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NSAC Advice on MSFD Descriptors 3 and 6

This paper was approved with consensus by the NSAC Executive Committee on 15 July 2026.

Executive Summary

This section provides an overview of the key NSAC recommendations concerning MSFD review. Further details are provided in the Advice section.

MSFD Descriptor 3

- NSAC members recommend that the **roles of ICES and the Commission** (DG MARE and DG ENV) in defining the scope of scientific advice **be further clarified**. A **clearer mutual understanding of advisory needs** could improve alignment between scientific outputs and policy requirements.
- Future work may explicitly explore whether it is suitable/feasible for threshold-setting for D3C3 to be based on **identifiable ecological breakpoints** or **rely on policy-defined targets** informed by scientific evidence.
- **Societal scrutiny and stakeholder input** to these **value-laden** deliberations may prove valuable in contributing to and refining scientific evidence and informing policymaking and management.
- In the context of the MSFD revision and CFP evaluation, greater alignment between these frameworks should be pursued to ensure **consistency in objectives, indicators, and management responses**.
- Clarification is needed on the relationship between **Blim, BMSY-trigger, and MSFD “good environmental status” concepts**, and how these relate to D3C3 interpretations of healthy population structure. A **consistent conceptual framework** would improve transparency and comparability across assessments.
- D3C3 should be **interpreted within a realistic, ecosystem-based and dynamic management context** rather than as a uniform static requirement.
- Continued emphasis should be placed on improving and regularly reviewing model assumptions underlying **age- and size-based indicators**. Future methodological guidance should clearly **distinguish between these sources of uncertainty** and



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ensure periodic reassessment of modelling frameworks as new data and methods become available.

- The potential role of D3C3 indicators in **improving TAC and quota stability** should be further examined.
- Greater attention should be given to **how scientific uncertainty is communicated** and used in decision-making.
- While frameworks such as ABIMSY have received positive scientific feedback, their operational uptake remains dependent on formal validation and policy acceptance. Given the urgency of delivering workable D3C3 solutions, a **more structured and coordinated validation pathway** between ICES and the Commission is recommended.
- Greater attention to **gear impacts and selectivity patterns** could improve understanding of demographic changes and support more ecologically coherent management strategies.
- In the context of defining GES for commercially exploited stocks, the principles of **food security and food sovereignty** should be explicitly considered.

MSFD Descriptor 6

- **Other activities than fisheries**, such as offshore wind development, dredging, eutrophication, and oxygen depletion, also exert significant and increasing impacts and **should be more systematically integrated**.
- Targeted efforts need to be made to **close data gaps for non-fisheries pressures**.
- Offshore wind and other offshore renewable energy (ORE) activities are increasingly important pressures on seabed ecosystems. There is a need to improve the **understanding of cumulative and large-scale impacts**.
- NSAC members welcome **recurring annual scientific advice to DG ENV on seabed habitat status and pressure-impact trade-offs**.
- All threshold-setting exercises under Descriptor 6 need to **explicitly acknowledge the current limitations in available datasets**, particularly for non-fisheries pressures.
- **Benthic monitoring data (type 3 data) from fisheries surveys** can provide valuable spatial coverage of benthic fauna across habitats and regions.
- There is a need to continue and enhance the detailed and **accurate mapping of the seabed**. Improved habitat maps are a prerequisite for effective spatial management and for correctly assessing the impact of pressures.
- The fishing sector, due to its wide spatial presence, can provide valuable local knowledge of areas that are otherwise less frequently sampled. Improved integration of **science–industry data** should be a priority, to make them compatible with existing mapping frameworks or data call structures.
- The use of **at least three indicators** per assessment area is considered necessary to ensure a more reliable evaluation of benthic ecosystem condition.
- **Consistency across indicators** increases robustness of the assessment.
- **Indicator selection is considered the most critical step** in the assessment process.
- Using precautionary approach, **key pressures should be considered in a risk-based approach** without the need to resolve full cumulative complexity.
- Indicators should not be combined into a single aggregated metric. Instead, **each indicator should be assessed separately with its own threshold**.

