Workshop Summary
Cayuga Lake Modeling Project, Quality Assurance Project Plan Review
Wednesday January 30, 2013
Tompkins County Public Library, Borg-Warner Room, Ithaca NY

Workshop Participants:

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<tr>
<th>Name</th>
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<tr>
<td>Jeff Myers</td>
<td>NYSDEC-Albany</td>
<td>Dave Bouldin</td>
<td>Cornell (retired)</td>
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<td>Diane Carlton</td>
<td>NYSDEC-Syracuse</td>
<td>Bob Johnson</td>
<td>Cornell (retired)</td>
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<td>Dan Hayes</td>
<td>NYSDEC-Syracuse</td>
<td>Todd Walter</td>
<td>Cornell</td>
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<td>Ed Wilson</td>
<td>EMC/Cornell</td>
<td>Cliff Kraft</td>
<td>Cornell</td>
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<td>Jim McGarry</td>
<td>EMC/WRC</td>
<td>Todd Cowen</td>
<td>Cornell</td>
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<td>Brian Eden</td>
<td>EMC</td>
<td>Roxy Johnston</td>
<td>C. Ithaca</td>
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<td>Dan Karig</td>
<td>WRC/Cornell (retired)</td>
<td>Jose Lozano</td>
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<td>Steve Effler</td>
<td>UFI</td>
<td>Hillary Lambert</td>
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<td>Dave Matthews</td>
<td>UFI</td>
<td>Casey Halton</td>
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<td>Susan O’Donnell</td>
<td>UFI</td>
<td>Steve Penningroth</td>
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<td>Jim Adams</td>
<td>Cornell</td>
<td>Adriel Shea</td>
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<td>Liz Moran</td>
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<td>Liz Cameron</td>
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<td>Herb Engman</td>
<td>T. Ithaca</td>
<td>Tom Vawter</td>
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<td>Aaron Ristow</td>
<td>TC SWCD</td>
<td>Linda Wagenet</td>
<td>EcoLogic</td>
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<td>John Halfman</td>
<td>HWS/FLI</td>
<td>Bert Bland</td>
<td>Cornell</td>
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1. Welcome from Roxy Johnston, on behalf of the Water Resources Council and the Cayuga Lake Monitoring Partnership.

2. Diane Carlton reviewed meeting agenda and purpose, asks for self-introductions

3. Jeff Myers-
   - Explained purpose and importance of a Quality Assurance Project Plan
   - Summarized status of draft document
     - Under review. Cornell will submit formally once final SPDES permit renewal for LSC is issued.
   - Stated that the objective of this phase is monitoring to support modeling, model tool to support TMDL

4. Steve Effler (UFI presentation slides are on SharePoint). Major points summarized below:
   - QAPP structure & outline are dictated by EPA standard guidelines
   - 2 phases of CLMP
     - 1: lake & stream monitoring
     - 2: lake water quality model development and testing
   - Instrumentation to be employed for monitoring
     - rapid profiling (SeaBird)
     - Stream sondes
     - Examples of profiles and data visualization
   - Described monitoring plan as presented in draft QAPP
Lakewide, biweekly; south end, 2x/week
- Whole-lake dreissenid transects are planned (Lars Rudstam and James Watson, CBFS)
  - Differentiate zebra and quagga along 10 transects
- Plankton sampling: Hairston et al.
- Stream sampling
  - USGS gauging stations, including Salmon Ck
  - Fixed frequency near mouth (biweekly)
  - Runoff events
    - @ 4 streams w/ gauging stations (Salmon, Fall, 6-mi, Inlet)
  - Upstream synoptic surveys
    - Salmon Ck & maybe Fall Ck
  - Bioavailability-algal bioassays on sediment “cake”- Dr. Marty Auer, MTU
- Described phosphorus fractions to be measured (or calculated) and rationale
- Described light scattering and turbidity measurements
- W2 as the Transport submodel: most widely used
  - Transects w/ depth layers
  - Transport of materials between layers
  - Esp. good for long, narrow lakes
- Draft timeline
- Incorporation of other data sets (see p 96 of the QAPP)

