Summary of the Fall 2014 meeting of the UMRCC Water Quality Technical Section, October 1 & 2, 2014

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The Fall 2014 meeting of the UMRCC Water Quality Technical Section (WQTS) was held from 1:00 PM on October 1st through noon on October 2nd at the University of Iowa's *Lucille A. Carver Mississippi Riverside Environmental Research Station* (LACMRERS) near Muscatine, Iowa. The following persons attended the Technical Section meeting.

1.	Michelle Balmer	Iowa DNR, Des Moines
2.	John Olson	Iowa DNR, Des Moines
3.	Mary Skopec	Iowa DNR, Des Moines
4.	Travis Kueter	Iowa DNR/LTRMP, Bellevue
5.	Doyn Kellerhals	IRBS, Illinois Natural History Survey, Havana, IL
6.	John Sullivan	La Crosse
7.	Doug Schnoebelen	LACMRERS, Muscatine
8.	Carrie Davis	LACMRERS, Muscatine
9.	Kent Johnson	Metropolitan Council Environmental Services, St. Paul
10.	Dave Bierl	U.S. ACE, Rock Island
11.	Elizabeth Bruns	U.S. ACE, Rock Island
12.	Karen Hagerty	U.S. ACE, Rock Island
13.	Leo Keller	U.S. ACE, Rock Island
14.	Mark Steingraeber*	USFWS, La Crosse
15.	Scott Yess	USFWS, La Crosse
16.	Cathy Henry	USFWS, Port Louisa NWR
17	Shawn Giblin	Wisconsin DNR, La Crosse
18.	Gina LaLiberte*	Wisconsin DNR, Madison

*Participated via telephone.

STATE/AGENCY UPDATES

Iowa DNR, John Olson:

Iowa's 2014 Section 303(d) list: Iowa's draft 2014 Section 303(d) list is in preparation. The aquatic life impairments due to cadmium and the drinking water impairments for arsenic for the Iowa portion of the UMR will be proposed for de-listing (removal) from Iowa's 2014 Section 303(d) list. Impairments remain, however, for the bacterial slime problem downriver from Clinton and for aluminum. **Upper Mississippi River Basin Association WQ Task Force:** Iowa DNR continues to participate in the WQ Task Force.

Recent activities have included work on a Clean Water Act-focused water quality monitoring strategy for the UMR and on development of a WQ assessment methodology to support this strategy. Iowa DNR continues to develop recommendations for numeric nutrient criteria for wadeable streams and rivers.

Kent Johnson, Metropolitan Council Environmental Services (MCES):

1. MCES will be initiating a project to update our Environmental Information Management System, the web portal by which our water quality monitoring data (rivers, streams, and lakes) are externally available to potential users. The project will create a more user-friendly and more readily-accessible system that also provides all of our biological monitoring data for rivers and streams. The current web address: http://es.metc.state.mn.us/eims/.

2. MCES, MPCA, MDNR, MDA, MDH, and BWSR are collaborating on a project that will create a web portal for accessing state-wide surface and ground water data. Here is the Executive Summary from the project charter:

   Executive Summary

   Historically, water data and information has been largely managed independently by multiple state agencies. More recently some of these agencies have partially migrated to shared systems for their water data management. They are interested in going further with a coordinated approach for data storage and access. However, a better understanding of the benefits, requirements, costs, and needs is essential for such an approach.

   This analysis phase of the project focuses on the business needs of water professionals, researchers, local government, and other members of the public who are actively working to meet Clean Water Legacy Act goals, clean water outcomes, and legacy-funded work. The results will inform a business case for a potential enterprise water data solution(s).

   This project explicitly explores what roles a water information portal(s) may play in providing more effective and efficient access to appropriate levels of water data. This project will identify what types of water data and information are desired by end users, how end users currently access that data, and where opportunities for multi-agency improvement and coordination of data storage and access can be found. The project will also define a data governance framework and standardization approach for water data management.
   The agencies involved[1] are striving to support clean water legacy funded activities and enable efficient and effective localized decision-making regarding clean water activities.