- Quality thresholds should not be applied uniformly across all habitats or indicators. Different habitats **sensitivity could be reflected in adjusted weighting or extent values**.
- **No single threshold value is appropriate for all habitat types** or assessment criteria.
- Less sensitive habitats (eg, mobile sands) may justify **less stringent thresholds**, reflecting higher natural variability.
- Significant advances have been made in assessing habitat extent, distinguishing the **impacts of different fishing gears**, and evaluating **pressure-response** relationships across habitat types. These developments have strengthened the move towards **integrated regional seafloor assessments**.
- Strengthened **science-industry partnerships** should continue catering for refined footprint and impact assessments.
- Potential **synergies between environmental monitoring and defense-related infrastructure** could facilitate funding and deployment of integrated monitoring systems.
- Because threshold setting is such an **ambiguous and undefined process** with no clear scientific determination of the extent of each habitat sufficient to have a healthy ecosystem, the process is **inherently democratic and value-laden** and should therefore be negotiated in the **policy-science-society interface**.
- The **same methodological framework** should be applied consistently across MSFD broad habitat types and under the Nature Restoration Regulation, particularly for Group 7 habitats, to avoid divergence between legislative approaches.
- **Stakeholder engagement** is integral to **Integrated Ecosystem Assessments (IEAs)**. Stakeholders help evaluate trade-offs, define acceptable environmental risks and conservation objectives, and support implementation through greater acceptance and compliance.
- **Ongoing participation and deliberation within Advisory Councils** promotes adaptive management by providing feedback on ecosystem changes and management effectiveness.
- There is **no primacy in basic human needs**, like food, nature and energy. All three ecosystem services should be given equal consideration in resource planning and governance.
- **Technological innovations** aimed at reducing the physical impact of fishing on the seabed must be formally recognised, encouraged, and financially supported to facilitate their widespread adoption across the European fleet.

1 Background

Since 2008, the Marine Strategy Framework Directive (MSFD) has attempted to achieve good environmental status (GES) in all EU marine waters by 2020, ensuring that European seas and oceans are clean, healthy and productive, and that the use of marine resources is in line with nature's capacity. A recent evaluation of the MSFD¹ concluded that the Directive has been partially effective in reaching its objectives but not yet achieving the GES in all EU waters and for all 11 descriptors. In Spring 2025, the Ocean Pact announced that the Commission will revise the MSFD to accelerate progress towards environmental objectives, simplify implementation, and reduce the administrative burden of reporting and data management.

¹ https://environment.ec.europa.eu/document/659eea3a-8a00-410e-bc2f-f94baf210c9b_en

In 2022, NSAC and NWWAC submitted a comprehensive advice on the MSFD review,² commenting on the implementation of the directive. Over the years, we have also produced several papers addressing one or multiple MSFD descriptors, including a paper on pollution in the Skagerrak and Kattegat³, and another one on the circularity of fishing gear⁴.

Finally, NSAC wishes to highlight that alongside formal advice from stakeholders, numerous sector-led initiatives are actively contributing to the objectives of the MSFD. Projects such as 'Fishing for Litter' in Belgium and the Netherlands demonstrate the fishing industry's commitment to undertaking voluntary ecological actions that support and improve the status of several MSFD descriptors.

In 2025, NSAC established a Focus Group on MSFD to provide further stakeholder input to MSFD revision.

Complementing the [first NSAC advice on MSFD](#), this paper gathers thematic recommendations on the MSFD Descriptors 3 and 6. The advice draws on presentations by Simon Jennings (ICES) on ICES work on MSFD indicators, Christopher A. Griffiths (SLU Aqua) on the paper *Including Older Fish in Fisheries Management: A New Age-Based Indicator and Reference Point for Exploited Fish Stocks*⁵, and Gert Van Hoey (ILVO) on developments of Descriptor 6 Package, including work by the Commission's Technical Group on Seabed and ICES' workshops on seafloor integrity thresholds (MSFD D6C5).

2 Descriptor 3 – Commercial Fish & shellfish

Descriptor 3 of the MSFD aims to ensure that populations of commercially exploited fish and shellfish are maintained within safe biological limits and exhibit a healthy population age and size structure. The descriptor is assessed through three criteria, addressing fishing mortality, spawning stock biomass, and population demographics.

