NORTH DAKOTA'S

Nutrient Reduction Strategy

Nutrient Criteria Workgroup Meeting Summary

November 9, 2015 • Bismarck, ND • 1:00 p.m. – 2:30 p.m.

Background

The Nutrient Criteria Workgroup met in person and via conference call on Monday, November 9, 2015 from 1:00 pm -2:30 pm at the North Dakota Department of Health's Environmental Training Center, Bismarck, ND. The following is a list of those in attendance.

List of Attendees:

Name	Affiliation
Ted Alme	Natural Resources Conservation Service
Al Basile*	USEPA Region 8
Keith Demke	City of Bismarck
Mike Ell	North Dakota Department of Health, Division of Water Quality
Scott Elstad	North Dakota Game and Fish Department
Jim Hausauer*	City of Fargo
Heather Husband*	North Dakota Department of Health, Division of Water Quality
Scott Korom	Barr Engineering/North Dakota Soybean Council
Paul Mathiason	Red River Valley Sugarbeet Growers
Kendall Nichols	North Dakota Soybean Council
Shaun Quissell	North Dakota Department of Agriculture
Pete Wax	North Dakota Department of Health, Division of Water Quality
Jim Ziegler	Minnesota Pollution Control Agency

*Participated via conference call

Mike Ell with the North Dakota Department of Health (NDDoH) opened the meeting with introductions. Mike then provided an update on the Nutrient Reduction Strategy Development process. Mike said that the goal of the NDDoH is to have a draft strategy by the end of December 2015. That said, Mike added that there were a couple of issues related to the strategy on which he wanted feedback from the Nutrient Criteria Workgroup. One was a recommendation made by the Point Source Workgroup (see November 20, 2014 Point Source Workgroup meeting summary) for the NDDoH to adopt narrative nutrient criteria in the state's water quality standards. The other issue was the development of a technical support

document which would serve as the scientific basis and justification for numeric nutrient criteria for Lake Sakakawea.

Narrative Nutrient Criteria

Mike Ell began the discussion of narrative nutrient criteria by saying that it was a recommendation that came from the Point Source Workgroup. The Point Source Workgroup suggested that narrative criteria form the basis for monitoring and assessing priority watersheds. Through this approach watersheds with "significant" point source contributions would be targeted for intensive stream and effluent monitoring. The numeric criteria and thresholds or targets developed from the narrative criteria would then be used to assess whether there are impairments caused by excessive amounts of nutrients in these watersheds and, if so, whether or not the nutrients are coming from the point sources, nonpoint sources or both. Based on the recommendation from the Point Source Workgroup, Mike said he felt it was necessary to present this recommendation to the Nutrient Criteria Workgroup for their consideration.

Following Mike's introduction, Pete Wax gave a short presentation on water quality standards. Pete explained that the water quality standards work by protecting beneficial uses that are defined in the standards. Examples of beneficial uses defined in the water quality standards are drinking water, recreation, aquatic life (e.g., fish and other aquatic organisms), agriculture (e.g., irrigation and livestock watering), and industrial uses (e.g., wash water, cooling). These uses are then protected through narrative criteria, numeric criteria and antidegradation policies and procedures. Pete said that numeric criteria are what most people think of when they think of water quality standards. A numeric criterion is the specific concentration of a pollutant that cannot be exceeded, or the specific level of a water quality parameter that must be maintained. Examples of the former are cyanide that should not exceed 22 µg/L and sulfate that should not exceed 250 mg/L. An example of the later is dissolved oxygen that should not be less than 5 mg/L. Pete explained that while numeric criteria are usually a specific number not to be exceeded, narrative criteria are statements about what should not be in water. Pete said that narrative criteria are often referred to as "free from" water quality standards as waters should be "free from" scum or oil, "free from" rubbish, or "free from" dead animals. An example of a specific narrative standard in the water quality standards is "free from floating debris, oil, scum, and other floating materials attributable to municipal, industrial, or other discharges or agricultural practices in sufficient amounts to be unsightly or deleterious."