5. Discussion and Q&A on UFI presentation
- **Steve Penningroth**- asked why not measuring SRP in stream samples? **Response (Effler and O'Donnell):** holding time issue. Under NELAC requirements (lab certification), samples must be filtered within 15 min of collection and analyzed within 48 hours. Not possible for the 24-hour composited autosamplers during events. Steve P. suggested that volunteers might be able to help. (note: Steve P. followed up with an email urging that samples be collected and analyzed by CSI, but flagged as not compliant)

- **Dan Karig**- stated that the geologic aspects of this project are not getting much attention; what happens to sediment plumes in the lake- are these important to the P budget? **Response (Effler):** UFI model will track particle transport and settling. Smaller particles contribute to turbidity. Model will represent range of particle size; will measure particle sizes according to chemical component during events; simulate plume and where it goes. Because the water column remains oxygenated, can assume that P flux from mud not significant.

- **Steve Penningroth** – asked why not collect samples for bacteria counts? CSI could test samples, might provide information to de-list southern shelf for pathogen indicators. Have data for E. coli and total coliform (NYS standard is fecal coliform)
Response (Myers): Data to support listing for bacteria as an impairment of southern shelf are not as extensive as data supporting listing for impairments due to phosphorus and silt/sediment. Stated that listing was based on assumptions. There may be sufficient existing data to support de-listing. Noted that bacteria is not attributed to LSC, so NYSDEC would not require Cornell to do this monitoring.

There was additional discussion regarding swimming impairment of southern shelf. Liz Cameron noted that turbidity was the primary concern that led to closing Stewart Park to swimming, but could not state that bacteria was not involved. Steve Penningroth pointed out that approved bathing beach discontinued in 1960s, prior to enactment of the Clean Water Act, and challenged reasonableness of citing an impaired use that never existed under regulatory framework. Jeff Myers explained that the lake is classified as “A” waters, which include swimming. Roxy Johnston pointed out that Sixmile Creek is a Class A waterbody, and there is no swimming. Jeff Myers explained that a Use Attainability Analysis may follow completion of the TMDL.

- **Steve Penningroth**- asked for clarification on the siting of gauging stations, and how flows will be adjusted to account for discharges at the mouth, especially on Sixmile Creek and Cayuga Inlet, where the gauging stations are miles upstream. **Response (Effler)**: UFI consulted with Lynn Szabo of USGS; sampling sites pushed down as far as is reasonable; project is reactivating stream gauge on Salmon Creek; other existing gauges will be used. USGS will assist with estimating discharge at the monitoring sites, using unit area corrections.

- **Aaron Ristow**- asked whether it is important to know the source of sediment and P in stream. **Response (Effler)**: will be addressed in Todd Walter’s presentation.

- **Roxy Johnston**- asked how and to what extent third-party data will be used model calibration. **Response (Effler)**: Model calibration uses data from a specific period of time (will be data collected in 2013, assuming monitoring starts this year). Once calibrated, the model can be verified by testing its ability to project conditions measured in other years. Historical data will be very valuable for verification.

- **Roxy Johnston**- requested that the organizational chart on pg. 19 be expanded to include process of how community stakeholders will interact with modelers in compiling and reviewing existing data for potential use in modeling effort. **Response (Moran)**: EcoLogic will serve as contact between modeling team and technical stakeholder community. Text will also be added to appropriate section of QAPP (around p. 95-96).

- **Roxy Johnston** – some data may be determined to have value in understanding general processes but not model development; can those data be used in management later? **Response (Effler)**: This issue of conceptual model of sediment and TP sources may be
more related to TMDL process than in the water quality model development. Response (Myers): NYSDEC commits to looking at the whole system.