Criteria D3C1 and D3C2 have now been aligned with FMSY and MSY biomass reference points of the CFP as adopted in the [Commission Decision \(EU\) 2017/848](#). Significant challenges remain for data-limited stocks, for which robust estimates of fishing mortality and biomass reference points are often unavailable.

2.1 Criterion D3C3 – Population age and size structure

This criterion addresses the age and size distribution of individuals within commercially exploited populations, with the objective of maintaining a sufficient proportion of older and larger individuals and safeguarding genetic diversity and population resilience. As such, D3C3

² https://www.nsrac.org/wp-content/uploads/2022/03/05-2122-NSAC-NWWAC-Advice-on-MSFD-review_final.pdf

³ <https://www.nsrac.org/wp-content/uploads/2025/02/09-2425-NSAC-Advice-on-Pollution-in-the-SkaKat.pdf>

⁴ <https://www.nsrac.org/wp-content/uploads/2020/07/13-1920-NSAC-Advice-on-Circular-Design-of-Fishing-Gear.pdf>

⁵ <https://onlinelibrary.wiley.com/doi/full/10.1111/faf.12789>

represents the additional ecological ambition of the MSFD beyond the production-oriented objectives of the CFP.

In its 2024 advice⁶, ICES focused primarily on stocks with analytical age-structured assessments (Category 1 stocks), while recognising the need to develop approaches applicable to a broader range of populations, including data-limited stocks.

In the future, ICES work will center on evaluating the performance of age- and size-based indicators and on defining appropriate thresholds for GES. The establishment of thresholds for D3C3 is considerably more complex than for D3C1 and D3C2. Whereas fishing mortality and biomass thresholds can be linked to MSY reference points, acceptable age and size structures cannot always be determined solely on scientific grounds. In the absence of clear ecological change points, defining thresholds inevitably involves value judgements regarding ecological objectives and societal priorities. While science can inform these choices, the setting of thresholds ultimately constitutes a policy decision that lies outside the advisory remit of ICES. To support this process, ICES is currently preparing technical guidance for the European Commission, outlining key findings and a roadmap for future work on D3C3.

Recent work by SLU Aqua⁵ has proposed a framework for assessing D3C3 for Category 1 stocks, providing guidance on robust age- and size-based indicators and the development of coherent reference points and thresholds. Applied to 81 ICES Category 1 stocks, representing a large proportion of commercial catches, the analysis showed that heavily exploited stocks often remain depleted in older individuals even when biomass and fishing mortality indicators suggest satisfactory status. This finding indicates a potential time lag between stock recovery and the restoration of natural population age structure and highlights the importance of incorporating demographic indicators into assessments of GES.

2.2 NSAC Advice for descriptor 3

- NSAC members recommend that the **roles of ICES and the Commission** (DG MARE and DG ENV) in defining the scope of scientific advice **be further clarified**. While ICES advice is formally open to addressing a broad range of scientific questions, there is a perceived divergence between expectations: general perception is that ICES is not restricted in the advice it may provide, however requests often focus primarily on yield-maximising fisheries objectives of the CFP. A **clearer mutual understanding of advisory needs** could improve alignment between scientific outputs and policy requirements.
- Population structure typically responds to fishing pressure along a continuum, making it difficult to define a clear ecological threshold separating “healthy” from “unhealthy” states. Future work may explicitly explore whether it is suitable/feasible for threshold-setting for D3C3 to be based on **identifiable ecological breakpoints** or **rely on policy-defined targets** informed by scientific evidence.

⁶ https://ices-library.figshare.com/articles/report/EU_request_on_identifying_operational_indicators_and_defining_usable_threshold_values_reference_points_for_criterion_D3C3_under_MSFD_Decision_EU_2017_848/25265284?file=44649871

