**National Organic Standards Board**
**Crops Subcommittee Proposal**
**Wild, Native Fish for Fertilizer Production**
**July 21, 2020**

**Summary**:
The use of fish in crop fertility products has a long history in organic agriculture. Over the past five years, the board has heard from stakeholders about potential negative environmental impacts of harvesting some marine materials for organic production. The purpose of this proposal is to limit the impact of harvesting wild, native fish for fertilizer and to ensure that liquid fish fertilizer products used in organic production are not harmful to the environment.

**Background**:
As part of the most recent sunset review of Liquid Fish Products (LFPs) under Section 205.601(j)(8) of the organic regulations, the Crops Subcommittee posed questions to stakeholders asking about the number of products using wild fish harvested solely for fertilizer versus products utilizing fish waste or byproducts. The board learned that the majority of LFPs use fish byproducts (offal), and some use whole fish harvested to control invasive species. At its Spring 2018 meeting, the board received testimony that some manufacturers are using wild, native fish harvested exclusively for fertilizer. Consequently, the Crops Subcommittee requested the development of a **Technical Report (TR) on Fish-Based Fertilizers** to investigate this further. At its spring 2020 meeting, the board put forward a Discussion Document on the topic soliciting stakeholder feedback.

**Relevant Areas of OFPA and the Regulations**:
OFPA Section 6517 [National List] (c) [Guidelines for Exemptions or Prohibitions] (1)(a)(i) and (2)(a)(i) which allows for the prohibition of synthetic or nonsynthetic substances, respectively, that would be "harmful to ... the environment."

OFPA Section 6518 [National Organic Standards Board] (m) [Evaluation] which directs the Board to consider—(6) "the alternatives to using the substance in terms of practices or other available materials; and (7) its compatibility with a system of sustainable agriculture."

§205.601 Synthetic substances allowed for use in organic crop production
In accordance with restrictions specified in this section, the following synthetic substances may be used in organic crop production: Provided that, use of such substances does not contribute to contamination of crops, soil, or water...
(j) As plant or soil amendments.
(8) Liquid fish products—can be pH adjusted with sulfuric, citric or phosphoric acid. The amount of acid used shall not exceed the minimum needed to lower the pH to 3.5.

NOSB Policy and Procedures Manual, Principles of Organic Agriculture Organic agriculture, adopted 2001, 1.1 states: Organic agriculture…is an ecological production management system that promotes and enhances biodiversity, biological cycles, and soil biological activity.

**Discussion**:
In its TR request, the Subcommittee asked the following questions:

1. During the Spring 2018 public meeting, the Crops Subcommittee asked if there are manufacturers using exclusively wild-caught, native fish to manufacture liquid fish fertilizers and learned that there are. Public testimony suggested that other non-synthetic fish-based fertilizers, such as fishmeal, may also be derived from wild fish harvested solely for fertilizer production. Is any new information available about the impact of fish fertilizer manufacturing on the sustainability and health of wild, native fish stocks harvested solely for fertilizer production?
2. To what extent does the harvesting of wild, native fish exclusively for use as a fertilizer harm the environment?
3. Do different methods, locations, and/or frequencies of harvest pose different levels of risk for wild, native stocks?
4. Are there any species of wild, native fish for which there are no negative environmental impacts of harvest?
5. Are there any fish fertilizer products derived from farmed fish, and if so, are there any negative environmental impacts?
6. Are there any fish fertilizer products derived from wild, non-native fish populations, and if so, are there any negative or positive environmental impacts?
7. Please describe the environmental impact of using wild, native fish harvested exclusively for fertilizer versus using byproducts or invasive species.
8. Please provide universally agreed upon definitions of "wild, native fish", "wild-harvested", and "invasive species".
9. Please provide examples of non-regulatory/practice-based approaches (e.g. training, guidance) that should be considered.