[1] *Board of Water & Soil Resources (BWSR), Department of Natural Resources (DNR), Department of Agriculture (MDA), Department of Health (MDH), Metropolitan Council (MCES), and Pollution Control Agency (MPCA)*

This is a project of the Data Integration Sub team of the CWF Interagency Coordination Team in pursuit of clean water outcomes, made possible by the Clean Water Fund.

3. In early 2015, MCES will be purchasing and installing a continuous nitrate-nitrogen sensor (Hach Nitratax) at our automated Minnesota River monitoring site (near the mouth of the river).

4. MCES has recently completed a comprehensive, period-of-record report on the condition of the 22 Metropolitan Area streams we have been monitoring since 1989. The report includes information on watershed characteristics, stream flows and precipitation, pollutant concentrations and annual loads, several continuous monitoring variables (dissolved oxygen and turbidity), and biomonitoring results. The report can be accessed at:

   http://www.metrocouncil.org/Wastewater-Water/Services/Water-Quality-Management/Stream-Monitoring-Analysis.aspx?source=child

5. The MCES website that describes our monitoring programs for rivers, streams, lakes, and wastewater treatment facilities was updated in 2014. This information on our water monitoring programs can be viewed at:

   http://www.metrocouncil.org/Wastewater-Water/Services/Water-Quality-Management.aspx

Dave Bierl, U.S. Army Corps of Engineers, Rock Island:

UMRR HREP Monitoring

- Performance evaluation monitoring was performed during the summer at the following HREPs:

  McCartney Lake (Pool 11), Mud Lake (Pool 11), Sunfish Lake (Pool 11), Andalusia Refuge (Pool 16), Big Timber Area (Pool 17) and Lake Odessa (Pool 17/18).

- Baseline monitoring was performed at Pool 12 Overwintering (Kehough Slough), Beaver Island (Pool 14), Boston Bay (Pool 18), Keithsburg Division (Pool 18) and Huron Island (Pool 18) projects.

- A short-term dye/velocity study was performed at Mud Lake (Pool 11) in March 2014 to determine circulation patterns in the backwater area during the winter under ice cover.

EMP HREP Construction

- Construction is ongoing at the Pool 12 Overwintering (Sunfish Lake) HREP and will commence this fall at the Huron Island (Pool 18) HREP.

Transparency Tube Measurements at District Locks

- Transparency tube measurements were taken at District L/Ds during the growing season. The data are available to the public and can be viewed on the *rivergages.com* website.

Personnel Changes

- Dave Bierl will retire from the Corps on January 2, 2015.

Shawn Giblin, Wisconsin DNR:

- **WI/MN UMRBA monitoring strategy- pilot program:** WI and MN are moving forward with planning efforts to implement pilot program for UMRBA monitoring strategy for the UMR. Funding is uncertain, but details are being worked out with the assumption that funding will be available for a pilot program.

- **WI is assembling research priorities for the next five year increment:** A wide range of projects are being considered for the next five year period.

- **WI Mississippi River continuing research efforts:** Ecological shifts in a large floodplain river during a transition from a turbid to clear stable state. Effects of nutrient concentrations and zooplankton on phytoplankton abundance and community composition.

- **Holmen, WI WWTP reroute to La Crosse, WI WWTP:** Holmen, WI (a suburb north of La Crosse experiencing rapid population growth) is planning to re-route wastewater to La Crosse WWTP by 2017. This is good news for Lake Onalaska and points downstream and consistent with goals to reduce P within WI waters.

- **HREP Planning:** Discussions are ongoing regarding the North/Sturgeon Lake HREP (Pool 3). Debate has centered around what level of connectivity to the main channel is desirable to achieve project objectives.