Pete then went on to explain that the Clean Water Act requires all states that adopt water quality standards to review their standards every three years. This process is referred to as the triennial review. Pete said that North Dakota last updated its standards in 2014, so the next triennial review is due to be complete by the end of 2017. While the NDDoH has primary responsibility for the water quality standards, the NDDoH develops the standards with input from the State Water Commission and interested parties, including the Nutrient Criteria Workgroup. Included in the standards triennial review process is a requirement for a fiscal note when proposed changes are expected to result in an increased cost to the public. There is also a requirement for a public notice and comment with at least one public meeting. In addition, changes to the standards made as part of the triennial review are presented to the Water Pollution Control Board and to the Health Council. Pete said that while the NDDoH is not required to accept recommendations made by these two entities, it does take their recommendations and suggestions seriously. Pete said that the final step in the process before any changes are submitted to EPA is review and approval by the ND Legislature's Administrative Rules Committee. Pete then concluded his

presentation by saying the two priorities for the next triennial review as they relate to the Nutrient Reduction Strategy would be: 1) narrative nutrient criteria; and 2) numeric nutrient criteria for Lake Sakakawea.

Related to the issue of interpreting and implementing a narrative nutrient criteria, Mike Ell then presented a couple of slides (Figures 1 and 2) on how he envisions narrative nutrient criteria would be used in the development and implementation of the nutrient reduction strategy for North Dakota.

Mike explained that the first step in implementing narrative nutrient criteria in the nutrient reduction strategy would be to translate the narrative criteria into numeric thresholds or targets. This would likely be a 2 step process where the first step would be to identify a response indicator that is representative of the beneficial use impairment and its threshold for impairment. Once the indicator is identified then the second step would be to relate the indicator to a nutrient (N and P) concentration or load that causes the threshold to be exceeded. An example of this two step process would be an in-lake chlorophyll-a concentration that is known to cause recreation use to be impaired and the N and P concentration in the lake is known to cause that chlorophyll-a concentration to be exceeded. In some cases there may be multiple indicators affecting one or more use impairments which may result in more than one target nutrient concentration or load. In these cases the more sensitive use and indicator would take precedent.

Once the narrative standard is translated into a numeric threshold or target, then the threshold or target can be used to: 1) assess waters for nutrient impairments; or 2) set restoration targets in total maximum daily loads (TMDLs). Assessment can be done using the impairment indicator, the nutrient target or both. In the case of a TMDL the impairment indicator can be used as the TMDL target, but the load allocation would be based on the nutrient concentration or load.

Mike then described narrative nutrient criteria implementation as an iterative process where the thresholds and targets would be refined and updated based on the assessment and TMDL process. Through the assessment process, the numeric thresholds and targets will be tested and verified through the identification of regional “reference” or “least impaired” sites as well as through sites known to be impacted by excessive nutrient loadings. Mike described refinement of the numeric thresholds and targets occurring through the TMDL process in two possible ways. One pathway would be through additional monitoring and analysis which would occur as the TMDL is developed. The second would be through implementation of the TMDL. As best management practices are implemented for the nonpoint sources and reductions are achieved for the point sources, changes in the indicator threshold(s) and target(s) would be monitored along with changes in nutrient concentrations and/or loadings. The established thresholds and targets would be validated in cases when the beneficial uses are restored by meeting the nutrient TMDL targets. In cases where beneficial uses are not restored, even when the nutrient targets are met, then additional refinement of the thresholds and/or targets would be required. Mike explained that this set of implementation steps may occur several times before a final numeric nutrient threshold is judged to be scientifically defensible to be implemented as numeric nutrient criteria (Figure 2). Mike also said that it is likely that this process would occur regionally across the state and with a variety of waterbody types or classes. A member of the workgroup commented that the iterative process of refining thresholds could take many years to complete.