The findings of the TR were different from previous public comments. Specifically, the TR states that "based on available data, wild, native fish are not harvested solely for fertilizer production (see Table 1, in 268 Specific Uses of the Substance) (OMRI, 2019a). Rather, fish waste or otherwise unusable material is generally used as the starting material for fish-based fertilizers." (TR Lines 267-69). This statement is explained below (TR Lines 93-109):

> Of the 124 fish-based fertilizers listed by OMRI, 76 percent contained at least some wild fish, 15 percent contained at least some farmed fish, and 27 percent contained fish where it was not possible to tell if a source was farmed or wild (OMRI, 2019a). Products in some cases used various combinations of wild, farmed, and unknown fish. Twelve percent of products contained at least some fish meal, 45 percent contained at least some fish hydrolysate, and 43 percent contained at least some fish solubles. One product contained both meal and solubles and was counted in both groups.
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> It is worth noting that in Table 1, fish harvested for meal, oil, and solubles were not considered to be harvested solely for fertilizer production. The majority of fish-based fertilizers derived from the wet reduction process contain solubles—a material that is sometimes considered a byproduct of the process. A few products contain meal, but they do not also include fish oil; therefore, only a portion of the saleable fish biomass is utilized specifically for fertilizer and one cannot say that the fish were harvested exclusively for fertilizer use. An analogous example would be beef cows raised for steaks, ground meat, renderings and leather; those animals were not raised exclusively for any single one of those materials. Furthermore, only 2 percent of products contained fish meal that was derived from fish harvested specifically for wet

> reduction. The remaining 10 percent of products containing fish meal are derived from fish waste that undergoes further processing.

Table 1 in the TR states that of OMRI listed products, 43.5% are derived from market fish waste for human consumption (hereafter referred to as "waste"), 3.2% from bycatch and mortality, 31.5% from meal, oil, and solubles, 12.9% from market fish waste and bycatch/mortalities, 8.9% from market fish waste, meal, oil, and solubles, and 0% from fish sources specifically and exclusively for fertilizer.

The TR is extensive and answers the questions posed by the CS. While the amount of fish harvested globally for fertilizer is not available due to limited data, the TR addresses the generally negative impacts of commercial fishing on many wild, native stocks. The TR states:

> Production of fish-based fertilizers could, to a small degree, drive demand for fish harvested for meal, oil, and solubles production. Fish-based fertilizers are unlikely to create demand for fish waste that drives fish harvesting rates for human consumption. The extent that harvesting wild, native fish for use as a fertilizer harms the environment is small compared to the primary uses of fish because of the difference in scale (Lines 319-23).

The TR goes on to explain that:

> While none of the fish species known to be harvested for fish reduction purposes and which are incorporated into fish-based fertilizer products are threatened or endangered species (see Table 2), their population dynamics are not understood in many cases. It is also difficult to ascertain the effect of removing biomass, even from a sustainable fishery, considering that these species may be a food source for other species. Meal and oil fish can be critical to the function of entire ecosystems; for example, Pacific thread herring (Opisthonema libertate) and Pacific anchoveta (Cetengraulis mysticetus) are critical links in the Gulf of California, transferring energy through the food web and controlling the organization of these ecosystems (Hernandez-Padilla et al., 2017). (TR Lines 342-49)
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> Regardless of the intended use, harvesting wild, native fish can contribute to biodiversity loss, habitat destruction, and loss of ecosystem services. (TR lines 327-28)

The TR discusses some species used for meal/oil that have experienced documented large-scale population declines, though not always exclusively as a result of over-fishing. It addresses the effects of large-scale harvesting on fisheries and the broader ecosystems, yet it notes the relationship to fish used in fertilizer is scale-dependent. Harvest methods, location and timing, and gear are discussed. The use and impacts of farmed fish for fertilizers is also explained. Moreover, fertilizers made from waste of fish harvested for human consumption include species with well documented declines and collapses (TR lines 386-94).

During the spring 2020 meeting, the Board solicited public comment on the following questions:

1. Given the results of the TR indicating that there are no species of wild, native fish harvested exclusively for use in LFPs, please provide feedback on any next steps the subcommittee should take on this issue.