- **Societal scrutiny and stakeholder input** to these deliberations may prove valuable in contributing to and refining scientific evidence and informing policymaking and management, particularly where **value-judgements play a role**.
- While CFP management is primarily tied to MSY-based yield optimisation, D3C3 introduces **ecological expectations regarding population structure** that are not explicitly reflected in yield-based frameworks. In the context of the MSFD revision and CFP evaluation, greater alignment between these frameworks should be pursued to ensure consistency in objectives, indicators, and management responses.
- Clarification is needed on the relationship between Blim, BMSY-trigger, and MSFD “good environmental status” concepts, and how these relate to D3C3 interpretations of healthy population structure. A **consistent conceptual framework** for distinguishing ecological thresholds, management targets, and precautionary triggers would improve transparency and comparability across assessments.
- As with biomass-based management, indicators of age and size structure will naturally fluctuate over time and across stocks. It is therefore unlikely that all species will simultaneously meet an ideal condition of a high proportion of older individuals. This implies that D3C3 should be **interpreted within a realistic, ecosystem-based and dynamic management context** rather than as a uniform static requirement.
- Continued emphasis should be placed on improving and regularly reviewing model assumptions underlying age- and size-based indicators. While age determination (i.e., otolith-based methods) is generally considered robust and relatively stable, size-based metrics are more variable and influenced by environmental and biological factors. Future methodological guidance should clearly **distinguish between these sources of uncertainty** and ensure periodic reassessment of modelling frameworks as new data and methods become available.
- The potential role of D3C3 indicators in **improving TAC and quota stability** should be further examined. Available evidence suggests that while age-based indicators may not reduce short-term variability in recovering stocks, they could improve interpretability of stock status in well-performing stocks and thereby support more stable and informed long-term management decisions.
- Greater attention should be given to **how scientific uncertainty is communicated** and used in decision-making. Managers often require clear, defensible guidance with minimal uncertainty to support accountability, while robustness of scientific assessment frameworks relies on explicit communication of uncertainty. Improved dialogue between scientists, managers, and policy-makers could support more robust and transparent decision-making under D3C3.
- Some Member States (i.e., Sweden) have begun applying **age-based indicators** for internal MSFD assessments, but broader implementation requires formal endorsement through ICES processes. While frameworks such as ABIMSY have received positive scientific feedback, their operational uptake remains dependent on formal validation and policy acceptance. Given the urgency of delivering workable D3C3 solutions, a **more structured and coordinated validation pathway** between ICES and the Commission is recommended.
- Current practices (technical measures) may selectively remove larger individuals or alter size distribution in ways not fully captured by biomass-based indicators. Greater attention **to gear impacts and selectivity patterns** could improve understanding of demographic changes and support more ecologically coherent management strategies.

- In the context of defining GES for commercially exploited stocks, the principles of food security and food sovereignty should be explicitly considered. As enshrined in the Paris Agreement Article 2.b ensuring food production is a fundamental priority that must be balanced with environmental objectives. This perspective is essential when setting targets and management measures under Descriptor 3.

3 Descriptor 6 – Seafloor integrity

Descriptor 6 addresses seafloor integrity and aims to ensure that the structure and functions of benthic ecosystems are safeguarded against significant adverse impacts. It is assessed through five criteria covering both the spatial extent of physical pressures and the resulting condition of seabed habitats.

Criteria D6C1, D6C2, and D6C4 focus on the spatial extent and distribution of physical loss and physical disturbance of the seabed. D6C3 describes the proportion of each habitat type that is adversely affected, and D6C5 assesses the resulting condition of seabed habitats, including degradation and loss.

Most ICES work to date has concentrated on understanding the relationship between pressures and impacts, with particular emphasis on the spatial distribution of fishing pressure. This is commonly assessed using swept-area ratio (SAR) approaches derived from Vessel Monitoring System (VMS) data combined with gear-specific characteristics. Other seabed pressures either remain more difficult or politically inconvenient (i.e. “overriding public interest” argument for offshore wind development) to quantify consistently at broader spatial scales.

Recent ICES advice⁷ focuses on evaluating and testing different approaches to threshold setting for seafloor integrity indicators as well as addressing the linkages between MSFD Descriptor 6 and the Nature Restoration Regulation, with the aim of improving coherence, reducing reporting burden, and ensuring consistency across the two policy frameworks.

Looking ahead, future advisory requests include the provision of recurring annual scientific advice to DG ENV on seabed habitat status and on trade-offs between human activities and seabed condition. This will enable systematic tracking of changes in pressure from fishing, conservation measures, and emerging activities such as offshore renewable energy, and support assessment of their cumulative effects.