- **Position Vacancies:** WI is moving forward to backfill water quality and vegetation specialist positions at the Pool 8 Field Station (La Crosse, WI) within the next month.

- **305b and 303d Reporting:** WI is beginning to explore analytical approach for 305b and 303d reporting for 2016. Discussions between Mississippi River Staff and Central Office Staff are beginning to take place.

Pam Anderson, Minnesota Pollution Control Agency (provided via e-mail):

- River Eutrophication and TSS Standards have been promulgated; awaiting approval from EPA HQ; anticipated to be included on the 2016 list. As a result, turbidity will no longer be used in assessments

- Tiered Aquatic Life Use in rule development; anticipated to be included on the 2016 list.

- MPCA is requesting budget funds to pilot the UMRBA monitoring plan for Pools 0 and 1 in 2016. Would be a partnership with MDNR for the plants.

- Load and subwatershed load monitoring networks have been fully installed in 2014. Approximately 200 stations across the state will have flow and chemistry data collected for FLUX calculations and to support watershed modeling work.

- Biological monitoring was hampered by the floods this spring/summer – most of the sites were sampled, but not all (2014 watersheds).

- Large River monitoring (Upper Miss and MN) also lost samples this summer – flooding conditions in late June/early July required sampling to be stopped for safety issues. Some resampling will occur on the MN next year.

Coordinator's Report: Scott Yess, USFWS, Onalaska: (see annual UMRCC *Proceedings* document for the full report)**.**

PRESENTATIONS:

Update on UMRBA WQ monitoring strategy & assessment methodology for the Upper Mississippi River. John Olson, Iowa DNR, Des Moines:

The Water Quality Task Force of the Upper Mississippi River Basin Association continues to work on developing a Clean Water Act monitoring strategy for the Upper Mississippi River. Thus far, documents on monitoring options & considerations and on a recommended monitoring plan have been completed. Beginning in January 2014, the WQTF began work on a methodology for assessing the degree to which the UMR supports its four primary designated uses: primary contact recreation, aquatic life, drinking water, and fish consumption. A draft assessment methodology has been prepared. This methodology is designed to use data generated from several types of water quality monitoring (e.g., probabilistic and fixed station) over a five-year rotating cycle and is patterned after ORSANCO's monitoring program on the Ohio River.

Primary contact recreation uses will be assessed based on results of monitoring for indicator bacteria (*E. coli*) at UMR fixed monitoring stations. Support of aquatic life uses will be determined with results of biological monitoring for fish, macroinvertebrates, and aquatic vegetation at 15 probabilistic sites per UMRBA assessment reach. Drinking water uses will be assessed with a combination of data from fixed stations and targeted monitoring water supply utilities. Support of fish consumption use will be determined by analysis of fish tissue from bottom feeder and predator fish species for PCBs and mercury.

UMR mayfly emergence activity in summer 2014. Mark Steingraeber, USFWS, La Crosse.

The annual emergence of burrowing mayflies was noteworthy in many UMR reaches this year. More than 40 volunteers reported *Hexagenia* mayfly emergence events this summer from 16 UMR navigation pools, as well as three tributaries (Illinois, St. Croix, and Minnesota rivers). The first documented reports of emergent *H. limbata* and *H. bilineata* came 10 June (Pool 3) and 28 June (Pool 16) while the last came 9 September (Pool 3) and 10 September (Pool 2), respectively. During the interim, the daily magnitude of *H. bilineata* emergence events throughout the UMR was greatest the week of 18-24 July when the reported cumulative emergence strength in all UMR pools totaled more than 54; and emergence activity reached its annual overnight peak (19-20 July), spanning a distance of more than 230 river miles from Pool 2 to Pool 12. This single event generated enormous public interest in the connection between mayflies and water quality, highlighting the UMR at local, regional, national, and international levels via media reports and images that went "viral". Although the timing of this species' 2014 longitudinal emergence peak (*i.e.*, 18-24 July) was identical to that reported last year, cumulative emergence strength at this time was more than 18% greater this year than during the same period in 2013. Associated efforts using the volunteer-reported dates of UMR mass emergence events to help field-validate a laboratory derived model that estimates thermal-driven rates of growth and development for *H.bilineata* nymphs are continuing. A recent review of some of these validation efforts suggest that consideration of the prevailing trend in river water temperatures during the early life development of mayfly nymphs (*e.g.*, first 30 days after egg hatch) may be used to help improve the accuracy and precision of the model in estimating annual dates of mass emergence events in UMR pools. Finally, in conjunction with the multi-partner 2015 *Year of Fishing* outdoor recreation initiative occurring along the length of the Mississippi River, planning is underway to increase the spatial range and number of volunteers who report mayfly emergence events next year along the UMR (particularly at sites within the National Wildlife Refuge System). Much of this effort will utilize the National Phenology Network's *Nature's Notebook* protocols and tools for on-line data entry and download.

