search template) recording:

- database or information source;
- search date;
- complete search string;
- search filters applied;
- number of records retrieved;
- number of records retained following screening; and
- any modifications made to optimise search performance.

All searches were archived as supplementary documentation, allowing the evidence acquisition process to be independently reproduced or updated in future revisions of the SSCOs framework. Each retrieved record was compiled using the literature compilation template (Annex 4.2).

4.7. ELIGIBILITY CRITERIA AND STUDY SELECTION

All records identified through the literature search were assessed using predefined eligibility criteria developed within the Site-Specific Conservation Objectives (SSCOs) framework.

4.7.1. Eligibility Criteria

Evidence was considered eligible when it satisfied one or more of the following criteria:

The publication addressed one or more qualifying marine features protected under European nature legislation, including:

- Annex I marine habitat types listed under the Habitats Directive;
- Annex II marine species designated for Special Areas of Conservation (SACs);
- Marine bird species protected under the Birds Directive and relevant to Special Protection Areas (SPAs); or
- Ecological communities, characteristic species, or supporting habitats that contribute directly to the favourable conservation status of qualifying features.

4.7.2. Eligible Sources

The review included diverse forms of scientific and technical evidence:

- peer-reviewed journal articles;
- systematic reviews and evidence syntheses;
- books and book chapters;
- European Commission guidance documents;
- technical reports;
- Regional Sea Convention publications;
- national conservation guidance;



- monitoring manuals and protocols;
- governmental reports;
- recognised NGO publications;
- doctoral theses and institutional reports where scientific quality is demonstrable.

4.7.3. Exclusion Criteria

Evidence was excluded where it:

- focuses exclusively on terrestrial or freshwater ecosystems without marine relevance;
- does not address ecological characteristics, conservation objectives, management, or monitoring;
- consists solely of opinion pieces lacking supporting scientific evidence;
- duplicates information contained within more comprehensive publications;
- provides insufficient methodological detail to support interpretation;
- cannot be translated or interpreted with sufficient confidence; or
- addresses topics unrelated to Natura 2000 conservation objectives or ecological parameter development.

Where multiple publications report the same dataset or monitoring programme, the most comprehensive or recent source was normally retained unless earlier publications provide unique methodological information.

4.7.4. Final Study Selection Process

Study selection was undertaken using a sequential screening procedure designed to maximise consistency and transparency.

Following removal of duplicate records, publications underwent an initial **title and abstract screening** to determine their apparent relevance to the review objectives. Records that clearly failed to satisfy the eligibility criteria were excluded at this stage.

Publications retained after preliminary screening proceeded to **full-text assessment**, during which the complete document was evaluated against the predefined eligibility criteria. Particular attention was given to the extent to which each publication contributes evidence relevant to ecological parameter identification, conservation objective development, monitoring, or management.

Where uncertainty existed regarding the eligibility of a publication, inclusion decisions adopted a precautionary approach. Potentially relevant studies were retained for detailed assessment to minimise the risk of excluding valuable evidence during the early stages of screening.

The study selection process was documented using a transparent review workflow that records the number of publications identified, screened, excluded, assessed at full text, and ultimately included in the evidence synthesis. Reasons for exclusion during full-text assessment were



documented wherever practicable to enhance transparency and facilitate future updates of the review.

This structured screening process ensured that the evidence base supporting the SSCOs framework is scientifically relevant, policy aligned, and methodologically consistent while maintaining full transparency throughout the review process.

4.8. DATA EXTRACTION AND EVIDENCE SYNTHESIS

Data Extraction and Evidence Synthesis distinguishes this protocol from a conventional Rapid Evidence Assessment. Rather than simply extracting information, the objective is to transform diverse evidence into a standardised inventory of ecological parameters that will subsequently be evaluated, scored, and validated. Consequently, the concept of **evidence harmonisation** and **parameter standardisation** provides a much stronger link to the subsequent multi-criteria scoring framework leading to a more robust SSCOs blueprint (Phase II).

Data extraction was undertaken using a standardised evidence extraction template developed specifically for the Site-Specific Conservation Objectives (SSCOs) framework. The use of a common extraction protocol ensured consistency in the collection, organisation, and interpretation of information across diverse evidence sources while facilitating subsequent parameter evaluation and synthesis.

For evidence syntheses, technical guidance documents, and methodological frameworks that have already undergone rigorous review, information was extracted directly without further screening.

For primary research articles and grey literature, data extraction was performed following successful completion of the eligibility assessment described in Section 4.7.

The extraction process was designed not only to compile ecological information but also to identify candidate parameters that can contribute to the formulation of measurable, scientifically defensible conservation objectives.

This structured extraction process enabled ecological evidence originating from diverse disciplines and publication types to be harmonised into a common analytical database suitable for subsequent evaluation.

4.8.1. AI-Assisted Extraction Protocol

The data extraction template developed in the previous step was used as a basis for the subsequent automated AI extraction.

A common AI-assisted extraction pipeline was applied consistently across the 12 qualifying features, following literature searching and screening. The feature-specific catalogues contained



1,175 publications, of which 843 records were retained and 332 excluded as incoherent or unverifiable. Extraction used a single fixed Claude AI Opus 5 prompt, with adaptation limited to feature-specific terminology, assessment units and policy mapping, and outputs were structured using a common 16-worksheet database template. Workbooks were assembled programmatically using Python/openpyxl to ensure reproducibility and traceability. Each record was assigned VERIFIED, SOURCE-SUMMARY or PENDING status, supported by automated quality-control checks, bibliographic verification and human source review. 185 publications were independently verified against their original sources by human reviewers, who alone could promote records to VERIFIED status.

The final harmonised evidence base comprised 843 extracted records, including 334 confirmed quantitative records, providing a consistent and traceable foundation for identifying indicators, pressures, evidence gaps and site-specific conservation objectives across the 12 qualifying features (See Annex 6). The 17 selected features (a sample of which is listed in Annex 3.2) are grouped into these 12 evidence-base features, as explained in the notes to that annex.

4.8.2. Standardised recording of threshold and reference values

Each threshold or reference value encountered was recorded using a standardised evidence record containing, at minimum:

- **Parameter** being assessed;
- **Value or range**;
- **Unit of measurement**;
- **Environmental medium and ecological context**;
- **Establishing organisation or authority**;
- **Geographical or jurisdictional scope**;
- **Document title**;
- **Year or version**;
- **Threshold type**;
- **Precise source locator**, such as section, table, figure, paragraph, or page; and
- **Traceable reference** that allows the value to be independently verified.

4.8.3. Evidence Harmonisation

Following extraction, all ecological information underwent a harmonisation process to ensure consistent terminology and classification across habitats, species, and evidence sources.

Parameters describing similar ecological characteristics using different terminology were standardised under common ecological concepts. For example, variables describing habitat extent, occupied area, or spatial coverage were harmonised into consistent parameter categories while preserving the original terminology within the evidence database.



Similarly, ecological processes reported using different descriptors—such as recruitment, productivity, population replenishment, reproductive success, or demographic performance—are grouped into comparable ecological themes where scientifically appropriate.

This harmonisation process reduced semantic inconsistencies arising from differences in monitoring programmes, scientific disciplines, or national guidance documents, thereby facilitating robust comparison across multiple evidence sources.

4.8.3.1. Treatment of multiple thresholds

Where more than one authoritative threshold value exists for the same parameter, all relevant values are retained initially, together with:

- the reason for the difference between values;
- the environmental or ecological context in which each applies;
- the feature or geographic setting to which each is relevant;
- whether the values measure the same quantity and are directly comparable; and
- the implications of applying each value to the SSCOs assessment.

4.8.4. Evidence Synthesis

Evidence synthesis combines both quantitative and qualitative information to develop a comprehensive understanding of the ecological requirements of the qualifying features.

Where quantitative information is available, ecological metrics—including habitat extent, species abundance, demographic rates, ecological thresholds, environmental variables, and monitoring indicators—were collated to identify common patterns, ranges, and evidence-supported conservation benchmarks.

Qualitative evidence was synthesised using a narrative approach that identifies recurring ecological themes, management recommendations, monitoring methodologies, ecological interactions, and reported conservation challenges.

Rather than attempting formal meta-analysis, the synthesis adopts a **weight-of-evidence approach**, whereby conclusions are derived through convergence across multiple independent evidence sources. Greater confidence is assigned to ecological parameters consistently supported by diverse study designs, geographical regions, monitoring programmes, and policy guidance.

Reference or threshold values expressed in different units or representing different quantities are **not averaged, arbitrarily converted, or presented as interchangeable alternatives**. Where conversion is scientifically justified, the conversion basis is explicitly documented; where values are not directly comparable, their distinct meanings and contexts are retained.



Where one value must ultimately be selected for application within the Blueprint, the choice is based on **scientific relevance, ecological applicability, geographic context, evidentiary strength, and consistency with this protocol**. Selection is therefore not based simply on choosing the lowest or highest available value. The rationale for the selected value is documented transparently so that it can be reviewed or challenged. Where no single value can be demonstrated to be clearly superior, the competing values are retained and their respective consequences for the SSCO objective are presented explicitly.

4.8.5. Limits of the Literature Evidence

The REA (Phase I) establishes the empirical foundation for this work by supplying four of the five elements needed to formulate an SSCOs for each qualifying feature, namely: identification of candidate parameters, reference conditions (quantitative/qualitative), international / regional threshold values (where one exists), the desired direction, and the form each target should take. However, it doesn't provide a prioritized list of key parameters. The subsequent phase therefore focuses on parameter evaluation, expert validation, and conservation objective development (see Annex 5.1).