A member of the workgroup asked if through this process, narrative nutrient criteria could be used to impose effluent limits for nutrients in permits or would the state wait until there were numeric nutrient limits before implementing permit limits. Mike responded by saying yes, he believed that narrative criteria could be used to establish nutrient limits in permits, but it would be through the implementation steps that he described for TMDL development and implementation. Mike said that before effluent limits for nutrients would be required there would have to be sound scientific justification for the threshold or targets used as a basis for the limits and also, through the TMDL process, there would have to be "reasonable assurance" that the nonpoint sources are adequately identified and will be addressed in addition to any requirements for the point sources.

Pete Wax then presented an example of what a narrative nutrient criterion might look like. It read as follows:

"Except as due to natural conditions, nutrients shall not be allowed in concentrations that cause objectionable algal densities, nuisance aquatic vegetation, abnormal diurnal fluctuation in dissolved oxygen or pH, changes to the composition of aquatic ecosystems, or otherwise render the waters unsuitable for the designated uses."

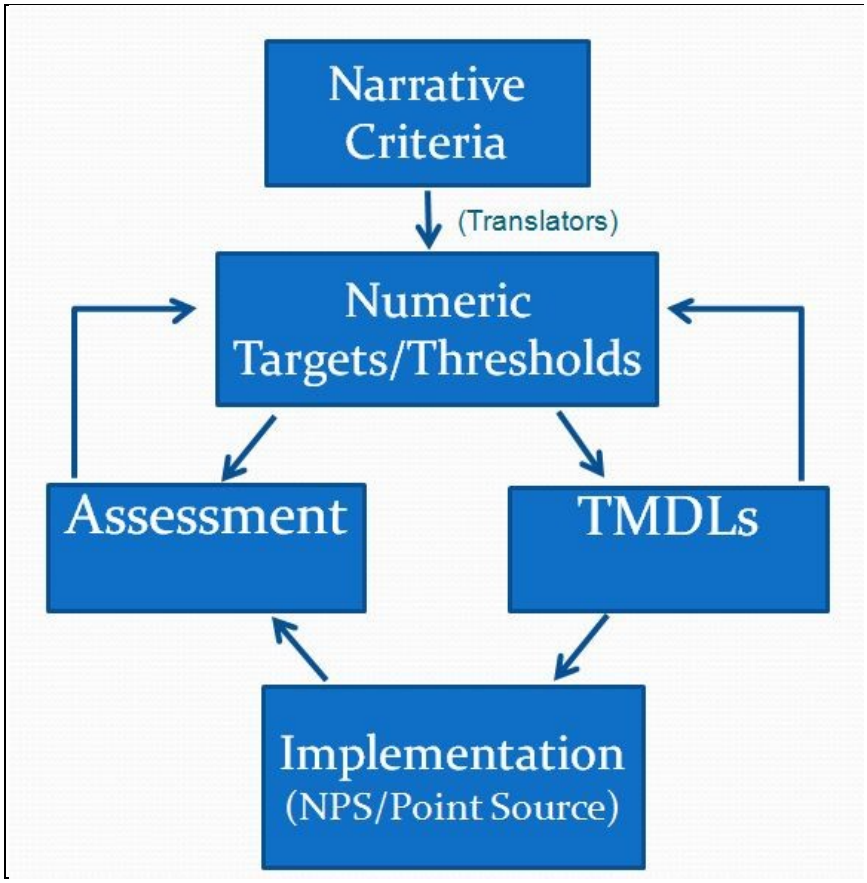

Figure 1. Narrative Nutrient Criteria Implementation Process for North Dakota.