Update on LACMRERS water quality monitoring network. Doug Schnoebelen, LACMRERS *and* LACMRERS water quality monitoring network: research to data and implications for Mississippi River studies. Carrie Davis, LACMRERS.

Doug Schnoebelen, LACMRERS director, presented an update on the establishment of the water-quality high resolution sensor network project currently ongoing at LACMRERS and IIHR (University of Iowa Institute of Hydraulic Research/Hydroscience & Engineering). Starting with about 10 sites in 2012 the network this year has grown to 20 sites in 2014. Current monitoring is for turbidity, pH, water temperature, dissolved oxygen, specific conductance, and nitrate. Water quality and ecological research are undergoing significant changes through advances in the technology for measuring, collecting, and processing data within streams and on the landscape. These technological advances are of critical importance for the Mississippi River System and the Upper Mississippi River Basin (UMRB) watersheds so scientists, producers, and basin stakeholders can better understand water-quality processes, fate, and transport. Specific examples were given of the improved calculations of loads and yields for nitrate for various watersheds on the lower Iowa and Cedar River. Work is progressing on serving the data to the web real-time. Schnoebelen is currently looking to advance the water-quality sensor network for 2015 and would welcome partners in other areas of the Mississippi River Basin as well. Other LACMRERS news included updates on water-quality modeling that is ongoing in coupling chemical and hydrodynamic modeling. Schnoebelen also discussed the successful education program work with the Chinese high school students over the past 3 years. This last year included a week of intensive study and activities on the Mississippi River and its tributaries that has been very successful with the Chinese students.

Summary of nitrogen-related water quality monitoring on a UMR backwater: Shricker Slough and Rock Creek near Clinton, Iowa. John Olson, Iowa DNR, Des Moines.

Shricker Slough is a UMR backwater (river mile 508-510) near Clinton, IA, that receives flow from Rock Creek, an Iowa tributary of the UMR that drains 24 square miles of primarily agricultural land. Shricker Slough has been identified as an important overwintering area for Pool 14 fish. For decades, Rock Creek has been contaminated with high levels of nitrogen compounds (primarily ammonia and nitrate) from a now-abandoned nitrogen fertilizer plant, PCS-Nitrogen, which was closed in 2001. Iowa DNR Fisheries/LTRMP raised concerns regarding water quality in Shricker Slough in the mid-1990s due to algae blooms and due to high levels of ammonia and nitrate in Rock Creek. LTRMP began monitoring in Shricker Slough in 1993, and two monitoring sites on Rock Creek (upstream and downstream of PCS-Nitrogen) were added in 1996. In 2000, the Iowa DNR Contaminated Sites Section worked with PCS-Nitrogen to establish eight monitoring sites on Rock Creek that were monitored by a PCS consultant. Results of this monitoring showed that levels of ammonia in Rock Creek at and downstream from PCS-Nitrogen routinely violated Iowa's chronic ammonia criteria to protect aquatic life and occasionally exceeded acute criteria for ammonia.

