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National Organic Standards Board
USDA-AMS-NOP
1400 Independence Ave. SW.,
Room 2648-S, Mail Stop 0268
Washington, DC 20250-0268

Docket ID # AMS-NOP-21-0038

Re. CS: *Lithothamnion*

These comments to the National Organic Standards Board (NOSB) on its Fall 2021 agenda are submitted on behalf of Beyond Pesticides. Founded in 1981 as a national, grassroots, membership organization that represents community-based organizations and a range of people seeking to bridge the interests of consumers, farmers and farmworkers, Beyond Pesticides advances improved protections from pesticides and alternative pest management strategies that reduce or eliminate a reliance on pesticides. Our membership and network span the 50 states and the world.

In a memo, the National Organic Program (NOP) asks the NOSB to determine whether *Lithothamnion*, a genus of coralline marine red algae, can be certified organic.

NOP Policy Memo 12-1 states, "This policy memorandum is issued as a reminder that aquatic plants and their products may be certified under the current USDA organic regulations. Certifiers and their clients may use the USDA organic regulations, including the National List of Allowed and Prohibited Substances at 7 Code of Federal Regulations (CFR) 205.601-205.602, as the basis for the production and certification of cultured and wild crop harvested aquatic plants." Thus, it would appear that NOP has already decided that aquatic plants are eligible for certification.

However, as the Crops Subcommittee (CS) points out, the issue is not so clear. The CS reasons that because *Lithothamnion* is not a product of agriculture and is harvested as the dead skeletons of the algae, that it is nonagricultural. We would add that it also meets the definition of "nonagricultural" as cited by the CS because it is "extracted from, isolated from, or a fraction of an agricultural product [as determined by the NOP[1]] so that the identity of the agricultural product is unrecognizable in the extract, isolate, or fraction." (We have consistently made this argument without adequate response from NOP.)

The CS concludes, therefore, that since *Lithothamnion* is not agricultural and is not a wild crop that it cannot be certified organic. That is where the CS leaves the issue. But *Lithothamnion* is a marine material and, as such, deserves further consideration.

The conservation of marine materials used in organic production affects materials used in crop production, livestock production, and handling. The recommendation passed in Fall 2020 addresses marine algae used in crop production. Further action is needed on handling and livestock materials.

In its work on Marine Macroalgae in Crops Inputs, the Board convened an expert panel on marine materials at the Fall 2019 NOSB meeting, which included two scientists. A number of questions were addressed to the scientists, including (reply in *italics*):

> 6. Are there some species that are so important to ecosystem structure and function that harvest should not be permitted at all?
> *a. Coralline algae should be considered as off-limits to harvesting because of their life history characteristics and ecological importance.*

Coralline algae, **including *Lithothamnion***, are marine red macroalgae whose cell walls are heavily impregnated with calcium carbonate, making them an important structural element of coral reefs. They form a crust covering the structure produced by coral animals, cementing it together and providing structural stability.[2,3] Crustose coralline algae, through their storage of calcium carbonate, provide a significant sink for carbon that has been calculated at potentially 1.6×10^9 tons of carbon per year.[4] Unfortunately, coralline algae are at risk from multiple causes. Eutrophication can cause overgrowth of macroalgae that smother the reefs.[5] The climate crisis threatens the reefs through both acidification and warming.[6] Harvesting adds another threat,[7] something organic must not do. After all, the goal of organic, through conintuous improvement, is to achieve agricultural production and processing sytems and

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[1] NOP Policy Memo 12-1.
[2] Bjork, M., Mohammed, S.M., Bjorklund, M. and Semesi, A., 1995. Coralline algae, important coral-reef builders threatened by pollution. *Ambio*, *24*(7-8), pp.502-505.
[3] MD Johnson, 2014. Coralline algae: the unsung architects of coral reefs. https://ocean.si.edu/ocean-life/plants-algae/coralline-algae-unsung-architects-coral-reefs.
[4] Van der Heijden, L.H. and Kamenos, N.A., 2015. Reviews and syntheses: Calculating the global contribution of coralline algae to total carbon burial. *Biogeosciences*, *12*(21), pp.6429-6441.
[5] Bjork, M., Mohammed, S.M., Bjorklund, M. and Semesi, A., 1995. Coralline algae, important coral-reef builders threatened by pollution. *Ambio*, *24*(7-8), pp.502-505.
[66] Diaz-Pulido, G., Anthony, K.R., Kline, D.I., Dove, S. and Hoegh-Guldberg, O., 2012. Interactions between ocean acidification and warming on the mortality and dissolution of coralline algae 1. *Journal of Phycology*, *48*(1), pp.32-39.
[7] EPA, 2021. Threats to coral reefs. https://www.epa.gov/coral-reefs/threats-coral-reefs.

practices that are compatible with sustaining and enhancing the ecosystem on which life depends.

