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Marine Numeric Nutrient Criteria Technical Advisory Committee
Florida Department of Environmental Protection (FDEP)

Estuarine Numeric Nutrient Criteria Scientific Advisory Board
US Environmental Protection Agency (EPA)

VIA EMAIL

RE: Development of Estuarine Numeric Nutrient Criteria.

Dear Marine Numeric Nutrient Criteria Technical Advisory Committee (MTAC) and Estuarine Numeric Nutrient Criteria Scientific Advisory Board (NNC SAB) Members:

Excess nutrient pollution of nitrogen and phosphorous can harm aquatic ecosystems by promoting excess plant and algal growth, reducing clarity and oxygen levels, leading to decreased biodiversity and other environmental and aesthetic harms. Worse, nutrient pollution can lead to decreased productivity, fish kills, and harmful algal blooms that pose a threat to human health either directly or via the food chain through contaminated fisheries or water supplies and damage the economy. Florida Wildlife Federation (FWF) applauds the Environmental Protection Agency (EPA)'s efforts in successfully establishing numeric nutrient standards for Florida's rivers and streams, and welcomes the opportunity to comment on EPA's recommendations to the Scientific Advisory Board on this next round of standards to be applied to Florida's estuarine and coastal areas and inland and marine streams.

FWF generally supports EPA's recommendations, and would like to underscore a few key points: First, FWF proposes general comments on the structure and scientific

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validity of EPA's recommendations. Second, FWF offers comments on EPA's general approach, including the identification of reference conditions, water quality indicator variables, and assessment endpoints. Third, these comments address EPA's approach to establishing numeric nutrient criteria for estuaries, and in particular urge using a combination of the three selected methods, rather than only one method independently. Fourth, FWF approves of EPA's proposals for developing numeric nutrient criteria for coastal waters, as well as for South Florida's marine and inland flowing waters. Lastly, these comments urge the adoption of numeric nutrient criteria for downstream protection values phrased in terms of weighted-flow concentrations, rather than as load limits.

General Comments on the Structure and Scientific Validity of EPA's Recommendations

In general, FWF supports EPA's involvement in setting numeric nutrient criteria for Florida's waterbodies. The Florida Department of Environmental Protection (FDEP) has set designated uses for the state's water resources. EPA is supplementing FDEP's local knowledge by lending the support of its greater resources to help derive scientifically verifiable standards that will achieve these designated uses.

EPA's analysis is comprehensive, and scientifically defensible. EPA surveyed over 800 documents in investigating and assessing endpoints and stress-response indicators and opened its comments to public input, and looked at approaches and literature from several other state and federal agencies in selecting which methods to apply in deriving numeric nutrient criteria for Florida.

EPA's comments were crafted in such way as to balance scientific integrity and public accessibility. EPA provides the facts and the hard science upon which it bases its recommendations, but discusses its conclusions in terms that a layperson can understand. This is important to facilitating public discussion and democratic involvement in the process.

Comments on EPA's General Approach: Chapter 2

EPA proposes to identify reference conditions for each waterbody based on best professional judgment. While FWF acknowledges and supports EPA's conclusion that reference conditions may necessarily vary among waterbodies, we would like to encourage EPA to establish objective criteria to guide decision-makers' best professional judgment for determining reference conditions. Otherwise, FWF supports EPA's general approach of establishing reference conditions for each water body type, analyzing predictive relationships among models, biocriteria, and other parameters, and applying/modifying nutrient and algal thresholds based on established literature to ensure protective levels of nutrient management that restore and protect water quality.

In selecting assessment endpoints and water quality indicator variables, FWF agrees with EPA that "[i]t is important to select assessment endpoints that are sensitive to nitrogen/phosphorus pollution, so that one can infer that the numeric criteria will protect less sensitive receptors from such pollution" (33). It is also important to select endpoints where there are sufficient data to establish a quantitative relationship, either through stressor-response regression models, and/or water quality simulation models that would be sensitive to environmental changes. FWF agrees with EPA's selection of the causal and response indicator variables as total nitrogen and total phosphorous,

and chlorophyll *a*, respectively. As biological endpoints, EPA has selected 1) the protection and restoration of healthy seagrass communities; 2) balanced phytoplankton biomass and production; and 3) balanced faunal communities. FWF supports these selections as reliable indicators of a waterbody's ability to meet its designated uses.

The health of seagrass communities is a particularly strong assessment endpoint. Seagrass provides a vital habitat for Florida's unique, endangered, and other sensitive species. Moreover, because seagrass is directly responsive to the amount of light and oxygen reaching it, the depth at which seagrass is able to grow is a close proxy for measuring those parameters. Lastly, the presence or absence of seagrass is readily measured, and an abundance of data already exists. The health of a seagrass community is a direct indicator of the viability of an ecosystem for its aesthetic, academic, and recreational uses, and is also directly related to the level of nutrient pollution in the system.