Results of Iowa DNR fish surveys in 1997, 1999, and 2002, however, continued to show a relatively diverse fish community (total of 47 species) in the segment of Rock Creek containing these high levels of ammonia. Various remediation measures were implemented at and downstream from PCS-Nitrogen to reduce input of ammonia to Rock Creek and Shricker Slough. The most effective of these measures were (1) a groundwater interception trench that was in operation from 1999 to 2009 and (2) construction of an 80-acre treatment wetland on Rock Creek downstream from the PCS-Nitrogen site in 2000. Both of these measures were effective in reducing levels of ammonia in the lower segments of Rock Creek. Cessation of pumping of the groundwater interception trench in 2009, and a similar action at an adjacent industrial facility (aka, Chemplex), however, has resulted in a return of high levels of ammonia in Rock Creek between the PCS site and the treatment wetland. The results of 20 years of monitoring suggest that water quality conditions in Shricker Slough have improved with average growing season levels of turbidity and suspended solids that often meet UMRCC recommendations for protection of submersed aquatic vegetation. Chlorophyll levels have also shown a downward (improving) trend. Secchi depth levels, however, remain poor suggesting some additional water clarity problem for this backwater. Levels of total nitrogen in Shricker Slough have changed little over the 20-year period and show neither increasing nor decreasing trends. Levels of TN in Shricker Slough and the adjacent segment of the UMR appear similar. Also, levels of TN in Shricker Slough are very poor predictors of chlorophyll levels.

Winter velocities and circulation patterns in a Pool 11 backwater in Iowa: Mud Lake HREP. Dave Bierl, USACOE, Rock Island.

The Mud Lake habitat restoration project in Pool 11 was designed to (1) create deep water off-channel areas to provide year-round habitat for Centrarchids and associated species and (2) reduce resuspension of sediment. This project was completed in 2005. The following problem occurred during the post-project period: too much flow was getting in this backwater area resulting in undesirable velocities for Centrarchid overwinter use. Thus, an adaptive management strategy was used to address this problem. In 2006, the lateral inlet was completely filled, and the upper inlet was partially filled. Although these actions resulted in reduced velocities, studies showed that (1) the backwater was underutilized by fish, (2) flow was entering the backwater through the outlet, and (3) velocities in the backwater remained too high. Thus, winter dye studies were conducted to better characterize velocities and to determine the best strategy for improving the backwater as overwintering habitat for fish. Based on results of these studies, it has been proposed that additional rock be placed in the upper inlet this fall to reduce the size of the opening from approximately 28 ft^2 down to 8 ft^2. It has also been proposed that dye and fish telemetry studies be performed in order to determine the effectiveness of this action.

Monitoring for cyanotoxins in Iowa: results, concerns & implications. Mary Skopec, Iowa DNR, Des Moines.

Background was provided on the ecological importance and the ecological problems associated with cyanobacteria such as blooms and scums in late summer. Harmful algal blooms (HABs) deplete dissolved oxygen and produce toxins and thus can cause fish kills and death of waterfowl. Types of cyanotoxins include cyclic peptides (hepatoxins), alkaloids (neurotoxins, cytotoxins, and dermatotoxins) and irritant toxins (lipopolysaccharides). Iowa's cyanotoxin monitoring program began in 2004 and is based an action level of 20 ug/l of total microcystins. Warning signs are posted if total microcystins exceed 20 ug/l, and beaches are closed if levels exceed 2,000 ug/l. The public is informed of warnings and advisories through the following: information signs, notifications of park staff and Iowa Dept. of Public Health, press releases, and the IDNR beach monitoring web site (http://www.iowadnr.gov/Environment/WaterQuality/WaterMonitoring/MonitoringPrograms/Beaches.aspx). Iowa DNR participates in the CDC's harmful algal bloom illness surveillance system (HABISS). Health impacts from microcystin poisoning include dermal impacts, ingestion-related impacts (GI problems, muscle weakness, and liver impacts), and inhalation impacts that can range from slight respiratory distress to severe allergic reactions. All suspected cases of microcystin poisoning must be reported to the Iowa Dept. of Public Health with notices sent to health care providers and veterinarians.

