NORTH DAKOTA'S

Nutrient Reduction Strategy

Prioritization Workgroup Meeting Summary

April 15, 2014 • Bismarck, ND • 10:00 a.m. – 3:00 p.m.

Background

As follow up to the December 19, 2013 ND Nutrient Reduction Strategy Stakeholder meeting and to the Prioritization Workgroup conference call which was held on March 12, 2014, the Prioritization Workgroup met in person at the Comfort Inn, Bismarck, ND on Tuesday, April 15, 2014. 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
Mary Berg	NDSU Carrington Research Extension Center
Jim Collins	North Dakota Department of Health, Division of Water Quality
Ken Demmons	HDR Inc.
Mike Ell	North Dakota Department of Health, Division of Water Quality
Scott Elstad	North Dakota Game and Fish Department
Paulo Flores	NDSU Carrington Research Extension Center
Ann Fritz	North Dakota Department of Health
Joel Galloway	US Geological Society
Trace Hanson	Wild Rice Soil Conservation District
Andrew Job	City of Grand Forks
Craig Kopp	Cargill Malt
Jeff Lewis	Red River Basin Commission
Tom Lilja	North Dakota Corn Growers
Andy McDonald	ND Rural Water Association
Mary Podoll	USDA Natural Resources Conservation Service
Kayla Pulvermacher	North Dakota Farmers Union
Shaun Quissell	North Dakota Department of Agriculture
Scott Rising	North Dakota Soybean Growers
Greg Sandness	North Dakota Department of Health, Division of Water Quality
Jerry Sauter	North Dakota Department of Agriculture

Name	Affiliation
Jeanne Schultz-Mock	AE2S (Advanced Engineering and Environmental Services, Inc.)
Eric Sikora	North Dakota State Water Commission
Leo Walker	Dakota Resource Council
Pete Wax	North Dakota Department of Health, Division of Water Quality

Mike Ell with the North Dakota Department of Health opened the meeting with introductions. Mike then provided a summary of previous nutrient reduction planning team and stakeholder meetings as well as the Prioritization Workgroup conference call held on March 12, 2014. Based on workgroup discussions during the conference call, the meeting agenda was developed (see attached agenda). Mike then stated that it was now time to get down to business and start making some decisions with respect to Prioritization. Mike also said that he realizes that a number of people have expressed an interest in this workgroup and that he has been sending out information on this workgroup as well as the other workgroups to all of stakeholders and planning team members. Mike said that he would like to narrow membership on the workgroups a bit and will be using the folks in attendance at this meeting as the basis for the core Prioritization Workgroup. He will make one last request to other stakeholders to see if they want to formally be part of the Prioritization Workgroup. After that he will limit Prioritization Workgroup emails and correspondence to a core group.

The following sections provide a summary of the agenda items discussed during the workgroup meeting. Copies of all of the presentations used by the presenters during the meeting are available on the North Dakota Department of Health's North Dakota Nutrient Reduction Strategy website. (http://www.ndhealth.gov/WQ/SW/Z6_WQ_Standards/Nutrient_Management/Nutrient_Management.htm)

Nutrients in North Dakota

Mike began this agenda topic by introducing Joel Galloway, Associate Director, USGS North Water Science Center. Joel gave a presentation entitled "Nutrient Characteristics for Streams in North Dakota" Joel said the results he presented were from a report prepared for the ND Department of Health and the ND State Water Commission. The purpose of the report was to examine data collected from 1970-2008 to: 1) provide descriptive statistics and summaries of water-quality data from sites throughout the state; 2) determine trends and loads for selected constituents and sites with sufficient concentration and streamflow data; and 3) determine an efficient state-wide network sampling design for monitoring future water-quality conditions. A copy of the USGS report is available at http://pubs.usgs.gov/sir/2012/5216/ .