2. The TR outlines the wet reduction process for fish meal, oil, and solubles and states that solubles are a byproduct of meal (solid phase) and oil (liquid phase) production. Because of the multiple products derived, it did not consider fertilizers using them to be from fish harvested exclusively for fertilizer. Please comment.
3. Please provide any additional information you may have to help answer the TR questions, particularly:
    - During the Spring 2018 public meeting, the Crops Subcommittee asked if there are manufacturers using exclusively wild-caught, native fish to manufacture liquid fish fertilizers and learned that there are. Public testimony suggested that other non-synthetic fish-based fertilizers, such as fishmeal, may also be derived from wild fish harvested solely for fertilizer production. Is any new information available about the impact of fish fertilizer manufacturing on the sustainability and health of wild, native fish stocks harvested solely for fertilizer production?
    - Do different methods, locations, and/or frequencies of harvest pose different levels of risk for wild, native stocks?
    - Please provide examples of non-regulatory/practice-based approaches (e.g. training, guidance) that should be considered.

A number of public commenters advised that since the TR indicates that no fish are harvested exclusively for fertilizer, the board should not continue work on this topic. Others stated that the discrepancy between the spring 2018 public comments and the TR results should be clarified. The subcommittee confirmed with the TR authors that they conducted additional research and analysis that revealed the multi-use purpose of fish harvested for wet reduction, namely for meal, oil, and solubles, information unavailable for the spring 2018 public comments.

Commenters noted that organics should not degrade one ecosystem—in this case, the marine environment—to promote the health of another—agriculture. As one certifier stated, some producers think liquid fish products are already the result of waste only. Others expressed support for the precautionary principle. Several noted that even if fish are not harvested exclusively for fertilizer, having an outlet for meal and solubles provides some economic incentive to harvesting fish for meal for livestock feed and oil.

It was suggested that the environmental impact should be considered in balance with all evaluation criteria. It was recommended that the NOP issue an instruction to Material Review Organizations to collect data on 1) the types of fish used, 2) the percentage that is waste, by-catch and mortalities, and meal, oil, and/or solubles, and 3) farmed, wild, or invasive.

Fish-based fertilizers are widely used by organic farmers. The board heard from several producers of fish-based fertilizers stating that they share the board's concern that fish should not be harvested exclusively for fertilizer and that they use waste material (heads, racks, skin, and viscera) left over from fish and shellfish processed for human food products. They explained that previously, these materials were dumped back into the ocean. Several harvesters noted that the waste they use comes from fish harvested in the U.S. Exclusive Economic Zone. They expressed concern over a lack of government oversight in some other regions.

One commenter shared his experience as an organic inspector for a fish-based fertilizer:

> Several years ago, I undertook an inspection of a liquid fish production facility for OMRI, part of the mandatory inspection of facilities producing high nitrogen liquid fertilizer products that is now mandated under NOP. The inspection took place in a region that I know has been heavily, negatively impacted by years of unregulated or poorly regulated commercial fishing, namely Mexico's Sea of Cortez. While I previously assumed that most if not all fish fertilizer products were generated from bycatch or processing waste from canneries, while performing the inspection I was deeply shocked, surprised and saddened to learn that the operation was harvesting fish stocks solely for the purpose of producing fish emulsion and fish meal.

The commenter further states:

> I believe the TR actually does a disservice by attempting to separate fish stocks that are harvested for fishmeal from those that are harvested for fish solubles. Either way, we are talking about mining the oceans for agricultural nutrients, whether they are fish solubles or fish meal used as fertilizer or feed, at a time when there are not enough resources left to support healthy marine ecosystems, not to mention the many poor people who depend on these fisheries to survive.

A number of commenters expressed support for allowing fish-based fertilizers from human consumption waste only.