Therefore, use of products derived from *Lithothamnion* should be prohibited.

Marine biodiversity is important, and the roles played by marine algae (seaweed) are important to marine biodiversity and ecology.

Marine biodiversity is declining. Human threats to marine environments include overharvesting, global warming, biological introductions, pesticide run-off, and other forms of pollution. These factors, separately and together, have resulted in a rapid decline in global marine biodiversity, as reflected in species extinctions, population depletions, and community homogenization. This biodiversity loss may result in changes in ecosystem function and a reduction in the provision of ecosystem services. The timing and magnitude of future catastrophic events like ecological collapse cannot be predicted, though it is likely that they will become more frequent.[8] In coastal areas, "Human impacts have depleted >90% of formerly important species, destroyed >65% of seagrass and wetland habitat, degraded water quality, and accelerated species invasions. Twentieth-century conservation efforts achieved partial recovery of upper trophic levels but have so far failed to restore former ecosystem structure and function."[9]

Biodiversity loss in the oceans has negative impacts on humans, and scientists recommend applying the precautionary principle to preventing harm to the oceans. "We conclude that marine biodiversity loss is increasingly impairing the ocean's capacity to provide food, maintain water quality, and recover from perturbations. Yet available data suggest that at this point, these trends are still reversible."[10] A precautionary strategy should "consider the ecological significance of all animals and plants when providing policy protections and to address the levels of genome, species, and habitat."[11]

Marine algae play multiple ecological roles, and overharvesting of marine algae can have multiple detrimental impacts on marine biodiversity. Kelp forests are some of the most diverse and productive habitats on Earth.[12] Kelps provide physical structure, habitat, and shading, as

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[8] Sala, E. and Knowlton, N., 2006. Global marine biodiversity trends. *Annu. Rev. Environ. Resour.*, *31*, pp.93-122.
[9] Lotze, H.K., Lenihan, H.S., Bourque, B.J., Bradbury, R.H., Cooke, R.G., Kay, M.C., Kidwell, S.M., Kirby, M.X., Peterson, C.H. and Jackson, J.B., 2006. Depletion, degradation, and recovery potential of estuaries and coastal seas. *Science*, *312*(5781), pp.1806-1809.
[10] Worm, B., Barbier, E.B., Beaumont, N., Duffy, J.E., Folke, C., Halpern, B.S., Jackson, J.B., Lotze, H.K., Micheli, F., Palumbi, S.R. and Sala, E., 2006. Impacts of biodiversity loss on ocean ecosystem services. *Science*, *314*(5800), pp.787-790.
[11] Wilder, R.J., Tegner, M.J. and Dayton, P.K., 1999. Saving marine biodiversity. *Issues in Science and Technology*, *15*(3), pp.57-64.
[12] Smale, D.A., Burrows, M.T., Moore, P., O'Connor, N. and Hawkins, S.J., 2013. Threats and knowledge gaps for ecosystem services provided by kelp forests: a northeast Atlantic perspective. *Ecology and evolution*, *3*(11), pp. 4016-4038.

well as a source of food. They provide habitat for invertebrates, fish, and marine top-predators, such as seabirds and sea mammals.[13] The detritus from these habitats is exported to other habitats –some quite distant— where it serves as a significant biological resource.[14]

The oceans provide a sink for carbon dioxide. As stated in the Technical Review on marine plants and algae,[15] biological forces that remove CO_2 from the atmosphere include phytoplankton, seagrasses, and marine algae. A recent study shows that "marine macroalgae do contain refractory compounds and thus may be more valuable to long-term carbon sequestration than we previously have considered."[16]

We support mechanisms for protecting marine ecology from the impacts of harvesting marine algae for use in organic products and production.