Measuring phytoplankton biomass and production is also an easily measured assessment endpoint, and is significant in itself, not only because phytoplankton mark the foundation of the marine food web, therefore standing as an early indicator of potential pollution-caused problems, but also because excess nutrient loading poses direct threats to human health and the environment. This assessment endpoint is therefore essential.

Measuring balanced faunal communities is likely the weakest of these endpoint assessors for nutrient criteria, because so many factors contribute to poor health of faunal communities, and it can be difficult to determine the extent to which the impairment is a result of nutrient pollution. Moreover, a healthy faunal population may

not be indicative of balanced nutrient levels, because dangerously excessive nutrient pollution may have a delayed effect on the faunal community. Nevertheless, because fishing and tourism are essential staples of the Floridian culture and economy, the health of faunal communities is a parameter worth measuring, but it is worth noting that once these communities have been impaired, it is often too late to set protective values that would have immediate ameliorative impacts. Consider the "dead zone" in the Gulf of Mexico. This hypoxic area has significantly impaired faunal communities already from nutrient pollution. However, even if nutrient loading were to be better managed, the recovery period would be long before the area is productive again.

Comments on Estuaries: Chapter 3

Estuaries are affected by a combination of basin shape, tides, and the magnitude, location, and quality of freshwater inflows. EPA's approach appropriately delineates Floridian estuaries into discrete coastal areas. EPA considers designating specific endpoints and indicators, including the health of seagrass communities, and of benthic, planktonic, nektonic, and algal communities. EPA contemplates three approaches (1) reference conditions, (2) stressor-response relationships, and (3) water quality simulation modeling. ES-19. EPA proposes to use these methods independently or in combination to develop numeric criteria for chlorophyll a, total nitrogen, and total phosphorus.

FWF approves of EPA's proposal to develop numeric nutrient criteria on a system-specific basis, taking into account the interplay of factors such as basin shape, tides, and the magnitude, location, and quality of freshwater inflows. EPA acknowledges, and FWF agrees, that it may be necessary to develop sub-regions to

reflect natural estuarine variations from one system to another, because of the potential for unique variations among systems from the interplay of so many complicated variables.

FWF applauds EPA's proposal to delineate watersheds based on the natural geographic limits of estuarine basins and their associated watersheds. However, EPA must take care to take full stock of the complicated hydrology of these systems, many of which have complex characteristics unique to Florida systems, and EPA should make sure to properly define the boundaries between the basins and their associated watersheds. While this general approach has been used before by NOAA in its Coastal Assessment Framework, presumably with some success, Florida's hydrology is unique in many respects, and EPA should look into whether the NOAA framework is appropriate in defining Florida estuarine basins. FWF also commends EPA's consideration of delineating sub-segments within estuaries based on FDEP's waterbody identification scheme. FWF finds it appropriate for EPA to modify FDEP's assessments where necessary, because although FDEP as the local agency has detailed experience with the region, it is also subject to local political pressures, and thus EPA's oversight is appropriate to ensure that the sub-system delineations are based on the best science available.

EPA proposes to use three methodologies either independently or in combination for assessing estuarine nutrient pollution. FWF urges using them in combination, in order to mitigate the different weaknesses and biases inherent in each approach, and to improve accuracy and enhance the scientific rigor of the analysis.

For example, while the reference condition approach of comparing present conditions to ideal or historical conditions is a simple and direct method of understanding the extent of pollution, in many areas such historical data are not available beyond when anthropogenic impacts would be observable. Moreover, because each estuary is unique, if the reference condition approach is to be used, it would be most effective to compare the status of individual estuaries with their own historical conditions, rather than attempting to compare data from one minimally impacted estuary to data from another polluted estuary. Natural nutrient variation may lead to one minimally impacted waterbody to have higher nutrient content than would be natural in another estuary, and visa versa. This could lead to the establishment of inadequately protective criteria in certain areas, depending on the similarities between the two compared systems. However, for estuarine systems where historical data are available beyond the time where human interference impaired the system, this may be an appropriate method on a system-by-system basis, when used in conjunction with other methods. FWF discourages the use of annual geometric or arithmetic mean water quality measures when used independently, as annual measures to not reflect the health of a waterbody that can experience dramatic nutrient fluctuations seasonally and even diurnally. Instead, FWF recommends the use of flow-weighted means.

The stressor-response relationship method of using regression analyses may be the most effective for determining the level of nutrient impairment in a waterbody, because of its ability to provide direct correlative values between past observations and to predict how water management will affect future system health. The EPA expresses some concern that this method does not account for intervening or covariant factors in a

complex system (and thus causation may not always be adequately determined), but a correlative relationship between nutrient pollution and ecosystem health is nevertheless informative in establishing the ideal criteria levels by erring on the conservative side. In other words, if the system is healthy, nutrient levels can be assumed to be acceptable, but if the system is unhealthy, nutrient levels will considered to exceed appropriate levels, even if nutrient levels are only one cause of impairment. While it is better to be overprotective than underprotective in setting water quality standards, this too could be mitigated by using a combination of methods in conjunction with the stressor-response regression analysis.