Joel then presented several figures depicting spatial trends in ammonia, nitrate-nitrite and dissolved phosphorus concentrations in terms of median concentrations at each site. In summary, there was no discernible spatial pattern to ammonia concentrations in the state, although concentrations tended to be higher in the winter as compared to the spring and summer. Spatial patterns in nitrate-nitrite concentrations showed higher concentrations in the Red River basin when compared to other basins in the state. Nitrate-nitrite concentrations were also higher in the winter in the Missouri River basin and lower in the winter in the Red River basin. Phosphorus concentrations tended to be higher in the Red River basin during all times of the year with generally higher concentrations in the summer at all locations in the state.

Joel then provided a comparison of median ammonia, nitrate-nitrite and phosphorus concentrations for the Red River and Missouri River basins in North Dakota to those reported by Mueller and Spahr (2006). Mueller and Spahr compiled results from the USGS's National Water Quality Assessment Program by land use category. Land use categories reported by Mueller and Spahr included undeveloped, partially developed, agriculture, urban, mixed, and "large" watersheds. When compared to the land use categories reported by Mueller and Spahr, ammonia concentrations for both the Red and Missouri River basins in North Dakota were similar to those reported for the partially developed land use category. Nitrate-nitrite concentrations for both the Red and Missouri River basins in North Dakota were similar to the undeveloped land use category. Phosphorus concentrations in the Red River basin were similar to the agricultural land use category, while phosphorus concentrations in the Missouri River basin were similar to the undeveloped and partially developed land use categories.

Based on nutrient concentration data and flow, Joel then presented nutrient yield results for 34 sites located across the state. For purposes of Joel's analysis, yield is expresses as $lbs/yr/mi^2$. For all of the nutrients (ammonia, nitrate-nitrite, total phosphorus and dissolved phosphorus), yields were greatest in the Red River basin.

Finally, Joel presented results of some trends analysis. It was determined that of the sites used for the USGS's analysis in the report, only 10 sites had sufficient nutrient data to compute trends. Also, of the nutrients analyzed, trends could only be determined for nitrate-nitrite and total phosphorus. Based on the USGS's analysis, the only site with a significant trend was the Red River at Grand Forks site. This site had a significant increasing trend. For the remaining 7 sites (Wild Rice River at Abercrombie, Sheyenne River near Cooperstown, Souris River near Sherwood, Little Missouri River near Watford City, Knife River near Hazen, Heart River near Mandan and Cannonball River near Breien) there was no discernible increasing or decreasing trend. For total phosphorus, 4 sites (Spring Creek at Zap, Knife River near Hazen, Heart River near Mandan and Cannonball River near Breien) had significant decreasing trends and one site, the Red River at Grand Forks, had a significant increasing trend.

Following Joel's presentation a question was asked about the state's current water quality monitoring program and our ability to assess trends in the future. Mike answered the question by stating that the recommendations put forth by the USGS in their report had been fully implemented as of January 1, 2013. These recommendations included a system of 81 located on 48 rivers and streams in the state. Mike explained that the revised monitoring network consists of three levels of sites with level 1 sites sampled more frequently than level 2 sites and level 2 sites sampled more frequently than level 3 sites. Mike also stated that as long as the revised monitoring network is not changed, it will be possible to assess trends in 5 to 10 years at the level 1 and 2 sites. Joel added that it should also be possible to determine the level 3 sites, it just may require a longer period to measure a trend if it is present.

Mike Ell then gave a presentation which looked at total nitrogen and total phosphorus concentrations by 8-digit sub-basin (i.e., HUC) and by ecoregion in the state. For this analysis Mike compiled ND Department of Health and USGS data collected in North Dakota from January 1, 2004 through December 31, 2013 (10 years). Results were summarized using box and whisker plots by 8-digit HUC and by ecoregion. Mike explained that there is a lot of nutrient data available for North Dakota. For example, of the 50 8-digit sub-basins located in North Dakota, there were sufficient data to compute box and whisker plots for 39 sub-basins. For his analysis Mike compared the results to several nutrient thresholds

developed by EPA for ecoregions in North Dakota. These included the EPA nutrient ecoregion thresholds for total nitrogen (N) and total phosphorus (P) and the N and P thresholds developed for the Western EMAP Pilot Project.