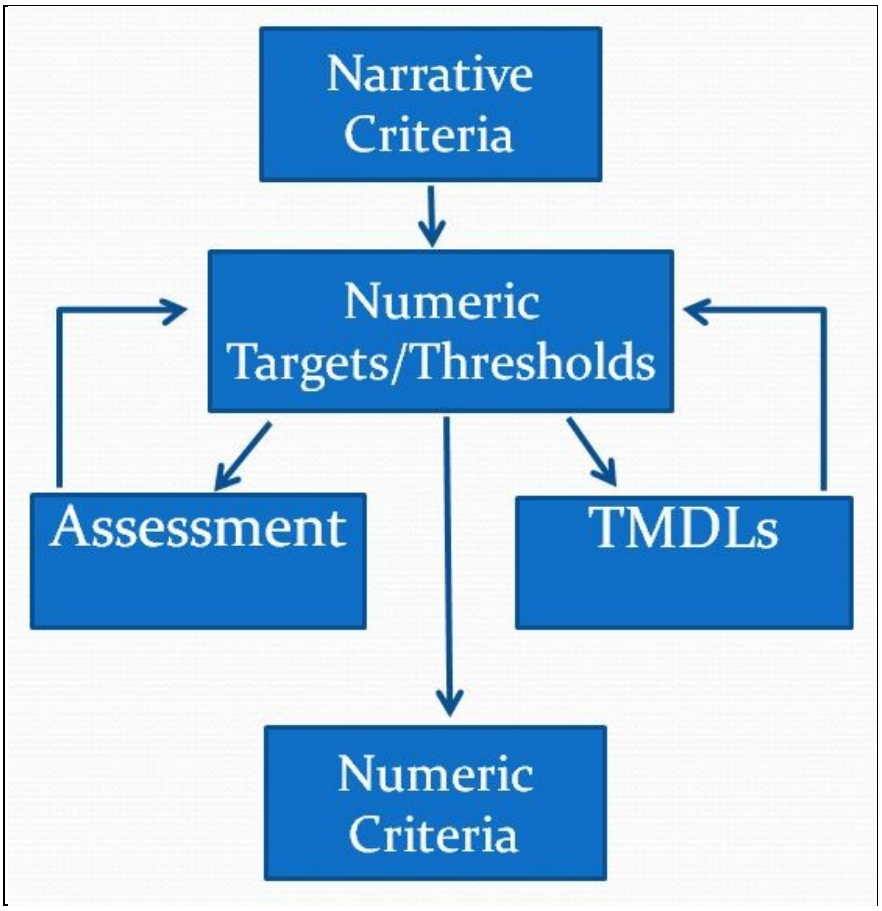

Figure 2. Numeric Criteria Develop Following the Iterative Narrative Nutrient Criteria Development Process.

Pete mentioned the term "natural conditions" in the draft may raise some concerns with EPA. Pete went on to say that in his view "natural conditions" included the interaction of humans on other components of nature. That is, humans are a part of nature. Others in the workgroup questioned terms like objectionable, nuisance and abnormal and asked who determines what is objectionable, a nuisance or abnormal. One workgroup member added, "What I think is objectionable, may not be to another person". Similarly, what is a nuisance to one person may not be a nuisance to another person. It was suggested that since the standards are intended to protect beneficial uses, then the narrative nutrient criteria should probably work best if it simply ties nutrients to protecting beneficial uses. It was the consensus opinion of the workgroup that Pete and Mike would work on a revision to the proposed narrative nutrient criteria. They will then send it out to the workgroup for comment. As comments are provided, revisions will be made and sent out again for additional comment. Mike said he would like to have a draft narrative nutrient criterion for inclusion in the strategy by the end of December. It was also the consensus opinion of the workgroup that the implementation process that Mike described (Figures 1 and 2) made sense and should be included in the strategy.