5. PHASE II: ECOLOGICAL PARAMETER EVALUATION AND VALIDATION

5.1. MULTI-CRITERIA ECOLOGICAL PARAMETER EVALUATION FRAMEWORK

The Rapid Evidence Assessment produces a proposed inventory of ecological parameters representing the structural, functional, compositional, supporting, biological-state and pressure characteristics of qualifying marine habitats and species. However, not every parameter identified within the evidence base is equally suitable for inclusion in Site-Specific Conservation Objectives (SSCOs). Some parameters are ecologically informative but difficult to monitor, whereas others may be operationally feasible yet provide limited ecological insight or insufficient alignment with legislative requirements.

A transparent and systematic evaluation process is therefore required to distinguish parameters that are scientifically credible, ecologically meaningful, legally defensible, and operationally applicable. To achieve this, all candidate parameters identified during the Rapid Evidence Assessment will undergo a structured **Multi-Criteria Decision Analysis (MCDA)** (Keeney & Raiffa, 1993; Belton & Stewart, 2002; Linkov et al., 2006; Dodgson et al., 2009; Huang et al., 2011) before being considered for inclusion within the SSCOs framework (Annexes 5.1 and 5.2).

The MCDA provides an explicit, repeatable, and evidence-based mechanism for comparing candidate parameters against a common set of evaluation criteria. Rather than relying solely on expert judgement or data availability, the framework integrates multiple dimensions of scientific quality and implementation potential into a single, transparent decision-support process. This approach strengthens consistency across habitats, species, and Member States while ensuring that parameter selection remains objective, reproducible, and fully traceable.



Unlike traditional indicator selection methods that frequently prioritise data availability, the proposed framework recognises that ecologically important parameters should not be excluded solely because current monitoring capacity is limited. Instead, ecological importance forms the primary basis for evaluation, while implementation feasibility and evidence availability are considered as complementary criteria influencing prioritisation rather than determining inclusion.

Accordingly, each candidate parameter is evaluated against five complementary dimensions that collectively represent the ecological, legal, and operational requirements of Site-Specific Conservation Objectives (Ecological Relevance, Transferability, Legislative and Policy Alignment, Management Feasibility, Data Availability).

A standardized **parameter validation template** was subsequently developed for each feature, systematically documenting all parameters identified during Phase I, together with the applicable validation criteria and clear guidance on the scoring methodology.

5.2. SCORING METHODOLOGY

Each candidate parameter is independently assessed against all five evaluation dimensions using a standardised ordinal scoring scale ranging from **1 (very low suitability)** to **5 (very high suitability)**.

The scoring framework combines expert judgement with evidence derived from the Rapid Evidence Assessment. Scores are assigned on the basis of published scientific evidence, technical guidance, monitoring experience, and policy relevance rather than subjective preference.

To reflect the differing importance of each evaluation dimension, individual scores are multiplied by predetermined weighting factors before being aggregated into a composite suitability score (Table 2).

Table 2. The proposed parameter weighting scheme

Evaluation Dimension	Weight (%)
Ecological Relevance	25
Transferability	22
Legislative and Policy Alignment	22
Management Feasibility	21
Data Availability	10
Total	100

The weighted score for each parameter is calculated as:

$$WS = \sum_{i=1}^n w_i s_i$$

where:



- **WS**= overall weighted score;
- **s_i** = score assigned to criterion *i*;
- **w_i** = weighting assigned to criterion *i* (expressed either as a proportion or percentage); and
- **n** = total number of evaluation criteria (here, *n* = 5).

Since the framework uses **five evaluation criteria**, the equation can also be expanded explicitly as:

$$WS = (w_1 s_1) + (w_2 s_2) + (w_3 s_3) + (w_4 s_4) + (w_5 s_5)$$

If the weights are expressed as **percentages** that sum to 100, the standardised weighted score is calculated as:

$$WS = \frac{\sum_{i=1}^5 w_i s_i}{100}$$

or, alternatively,

if the weights are expressed as **proportions** (i.e., summing to 1.0):

$$WS = \sum_{i=1}^5 w_i s_i, \quad \sum_{i=1}^5 w_i = 1$$

To facilitate comparison among parameters, the composite weighted score is standardised by dividing the total weighted score by 100, producing a final suitability score ranging from **1.0 to 5.0**.

This standardised score provides a transparent measure of the overall suitability of each candidate parameter for inclusion within the Site-Specific Conservation Objectives framework.

For each parameter (scored preferably by at least three experts), **three values** are reported together and should be **interpreted as a single assessment**, including: the **Final Score**, the **number of experts contributing to the score**, and the **score spread**, defined as the difference between the highest and lowest weighted expert scores. Reporting the mean score without its spread would be incomplete, because two parameters with the same mean may reflect either strong agreement among experts or substantial disagreement.

5.2.1. Aggregation of Expert Scores

Each parameter is scored independently by at least three experts, and the Final Score is the arithmetic mean of their weighted scores. Individual scores are retained and never replaced by the mean. Scores are recorded against the five dimensions by name rather than by position, since the order in Table 2 is not necessarily the order used in feature scoring workbooks.



5.2.2. Scoring Uncertainty and Sensitivity Assessment

Where an expert provides a **non-numeric, conditional, or otherwise qualified response**, the original entry is retained verbatim and is not overwritten or converted into an assumed numerical value. Where the expert's intended numerical value can be clearly identified, that value is used and the entry is flagged. Where no defensible numerical value can be determined, the expert is treated as having **not scored that criterion**, and the Final Score is calculated from the remaining valid expert scores. In both cases, the entry is flagged for subsequent review.

Before the ranked inventory is finalised, **three sensitivity tests** are applied and documented:

- **Leave-one-expert-out test.** The Final Score is recalculated after excluding each expert in turn. A parameter is flagged as **classification-sensitive** if its classification under Table 3 changes when any individual expert is excluded.
- **Scoring-pattern screen.** Each expert's scoring pattern is examined for insufficient differentiation. An expert is flagged where they assign either the maximum or minimum value on all five criteria for **more than half of the parameters they score**. Scores are not modified as a result. However, every parameter whose classification depends on that expert's score is flagged for review.
- **Flagged-entry sensitivity test.** For each parameter affected by a qualified or otherwise flagged entry, the score is recalculated by assigning the **mid-point of the relevant scoring scale** to that entry. Any resulting change in classification is flagged as sensitive to the qualified response.

A **flagged classification is not altered automatically**. The parameter is retained at its calculated score, clearly marked in the inventory, and carried forward to **expert validation (Section 5.3)** for resolution. A flagged parameter may be incorporated into the Blueprint only where expert validation confirms its classification, or where the conservation objective does not depend on the element that remains contested.

Where the **score spread exceeds 1.5**, the justifications provided by the highest- and lowest-scoring experts are compared to determine the principal source of disagreement. Disagreement is classified as arising from one of four causes:

- A. **Different interpretations of the parameter definition;**
- B. **Different assessments of transferability;**
- C. **Different assessments of data availability or implementation feasibility; or**
- D. **Genuine scientific disagreement about ecological relevance.**

Cases involving **genuine scientific disagreement** are referred to expert validation (Section 5.3) irrespective of the resulting mean classification. This safeguard is important because the mean alone can conceal substantive disagreement in either direction: a parameter scored 5, 5 and 2 and a parameter scored 4, 4 and 4 both return a mean of 4.0, but only the first reflects an unresolved difference of scientific opinion. The framework therefore treats **agreement**,



uncertainty and sensitivity as integral components of parameter validation, rather than relying on the Final Score alone.

5.2.3. Interpretation of Scores

Composite scores are interpreted using predefined decision thresholds that support consistent parameter prioritisation (Table 3).

Table 3. Decision thresholds for parameter prioritisation

Final Score	Interpretation	Decision
≥ 4.0	Excellent overall suitability	Accept for inclusion
$3.0 - < 4.0$	Moderate suitability	Revise or obtain additional evidence
< 3.0	Limited suitability	Exclude or substantially revise

These thresholds provide an objective basis for parameter selection while maintaining flexibility for expert judgement where exceptional ecological circumstances justify deviation. Table 3 determines whether a parameter is suitable for inclusion; it does not determine the relative priority of parameters that meet the acceptance criteria. Because the number of accepted parameters may exceed what can realistically be monitored at a single site, accepted parameters are subsequently assigned to prioritisation tiers, as set out in Table 4.

Table 4. Prioritisation tiers for accepted parameters

Tier	Definition	Status in the SSCOs
Tier 1 – Priority	Accepted parameters (≥ 4.0) scoring above the largest score break within the accepted band	Objectives formulated for all; monitoring mandatory
Tier 2 – Supporting	Remaining accepted parameters (≥ 4.0)	Objectives formulated where evidence permits; monitoring recommended, may be phased
Tier 3 – Reference	Parameters classified Revise ($3.0 - < 4.0$) or Exclude (< 3.0)	No objective formulated; retained for transparency and as research priorities under Section 5.3.3

The boundary between Tier 1 and Tier 2 is determined by the largest arithmetic gap between consecutive parameters in the ranked list of accepted parameters. The boundary is therefore determined by the distribution of scores rather than by a fixed number or proportion of parameters. Consequently, the number of parameters assigned to Tier 1 may vary between features. The location and magnitude of the gap used to establish the boundary are recorded alongside the ranked inventory to ensure that the prioritisation is transparent and reproducible.