In general, both median total N and total P concentrations varied by ecoregion and by sub-basin and reflected the differences in the thresholds developed by EPA. In addition, median N and P concentrations for most sub-basins were near or below the threshold values developed by EPA.

The Nutrients in North Dakota Session concluded with another presentation by Joel Galloway on the SPARROW model and results. SPARROW is an acronym for SPAatially Referenced Regression on Watershed Attributes. For a full description of the model the reader is referred to the following web site **http://water.usgs.gov/nawqa/sparrow** . Currently, there are eight (8) SPARROW models which cover the US. North Dakota is covered by two models, the Missouri River Basin model and the Great Lakes-Red-Souris-Rainey River model. Each of these models provides estimates of average annual total nitrogen and total phosphorus loads and yields. These loads and yields are provided as a total for the entire contributing watershed above a point on a river or stream or as the incremental load or yield for the catchment represented by the point on the river or stream. The model also partitions the total/incremental load or yield into various source categories (e.g., point sources, fertilizer, manure, atmosphere, urban areas, and natural [e.g., forest, wetlands]). Joel then provided several examples of N and P SPARROW model results for both the Missouri River basin and for the Great Lakes/Red/Souris/Rainey at different spatial scales and for both incremental and total load and yield. As an example of some of the results provided through SPARROW, Joel showed a ranking of state contributions of N and P loading to the Gulf of Mexico. Based on the SPARROW model, of all the states in the Mississippi River/Gulf of Mexico drainage, North Dakota ranks 23rd in terms of N loading and 25th in terms of P loading.

Watersheds 101

The next topic on the agenda was a presentation by Ann Fritz on the watershed boundary dataset (WBD), what it is, why was it developed, who completed it, how was it created and maintained, and how to obtain a copy of it in a GIS. Ann described the WBD as a series of nested hierarchical drainage units which encompass all surface area drainage in the nation. Each drainage unit (or container) is subdivided into uniform areas based on topography and hydrologic principles. Drainage units are defined using Federal Standards which are a set standardized methods. These Federal Standards ensure that drainage area delineation is consistent from state to state and will result in a seamless national WBD product.

Ann described the hydrologic unit hierarchy, which is how the drainage units are organized across the nation. The highest level, or largest size drainage area is a "region" and is represented by a 2-digit hydrologic unit code. For example, the entire Missouri River drainage area is a "region" represented by the 2-digit code 10, while the Red River of the North, including the Souris and Rainey Rivers is region 09. Next in the hydrologic unit hierarchy is the sub-region which is a 4-digit code, followed by basin (6-digit), sub-basin (8-digit), watershed (10-digit) and sub-watershed (12-digit). The average size of a sub-basin is 700 mi^2, while the watersheds range in size from 40,000-250,000 acres and sub-watersheds are 10,000-40,000 acres.

Ann explained that from the very beginning, the development of the WBD in North Dakota has been a cooperative effort by various state and federal agencies. In 2000, a Memorandum of Understanding was

signed by six agencies, including the North Dakota Department of Health, North Dakota State Water Commission, North Dakota Geological Survey, US Forest Service-Dakota Prairie Grasslands, US Geological Survey and the US Department of Agriculture-Natural Resource Conservation Service. Each agency agreed to supply staff, maps, and/or expertise to the project. In addition to the support of these agencies, the US Bureau of Reclamation has provided assistance through their technical assistance to states program. Financial support has been received from US EPA grants and ND-GIS Technical Committee Data Acquisition funds.

Ann concluded her presentation by showing the workgroup where to view and to download the WBD. Both the WBD and the National Hydrography Dataset can be viewed and downloaded at nhd.usgs.gov.