**Proposal**:
In its initial discussions, the Subcommittee considered how any negative environmental impacts associated with harvesting wild, native fish for fertilizer might be addressed in the regulations. There is no intention to exclude the use of farmed fish or invasive species that are harvested to protect native ecosystems, though the TR explains that there are currently few such products on the market (TR lines 662-87). The Subcommittee explored the merits of an annotation to Section 205.601(j)(8) prohibiting the use of wild, native fish harvested solely for the manufacture of those materials, as well as listing wild, native fish harvested solely for fertilizer at Section 205.602. While the Subcommittee initially proposed that a prohibition on 205.602 alone would suffice, public comment suggested that an annotation should also be listed at 205.601(j)(8). The Subcommittee consulted with the Organic Materials Review Institute (OMRI) and found that the overwhelming majority of fish fertilizer products they list are synthetic. In discussion with the National Organic Program and review of OFPA section 6517(c), it was determined that the best course of action would be a single listing at 205.601(j)(8). The proposed definitions were crafted based on language in the TR. The definition of bycatch, in particular, is a fusion of federal definitions and wording from the TR.

As noted above, the TR Table 1 lists the source of fish for OMRI listed products, and a total of 60% are from a combination of waste and/or bycatch/mortalities. Of the remaining products, 31.5% are from meal, oil, and solubles from the wet reduction process, and 9% are a combination of waste and meal, oil, and solubles. It is important to note that meal, oil, and/or solubles can be derived from fish waste. The TR explains that "some meal, oil, and solubles are produced from fish originally harvested for other purposes" (TR pg. 3, footnote 3). In other words, "waste from fish harvested for other purposes is sometimes diverted into fish meal production" (TR pg. 3, footnote 3). Additionally, "the majority of fish meal used in fish-based fertilizers is produced from fish waste, but a minor amount (2 percent) is produced from fish

caught specifically for reduction purposes (fish meal and fish oil, with fish solubles as a byproduct or coproduct)" (TR lines 337-39). The TR goes on to explain that "fish solubles used in fish-based fertilizers on the other hand most often come from fish harvested specifically for meal and oil production" (TR lines 339-40). Finally, "while 55 percent of fish-based fertilizers currently approved by OMRI contain fish meal or solubles, the remaining 45 percent contain hydrolysates, most of which are produced from fish scraps of wild fish, harvested for human consumption" (TR lines 384-86). It is unclear from the TR how many of the OMRI-listed products in Table 1 derived only from meal, oil and solubles (31.5% of the total) are sourced from fish harvested exclusively for wet reduction (see footnote below for a breakdown of products by source).

The question before the subcommittee is whether fertilizer products containing fish harvested exclusively for the wet reduction process should be used. The wet reduction process harvests fish for meal, oil, and solubles. After harvest, the fish are cooked and pressed. The solids and liquids are separated. The solids become fish "meal". The liquids can be further separated into "oil" and "solubles". Solubles are then evaporated and concentrated.

> Fish-based fertilizers occur in liquid and dry forms. Dry forms are typically composed of the same materials as liquid products, though some dry products contain fish meal, which is not typically found in liquid formulations. Ingredients are usually in one of the following forms: solubles, hydrolysates, or meals. (TR lines 42-45)

The Subcommittee agrees with public commenters that fertilizer derived from fish harvested for the wet reduction process, while not harvested exclusively for fertilizer, is not in keeping with organic principles as both the meal and solubles are used in dry and liquid fertilizers. The Subcommittee also recognizes the importance of fish-based fertilizers for organic producers. Consequently, this proposal recommends an annotation that does not prohibit fish fertilizers but instead requires that they be derived from waste from human use or bycatch/mortalities. The majority of OMRI-listed fish-based fertilizers already meet these criteria.

Public comment questioned how such an annotation could be verified. Because this annotation relates to easily identified ingredients—fish hydrolysates, meal, and/or solubles —an affidavit from producers attesting that the fish ingredients in their products are sourced from waste, bycatch/mortalities, and/or invasive species would be sufficient. Either the product does or does not contain fish products sourced from waste, bycatch, and/or invasive species.

