| N-STEPS Webcast Questions | Response |
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| (1) In graphs of number of fish species versus nutrient or chlorophyll concentrations, has stream size been considered? (e.g., fish richness tends to increase with stream size). (2) Is there correlation between stream size and D.O... flux? | Stream size has been considered to the extent that the majority of the data we reported on was derived predominately from 4th-6th order streams. If one were to conduct this analysis across a wide range of stream sizes (watershed areas) it is likely stream size could be a very important factor. With respect to question 2 we do see some correlation between watershed size and total chlorophyll (pp 42-46 http://www.pca.state.mn.us/publications/reports/biomonitoring-mnriverrelationships.pdf ) and since there is a correlation between chlorophyll and diurnal flux it is reasonable to believe there may be some relationship between watershed size and diurnal flux. While we have not tested this directly it is something we can pursue to more fully understand what we are seeing in our data. |
| could seasonal confounding, even within summer, affect your results showing decline in sensitive taxa with increasing nutrient concentrations | Lets see if I understand this question: The comparisons we have made are based on summer mean water quality data (typically based on ~5-8 collections made between mid-June thorugh September) and biological collections that are generally made mid to late summer. While the biota are considered overall integrators of the health of the stream -- the summer water quality measures are just that -- a reflection of the water quality the organims are exposed to in the summer. Though the data are limited to summer we do see fairly distinct regional patterns in the data such that we believe that the comparisons we make are valid (e.g. northern forested rivers have low nutirent concentrations relative to southern agriculturally -diominated streams in all seasons). However, by focusing on summer alone it is possible that we may miss some important explanatory variable (measure) associated with spring high-flow events (e.g. elevated TSS, TP or nitrate-N) that may in some fashion impact the stream biota. |
| Has TMDL been establish for the rivers? | No, nutrient-based TMDLs have not yet been established for MN since we do not have nutrient (eutrophication-related water quality standards for rivers). With that said, the low dissolved oxygen TMDL for the Lower Minnesota River successfully makes the association between elevated TP, yielding elevated sestonic chlorophyll-a and high BOD, which contributes to violation the dissolved oxygen standard for this reach of the MN River during low flow conditions. The TMDL has lead to phosphorus effluent limitations at upstream facilities. See #6 below for link to our TMDL program information. |
| Comment, relative to DO flux: We have measured in a MT river diel DO data (by instrument) and have found that DO alone exceeds the state's total dissolved gas standard (110%) midday (we assumed nitrogen gas was at saturation). A possible explanatory mechanism | Yes, this may be a possible mechanism as well. |
| Was any evaluation done on the relative contribution of nutrients from direct land use, like agricultural practices (e.g.. fertilizer application, top soil erosion, etc.) versus erosion from in-channel processes caused by destabilized streams? Could it be t | No, this level of detail was not addressed in this work. This type of analysis would be more appropriate for TMDL studies. This level of analysis is being conducted for a low dissolved oxygen TMDL (where association between low DO and excess phosphorus was previously made and is being factored into a TMDL for Lake Pepin, a run-of-the-river reservoir (natural lake) on the Mississippi River. Information on our TMDLs may be found at: http://www.pca.state.mn.us/water/tmdl/index.html |
| Will your stream criteria strategy be applicable to all streams in an ecoregion or will you define habitats or biological assemblages that need protection within each ecoregion? | Since we have not yet drafted the criteria this is a bit tough to address. At this point we intend to make use of the various data sets and relationships we shared to help identify thresholds for criteria development. Since most of our data was derived from medium to large streams (~3rd-6th order) we may establish a minimum watershed size that the criteria will be applied to. If so we will need to find some mechanism for addressing lower order streams too. While we have combined data from all ecoregions to identify thresholds we will need to use data distributions a noted on page 91 to develop criteria in an ecoregion-based context (http://www.pca.state.mn.us/publications/reports/biomonitoring-mnriverrelationships.pdf ). Starting at page 70 we have some additional thoughts on approaches we might apply. |
| On the question related to the derivation of sensitive vs. tolerant species (some further clarification). | From Scott Niemela (supervisor of one of MPCA's biological monitoring units) Generally speaking the organisms are classified into these groups by reviewing a wide range of literature sources on the life history requirements for both fish and invertebrates. Species classified as tolerant are known to occupy fairly wide niche spaces relative to habitat, reproduction, feeding, etc. Sensitive species are just the opposite having a fairly narrow ecological niche space and more restricted and specific requirements related to habitat, feeding, and reproduction. Disturbance in general is known to destabilize physical and chemical processes in streams allowing those species that are more opportunistic (i.e. wide niche species) in nature to adapt whi those requiring a more stable environment (narrow niche species) go someplace else or simply fade away. |
| It's puzzling why the TN vs. Chl-a) relations were so good while the streams were presumably P limited. You thought that that reflected N in the bodies of the algae? But TN is in mg/L and isn't algae biomass in the ug/L range? | The relationship of total Kjeldahl nitrogen (TKN) and chl-a is one of the strongest relationships we see for both rivers and lakes. The TKN, is predominately organic N, and algae is one of the larger sources of organic N in the water. Pages 41-48 in the report in question 1 demonstrates the various relationships and is addressed in the following journal article as well ( http://www.pca.state.mn.us/publications/reports/biomonitoring-nutrientsinrivers.pdf ). As for lakes we see similarly strong relationships as noted on page 92 in http://www.pca.state.mn.us/publications/reports/lakes-shallow-westcentral.pdf . In most instances as well we find that TKN and TP are highly correlated as well e.g. page 36 in http://www.pca.state.mn.us/publications/wq-bsm6-01.pdf . |