If the largest score gap would result in fewer than three parameters being assigned to Tier 1, the next-largest gap is used instead. A parameter that has been flagged as classification-sensitive under Section 5.2.2 cannot be assigned to Tier 1 until the underlying flag has been resolved.



It should be noted that the decision threshold and tiering systems (Tables 3 and 4) are simply prioritisation mechanisms that form the basis for the subsequent validation stages only, and should not be interpreted as a defensible numerical threshold, an indication of ecological condition, habitat quality, or conservation status. Final objective formulation requires an additional evidence chain described later in the protocol, including an appropriate reference or thresholds where available, and site-condition data or a plan to establish a baseline.

5.3. PARTICIPATORY EXPERT VALIDATION

Participatory expert validation complements the evidence synthesis and parameter evaluation by incorporating expert knowledge, practical experience, and perspectives. Its purpose is to evaluate the scientific credibility, ecological relevance, operational feasibility, and practical applicability of the parameters identified during Phase I.

The participatory process is designed to achieve five principal objectives:

- verify the ecological relevance of candidate parameters;
- assess their practical applicability across diverse Natura 2000 sites and marine regions;
- evaluate consistency with existing conservation practice among Member States;
- identify knowledge gaps and implementation challenges; and
- build consensus on the final SSCOs methodological framework.

In step one of the validation process, the EWG members and targeted subject matter experts within their networks are requested to validate the parameters using the validation template.

5.3.1. Online Expert Survey

The final stage of expert validation consists of a structured online survey based on the original validation template, and designed to obtain independent external evaluations of the candidate ecological parameters prior to group discussion.

The survey will assess expert opinion using the five evaluation dimensions, primarily employing structured ranking exercises and opportunities for qualitative comments.

Open-ended sections will enable participants to:

- recommend additional parameters;
- identify missing ecological processes;
- suggest modifications to parameter definitions;
- highlight implementation challenges;
- identify regional considerations; and
- propose future research priorities.

The survey will also collect information on respondent expertise and professional background to support interpretation of the consultation results.



Expert input will be used to refine the candidate parameter inventory and methodological framework where justified. Where substantial uncertainty or disagreement remains, this will be documented rather than forcing consensus.

5.3.2. Participatory Expert Consensus Building

Following the survey, an internal participatory workshop of the Expert Working Group will review the aggregated survey results and Parameter Validation Scores. The workshop will focus on parameters flagged under Section 5.2.2, parameters whose expert scores differ by more than 1.5 points, and new parameters or definitions proposed by survey respondents.

Discussion will be facilitated in structured rounds that draw on established expert-elicitation principles (Rowe & Wright, 1999; Hsu & Sandford, 2007; Mukherjee et al., 2015), and research priorities will be identified following established collaborative methods (Sutherland et al., 2011). Each decision will be recorded in the decision log together with its rationale. Since consensus is sought, not forced, where agreement cannot be reached, the competing positions and their implications are documented and carried forward to Phase III (Section 6) and to the final stakeholder workshop (Section 7).

5.3.3. Final Decision-Based Validation

The final stage of ecological validation applies a structured decision-support process (Gregory et al., 2012) to determine whether candidate parameters should be incorporated into the final SSCOs Blueprint. Rather than relying on a single numerical threshold, parameter selection follows a sequential evidence-based decision pathway. Each candidate parameter is evaluated using the following sequence of questions, where relevant:

Step 1: Is the parameter supported by sufficient scientific evidence?

Step 2: Does the parameter represent an ecologically meaningful characteristic of the qualifying habitat or species?

Step 3: Is the parameter consistent with the legal and policy requirements of the Birds Directive, Habitats Directive, and associated European guidance?

Step 4: Can the parameter realistically support conservation management, monitoring, or adaptive decision-making?

Step 5: Does the parameter remain ecologically valid when ecological connectivity, highly mobile species, and ecosystem health considerations are incorporated?

Only parameters satisfying all stages of the validation process will normally proceed to inclusion within the harmonised SSCOs framework.

Where evidence is incomplete but ecological importance is considered high, parameters may be provisionally retained as **research priorities**, highlighting areas where additional monitoring, ecological investigation, or methodological development is required before full operational implementation.



This precautionary approach recognises that the absence of monitoring data does not necessarily imply ecological insignificance and avoids excluding parameters that may become increasingly important as scientific understanding and monitoring capacity evolve.

6. PHASE III: DEVELOPMENT OF THE HARMONISED OBJECTIVES FRAMEWORK

Phase III integrates the outputs of evidence assessment, parameter evaluation, expert validation and site-level interpretation into a harmonised, evidence-to-objective procedure for marine Natura 2000 sites.

6.1. INTEGRATION OF MULTIPLE EVIDENCE STREAMS INTO SSCOs

For each qualifying feature, the process follows six sequential steps:

- i. **Confirm the validated parameter:** Transfer the parameter's classification, score, uncertainty, validation status and prioritisation tier from Phase II. Only Accepted parameters proceed directly; Revised parameters require confirmation through expert validation (Section 5.3), while Excluded parameters are omitted unless their associated pressure requires monitoring under an adopted instrument.
- ii. **Verify the supporting evidence:** Compile quantitative and qualitative evidence, retaining its original value, unit, location, period, ecological context, source and verification status. Numerical baselines or targets must be supported by evidence verified against the primary source; unverified evidence may inform context but cannot independently establish a numerical value.
- iii. **Establish reference condition and applicable threshold:** Record separately the reference condition and any applicable external threshold or reference value, including its geographic and ecological specificity, authority and source. An external threshold (as will be provided in the SSCO blueprint) informs—but does not automatically determine—the site-specific target. Where no defensible threshold exists, this is explicitly recorded rather than substituted with a value from another feature, parameter or region.
- iv. **Assess current condition and desired direction (at site level):** Determine the ecological direction of improvement, maintenance or acceptable change from the evidence, applying the sign-inversion test where appropriate. Current condition is assessed only from site-specific evidence. Where such evidence is unavailable, condition is recorded as not assessable and baseline acquisition becomes a defined monitoring requirement.
- v. **Set the site-specific target and monitoring specification:** The target is formulated as an absolute, conditional or evidence-gap objective, according to the strength of available evidence. Each target specifies, as appropriate, the metric, value or range, unit, spatial and temporal scale, sampling method, depth/stratum, replication and monitoring frequency. Where evidence is insufficient for a defensible numerical target, the evidence-gap formulation specifies the additional evidence required.
- vi. **Complete and record the conservation objective:** The final objective is expressed as a concise, unambiguous statement and assigned a confidence rating reflecting the complete



evidence chain. Each objective is documented in the Evidence Chain Template (Annex 5.3), linking the qualifying feature and ecological requirement to the parameter, evidence, reference condition, threshold, current condition, direction, target and monitoring requirement.

The six steps are applied **independently to each parameter**, and once individual objectives have been formulated, they are reviewed collectively before adoption.

This step-wise review serves three purposes.

- First, it confirms that the objectives are **mutually consistent** and that achieving one objective would not inadvertently undermine another.
- Second, it verifies that the parameter set collectively captures the relevant **structure, function and pressures** of the feature rather than disproportionately representing a single ecological dimension.
- Third, it identifies important causal relationships between condition and pressure.

6.2. FORMS OF CONSERVATION OBJECTIVE STATEMENTS

Conservation objectives are expressed using **one of three prescribed forms** (Table 5). The appropriate form is determined by the **strength and completeness of the available evidence at site level**. This ensures that the wording of each objective transparently reflects the nature, measurability and strength of the commitment being made.

Table 5. Forms of conservation objective statements

Objective form	When to use	Standard formulation	Purpose and interpretation
Form 1 – Absolute Objective	Used where a defensible numerical target exists and the means of determining compliance are sufficiently established.	<i>Maintain</i> [parameter] at [value] [unit], or [above / below / within] it, across [spatial scale], assessed [frequency] by [method]. [Threshold type] threshold established by [organisation, document, year]. Confidence: [rating].	This is the strongest and most directly measurable form. Both the target and the compliance mechanism are explicitly defined, allowing progress and compliance to be assessed against a clear numerical benchmark.



Site-Specific Conservation Objectives

Form 2 – Conditional Objective	Used where the desired direction, target structure and monitoring methodology are established, but a reliable site-specific baseline has not yet been measured. Particularly appropriate during first adoption.	<i>Establish a baseline for [parameter] at [site], measured by [method] at [depth / stratum], with [n] replicates during [season], by [date]. Thereafter maintain [parameter] [direction] relative to that baseline, with [deviation] as the limit of acceptable change and [deviation] as a management trigger. Reference condition: [value, with specificity]. International threshold: [value and type, or “none identified”]. Confidence: [rating].</i>	Converts the absence of a current site-specific baseline into an explicit baseline-establishment commitment. The absence of baseline data is therefore made transparent rather than concealed. Such objectives should not be regarded as deficiencies where the required baseline action is clearly specified.
Form 3 – Evidence-Gap Objective	Used where the available evidence does not support a defensible numerical target.	<i>Insufficient evidence to establish a defensible numerical target at this stage. [Parameter] is retained as a [Tier 1 / Tier 2] parameter for [feature], based on its validation score of [score]. The desired direction is [direction], supported by [evidence]. No [threshold type] threshold has been identified. The following evidence is required before a target can be established: [evidence, responsible party, timescale]. Until then: [interim monitoring or precautionary measure]. (This implies a “fail” condition, and each State has a duty to demonstrate good condition).</i>	Provides a standardised and transparent way of recording evidence gaps, allowing them to be consistently identified, counted and compared across features and sites. It distinguishes a genuine lack of evidence from an established target.