Technical Support Document for Lake Sakakawea

Mike then discussed the idea of developing a technical support document which would serve as the basis for developing numeric nutrient criteria for Lake Sakakawea. Mike reminded the workgroup that in a previous workgroup meeting, Lake Sakakawea and the Red River were identified as priorities for numeric nutrient criteria development. Mike also described the monitoring and modeling work that has already

been done by the NDDoH, US Army Corps of Engineers (COE) and the ND Game and Fish Department that could be used to develop the technical support document. The NDDoH first started monitoring Lake Sakakawea in the early 1990's, while the COE has been monitoring the lake intensively since 2003. In addition, the COE developed a CE-QUAL-W2 Hydrodynamic and Water Quality Model for Lake Sakakawea in 2008 and is currently in the process of updating the model based on more recent water quality data. Mike said that he thought most of the information that would be needed for a technical support document was already available for the lake. Mike added that because there is already so much monitoring data available for Lake Sakakawea it makes sense to address the development of numeric criteria for Lake Sakakawea. It would just be a process of compiling this information in a format that would evaluate nutrient criteria in response to different water quality indicator endpoints. Mike provided some examples of potential nutrient related endpoints, including: average chlorophyll-a concentration, maximum chlorophyll-a concentration, Secchi Disk Transparency depth, algal bloom frequency and duration, cyanobacteria and cyanotoxin occurrence, taste and odor, dissolved oxygen in the hypolimnion, and pH in the epilimnion. Mike said that he thought most of these endpoints could be modeled with the COE's CE-QUAL-W2 model. The technical support document would use the model to evaluate a range of endpoint responses to nutrient concentration and/or loading. The results would then be used to select appropriate endpoints necessary to maintain and protect the lake's beneficial uses and their corresponding nutrient criteria.

Mike added that one option for preparing the technical support document would be to use technical support grant funding available from EPA Headquarters. Mike said that these funds have already been used for contractor support for developing the nutrient reduction strategy and is currently being used to develop the North Dakota Recovery Potential Screening Tool. In both cases EPA has contracted with Tetra Tech, Inc. to help the state. Mike said that it is likely, if the state requested assistance for the technical support document, Tetra Tech would again be the contractor selected. Scott Korum asked if the state had contracted with Houston Engineering in the development of the Nutrient Criteria Development Plan and with the series of technical memos regarding nutrient criteria for lakes and reservoirs. Mike said that these projects were also funded by EPA through subcontracts issued to Houston Engineering. Mike added that another option would be for the state to issue its own RFP for the project, but in that case the NDDoH would have to find its own funding for the project. It was the consensus opinion of the workgroup that the NDDoH should pursue development of a technical support document for Lake Sakakawea and that it should also pursue funding through EPA Headquarters. As an action item, Mike will follow up with Al Basile with EPA Region 8 to see if funding is available.

Red River Periphyton/Phytoplankton Study

Mike provided a brief summary of a project that the NDDoH participated in this summer which is referred to as the Red River Periphyton and Phytoplankton Study. Mike explained that the study is part of the larger International Red River Board "Red River Nutrient Management Strategy." The International Red River Board (IRRB) was formed by the International Joint Commission. The IRRB established the Red River Basin Nutrient Management Strategy with its mission "to develop a collaborative, science and watershed-based approach to managing nutrients in the Red River and its watershed with the goal of restoring and protecting aquatic ecosystem health and water uses in the Red River watershed and Lake Winnipeg." The IRRB also formed the Water Quality Committee to develop this strategy. The Water Quality Committee is co-chaired by Jim Ziegler with the Minnesota Pollution Control Agency and Nicole

Armstrong with Manitoba Conservation and Water Stewardship. Mike added that he is also a member of the Water Quality Committee along with folks from the Red River Basin Commission and other federal, state, and provincial agencies.