3.1 NSAC Advice for descriptor 6

- Current analyses are heavily **biased towards fishing impacts**. While fisheries represent a major spatial pressure, other activities, such as offshore wind development, dredging, eutrophication, and oxygen depletion, also exert significant and increasing impacts and should be more systematically integrated.
- For a more comprehensive picture, targeted efforts need to be made to **close data gaps for non-fisheries pressures**, particularly where impacts occur at spatial scales

⁷ https://ices-library.figshare.com/articles/report/EU_request_to_advise_on_seafloor_integrity_thresholds_MSFD_D6C5_operational_methods_and_application_to_the_Nature_Restoration_Regulation/32244633?file=64514757

relevant for MSFD assessments. Many existing datasets are limited to localised studies and are not directly scalable to continental shelf assessments, limiting their usability for threshold setting and comparative analyses.

- Offshore wind and other offshore renewable energy (ORE) activities are increasingly important pressures on seabed ecosystems, including through changes in regional and local hydrography and circulation, nutrient distribution, phytoplankton and primary production, and sediment load in the water column⁸ affecting fish stocks. While local-scale effects are relatively well documented, there is **limited understanding of cumulative and large-scale impacts**.
- Descriptor 6 assessments should better reflect recent changes in marine spatial use, including developments after 2022 such as expanded marine protected areas, new fishing closures, and increasing spatial displacement of fishing effort due to ORE development. In view of this, NSAC members welcome **recurring annual scientific advice to DG ENV on seabed habitat status and pressure-impact trade-offs**. Such recurrent advice could be further developed into an adaptive monitoring framework capable of capturing changes in fishing effort distribution, spatial closures, and emerging industrial activities.
- Overall, all threshold-setting exercises under Descriptor 6 need to **explicitly acknowledge the current limitations in available datasets**, particularly for non-fisheries pressures. These limitations should be transparently reflected in methodological guidance to avoid over-reliance on fishing-related datasets as proxies for overall seabed pressure–impact relationships.
- Habitat maps are often model-based, not continuously updated, and in many cases remain incomplete. Better integration of existing datasets is crucial. In particular, **benthic monitoring data (type 3 data) from fisheries surveys** can provide valuable spatial coverage of benthic fauna across habitats and regions. At the same time, the need for updated and more comprehensive national habitat layers is a high priority for improving assessment quality.
- To ensure that management measures are both targeted and proportionate, it is crucial to continue and enhance the detailed and **accurate mapping of the seabed**. Improved habitat maps are a prerequisite for effective spatial management and for correctly assessing the impact of pressures.
- The fishing sector, due to its wide spatial presence, can provide valuable local knowledge of areas that are otherwise less frequently sampled. However, such data are not always compatible with existing mapping frameworks or data call structures. Improved integration of **science–industry data** should therefore be a future priority.
- At least one indicator from each of three categories should be used: (1) **species-based or trait-based indicators**, (2) **diversity indicators**, and (3) **biomass or abundance indicators**. The use of at least three indicators per assessment area is considered necessary to ensure a more reliable evaluation of benthic ecosystem condition.
- Greater confidence can be achieved when several indicators point to the same outcome. **Consistency across indicators** increases robustness of the assessment. The combined use of multiple indicators can therefore be mapped to identify areas of agreement and strengthen confidence in the results.

⁸ Renner, H. H. A., 2025. Current knowledge and key gaps in understanding of offshore wind farm impacts on the physical marine environment. *ICES Journal of Marine Science*, Volume 82, Issue 12, December 2025. <https://academic.oup.com/icesjms/article/82/12/fsaf235/8403876>