What is a TMDL?

The final agenda item for the morning session was a presentation by Heather Husband, North Dakota Department of Health-Division of Water Quality, on Total Maximum Daily Loads (TMDLs). During the March 12, 2014 Prioritization Workgroup conference call several workgroup members asked for further explanation on what TMDLs were and how they related to the nutrient reduction strategy.

Heather began her presentation by explaining that the Clean Water Act (CWA) was created in 1972 in response to growing concern over pollution of the nation's waters. Under the CWA, states were required to develop Water Quality Standards (WQS), or pollution limits, to protect their waters. The foundation of pollution control is the WQS which are developed by each state. Heather explained that WQS include beneficial use designations for the rivers, stream, lakes and reservoirs in a state. Beneficial uses of North Dakota's waters include drinking water, recreation, aquatic life, agriculture, and industrial. The state WQS then describe the maximum levels in which a pollutant can occur and still protect that lake or river's beneficial use(s). When a waterbody like a lake or river does not meet WQS (i.e., beneficial uses are impaired), it is then listed on North Dakota's Section 303(d) List of Impaired Waters Needing a TMDL.

Heather then went on to explain that once a lake or reservoir, or a river or stream segment is listed on the Section 303(d) as impaired, a Total Maximum Daily Load analysis and report is required under the CWA. The TMDL analysis and report pulls together all available water quality data, flow data, land use information, and precipitation data from a wide variety of sources. These data are used to help determine how much pollutant loading is occurring, what the possible sources of the pollutant are and where they are located. Once the pollutant load and its sources are identified, the TMDL report then sets forth a plan for pollutant reduction so that the waterbody can again meet WQS (i.e., its beneficial uses). Heather described the mathematical portion of the report as that part that identifies the maximum load (quantity) on a daily basis, that the river or lake can accommodate and still protect the beneficial use(s), along with the reduction in load needed to reach the identified goal. This goal can be a specific number listed in the WQS, or it can be a guideline value based on research or a site specific study that determines the pollutant level necessary to protect the beneficial use(s) of the water. Heather said you can think of a TMDL as a pollution diet. The third step in the process is to find local support in the form of a sponsor, with possible financial assistance from North Dakota's Section 319 Grant Program, to encourage volunteers to adopt conservation practices aimed at reducing the pollutant load to meet the target value listed in the TMDL report. Heather emphasized that this third part is a voluntary, <u>not regulatory</u>, process so it is often the most difficult to initiate.

Overview of Prioritization Methods

Following lunch, Mike reviewed methods for prioritization. The methods that were reviewed include the decision tree method, the score card method, and the Recovery Potential Screening Tool method. Mike gave an overview of the decision tree and score card methods, while Doug Norton with EPA Headquarters provided a webinar presentation on the Recovery Potential Screening Tool.

Basin Framework for Prioritization

Following the prioritization methods presentations, Mike discussed a basin framework concept. Mike described the basin framework as something the Health Department has been discussing internally for a few months and is a new way to organize and implement their water quality management programs. This would include monitoring and assessment, TMDLs, Section 319 NPS and nutrients. Mike explained that currently, the Health Department for the most part implements their water quality management programs on a statewide basis. For example, each year Section 319 project proposals are accepted from throughout the state. Also, TMDLs are developed each year on impaired waterbodies located throughout the state. Through the basin framework, the state would be divided into 5-6 major basins (e.g., Red River, Souris River, James River, Missouri River). The Health Department would then implement basin water quality planning, monitoring, assessment, TMDLs and Section 319 NPS implementation within each basin over a 2-3 year time frame, then move on to the next basin where the process would be repeated. Mike explained that there would likely be overlap between the basins, so that as one basin began the planning process another basin may be in the implementation phase. Mike then said that this basin framework may be a good way to organize the nutrient reduction strategy. Through the basin framework, nutrient priorities would be set for each basin, rather than on a statewide basis.