Cultivated marine algae should also be subject to examination of the impacts of the cultural practices used to produce them. For example, warm water species that are cultivated for use in carrageenan present "serious bio-invasive risks for nearby marine communities" — not only spreading beyond cultivation sites, but also smothering coral ecosystems and contributing to reef degradation. Other adverse impacts are detailed in the carrageenan technical review.[17]

A recent brief by the United Nations University and the Scottish Association for Marine Science also highlights impacts of production of marine algae products.[18] In relation to cultivated species, it says,

> For example, the red seaweed *Kappaphycus* is one of the most valuable crops grown for its carrageenan content, a product used widely in food, pharmaceuticals, and nutraceuticals. As a result, the cultivation of this crop has been promoted in over 30 countries worldwide. The occurrence of 'ice-ice' disease - a bacterial infection causing whitening of the seaweed branches and epiphyte infestations, however, have led to dramatic declines in the productivity of this crop in the Philippines, where this seaweed originated, in many of the other countries where it has been introduced (e.g. Madagascar and Tanzania). In the Philippines alone, disease caused a 15% loss in

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[13] Lorentsen, S.H., Sjøtun, K. and Grémillet, D., 2010. Multi-trophic consequences of kelp harvest. *Biological Conservation*, *143*(9), pp.2054-2062.
[14] Krumhansl, K.A. and Scheibling, R.E., 2012. Production and fate of kelp detritus. *Marine Ecology Progress Series*, *467*, pp.281-302.
[15] Technical Review for Marine Plants and Algae, Lines 1099-1113.
[16] Trevathan-Tackett, S.M., Kelleway, J., Macreadie, P.I., Beardall, J., Ralph, P. and Bellgrove, A., 2015. Comparison of marine macrophytes for their contributions to blue carbon sequestration. *Ecology*, *96*(11), pp.3043-3057.
[17] 2011 TR lines 469-551.
[18] Cottier-Cook, E.J., Nagabhatla, N., Badis, Y., Campbell, M., Chopin, T, Dai, W, Fang, J., He, P, Hewitt, C, Kim, G. H., Huo, Y, Jiang, Z, Kema, G, Li, X, Liu, F, Liu, H, Liu, Y, Lu, Q, Luo, Q, Mao, Y, Msuya, F. E, Rebours, C, Shen, H., Stentiford, G. D., Yarish, C, Wu, H, Yang, X, Zhang, J, Zhou, Y, Gachon, C. M. M. (2016). Safeguarding the future of the global seaweed aquaculture industry. United Nations University (INWEH) and Scottish Association for Marine Science Policy Brief. ISBN 978-92-808-6080-1. 12pp. http://voices.nationalgeographic.com/files/2016/08/Final-unu-seaweed-aquaculture-policy-for-printing.pdf.

production of *Kappaphycus alvarezii* between 2011 and 2013 (a reduction of 268,000 tonnes), equating to a loss of over US$ 310 million based on a value of 1.09 USD/kg (farm-gate price). [19]

Other marine species should also be protected.

It is important to protect marine algae –species at the foundation of marine ecosystems. However, fish (and soon squid) may also be used in crop production. Like marine algae, they should be allowed only when obtained by sustainable and regenerative methods that are not destructive to the environment. We encourage the NOSB to also consider restrictions on the use of fish and squid products that meet those criteria.

Conclusions

In summary, we make the following recommendations:

- The NOSB should continue its efforts to clarify the identities of species of marine algae used in organic production. Application of binomial nomenclature to marine algae needs to be clarified, and any restrictions need to be justified.
- The NOSB should investigate mechanisms for protecting marine ecology from the impacts of harvesting marine algae for use in organic products and production. The NOSB should look at natural materials in use in crops and livestock, as well as those on the National List.
- The NOSB should also protect marine animals.
- **The NOSB should protect *Lithothamnion* by prohibiting its use in organic production.**

Thank you for your consideration of these comments.

Sincerely,

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Board of Directors
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[19] Cottier-Cook, E.J., et al. (2016). Safeguarding the future of the global seaweed aquaculture industry. United Nations University (INWEH) and Scottish Association for Marine Science Policy Brief. ISBN 978-92-808-6080-1. 12pp. http://voices.nationalgeographic.com/files/2016/08/Final-unu-seaweed-aquaculture-policy-for-printing.pdf.