Lastly, although modeling is administratively simple to execute and allows consideration of additive effects and a range of variables simultaneously, the water quality simulation modeling method is also the most susceptible to bias in entering assumptions for certain model parameters. Therefore, extensive monitoring should accompany any modeling, to measure key parameters to ensure that modeling results trend accurately, and modeling should not be employed independently without verification through stressor-response regression or reference condition approaches.

Comments on Florida's Coastal Waters: Chapter 4

EPA is proposing to use remotely sensed data to develop criteria for water quality along Florida's coastlines. This may be one area where using a reference-based approach on its own may be acceptable because there is sufficient historical data representing minimally impacted waters. Generally, FWF supports the use of satellite measurements because they tend to be an accurate and simple method of collecting data. Moreover, satellite data can account for more uncertainty and minimizes input

biases. EPA states that satellites can take over 25,000 data points compared with only 1,600 data points with field analyses for the same area. EPA also notes that remote sensing data has been effectively used in other areas, and can be easily applied to this situation. However, in certain areas, data are not readily available and needs to be accounted for beforehand to ensure accuracy. In particular, data need to be verified for the Northwest Gulf and Northern Atlantic. It is also important to be able to distinguish satellite data concerning harmful algal blooms from nutrient increases due to pollution events. EPA appears to have gone to great lengths for satellite verification necessary to ensure operational effectiveness and accuracy. In comparing field-collected chlorophyll data with satellite-collected data, there was significant positive correlation (R^2 = .52). EPA has also identified two areas where colored organic matter and bottom reflectance would interfere with satellite verification, and has decided to exclude these areas in order to minimize this interference. FWF supports this decision. EPA has further sought to minimize uncertainty or data gaps by accounting for interferences such as bottom reflectance and the presence of seagrass in certain areas by not using satellite imagery for evaluating coastal criteria in those areas. Lastly, EPA has acknowledged that satellite missions “have finite duration,” and that technology is continuously improving, and has identified additional missions and technology to collect overlapping data and ensure against any gaps in data collection.

EPA has determined that there is no need to measure total nitrogen or total phosphorous for coastal waters based on the assumption that if nutrient standards are met in Florida’s estuaries, then there would be no further need to monitor these levels offshore. FWF agrees that this conclusion is accurate insofar as it reflects Florida’s

contributions to nutrient pollution in coastal waters. Pollution from other states may negatively affect coastal nutrient levels, and requiring Floridians to account for those increases would be inequitable and outside the scope of this project.

Comments on South Florida Marine and Inland Flowing Waters: Chapter 5

EPA plans to divide inland flowing waters into five sub-regions and to derive instream protective values for total nitrogen and total phosphorous based on the reference condition approach using least disturbed sites and stressor-response regression analyses. FWF supports EPA's delineation of the five proposed sub-regions, and agrees with EPA's decision to apply both criteria development approaches simultaneously.

Comments on Downstream Protection Values: Chapter 6

Water quality standards must ensure the attainment and maintenance of downstream water quality standards. 40 C.F.R. 131.10(b). As such, downstream protective values (DPVs) will apply in place of stream criteria if the DPV is more stringent. Downstream protection values should be applied as a concentration, rather than as a load, especially where measured at the terminal reach of each tributary to the estuary. EPA's own guidance interpreting §304(a) of the Clean Water Act on the development of water quality criteria states that standards must be "based solely on scientific judgments *on pollution concentrations* and environmental or human health effects."[1] (Adopted by rule at 40 C.F.R. 131.11(b)). Measuring nutrient content in terms of concentrations at the terminus ensures that standards will be consistently protective

[1] Available at: http://water.epa.gov/scitech/swguidance/ (emphasis added) (last accessed 12/6/10).

in wet and dry seasons, and also reduces uncertainty regarding in-stream nitrogen losses that would be more likely if criteria were designated in terms of load limits.

These standards should be applied as flow-weighted concentrations empirically adjusted for season and flow conditions, rather than as annual means, because Florida experiences dramatic seasonal variation in stream conditions. Annual averages will overlook individual events and would impair the agency's ability to accurately monitor and enforce standards or to design a permit system reflective that would provide year-round protection of aquatic resources. Moreover, annual means do not account adequately for the difference in pollution impacts in seasonal variations or the ability for water quality to fluctuate over relatively short periods.

Lastly, in the hypothetical for Pensacola Bay, the model does not seem to consider streams with multiple lakes or reservoirs. FWF requests clarification of methods for incorporating these waterbodies into downstream protective values.

We sincerely thank you for consideration of our input on this matter, and please do not hesitate to contact Anne Harvey at (850) 681-0031 to discuss this matter further.

Sincerely,

Anne Michelle Harvey
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On Behalf of the Florida Wildlife Federation

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