Mike explained that one component of the IRRB's Red River Basin Nutrient Management Strategy is to develop nutrient targets for the Red River and Lake Winnipeg. To do this the IJC, IRRB and Water Quality Committee contracted with RESPEC, Inc. to develop a report in which they analyzed methods and procedures for the development of nutrient targets or criteria and provided recommendations for the Red River. In their report RESPC recommended a two prong approach, one based on targets developed by Manitoba for the restoration of Lake Winnipeg and one based on targets to protect the Red River itself. This approach recognizes that targets developed for the Lake Winnipeg and for the Red River may not be the same. In other words, targets developed by Manitoba for Lake Winnipeg may not be restrictive enough to be protective of the Red River, and conversely targets developed for the Red River may not adequately protect or restore Lake Winnipeg.

In order to develop nutrient targets for the Red River, the IRRB and Water Quality Committee obtained additional IJC funding and again contracted with RESPEC to develop a "conceptual model" for the Red River that would serve as the basis for evaluating ecological responses to nutrients. Mike added that an experts workshop was held last December in Grand Forks in order to better understand the Red River ecosystem and the mechanisms, including nutrients, that affect it. Once the conceptual model report was completed, RESPEC requested agencies and organizations provide information and data that could be used to test and evaluate the "conceptual" ecosystem responses identified in the model, including responses to changes in nutrient concentration(s) and/or loading(s). Based on this call for data, it was determined that while there is a lot of water chemistry and flow data for the Red River, biological data and especially algae data are extremely limited. As a result of these limited data the Water Quality Committee initiated the periphyton and phytoplankton study during the summer of 2015. The MPCA conducted their large river monitoring program sampling on the Red River in 2015 and this presented an opportunity to collaborate with them in the collection of periphyton and phytoplankton data at sites located along the Red River in the US where they were already going to collect water quality, including nutrient samples every two weeks. In addition, the MPCA conducted macroinvertebrate and fish sampling at the sites. Mike said the Red River periphyton and phytoplankton study was a collaborative effort on the part of the MPCA, NDDoH, Manitoba Conservation and Water Stewardship and Environment Canada. The study consisted of sampling periphyton with artificial substrates at 30 sites located on the Red River from its origins near Wahpeton, ND downstream to Lake Winnipeg in Canada. Twenty-three (23) sites were located in the US portion of the Red River and 7 sites were located in Canada. At each site 3 artificial substrate samplers, called periphytometers (Figure 3), were deployed during the week of July 18th in the US portion of the Red River and during the week of July 25th in the Canadian portion. Mike said that based on what most folks think about the Red River, that it is light limited and does not grow algae, it would take 4 or maybe 6 weeks to see any significant growth on the periphytometers, if any. Mike said that after only 2 weeks it was determined that algae do grow in the Red River and at a fairly rapid rate. Based on what was observed on the periphytometers after two weeks it was decided that the samplers would be pulled after three weeks. The NDDoH retrieved the 23 US samplers the week of August 10th and Manitoba Conservation and Water Stewardship retrieved their samplers the following week to coincide with a 3 week deployment period. Mike said that in addition to

collecting the periphyton samples at each site a phytoplankton sample was also collected at each site. The phytoplankton sample was collected by filtering 5-liters of water through a 20 µm Nitex mesh net. Mike said the periphyton samples were analyzed for chlorophyll-a and ash free dry weight as measures of algal biomass. In addition, both the periphyton and phytoplankton samples were analyzed for species composition and density. Mike mentioned that the lab costs for analyzing the US samples were split between the MPCA and the NDDoH, while Manitoba Conservation and Water Stewardship paid for the cost of samples on the Canadian side. Mike also added that the MPCA paid for all of the periphytometers.

Mike said that as of this meeting all of the chlorophyll-a and ash free dry weight analysis have been completed for the periphyton samples and most of the taxonomic analysis has been completed for the periphyton and phytoplankton samples. Once all of the lab analysis is complete, then RESPEC will begin analyzing these data and other available biological data in relation to available nutrient data with the objective of identifying relationships between nutrients and ecological indicators.