The Subcommittee contacted the TR authors to ascertain the number of fertilizer products containing fish meal, oil, and/or solubles from fish harvested exclusively for the production of meal, oil, and solubles versus fertilizers containing meal, oil, and/or solubles derived from fish waste and/or bycatch. The majority of LFPs are derived from waste and/or bycatch/mortalities[1].

[1] The following data is from a combination of dry products (27) and liquid products (97), for a total of 124 products altogether.

For meal-based products, 11 of the 15 were derived from waste, and 4 were derived from fish harvested for meal/oil/solubles.

As organic production increases, the use of LFPs will rise. This proposal prevents the use and expansion of LFPs from fish harvested exclusively for meal, oil, and solubles, regardless of their portion of market demand relative to other uses for those products.

The TR notes that "In general, commercial fishing has been detrimental to the sustainability and health of many wild, native fish stocks" (lines 290-91). While not specific to those species harvested for meal, oil, and solubles, the TR provides an overview of global fisheries:

> Globally, collapses in large predatory fish now occur in all large marine ecosystems, primarily due to mismanagement and overfishing (Worm et al., 2007; Costello, Gaines, & Lynham, 2008). Except for the Northwest and Northeast Pacific regions, harvests in temperate areas have declined for several years (FAO, 2018), indicating reduced populations of fish biomass, generally. Models have indicated that by 2050, overfishing and habitat degradation will have depleted not only the oceanic shelves, but also deep slopes, canyons, seamounts, and deep ocean ridges of "bottom fish" such as orange roughy, Chilean seabass, and hagfish (Pauly et al., 2003; Worm et al., 2006). In 2015, the FAO considered 33.1% of fish stocks to be harvested at biologically unsustainable levels (2018). (TR lines 299-306)

Specific to fish harvested for meal, oil, and soluble production, the TR provides the following details:

> Of the primary meal/oil fish that are likely to be used in fish-based fertilizers, three species have documented large-scale population declines (collapses) within the last 50 years or so (Table 2). In some cases, localized populations have undergone severe declines, but these declines are not always captured within FAO fact sheets and International Union for Conservation of Nature (IUCN) data. For example, the FAO's fact sheet for Indian oil sardine (*Sardinella longiceps*) does not capture collapses and declines shown by Kripa, et al. (2018). Pacific anchoveta experienced collapse in 1947 around the Gulf of Nicoya (Bayliff, 1969), but this is both outside of the data range, and possibly too localized to show up in FAO fact sheets and IUCN data. These declines are not always due exclusively to overfishing, but also due to climate, ocean currents, and

For solubles-based products, 4 of the 54 were derived from waste, 2 were derived from waste and from bycatch/mortalities, 36 were derived from fish harvested for meal/oil solubles, and 11 were derived from waste and from fish harvested for meal/oil solubles.

None of the hydrolysates-based products (56) were derived from fish harvested for meal/oil/solubles.

Therefore, 40 of the 124 are derived from fish harvested for meal/oil solubles, and 11 were derived from waste and from fish harvested for meal/oil solubles for a total of 51 of 124 products. Note that this proposal only deals with liquid fertilizers. Of the liquid products, 48 would meet the proposed annotation because they are hydrolysates-based (are all which are derived from market waste). Of the 48 solubles-based liquid fertilizers, 4 are derived from waste, 2 are from waste and bycatch/mortalities, 11 are from a combination of waste and from fish harvested for meal/oil solubles, and 31 are from fish harvested for meal/oil solubles. The 1 meal-based liquid fertilizer is derived from waste from market fish.

Finally, it is important to emphasize that this information cannot be assumed to be without error, though every attempt was made to assess the products as accurately as possible. The subcommittee thanks the TR authors for the additional detail they provided.

food web changes—though the exact mechanisms are not always well understood (Chavez, Bertrand, Guevara-Carrasco, Soler, & Csirke, 2008; Bayliff, 1969; Punt, et al., 2016).