- The choice of indicator has a stronger influence on threshold outcomes than the choice of threshold-setting method. Therefore, **indicator selection is considered the most critical step** in the assessment process.
- A comprehensive assessment of cumulative impacts of pressures is the end goal. However, to not delay action, **key pressures should be considered in a risk-based approach** without the need to resolve full cumulative complexity.
- Indicators should not be combined into a single aggregated metric. Instead, **each indicator should be assessed separately with its own threshold**.
- Some indicators, such as sensitive, fragile, or long-lived species, may respond at relatively low levels of disturbance, whereas others may show more gradual changes. Consequently, quality thresholds cannot be applied uniformly across all habitats or indicators. In future developments, this **sensitivity could be reflected in adjusted weighting or extent values**.
- The development of quality thresholds is a complex process that must account for natural variability within ecosystems, differing sensitivities among species and habitats, and the range of ecological responses to human pressures. As a result, **no single threshold value is appropriate for all habitat types** or assessment criteria.
- Less sensitive habitats (eg, mobile sands) may justify **less stringent thresholds**, reflecting higher natural variability. This approach includes a policy component but can also be parameterized statistically.
- Over the past decade, improved use of Vessel Monitoring System (VMS) data has enabled more accurate mapping of fishing footprints and their spatial distribution. Significant advances have also been made in assessing habitat extent, distinguishing the **impacts of different fishing gears**, and evaluating pressure-response relationships across habitat types. These developments have strengthened the move towards **integrated regional seafloor assessments**.
- Strengthened **science-industry partnerships** should continue catering for refined footprint and impact assessments.
- Offshore wind farms have been identified as potential infrastructure platforms for monitoring equipment such as cameras or acoustic sensors for use in military and defense sectors. Potential **synergies between environmental monitoring and defense-related infrastructure** could facilitate funding and deployment of integrated monitoring systems.
- Threshold-setting is a complex process and is more a policy choice than a scientific one. This choice is guided and informed by international political conventions (Convention on Biological Diversity, EU Habitats Directive etc) or national decisions (UK, Germany) on the basis of best available science. Because threshold setting is such an **ambiguous and undefined process** with no clear scientific determination of the extent of each habitat sufficient to have a healthy ecosystem, the process is **inherently democratic and value-laden** and should therefore be negotiated in the **policy-science-society interface**.
- The **same methodological framework** should be applied consistently across MSFD broad habitat types and under the Nature Restoration Regulation, particularly for Group 7 habitats, to avoid divergence between legislative approaches.
- **Stakeholder engagement** is integral to **Integrated Ecosystem Assessments (IEAs)**. Stakeholders help identify relevant ecosystem components, pressures, and services, ensuring assessments address real-world concerns. They also contribute local and experiential knowledge that complements scientific evidence. Engagement enhances the legitimacy, transparency, and credibility of assessment outcomes,

building trust and reducing conflicts. Stakeholders help evaluate trade-offs, define acceptable environmental risks and conservation objectives, and support implementation through greater acceptance and compliance.

- **Ongoing participation and deliberation within Advisory Councils** promotes adaptive management by providing feedback on ecosystem changes and management effectiveness.
- There is **no primacy in basic human needs**, like food, nature and energy. The application of the principle of “overriding public interest” to offshore wind is therefore irrelevant and should not guide policy decisions. All three ecosystem services should be given equal consideration in resource planning and governance.
- **Technological innovations** aimed at reducing the physical impact of fishing on the seabed must be formally recognised, encouraged, and financially supported to facilitate their widespread adoption across the European fleet. Acknowledging and promoting these advancements is key to mitigating the impacts of bottom-contacting gears.

4. Conclusion

Overall, NSAC members underline that further development and implementation of the MSFD requires improved coherence both within Descriptor 3 and Descriptor 6 and across related EU policy frameworks. For Descriptor 3, priority should be given to clarifying institutional roles and expectations between ICES and the Commission, and to addressing the fundamental methodological challenge of defining reference points for age- and size-structure indicators. A recurring concern is the structural misalignment between MSFD objectives and CFP implementation, particularly regarding the treatment of stock structure and the ecological importance of large and old fish.

For Descriptor 6, members highlight the need to move towards a more balanced and comprehensive assessment of seabed pressures across all sectors. Current analyses are disproportionately driven by fisheries data availability, while impacts from offshore wind, dredging, and other activities remain less well quantified at relevant spatial scales. Improved data collection, harmonised datasets, and better cumulative impact assessments are considered essential to support robust threshold setting and policy development.

Across both descriptors, NSAC members stress the importance of addressing data gaps, improving comparability between sectors, and strengthening the scientific basis for threshold development. The need for regularly updated assessments and more adaptive and recurrent advice is highlighted, especially given rapidly evolving spatial pressures in the North Sea. Meaningful stakeholder engagement remains an important component of integrated ecosystem assessments and development and refinement of ecosystem indicators.

NSAC members thank the European Commission for taking their views into consideration in the revision of the MSFD. NSAC is ready to provide any further clarification on the content of this advice and to engage in continued dialogue on the topic.