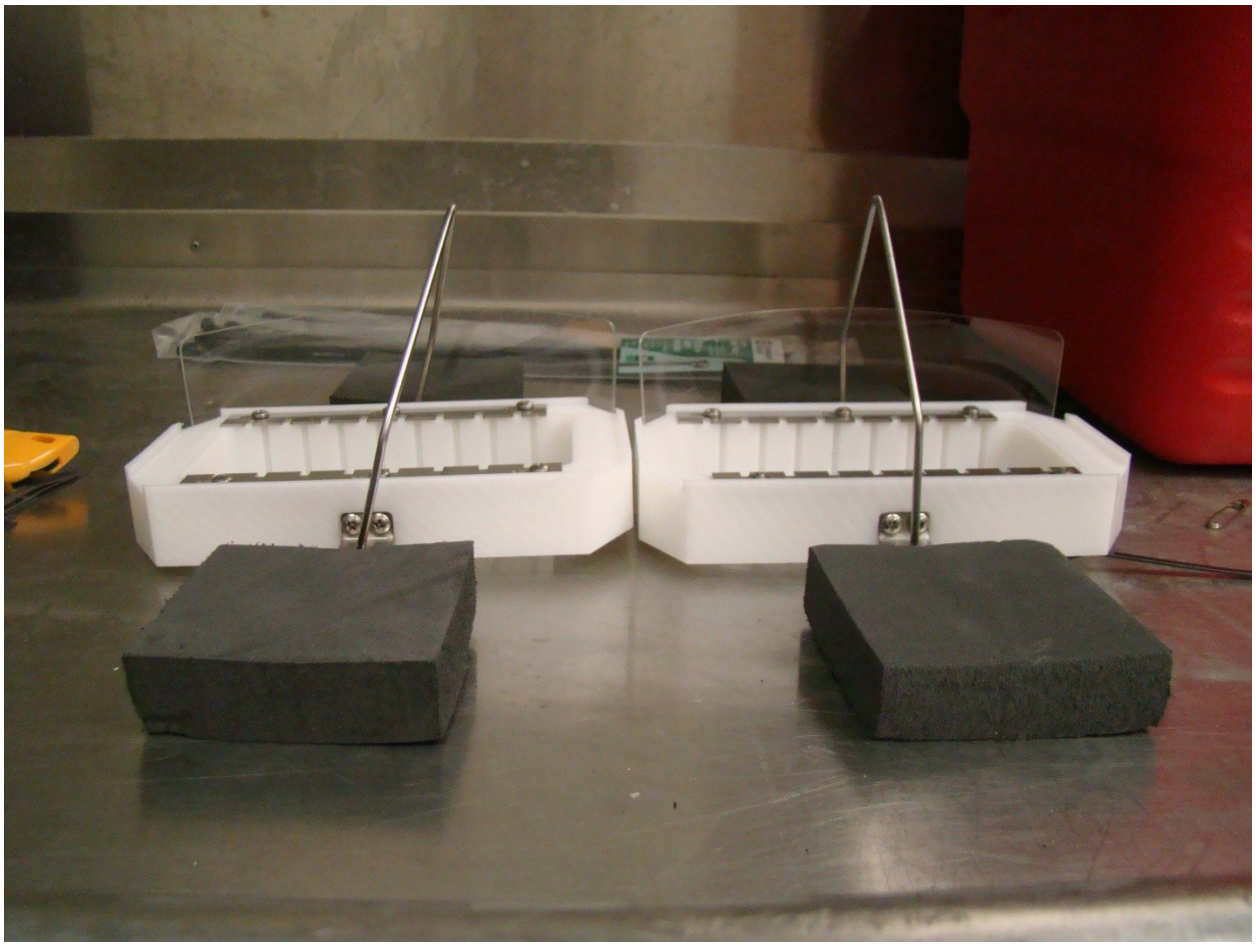

Figure 3. Periphytometer used in the 2015 Red River Periphyton and Phytoplankton Study.

Figure 4. Periphytometers Deployed in the Red River.