In summary, the three forms provide a graduated framework—from quantified and directly enforceable targets (Absolute), through targets contingent on establishing a site-specific baseline



(Conditional), to **explicitly documented evidence gaps (Evidence-Gap)**—while ensuring that every objective remains transparent about its evidential basis and uncertainty. The information to be recorded for every objective, regardless of its form, is listed in Annex 7.

The desired direction of change is established from ecological evidence and must not be inferred from numerical magnitude alone. For each parameter, the assessment explicitly determines whether improvement requires an increase, decrease, stability, maintenance above or below a limit, a defined range, an acceptable deviation from baseline, or a specified temporal trend. A simple sign-inversion test is required in the context of the following question: if the parameter value doubled, would the ecological condition of the feature improve or deteriorate?

7. PHASE IV: FINAL STAKEHOLDER ENGAGEMENT WORKSHOP

Following completion of the SSCOs evidence synthesis, parameter validation and analytical frameworks, a final stakeholder validation workshop will be convened to present, critically review, and refine the proposed Harmonised Site-Specific Conservation Objectives (SSCOs) Blueprint.

The workshop will provide a structured interface between scientific evidence, EU policy requirements, Natura 2000 site management experience, Member State implementation realities, and stakeholder perspectives. It will be designed not merely as a dissemination event, but as a formal engagement and co-refinement stage in the SSCOs development process.

The workshop will engage representatives of the European Commission Directorate-General for Environment (DG ENV), Natura 2000 site managers and competent authorities, Member State representatives, marine conservation practitioners, regional sea-convention organisations, scientific experts, monitoring organisations, and other relevant stakeholders. The objective is to ensure that the final Blueprint is scientifically robust, legally coherent, operationally feasible, transparent, and sufficiently adaptable for application across different marine regions and site contexts.

The principal purpose of the workshop is to discuss the draft SSCOs Blueprint with relevant stakeholders before finalisation and ensure that the proposed methodology can be translated into practical, defensible and implementable conservation objectives at Natura 2000 sites.

Specifically, the workshop will:

- I. **Present the SSCOs Blueprint methodology**
 - Explain the conceptual framework and overall logic of SSCOs development.
 - Present the Rapid Evidence Assessment (REA) approach.
 - Explain the feature-selection methodology.
 - Demonstrate the EUNIS–Annex I crosswalk.
 - Present the ecological attributes, indicators and threshold framework.
 - Explain the treatment of uncertainty and evidence quality.
- II. **Present the evidence and analytical process**



- Explain how scientific literature, Article 17 and Article 12 reporting, BISE, EUNIS, MSFD assessments, regional sea-convention information and national sources were integrated.
- Demonstrate how evidence was screened, classified and synthesised.
- Explain the distinction between quantitative thresholds, reference values, trend-based objectives and qualitative descriptors.

III. Assess operational feasibility

- Determine whether proposed indicators can realistically be monitored by Natura 2000 managers and competent authorities.
- Identify data, technical, financial and institutional constraints.
- Assess whether proposed thresholds can be translated into management triggers and conservation measures.

IV. Identify gaps and uncertainties

- Identify evidence gaps, inappropriate thresholds, poorly supported assumptions and geographic or ecological transferability limitations.
- Distinguish between evidence gaps that can be addressed immediately and those requiring longer-term research or monitoring.

V. Obtain structured stakeholder recommendations

- Capture proposed amendments in a transparent decision log.
- Prioritise recommendations according to scientific importance, legal relevance and implementation feasibility.
- Establish which recommendations should be incorporated into the final Blueprint and which should be retained as future research priorities.

7.1. STAKEHOLDER IDENTIFICATION

The expert consultation process will adopt a purposive sampling strategy to ensure broad representation of scientific disciplines, management experience, and European marine regions.

Participants will be selected on the basis of recognised expertise in one or more of the following areas:

- marine ecology;
- conservation biology;
- Natura 2000 site management;
- Birds and Habitats Directive implementation;
- Marine Strategy Framework Directive implementation;
- marine biodiversity monitoring;
- fisheries ecology;
- marine mammals;
- seabirds;
- benthic ecology;
- habitat mapping;



- ecological modelling;
- ecosystem-based management;
- restoration ecology; and
- environmental policy and governance.

To maximise representativeness, stakeholder mapping will ensure participation from:

- European Commission services;
- Eclipse Expert Working Group members;
- national competent authorities;
- research institutes;
- universities;
- Regional Sea Convention representatives;
- environmental agencies;
- marine protected area managers; and
- recognised conservation organisations.

Where appropriate, representation will encompass all major European marine regions, ensuring that ecological variability and differing implementation experiences are adequately reflected.

7.2. PRE-WORKSHOP PREPARATION

A **Stakeholder Validation Package** will be circulated before the workshop. This will allow participants to review the proposed methodology and focus workshop time on substantive validation rather than introductory explanation.

Participants will be invited to identify, in advance:

- applicability concerns;
- monitoring constraints;
- legal or policy inconsistencies;
- transferability concerns;
- suitability of proposed outputs; and
- recommended improvements.

7.3. WORKSHOP DESIGN

The workshop will use a **structured, evidence-based and participatory design**, combining plenary presentations, technical breakout sessions, facilitated validation exercises and a final prioritisation process. The proposed structure is summarised in Table 6.

Table 6. Proposed workshop structure

Session	Focus	Principal activity	Expected output
1. Opening & objectives	Workshop context	Introduction, objectives and expected decisions	Shared understanding



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2. SSCOs Blueprint overview	Methodology	Presentation of conceptual and methodological framework	Common methodological baseline
3. Evidence and REA	Evidence base	Presentation of evidence synthesis, BISE/EUNIS integration and evidence grading	Validation of evidence architecture
4. Feature selection	Habitats & species	Review of selection criteria and selected features	Validated feature-selection logic
5. Ecological attributes, Parameter database, validation & thresholds	Indicators	Review of attributes, parameter validation framework, indicators, reference values and thresholds	Threshold/indicator recommendations
6. Management implementation	From SSCOs to action	Review of triggers, management measures and monitoring requirements	Implementation recommendations
7. Breakout validation	Detailed review	Thematic stakeholder groups assess specific Blueprint components	Structured comments and proposed amendments
8. Prioritisation	Decision-making	Rank recommendations by importance and feasibility	Prioritised action matrix
9. Plenary agreement	Validation	Review of principal conclusions and outstanding issues	Workshop consensus
10. Closing	Next steps	Explain revision, quality assurance and finalisation process	Agreed pathway to final Blueprint

7.4. FINAL BLUEPRINT REVISION AND QUALITY ASSURANCE

The stakeholder workshop will feed directly into the final SSCOs Blueprint through a closed evidence-to-implementation loop.

Following the workshop, the SSCOs EWG will undertake a structured revision process comprising:

- Step 1 – Evidence reconciliation
- Step 2 – Technical revision
- Step 3 – Consistency checking
- Step 4 – Legal and policy compliance review
- Step 5 – Uncertainty assessment
- Step 6 – Final expert review

The revised Blueprint will undergo final internal scientific and methodological quality assurance before submission.

8. OVERALL EXPECTED OUTPUTS

The protocol consolidates **evidence synthesis, ecological validation, expert judgement and site-level objective setting** into a single, transparent evidence-to-objective process. Its outputs are designed to be **traceable, reusable and operational**, supporting consistent SSCOs development while allowing ecological and governance differences among European marine Natura 2000 sites. The main outputs are summarised in Table 7.

Table 7. Overall expected outputs of the protocol

No.	Output	What it contains	Primary purpose / use
1	Comprehensive Evidence Base	Structured evidence on ecological parameters, conservation measures, monitoring approaches, site-relevant pressures and supporting literature for qualifying marine habitats and species.	Provides the traceable scientific foundation for parameter selection and SSCOs development.
2	Validated Parameter Inventory & Prioritisation	Candidate parameters evaluated using transparent multi-criteria assessment, including ecological relevance, policy relevance, transferability, feasibility, data availability, uncertainty and validation status.	Identifies the most appropriate parameters for assessing and formulating site-specific objectives.
3	Threshold & Reference-Value Register	Consolidated values and ranges identified across qualifying features, classified by type and linked to their source, authority, geographical context, applicability and evidentiary status.	Prevents inappropriate transfer of thresholds and provides a fully traceable reference for target setting .
4	Evidence-Gap Register	Data and structural gaps, their implications, evidence required, priority, monitoring/research needs and responsible actors, recorded using the standard template.	Makes uncertainty explicit, comparable and actionable across features and sea basins.
5	Evidence Chain & Objective Records	For each prioritised parameter: ecological requirement → evidence → reference condition → threshold/reference value, where	Provides a complete audit trail from evidence to the final conservation objective.

No.	Output	What it contains	Primary purpose / use
		applicable → current condition → desired direction → site-specific target → monitoring requirement.	
6	Harmonised SSCOs Methods Protocol	The consolidated procedure for feature selection, parameter validation, evidence assessment, reference/threshold evaluation, target formulation, monitoring, uncertainty management and implementation.	Serves as the principal methodological deliverable for developing SSCOs across European marine Natura 2000 sites.
7	Monitoring, Management & Adaptive-Review Recommendations	Recommendations for baseline establishment, monitoring design, confidence review, evidence-gap closure, management relevance and updating objectives as evidence or policy changes.	Supports practical implementation and continual improvement of SSCOs.

