

CMECS Peer Review of Proposed Changes Guidelines

A broad range of scientific expertise contributed to the development of the Coastal and Marine Ecological Classification Standard (CMECS) and its endorsement by the Federal Geographic Data Committee (FGDC). This expertise will remain essential to any updates and modifications to CMECS as part of the Dynamic Standard Process (DSP). The following is intended to assist subject matter experts and peer reviewers involved in evaluating proposed modifications to CMECS and supports Step 3 in the CMECS DSP: *Criteria for determining if proposed revisions meet DSP Submission Guidelines*. The DSP is designed to ensure that proposed changes receive the appropriate level of review, to support tracking of the decision process, and to maximize transparency related to the decision on a proposed change for the submitter as well as the user community at large. This guidance identifies issues and questions to be considered in evaluating proposed revisions, and offers a sense of how the DSP is conducted. The document is not a procedural manual, although procedures are discussed.

Criteria related to specific proposed modifications

Building on a strong understanding of the goals and domain of CMECS, reviewers should give priority to the scientific relevance of any proposed modification of the standard. The following specific criteria will help determine the ecological validity and necessity of a proposed modification to CMECS.

1. *Biological Relevance* - Does the change recognize factors that are believed to shape biotic patterns?
2. *Repeatability* – Are any new units based on relatively homogeneous assemblages or physical characteristics – are new/modified units recurring observations in space and time, characterized by dominant or representative species or physical characteristics.
3. *Clear Circumscription* - Do the units include clearly defined conceptual boundaries that are consistent with others? Does the description include the key classifiers with thresholds (numerical cutoff values or descriptive boundaries)? Is there a clear and scientifically defensible rationale for the conceptual boundaries? Are distinctions made between seemingly similar types?
4. *Uniqueness* - Does the new unit or the re-organization of units improve the ability to distinguish meaningful features?

5. *Logical Internal Consistency* – Is the change consistent with the pattern of existing classifiers or is it a suggestion to change the pattern of the classifiers for that component/level? Does it break any other logic someplace else? Have they provided a rationale for different classifiers? Reviewers are encouraged to review the CMECS ontology document.
6. *Range-wide Description* – Does the change address the unit across its entire range of distribution? Units should not be just a local variant of something more broadly distributed. Does the description include a description of variability across its range?
7. *Temporal Influences* – In light of an increasingly dynamic environment resulting from factors such as climate change, what is the longevity of any proposed new units and their relationship to other biotic and abiotic entities? NOTE-features which may be ephemeral in the landscape, such as algal blooms, should be reflected in CMECS.
8. *Necessity* – For proposals related to areas of CMECS other than units, is the change necessary for clarity, function, logical consistency, or application of the standard?

Criteria related to consistency with goals of CMECS

Reviewers must consider the Ecological Foundation of the standard as described in Section 2.6¹ in evaluating proposed changes. The issues discussed in this section are important to maintaining the soundness of the system itself, the ability of users to apply it in their work, and the utility of end products developed using the standard.

1. *Build a Scientifically Sound Ecological Classification*
First and foremost any proposed revision must have a strong scientific justification. New units and modifications to existing units should improve the ability to discriminate ecologically meaningful variables.
2. *Meet the Needs of a Wide Range of Users*
To the greatest extent possible, any proposed revisions to CMECS should be applicable by a wide range of users with varying areas of expertise. Occasionally it will be necessary to create units that require detailed knowledge in a particular topic area, but is preferable when units are based on characteristics that non-specialists can identify.
3. *Maintain a Comprehensive Internally Consistent Structure*
Generally units within the CMECS hierarchy are based on one or two bio-physical variables (e.g. growth morphology). To the greatest extent any new or revised units should use the same variables to define any new units. Whenever possible proposed new units should nest within the existing hierarchy, although modifications to the hierarchy are acceptable with sufficient scientific or practical justification.

4. *Support Mapping Needs*

Reviewers should consider the ability of the geospatial community to apply any revisions at scales ranging from grabs to satellite imagery.

5. *Maintain Flexibility*

There may be proposed revisions that reflect very local conditions or characteristics of interest. Reviewers should consider these proposals with the awareness that users can apply additional local modifiers and attributes as needed, within the overarching structure of CMECS and that a modification of the standard may not be necessary.