Cyanobacteria and algal toxin sampling in Wisconsin. Gina LaLiberte, Wisconsin DNR, Madison.

Background on cyanobacteria blooms in Wisconsin was reviewed with historical information showing complaints regarding algal blooms in the late 1880s. Hazards of cyanotoxins to aquatic life and human health were reviewed, especially concerns and health impacts of cyanotoxins in drinking water as occurred this summer in Toledo, OH. Causes of cyanobacteria blooms were reviewed with the conclusion that many factors—including high levels of nutrients, warm & calm weather, presence of the strains of algae that can take advantage of the particular conditions present, presence of micronutrients (e.g., iron), dissolved carbon, and presence of zebra mussels or quagga mussels—all combine to create conditions favorable for a cyanobacteria bloom that may produce toxins. Studies of cyanotoxins occurrence in Wisconsin were reviewed from the late 1960s, mid to late 1980s, and 2004-2008. Wisconsin's harmful algal bloom surveillance program was described; i.e., sampling for cyanotoxins in response to human or animal illness. World Health Organization guidelines are used to estimate cyanotoxins risk levels with the risk threshold set at 20 ug/l of microcystin-LR. Recommendations for minimizing exposure and health risk from harmful algal blooms were presented. Cyanobacteria blooms appear to be more frequent than historically due to increased precipitation levels (i.e., more nutrient delivered to surface waters), earlier warming in spring, and extended warm periods during summer.

The return of the Longear Sunfish to Iowa. John Olson, Iowa DNR, Des Moines.

One of Iowa's most colorful fishes, the Longear Sunfish, was once distributed across the northern half of Iowa. The decline of aquatic macrophytes in Iowa's interior streams and rivers in the early and mid-20th Century has adversely impacted a number of Iowa's fish species, including the Longear Sunfish. In addition, the elimination of off-channel habitats through stream straightening, and the lack of connectivity with the remaining off-channel habitats due to channel degradation, are additional factors in the declines of several Iowa fish species. In July 2014, biologists at the Iowa DNR's Fairport Fish Hatchery (UMR Pool 16 near Muscatine) reported seining what was believed to be several Longear Sunfish from hatchery ponds along the UMR that had been flooded earlier in the summer. The specimens were placed in aquaria at the hatchery. Photos of these fish were sent to experts on Longear Sunfish who confirmed the identification as *Lepomis megalotis*, Longear Sunfish. This form of the Longear Sunfish complex, however, is not the same form that was collected in Iowa during the late 19th and early 20th centuries (now known as the Northern Sunfish, *L. peltastes*). The species found at Fairport is believed to be the southern form of the Longear Sunfish that is found primarily in the lower Mississippi and Ohio river basins. Upon hearing of the discovery at the Fairport Hatchery, several fisheries biologists on the UMR recalled collecting Longear Sunfish near and upriver from the Fairport Hatchery over the last 10 to 15 years. Genetic testing is currently underway to definitively identify the Fairport specimens and to better determine the particular form of the Longear Sunfish complex to which the Fairport specimens belong. So, after an absence of approximately 100 years, the relatively sudden appearance of the Longear Sunfish in the early 21st Century along the IA/IL portion of the UMR raises an interesting question: was this species always present in this portion of the UMR, or does its presence now possibly reflect the impact of climate change on fish distribution? This question suggests the need for additional biological monitoring in Pools 16 and 17 of the UMR to track changes in fish distribution potentially related to climate change. This type of monitoring could be provided by the addition of an LTRMP field station in this segment of river.