8.1. DOCUMENTATION AND REPRODUCIBILITY

The protocol has been designed to maximise reproducibility and facilitate future methodological updates. Accordingly, documentation will be maintained for:

- literature search strategies and search histories;
- eligibility assessments;
- evidence extraction templates;
- parameter classification;
- scoring matrices;
- weighting procedures;
- ecological validation outcomes;
- expert consultation results;
- consensus decisions; and
- revisions incorporated into the final methodological framework.

This comprehensive documentation enables independent verification of methodological decisions and provides a transparent evidence trail supporting the development of each Site-Specific Conservation Objective.

8.2. TRANSPARENCY AND CHANGE CONTROL

Where appropriate, **supporting datasets, scoring templates, survey instruments, workshop materials, and supplementary methodological documentation** may be published alongside future



revisions of the protocol. Making these materials available will strengthen transparency, support reproducibility, and facilitate consistent application of the framework across Member States.

Every evidence-verification exercise is documented through a **formal change log**. For each change, the log records:

- **what changed;**
- **why the change was made;**
- **which source or sources were consulted; and**
- **how the change affected the objective, protocol, or assessment.**

The change log must record **corrections to source attribution as well as corrections to numerical or qualitative values**. Correct attribution is a substantive component of evidential integrity: a value that is correct but attributed to the wrong instrument constitutes a defect comparable to an incorrect value, because the authority and applicability of an objective depend in part on the instrument cited in support of it.

Each verification exercise should also include an explicit **statement of what did not change**. This should identify the sources, values, classifications, or methodological elements that were re-checked and retained without modification. Recording these non-changes ensures that continued reliance on previously adopted evidence is documented as a **positive verification finding**, rather than inferred merely from the absence of a recorded amendment.

8.3. ADAPTIVE IMPROVEMENT

Marine conservation operates within rapidly changing ecological, technological, and policy environments. Consequently, the methodological framework is intended to function as a living guidance document capable of evolving alongside advances in ecological science, monitoring technologies, and European conservation policy.

Adaptive management is treated here as an iterative cycle of objective setting, monitoring and revision rather than a single planning step (Holling, 1978; Williams, 2011; Westgate et al., 2013). Future revisions may incorporate:

- Expanded list of habitats and species;
- improved ecological indicators;
- advances in remote sensing and Earth observation;
- environmental DNA (eDNA) methodologies;
- autonomous and real-time monitoring technologies;
- ecosystem modelling and digital twin approaches;
- artificial intelligence-assisted ecological assessment;
- revised legislative guidance;
- updated conservation status assessments; and
- new scientific evidence generated through research and long-term monitoring.



Periodic review of the methodology is therefore recommended to ensure continued scientific relevance and consistency with emerging best practice in marine conservation (European Commission, 2023).

9. TIMELINE

The key activities, milestones and target dates are summarised in Table 8.

Table 8. Indicative timeline of activities, milestones and target dates

Tasks	Description	Target date
Milestone 1	Method Protocol	April 2026
Task 1.1	Draft Method Protocol, final version	March 2026
Task 1.2	Method Protocol peer review completed (3 weeks)	April 2026
Task 1.3	Reply to peer-review comments	April 2026
Milestone 2	Rapid Evidence Assessment (REA)	June 2026
Task 2.1	Development of databases and frameworks	June 2026
Task 2.2	Feature Selection Database	June 2026
Task 2.3	Parameter Database	June 2026
Task 2.4	Parameter extraction	June 2026
Milestone 3	Development of the Parameter Validation Framework (PVF)	July 2026
Task 3.1	Testing of the PVF	June 2026
Task 3.2	Internal parameter validation	July 2026
Task 3.3	Online survey (external parameter validation)	July 2026
Task 3.4	Participatory workshop (parameter validation: internal)	July 2026
Task 3.5	Parameter validation survey: external expert consultation	July 2026
Milestone 4	Data extraction / AI-assisted data extraction	August 2026
Task 4.1	Validation of AI-assisted extraction (Eclipse Methods Expert Working Group)	July 2026
Task 4.2	Data extraction	August 2026
Task 4.3	Compilation of data extraction results	August 2026
Task 4.4	Internal expert review of SSCOs data	End August 2026
Task 4.5	Initiation of collaborative SSCOs report writing	September 2026
Milestone 5	Participatory workshop: expanded stakeholder engagement	September 2026



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Task 5.1	Identification of experts for the workshop (with the requester)	September 2026
Task 5.2	Invitations to the workshop (with the requester)	September 2026
Task 5.3	Workshop planning	September 2026
Task 5.4	Workshop summaries by experts	September 2026
Task 5.5	Analysis of workshop results	End September 2026
Milestone 6	Final reporting	October 2026
Task 6.1	Draft report ready for peer review	October 2026
Task 6.2	Final report and deliverables	October 2026
Task 6.3	Final meeting and discussion of future collaborations	October 2026

In conclusion, the proposed flexible approach accommodates differences in ecological characteristics, data availability, monitoring capacity, and management priorities among Member States while maintaining methodological consistency across the Natura 2000 network. This methodological framework is consistent with best practice in IPBES assessments, PRISMA, Collaboration for Environmental Evidence, and the European Commission's better regulation toolbox (IPBES, 2019; Tricco et al., 2018; Collaboration for Environmental Evidence, 2018; European Commission, 2023).

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Site-Specific Conservation Objectives

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1. ANNEXES

ANNEX 1: KEY-TERMS AND DEFINITIONS IN MARINE CONSERVATION AND SSCOs

Annex 1.1: Key acronyms used in the literature reports and glossary of ecological parameters and SSCOs terminology.



Site-Specific Conservation Objectives

Term / Acronym	Definition	Key components / criteria	Policy context / application	Source
AA – Appropriate Assessment	Assessment of the implications of a plan or project for site integrity.	Screening; mitigation hierarchy	Habitats Directive Art. 6(3)	Directive 92/43/EEC
Adequacy	Ensures a conservation network is sufficient for long-term persistence.	Viability thresholds; population size	Habitats Directive reporting	Rondinini & Chiozza (2010)
BD – Birds Directive	EU Directive 2009/147/EC (earlier 79/409/EEC) concerning the conservation of wild birds.	Annex I species; SPA designation	Designation and management of Special Protection Areas	Bijlsma et al. (2019)
Blue Carbon Ecosystems	Marine ecosystems storing significant carbon, including seagrass, saltmarsh and mangroves.	Carbon sequestration; habitat provision	Climate mitigation; restoration	Nellemann et al. (2009)
Complementarity	Selection of sites that add biodiversity features not yet represented in a conservation network.	Marginal gain; avoidance of redundancy	Protected area network design	Margules & Pressey (2000)
Connectivity	Ecological linkages allowing movement between sites.	Larval dispersal; corridors	Climate-resilient MPA networks	Beger et al. (2010)
Conservation Efficiency	Achieving conservation goals at minimal socio-economic cost.	Cost-effectiveness; optimisation	Spatial prioritisation	Wilson et al. (2009)
Conservation Measures	Actions necessary to maintain or restore favourable conservation status.	Legal; administrative; restoration	Habitats Directive Art. 6(1)	Directive 92/43/EEC



Site-Specific Conservation Objectives

CV – Current Value	The value currently observed for range, area or population.	Observed range; area; population	Article 17 and Article 12 reporting	Bijlsma et al. (2019)
DV – Directive Value	The reported reference or required value in reporting; sometimes used synonymously with FRV where the FRV is determined as equal to the current value, as in the stepwise approach where FRV = DV.	Stepwise approach to FRV setting	Article 17 reporting	Bijlsma et al. (2019)
EBM – Ecosystem-Based Management	Integrated ecosystem-scale management that includes human activity.	Cumulative impacts; resilience	MSFD; MSP	CBD (2000)
FCS – Favourable Conservation Status	The status of a habitat or species when its structure and functions, including population size and range, are such that they are likely to continue in the long term.	Range; area; structure; future prospects	Habitats Directive Art. 1; Article 17 reporting	Directive 92/43/EEC ; Bijlsma et al. (2019)
FRA – Favourable Reference Area	The area extent needed for a habitat type, or the area of habitat type sufficient for viability.	Area sufficient for long-term viability	Article 17 reporting (habitats)	Bijlsma et al. (2019)
FRP – Favourable Reference Population	The population size needed for viable long-term conservation.	Minimum viable population	Article 17 reporting (species)	Bijlsma et al. (2019) ; European Commission (2017)

FRR – Favourable Reference Range	The spatial or geographical range needed for favourable conservation status, for species or habitats.	Historical baseline; spatial extent	Article 17 reporting	Bijlsma et al. (2019); European Commission (2017)
FRV – Favourable Reference Value	The benchmark value for a species' or habitat's parameter (range, population or area) corresponding to favourable conservation status. Umbrella term covering FRR, FRA and FRP.	Viability threshold	Article 17 reporting	Bijlsma et al. (2019); European Commission (2017)
GES – Good Environmental Status	Status in which marine ecosystems are healthy and resilient.	11 descriptors; ecosystem functioning	MSFD Art. 3(5)	Directive 2008/56/EC
HD – Habitats Directive	EU Directive 92/43/EEC establishing the conservation of natural habitats and of wild fauna and flora.	Annex I habitats; Annex II species	Designation and management of Special Areas of Conservation; Art. 6	Directive 92/43/EEC
HMS – Highly Mobile Species	Species undertaking large-scale migrations across jurisdictions.	Migratory routes; transboundary governance	Cetaceans; tuna; seabirds	CMS (1979)
IUCN – International Union for Conservation of Nature	Source of comparative thresholds, for example area thresholds and vulnerability categorisations, used by some Member States.	Red List categories; area thresholds	Comparative benchmarking in FRV setting	Bijlsma et al. (2019)