Having determined the ecological validity of a proposed change there are several potential ways it might be accomplished with CMECS. These include:

- Addition of a new unit at any level of the hierarchy
- Removal (or dissolving) of an existing unit into another
- Movement of a unit upward or downward in the hierarchy
- Removal or addition of a new hierarchical level
- Movement of existing units into different higher level units in the hierarchy.
- Changes in thresholds related to unit definitions.
- Changes in text to support other changes not related to units.

Reviewers should consider which of these options is most appropriate with the clear preference for changes that minimize alterations to the rest of the standard.

Additional instructions for peer reviewers

Beyond considerations described above, reviewers should evaluate the following:

1. *How is CMECS in its current form (before proposed revision) deficient?*
Does the perceived problem relate to the standard itself or to ancillary issues such as coding, applications, mapping protocols, or data management? Note that the DSP relates only to the text of the standard itself.
 - a) Is the proposed change really needed? Can the identified deficiency be addressed through alternate applications of the current version of CMECS?
 - b) Is the proposed change primarily a matter of adopting an approach that is familiar to, preferred by or convenient for the proposer?
2. *Is the proposed revision likely to be at odds with or unfavorably impact other FGDC standards?* CMECS shares units and definitions with other federally endorsed standards. What are the implications of a proposed change on

these standards? The three standards which should be considered in addressing this question are:

- a) Classification of Wetlands and Deepwater Habitats in the United States, FGDC-STD-004,
- b) National Vegetation Classification Standard (Version 2.0), FGDC-STD-005-2008,
- c) Metadata Profile for Shoreline Data Standard (FGDC-STD-001.2-2001

3. *Is the proposed approach included in or congruent with widely accepted foreign ecological classification standards?* Throughout development CMECS has been designed to integrate with other relevant international standards and has borrowed concepts and structure from them. Would the proposed changes improve the ability to assess landscapes across international boundaries?

Decision Reporting and Recommendations

As the review team formulates their decision on a proposed change and prepares their response, the Implementation Group will need specific information to apply any recommendation. This information includes the scientific justification, the resources (additional information/data) used to arrive at a recommendation, and the anticipated implications of the decision. This information and all supporting documents will be preserved by the Implementation Group to ensure a transparent DSP process. Specific areas outside of the proposed change itself where reviewers are asked to comment are:

Review Decision – Specific recommendations on the proposal.

- Proposed names for new or aggregated units
- Proposed definitions for new or aggregated units
- Proposed hierarchical locations for new units in any relevant components. This includes elements of a new feature that may have biotic, substrate or geoform elements, such as shallow coral reefs.
- New parents for units being aggregated into others

Review Confidence – Information on the confidence among the review team in making a recommendation. Is additional expertise needed? Can an ecological consensus be reached? Is additional information needed from the proposer?

Additional Review - Should this proposal be made available for public comment (in addition to technical review) because of potential economic implications or possible significant impacts to user groups or governmental policy (at any level)? All recommendations from the evaluation team will be considered by the CMECS Implementation Group and other stakeholders as appropriate. Some changes are of small enough scale (typographic errors, etc.) that only very limited review

will be needed to apply the change. Others may have significant impacts to the user community. Reviewers are asked to recommend whether evaluation of a change by additional users, researchers or the public at large is advisable.

Clarification of Origin - Was the concept identified by best professional judgement/expertise/knowledge of the system, or through available data.

Address Controversy - Are there user communities that would be negatively impacted by the change? What steps to mitigate negative impacts could be developed? The reviewers may have some understanding of the various scientific perspectives on controversial issues and on ways to address these issues.

Address Benefits of the Change - What are the pros and cons to adopting the change? Does the change enhance our ability to recognize the units from data (i.e. geofoms that can be detected from bathymetry)? Are there practical applications reasons for making the change? Does the change make the classification easier to understand and use?

Implementation Considerations - Will the change require new implementation guidance? Are there data collection or observation requirements associated with any changes that need to be conveyed to the user community. What are the pros and cons to adopting the change? Does the change enhance our ability to recognize the units from data (i.e. geofoms that can be detected from bathymetry)? Are there practical applications reasons for making the change? Does the change make the classification easier to understand and use?

Throughout the review the Implementation Group will be available to support the reviewers. Reviewers are encouraged to continue their involvement in the pool of experts available to evaluate future proposed changes to CMECS and to share their experience with others.