Following some discussion, it was the consensus opinion of the group that the basin framework made sense. Some, however, made the point that even with the basin framework, the Health Department should keep in mind watershed projects which may be located outside of a priority basin in a particular year. For example, the Red River basin may be the focus for Section 319 NPS project funding in a particular year, but there may be a "really good" project in another basin that is ready to go. There should be flexibility with the basin framework to allow funding for a "really good" project even through it is not in the basin priority that year. Both Mike and Greg Sandness, Section 319 Program Coordinator for the Health Department, agreed.

It was also recommended that the entire Red River basin in North Dakota be part of the framework, but the Missouri River basin in North Dakota be divided into an upper Missouri River basin which would be that portion which contributes to Lake Sakakawea and a lower Missouri River basin which is that portion of the Missouri River drainage located below Garrison Dam. The lower Missouri River basin would include the Missouri River below Garrison Dam and Lake Oahe in North Dakota.

Proposed Nutrient Reduction Framework

Following the discussion on the Basin Framework, Mike presented a slide (Figure 1) showing a flow diagram (i.e., conceptual framework) for nutrient reduction or management which would be implemented within the basin framework. As Mike described this conceptual or proposed framework, the process would start with monitoring, including both water quality and biological monitoring. Monitoring data would then be used and interpreted to make assessment decisions. In other words, are the beneficial uses being attained, or are uses impaired, and if so, what are the cause(s) and source(s) of pollution causing the impairment. With respect to nutrients, assessments would be based on comparing the data to some threshold or a nutrient criteria. Therefore, if you look at the arrow between monitoring and assessment you will see criteria development next to the arrow. Criteria development was placed next to the arrow between monitoring and assessment because it should be recognized that some criteria or threshold may not currently be available to interpret monitoring data, and where these criteria are lacking, there will be a need to develop criteria.