Site-Specific Conservation Objectives

LAC – Limit of Acceptable Change	Threshold defining acceptable ecological change before intervention.	Indicators; trigger values	Adaptive MPA management	Stankey et al. (1985)
LRL – Limit Reference Level <i>or</i> Lower Reference Limit	Two expansions are in use and should not be conflated. <i>Limit Reference Level:</i> a lower reference or minimum, applied as a HELCOM core indicator for seal abundance. <i>Lower Reference Limit:</i> the threshold below which conservation status is unfavourable.	Precautionary benchmark	HELCOM core indicators; MSFD and fisheries	HELCOM (2018) ; Directive 2008/56/EC
MPA – Marine Protected Area	Clearly defined marine area managed for long-term conservation.	Legal designation; monitoring	Global marine conservation	Day et al. (2019)
MSP – Marine Spatial Planning	Process allocating marine space for ecological and socio-economic objectives.	Zoning; stakeholder engagement	MSP Directive	European Parliament & Council of the European Union (2014)
MU – Management Unit	<i>A spatially or administratively defined area within which conservation measures are planned, implemented, monitored and assessed as a single entity.</i>	Spatial delineation; assessment unit	Natura 2000 site management; Article 17 reporting	European Commission (2019)
MVP – Minimum Viable Population	The smallest population size at which a species can sustain its numbers and survive in the long term.	Used in FRP-related modelling	Article 17 reporting	Bijlsma et al. (2019)



Site-Specific Conservation Objectives

Natura 2000 Network	EU-wide network of Special Areas of Conservation and Special Protection Areas.	Connectivity; biogeographic coverage	Habitats and Birds Directives	Art. 3, Habitats Directive
Ne – Effective Population Size	Genetic concept: the number of individuals in a population who contribute offspring to the next generation.	Used in genetic rule-based FRP setting	Article 17 reporting	Bijlsma et al. (2019)
OHA – One Health Approach	Integrated approach linking ecosystem, animal and human health in environmental management.	Zoonotic risk; pollution control; ecosystem integrity	Marine and coastal planning	World Health Organization (2021)
Precautionary Principle	Preventive action where risk exists despite uncertainty.	Risk avoidance; burden of proof	EU environmental law	European Union (2012), Art. 191
PVA – Population Viability Analysis	Quantitative modelling of extinction risk under scenarios; used by some Member States to set FRPs.	Demographic modelling; stochasticity	Species management planning; Article 17 reporting	Morris & Doak (2002) ; Bijlsma et al. (2019)
Representativeness	Inclusion of the full biodiversity range across regions.	Habitat diversity; species assemblages	Natura 2000 coherence	Kukkala & Moilanen (2013)
SCP – Systematic Conservation Planning	Structured decision-support framework for identifying priority conservation areas based on explicit biodiversity objectives, spatial data and cost-efficiency.	Complementarity; representativeness; adequacy; efficiency	MPA network design; spatial prioritisation	Margules & Pressey (2000) ; Pressey & Bottrill (2009) ; Ball et al. (2009)

Site Integrity	Ecological coherence sustaining designated features.	Structure; function; conservation objectives	Appropriate Assessment decision-making	European Commission (2021)
SSCOs – Site-Specific Conservation Objectives	Defined conservation targets for habitats and species within Natura 2000 sites.	Quantified targets; structure and function indicators	Natura 2000 site management	European Commission (2019)
Transboundary Governance	Cooperative ecosystem management across national borders.	Regional agreements; shared monitoring	Highly mobile species	United Nations (1982)
TRL – Target Reference Level	Carrying-capacity asymptote defined relative to population dynamics; used operationally in regional assessments and corresponding to an FRP.	Carrying capacity	HELCOM regional assessments	HELCOM (2018)

ANNEX 2: HIGHLY MOBILE MARINE SPECIES UNDER THE BIRDS AND HABITATS DIRECTIVES

Annex 2.1: EU Habitats Directive (Marine & Coastal Highly Mobile Species)

Species	Directive group	Description	HMS relevance	Implications for SSCO	Reference
Harbour Porpoise	Marine mammal	Small cetacean distributed across shelf seas and coastal waters	Large seasonal movements linked to prey distribution	Objectives should include connectivity among feeding areas and reduction of cumulative pressures (noise, bycatch)	EU Habitats Directive information



Site-Specific Conservation Objectives

Bottlenose Dolphin	Marine mammal	Coastal and offshore populations with complex movement behaviour	Uses extensive habitat networks and transboundary areas	Requires objectives reflecting habitat use patterns and ecological corridors	Natura 2000 species information
Grey Seal	Marine mammal	Widely distributed marine predator breeding at colonies but foraging over large areas	Long-distance foraging movements	Site objectives should recognise feeding ranges beyond colony locations (connectivity metrics)	EU protected species information
Common Seal	Marine mammal	Coastal seal using haul-out sites and extensive foraging areas	Regular movements among sites and marine regions	Requires habitat-network-based objectives	EU protected species information
Loggerhead Sea Turtle	Marine reptile	Migratory turtle using marine feeding areas and nesting habitats	Basin-scale migration across multiple jurisdictions	Objectives should integrate movement pathways and threat mitigation	EU Habitats Directive information
European Sturgeon	Migratory fish	Anadromous fish migrating between marine and freshwater systems	Cross-ecosystem connectivity requirement	Objectives must include movement barriers and habitat continuity	EU protected species information

Annex 2.2: EU Birds Directive (Marine and Coastal Highly Mobile Birds)

Species	Ecological group	Description	HMS relevance	Implications for SSCOs	Reference
Northern Gannet	Pelagic seabird	Colonial breeder foraging over extensive marine areas	Very large foraging ranges	Objectives should extend beyond nesting sites and include offshore feeding habitats	Birds Directive overview



Site-Specific Conservation Objectives

Black-legged Kittiwake	Pelagic seabird	Surface-feeding seabird strongly linked to marine productivity	Seasonal movement and variable distribution	Monitoring should incorporate regional prey dynamics	Birds Directive overview
Sandwich Tern	Coastal seabird	Colonial breeder using extensive coastal feeding areas	Long-distance migration and dispersed feeding	Requires multi-site conservation objectives	Birds Directive Annex I species list
Common Eider	Sea duck	Marine duck associated with coastal habitats	Seasonal migration and large aggregations	Objectives should include wintering and moulting habitats	Birds Directive overview
Red-throated Diver	Diving seabird	Uses offshore and coastal habitats across seasons	Strong seasonal redistribution	Requires integration of migratory staging areas	Birds Directive Annex I species list
Little Tern	Coastal migratory bird	Breeds on beaches and estuaries; migrates long distances	Highly dependent on spatially separated habitats	Objectives should protect habitat networks rather than isolated sites	Birds Directive Annex I species list

ANNEX 3: HABITATS AND SPECIES SELECTION FRAMEWORK

Annex 3.1: Feature-selection template

The template below was used to document the selection of marine habitats and species described in Section 4.4. One row is completed for each candidate feature; the resulting list of selected features is given in Annex 3.2.



Site-Specific Conservation Objectives

Field	What to record
Feature code and name	Annex I habitat code or species name, as listed in the Habitats or Birds Directive.
EUNIS crosswalk	EUNIS 2012 code and corresponding EUNIS 2022 code(s) at levels 4 to 6, where applicable.
Priority status	Whether the feature is a priority habitat type or priority species (*).
Conservation status	Latest Article 17 or Article 12 assessment for the relevant marine region(s).
Occurrence in the network	Number of marine Natura 2000 sites and biogeographical regions in which the feature occurs.
Vulnerability and pressures	Main pressures and sensitivity of the feature, with supporting sources.
Evidence and monitoring availability	Availability of ecological evidence, established monitoring methods and existing thresholds.
Transferability	Expected transferability of the resulting SSCO approach across Member States and sea basins.
Selection decision	Include or exclude, applying the criteria in Section 4.4.
Justification and sources	Short rationale for the decision and the references used.