Perhaps the most important fish with regard to meal, oil, and solubles production is the Peruvian anchoveta (*Engraulis ringens*). Up to one third of the raw material for fishmeal comes from this fish (FAO, 2007), which is used for animal feed (both terrestrial and aquatic) and fertilizer (Pauly, et al., 2003). According to the FAO, Peruvian anchoveta have been exploited more than any other fish in world history (FAO, 2019a). In 2017, fishers were only able to capture 46 percent of the allotted quota (1.49 MMT), due to a population composed largely of juvenile fish (Fraser, 2018). According to the IUCN, the Peruvian anchoveta population trend is unknown, and this fish has undergone population collapse in the past due to overfishing and climatic conditions (IUCN, 2019; FAO, 2019a).

Likewise, Pacific sardines (*Sardinops caeruleus*) also experienced a population collapse in 1967 (FAO, 2019h). In 2015, the harvest was just 7 percent of what it was in 2009. The most recent decline in Pacific sardines has been attributed to unfavorable environmental conditions (Punt et al., 2016) and intense fishing pressure (Williams, 2014). The population decline of the Pacific sardine has affected populations of brown pelicans, marbled murrelets, Brandt's cormorants, and sea lions, which rely on the sardines as a food source (Williams, 2014; Spratt, 2016). NOAA, however, does not consider the Pacific sardine overfished as of 2017 (NOAA, 2019c). (TR lines 355-81)

Although fish harvested for human consumption has ecological impacts as well, the parts used in fertilizer are considered waste products that would not otherwise have a use. Since the majority of OMRI-listed fertilizers containing fish are sourced from a combination of fish waste and/or bycatch, ample alternatives exist to LFPs that are derived from fish harvested for meal, oil, and solubles. For the spring 2020 meeting, the board received a letter signed by "three companies … compris[ing] the majority of the domestically manufactured Fish Protein Hydrolysate used in organic farming in the U.S.", and they wrote to explain that "all the fish we use to make Fish Protein Hydrolysate comes from the byproduct of fish processing for human consumption". Furthermore, in its 2016 recommendation to allow squid in fertilizers, the board voted to limit the listing to squid byproducts. The limitation to byproducts reflected the board's desire to ensure that squid are not harvested for fertilizer and that materials used in organic production contain only waste products left over after processing for human consumption.

**Conclusion**:
Harvesting wild native fish for use in meal, oil, and solubles is not essential for organic farming as alternative products using fish waste, bycatch, or even invasive species exist. As stated in public comment, the majority of fish fertilizers used by U.S. farmers comes from fish byproducts. Organic farmers often assume these products come from byproducts, and several large producers have expressed their support for the Board's work on this topic. To avoid contributing to population declines of fish and the associated species within the ecosystems dependent on them, LFPs made from fish harvested for meal, oil, and solubles are not compatible with a system of sustainable agriculture.

**Vote in Subcommittee**

**Motion to amend Section 205.601(j)(8) as follows:**
(8) Liquid fish products—sourced only from fish waste, bycatch, or invasive species–can be pH adjusted with sulfuric, citric or phosphoric acid. The amount of acid used shall not exceed the minimum needed to lower the pH to 3.5.

Motion by: Emily Oakley
Seconded by: Dave Mortenson
Yes: 8 No: 0 Abstain: 0 Absent: 0 Recuse: 0

**Motion to add the following definitions to Section 205.2 Terms defined:**
*Fish waste*. Waste or byproduct left over after market fish are processed for human consumption.
*Bycatch.* Incidental or discarded catch that have no economic value, fish that must be discarded because of management regulations, or fish that are killed by fishing gear (mortality).
Motion by: Emily Oakley
Seconded by: Steve Ela
Yes: 8 No: 0 Abstain:0 Absent: 0 Recuse: 0

**Approved by Jesse Buie, Subcommittee Chair to transmit to NOSB, July 21, 2020**