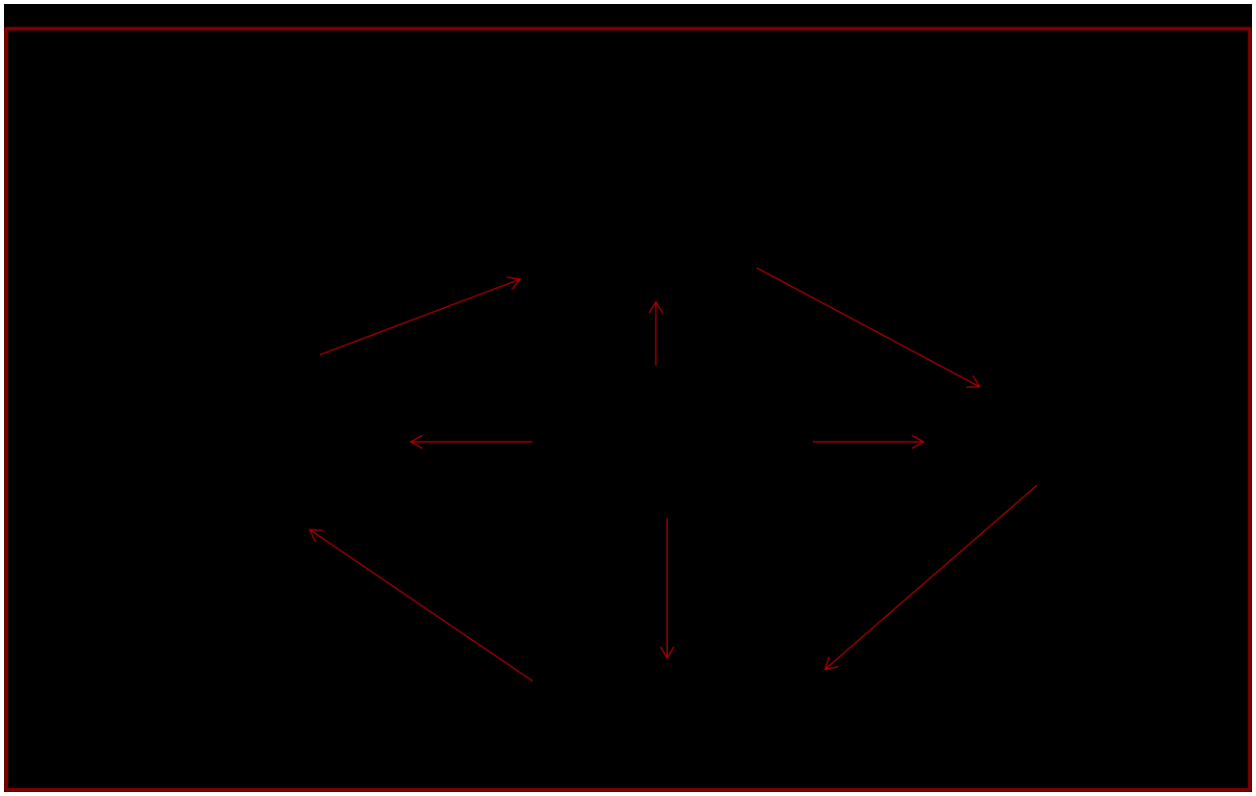

Figure 1. Nutrient Reduction/Basin Management Framework (as presented at the April 15, 2014 Prioritization Workgroup meeting.

The next step in the conceptual framework is TMDL development. This step, which may be a formal TMDL or something less formal, occurs for those waterbodies (i.e., lakes, reservoirs, rivers and streams) that are assessed as impaired. Since the TMDL development process needs a threshold or criteria for the pollutant of concern, criteria develop may be required for TMDL development as well. Once the threshold is set for the TMDL, then the TMDL sets forth a pollutant allocation for both point sources and nonpoint sources. Mike said that this allocation is generally based each source's relative contribution within a waterbody's contributing watershed. Therefore, if there were no point sources in a watershed, then all of the allowable pollutant load in the TMDL would be allocated to the nonpoint sources.

Mike then described the next step in the conceptual framework which is implementation. Mike emphasized that through this conceptual framework, the implementation step would only occur after the TMDL (or something similar to a TMDL) is developed. Mike then said that it is likely that implementation for point sources identified in a TMDL would occur through permitting, but that implementation for the nonpoint sources would occur through the voluntary adoption and implementation of best management practices through something like a Section 319 watershed project.

Following implementation Mike shows the flow diagram going back to monitoring. Mike explain this as the adaptive management component of the conceptual framework where monitoring is used to verify if the TMDL and the resulting implementation has resulted in the restoration of water quality and beneficial uses.

Mike then concluded this presentation by pointing out that in the diagram, prioritization is in the middle and is required for each element in the conceptual framework.

Discussion

Mike began the discussion by asking the workgroup if they are ready to make a recommendation for a prioritization method. After some discussion and questions it was the consensus of the workgroup to pursue development of the Recovery Potential Screening Tool (RPST) as presented by Doug Norton as the primary means for setting priorities for nutrient reduction in North Dakota. It was also the consensus recommendation that the Health Department initiate development of the RPST in the Red River basin, which would be consistent with the basin framework discussed earlier. Jeff Lewis, Executive Director for the Red River Basin Commission (RRBC), indicated that he thought the Red River basin would be a good place to pilot this process as there is already a basin organization in place in the RRBC.

Several workgroup members commented that while the RPST seemed like a good method for prioritization, there was also value in the score card method and in the decision tree method, especially since these methods may be easier to use when conveying information to the public. It was mentioned that there were elements of both the score card method (i.e., the three indices) and the decision tree method in the RPST.

Mike then concluded the workgroup meeting by thanking those in attendance and said that he thought a lot had been accomplished at this meeting.