Annex 3.2: Sample list of selected features for the SSCO blueprint

a.	Annex I Marine & Coastal Habitats (1110–1180) - UPDATED WITH EUNIS CROSSWALK: 2012 → 2022				
	<u>Annex I Code</u>	<u>Annex I Habitat Name</u>	<u>EUNIS 2012 Code</u>	<u>Corresponding 2022 Code(s)</u>	<u>EUNIS 2022 Habitat Name(s)</u>
1	1120*	<i>Posidonia oceanica</i> beds	A5.535	MB252	Biocenosis of <i>Posidonia oceanica</i>
2	1150*	Coastal lagoons	X02 / X03	MB152 / MB253 / MB554 / MB652	Mediterranean euryhaline and/or eurythermal lagoon biocenoses (on rock, biogenic reef, sand and mud)
3	1170	Reefs (coralligenous formations)	A4.26 / A4.32	MC151 / MC251	Coralligenous biocenosis / Coralligenous platforms
4	1110/1160	Maerl beds (As a sub-category under sandbanks)	A5.51	MB322 / MB421 / MB622; MB3511	Maerl beds on Atlantic infralittoral coarse, mixed and muddy sediment; association with rhodoliths (Mediterranean)
5	1170	Cold Water Corals (CWC)	A6.61, A6.66	ME123 ME221 MF221	Mixed cold water coral communities on Atlantic upper bathyal rock, Atlantic lower



Site-Specific Conservation Objectives

				MC222 MD221	bathyal cold water coral reef, Cold water coral reefs in the Atlantic circalittoral zone, Cold water coral reefs in the Atlantic offshore circalittoral zone
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b.	Marine Species			
	i). Marine Mammals (Habitats Directive – Annex II)			
	<u>Group</u>	<u>Annex</u>	<u>Scientific Name</u>	<u>Common Name</u>
6	Cetacean	II, IV	<i>Phocoena phocoena</i>	Harbour porpoise
7	Cetacean	II, IV	<i>Tursiops truncatus</i>	Common bottlenose dolphin
8	*Pinniped	II, IV	<i>Monachus monachus</i>	Mediterranean monk seal
	ii). Marine Birds (Birds Directive – Annex I and regularly occurring migratory species under Article 4(2))			
	<u>Group</u>	<u>Annex</u>	<u>Scientific Name</u>	<u>Common Name</u>
9	Seabird	I	<i>Fratercula arctica</i>	Atlantic puffin
10	Seabird	I	<i>Uria aalge</i>	Common guillemot (Common murre)
11	Seabird	I	<i>Thalasseus sandvicensis</i>	Sandwich tern
12	Seabird	I	<i>Rissa tridactyla</i>	Black-legged kittiwake
	iii). Marine Reptiles			
	<u>Common Name</u>	<u>Annex</u>	<u>Scientific Name</u>	<u>Common Name</u>
13	*Loggerhead turtle	II, IV	<i>Caretta caretta</i>	Loggerhead sea turtle
	iv). Fish (Annex II)			
	<u>Common Name</u>	<u>Annex</u>	<u>Scientific Name</u>	
14	*European sturgeon	II, IV	<i>Acipenser sturio</i>	European sturgeon (Atlantic sturgeon)

Notes to Annex 3.2. *Desmophyllum pertusum* is not itself listed on Annex II of the Habitats Directive; it is used here as a proxy taxon for the Annex I habitat type 1170 (Reefs) in its cold-water coral form. The full set of selected features, of which those listed above are a sample, is grouped into the 14 evidence-base features. Maerl beds was retained in the selection as a sub-category of 1110 although it does not exist as a separate habitat type under the HD. Cold water corals were treated as a sub-category, but separate from Reefs (coralligenous formations - 1170). An asterisk (*) denotes a priority habitat type or priority species under the Habitats Directive.



ANNEX 4: LITERATURE SEARCH AND COMPILATION FRAMEWORK

Annex 4.1: Example concept blocks used to construct database search strings

Habitats	Birds	Mammals	Supporting	Monitoring
"area" OR "extent" OR "structure" OR "structural complexity" OR "density" OR "height" OR "canopy" OR "matte" OR "age structure" OR "size- frequency" OR "geological feature" OR "seabed characteristi c" OR "substrate" OR "sediment type" OR "depth range" OR "characteristi c species" OR "typical species" OR "influential species" OR "keystone species" OR "canopy species" OR "species richness" OR "community	"species of interest" OR "habitat requirements" OR "environmental requirements" OR "feeding requirements" OR "breeding requirements" OR "reproduction requirements" OR "juvenile requirements" OR "migration requirements" OR "fledgling" OR "fledge" OR "adult" OR "breeding" OR "overwintering" OR "non-breeding" OR "flyway" OR "roosting" OR "nesting" OR "foraging" OR "burrow" OR "nest" OR "pelagic" OR "seabird" OR "wader" OR "waterfowl" OR "shorebird" OR "diver" OR "duck" OR "special protection area" OR "birds directive"	"optimal range" OR "tolerance limits" OR "temperature limits" OR "pH tolerance" OR "oxygen requirements" OR "critical thresholds" OR "critical population density" OR "critical prey density" OR "critical predator density" OR "small cetaceans" OR "large cetaceans" OR "pinnipeds" OR "Phocoena phocoena" OR "harbour porpoise" OR "hearing threshold shift" OR "mating" OR "calving" OR "echolocation" OR "communication" OR "fecundity" OR "bioaccumulation" OR "reproduction" OR "density" OR "population size" OR "bycatch" OR "underwater noise" OR "prey availability" OR "death rate" OR "birth rate" OR "disturbance" OR	"depth" OR "temperatur e" OR "salinity" OR "pH" OR "current velocity" OR "energy" OR "exposure" OR "sedimentati on rate" OR "water circulation" OR "turbidity" OR "nutrient loading" OR "dissolved oxygen" OR "contaminan ts" OR "vibration" OR "light exposure" OR "electromag netic fields" OR "smothering"	"novel monitoring" OR "monitoring" OR "status" OR "trends" OR "indicators" OR "targets" OR "evaluation" OR "quality"



Site-Specific Conservation Objectives

composition" OR "trophic structure" OR "food web" OR "grazing" OR "primary production" OR "epiphyte" OR "non- indigenous species" OR "invasive species" OR "problematic species" OR "food chain" OR "sea floor" OR "dominance" OR "displacemen t" OR "community structure"		"displacement" OR "injury" OR "collision"		
Search terms applied to Grey Literature: Keywords in combinations (AND/OR/NOT) used across Web of Science, Scopus, Google Scholar, EEA/EUNIS, OSPAR, HELCOM, AEWa, SCANS sites, and national repositories				
Core FRV / policy terms "Favourable Reference Value" OR "FRV" OR "Favourable Reference Population" OR "Favourable Reference Area" OR "Favourable	Feature-specific terms (add more as required) ("Posidonia oceanica" OR "Posidonia" OR "seagrass") ("sandbanks" OR "sand banks" OR "1100" OR "1110") ("reef" OR "biogenic reef" OR "sublittoral reef") ("harbour porpoise" OR "Phocoena	Methodology / data terms "SCANS-III" OR "SCANS" OR "line-transect" OR "distance sampling" "Article 17" OR "Habitats Directive reporting" OR "Annex I" OR "Annex II" "EUNIS" OR "EUNIS code" "population viability analysis" OR "PVA" OR	Boolean query for Google Scholar/Scopus: ("Favourable Reference Value" OR FRV) AND (Posidonia OR "seagrass" OR "sandbank" OR "sublittoral reef" OR "harbour porpoise" OR "minke whale" OR "Northern Gannet") AND (EUNIS OR "Article 17" OR SCANS OR AEWa OR HELCOM OR OSPAR)	



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Reference Range "Favourable Conservation Status" OR "FCS"	phocoena" OR "cetacean") ("minke whale" OR "Balaenoptera acutorostrata") ("Seabird" OR "Northern Gannet" OR "Barnacle Goose" OR "breeding population") ("seal" OR "ringed seal" OR "grey seal" OR "Harbour seal")	"carrying capacity" OR "MVP" OR "minimum viable population" "monitoring protocol" OR "indicator" OR "core indicator" OR "LRL" OR "TRL"	
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Annex 4.2: Literature Compilation Template

Each record identified through the search strategy was compiled using the fields below, so that screening, extraction and verification decisions remain traceable.

Field	Description
Record ID	Unique identifier assigned to each publication or document.
Feature	Qualifying habitat or species to which the record relates.
Full reference	Authors, year, title, source and DOI or URL.
Source type	Peer-reviewed article, grey literature, policy or guidance document, or regional assessment.
Database and search string	Database searched and search string used (Annex 4.1), with the search date.
Geographical scope	Sea basin, marine region and country or site covered.
Thematic category	Main ecological attribute or pressure addressed.
Parameters and thresholds	Candidate parameters, metrics, units and any reported thresholds or reference values.
Screening decision	Included or excluded at title/abstract and full-text stage, with the reason for exclusion (Annex 4.3).
Verification status	VERIFIED, SOURCE-SUMMARY or PENDING (Section 4.8.1).
Reviewer and comments	Reviewer initials and any notes on relevance, quality or uncertainty.

Annex 4.3: Literature Screening and Selection Criteria for SSCOs Development

Criteria	Inclusion	Exclusion	Rationale
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Site-Specific Conservation Objectives

Habitats and species	Marine habitats and species listed under Annex I of the Birds Directive and Annexes I and II of the Habitats Directive	Species or habitats not listed in Annex I or II	Focus on legally protected species and habitats relevant for SSCOs
Topics	Ecological requirements, conservation status, pressures/threats, conservation measures, monitoring methods/indicators	Studies unrelated to ecological requirements, conservation, pressures, or monitoring	Ensure relevance to SSCOs development and conservation planning
Geography	EU, UK, EEA, and other Mediterranean regions	Other regions outside the EU/EEA/Mediterranean	Maintain applicability to EU marine policy and management
Publication type	Peer-reviewed articles, grey literature (technical reports, monitoring reports, EU/national assessments), synthesis documents	Opinion pieces, unsupported commentaries, or sources without empirical or synthesised evidence	Ensure credibility and evidence-based conclusions
Temporal coverage	Primarily 2013–present; extend back to 1990 for baseline ecological data	Publications outside this range unless providing essential baseline data	Capture recent knowledge while retaining important historical context
Language	All languages, provided translation is feasible (human or machine-assisted)	Languages that cannot be reliably translated	Include relevant international sources while ensuring usability of evidence

ANNEX 5: ANALYTICAL FRAMEWORK FOR PARAMETER IDENTIFICATION AND INTEGRATION IN SSCO DEVELOPMENT

Annex 5.1: Full MCDA scoring matrix (Criteria used to evaluate each parameter identified through the search strategy)

Dimension	Guiding question	Scoring Logic (1-5)	Score (1–5)	Weight (%)	Weighted score



Site-Specific Conservation Objectives

Ecological Relevance	Does the parameter identify sites with important ecological functions? Does the parameter directly support conservation status assessment? Does it capture habitat use, migration behaviour, movement pathways, connectivity or network importance? Does it capture species/habitat conditions and wildlife health metrics? Does it help to highlight pollution, contaminants, disease exposure? Does it help identify and mitigate distributed threats? Does it capture habitat integrity and water quality?	Low (1) → High (5)		25	
Transferability	Can it be applied consistently across regions/sites? Does it support cross-border coordination and monitoring? (applicability across ecological networks)	Poor (1) → Robust (5)		22	
Legislative and Policy Alignment	Is it aligned with policy and legal requirements? Does it support regional or international conservation obligations?	No alignment (1) → Explicit legal requirement (5)		22	



Site-Specific Conservation Objectives

Management Feasibility	Can it support practical management action? Can management actions be coordinated beyond individual sites? Across national and regional boundaries? Can management actions directly/quantifiable influence the current status? Does it support cross-sector interventions and mitigation measures? Does it support integrated ecological and health surveillance?	Not actionable (1) → Directly actionable (5)		21	
Data Availability	Are sufficient data available? Are movement and connectivity datasets (telemetry, tracking, or spatial datasets) available (HMS dimension)? Are ecological status/quality and species health data available (One Health dimension)?	No data (1) → Established time series (5)		10	
Total				100	

Annex 5.2: Classification of threshold and reference-value types for the SSCOs blueprint

Threshold type	Definition	Typical use in an SSCO
Legal or statutory threshold	A limit or standard fixed in binding EU or national legislation.	Environmental quality standards and threshold values adopted in law.
Policy target or reference value	A value adopted in EU or national guidance or reporting frameworks that is not itself legally binding.	Favourable Reference Values (range, population, area) used in Article 17 reporting.
Scientific (ecological) threshold	A value derived from peer-reviewed evidence at which ecological condition or function changes materially.	Density, cover or light-availability limits reported in the literature.
Baseline or reference condition	The value describing the condition against which change is measured, taken from historical data, reference sites or modelling.	Historical extent or population size of a feature at the site.
Trend-based threshold	A permitted direction or rate of change, rather than an absolute value.	No net decline in extent or abundance over a reporting period.
Qualitative / quantitative descriptor	A narrative criterion used where no defensible numerical value exists.	Presence of characteristic species; absence of physical damage.

Annex 5.3: Evidence Chain Template

The Evidence Chain records, for each qualifying feature, how every prioritised parameter is carried from the extracted evidence to the final site-specific conservation objective (Section 6.1, step vi). One row is completed per parameter, using the columns below.

Column	Content to record
Qualifying feature	Habitat type or species, with its site and marine region.
Ecological requirement	Attribute of the feature the objective addresses (e.g. extent, structure, function, population).
Prioritised parameter	Parameter name, metric and unit, with its Phase II tier (Table 4).
Supporting evidence	Key references and verification status of the underlying records.
Reference baseline	Reference condition or baseline value and its source.
Threshold or reference value	Value and threshold type (Annex 5.2), with its source.
Current site condition	Latest condition value, data source and date, or a note that data are unavailable.



Site-Specific Conservation Objectives

Column	Content to record
Site-specific target	Maintain or restore target, expressed in the conditional form where condition is unknown.
Pressures and monitoring	Relevant pressures and activities, monitoring method and frequency.
Conservation objective and confidence	Final objective statement and its confidence rating.

Annex 5.4: Visual conventions for tiers and site condition

Prioritisation tier and site condition are distinct concepts and are therefore shown with separate colour schemes: shades of blue for the tier of a parameter, and a green–amber–red scheme for the condition of a feature at a site. The same conventions are used in all figures, tables and dashboards produced under the blueprint.

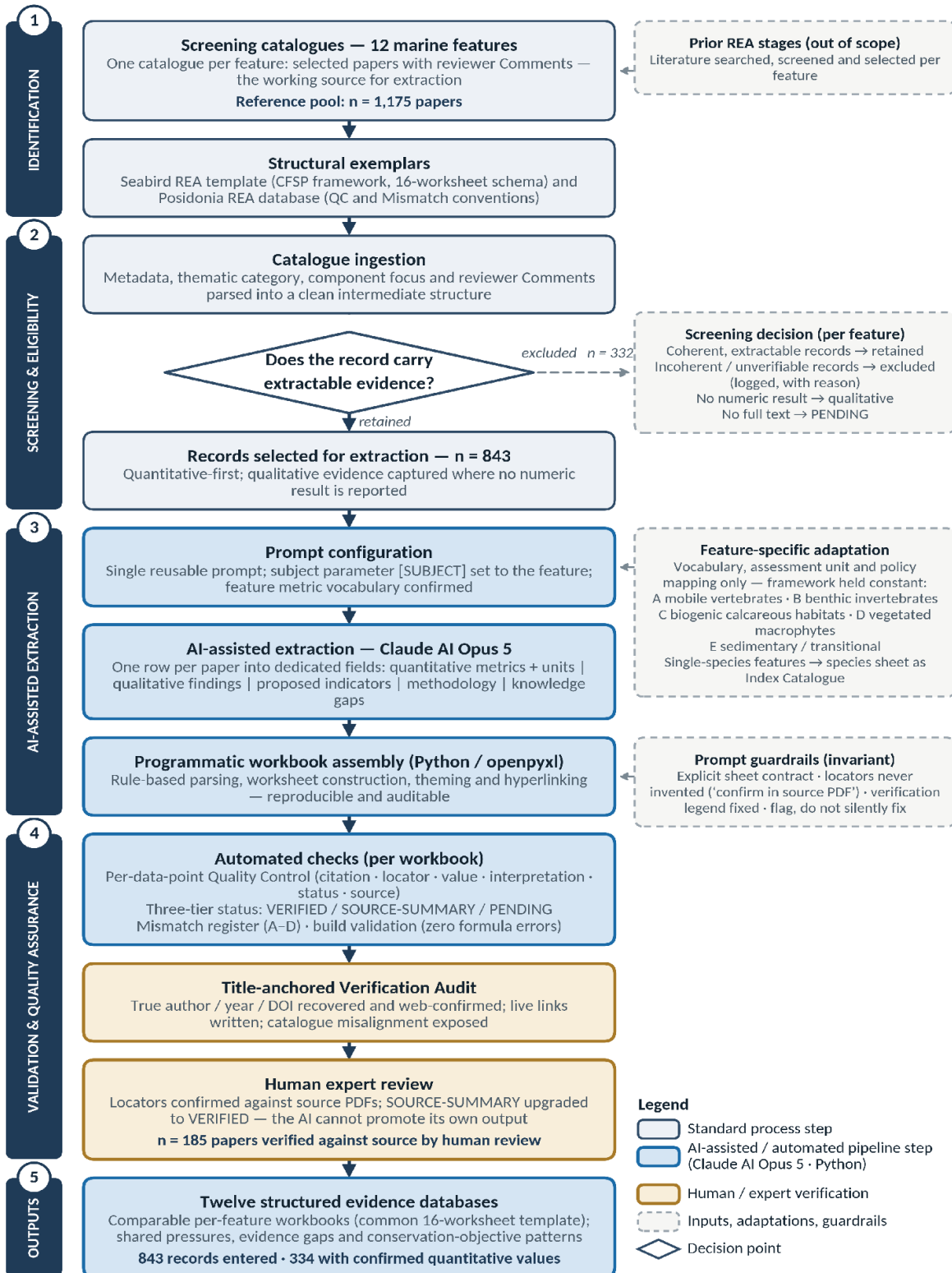
Scheme	Class	Colour	Hex code
Prioritisation tier	Tier 1	Dark blue	#1F4E79
Prioritisation tier	Tier 2	Mid blue	#2E75B6
Prioritisation tier	Tier 3	Light blue	#BDD7EE
Site condition	Target met	Green	#548235
Site condition	Target not met but improving	Amber	#FFC000
Site condition	Target not met	Red	#C00000
Site condition	Unknown or not assessed	Grey	#A6A6A6

ANNEX 6: AI-BASED PER-FEATURE EVIDENCE BASE: SELECTION AND EXTRACTION

Evidence extraction and quality-assurance workflow. A common, traceable pipeline applied to all twelve qualifying features, from the per-feature screening catalogues to the twelve structured evidence databases. Shading distinguishes standard process steps, AI-assisted and automated pipeline steps, and human / expert verification; dashed panels show inputs, feature-specific adaptations and the invariant prompt guardrails. Counts shown are totals across the twelve features.



Site-Specific Conservation Objectives



ANNEX 7: INFORMATION RECORDED FOR EVERY OBJECTIVE

Regardless of the form selected, each conservation objective should record the following information:

- Feature and parameter: Feature; parameter; validation rank
- Current and reference condition: Current value; reference baseline
- Threshold and direction: Threshold; threshold type; desired direction
- Target specification: Target; unit; spatial scale; temporal scale
- Monitoring: Monitoring requirement, including method and frequency
- Evidence and sources: Supporting evidence; baseline sources; threshold sources
- Confidence and uncertainty: Confidence rating; assumptions; limitations; residual uncertainty.

Eclipse was created in 2016 to help governments, institutions, businesses and NGOs make better-informed decisions when it comes to biodiversity in Europe. www.eclipse.eu