- Herb Engman- noted that the NYSDEC and UFI teams have designated quality control officers. How will this role be formalized for the Cornell team? Response (Effler): Data collection and data reduction for the mussel and plankton sampling describe their internal QA processes and staff training. Response (Myers): NYSDEC received comments about peer review and will likely defer this until they see what issues are emerging as most important. Best to bring in reviewers with expertise on the most critical issues.

- Steve Penningroth- noted that the QAPP describes periodic (quarterly) meetings between model team and NYSDEC. He would like a similar commitment to quarterly briefings of technical stakeholders. Steve further noted that there are four primary sources of local data: Jose Lozano, John Halfman, Dave Bouldin, and CSI. Response (Effler): Meetings not practical during monitoring season. Willing to accommodate requests. Myers noted that conference calls may be an alternative. Bland noted that Cornell would attend Lake Monitoring Partnership meetings, and may involve consultants as appropriate.

- John Halfman- asked whether UFI is estimating discharge at each of the upstream sites. Response (Effler): No, plan is to use Todd Walter’s model to estimate discharge at upstream locations during synoptic surveys.

6. Todd Walter presentation (PowerPoint is on SharePoint). Major points summarized below.
   - Why include the watershed when interest is on the lake?
   - Stream monitoring and water quality data
     - Calibration of the model
     - Validation: need to test the model on different data
     - Why do we need new data: get a snapshot at one time, benefit of having one data set from single project and lab- use for calibration
     - Why so many sites: get geographic variation (number constrained by funding)
     - Spatial and temporal variation
     - Overriding importance of hydrology on transport
   - Big picture: subwatershed analysis of land use, etc. to estimate P export
     - Broad brush: percent agriculture correlates with Total P export, cannot make any management decisions other than reduce agriculture
     - Lumped models are used in many TMDL applications, but cannot specify where in the subwatershed the sediment or nutrients is coming from.
       - Soil Water Assessment Tool (SWAT)
• General Watershed Loading Function (Haith) does not account for stream load. Dr. Walter did not have access to metadata used by Dr. Haith in initial model calibration.
  o Distributed model: interactions among part of the watershed
  o Example of a whole-farm model downstate (Catskills): compared control farm to show effects of steps taken to reduce P runoff

7. Discussion and Q&A on Dr. Walter’s presentation
• Dan Karig- commented that much of the sediment load is not from current land use, it’s from legacy sediment. Cannot assume that streams are in equilibrium. Cited his report on Sixmile Creek. This is the most significant source of sediment to southern shelf.

• Roxy Johnston- requested that references to Greg Nagle’s work be included in the QAPP. Further, she commented on Doug Haith’s models, and asked whether the coarse scale is adequate. Response (Walter): need to redo Haith’s model to include channel mechanism.

• Bert Bland- noted the streambank erosion that is obvious in Sixmile and Fall Creeks. How will the model address this? Response (Walter): Plan to use SWAT to reproduce findings of Nagle analysis (Cs content, used to differentiate landscape and in-stream (bank, bed) origin of sediment).

• Aaron Ristow- asked how agricultural BMPs will be incorporated into model, and how data will be QC’d for accuracy. Response (Walter): Model accommodates mostly structural BMPs, not measures like cover crops. Additional uncertainties arise from how to handle subsurface flows, there are lots of tiled fields; need to make some assumptions. Lidar data can be helpful. There are privacy rules in place that affect collection and analysis of actions on individual farms. Aggregated data are used. Only a small percentage of farms are regulated as part of the CAFO program.

• Liz Moran- asked what the watershed model will assume for future hydrologic conditions, when the model is used to evaluate various management scenarios (TMDL phase). Stated that future conditions likely to have more extreme events. Response (Walter): To date, not seeing impacts of climate change on stream flow. Rainfall is changing, but stream flow is not. May be some self-regulating mechanisms at play.

8. General Comments and Discussion on QAPP
• Roxy Johnston offered multiple comments on the QAPP.
  • Need to capture knowledge regarding the biological community. Good example is Bob Johnson’s extensive data regarding the macrophyte community, especially for the southern shelf. Response (Effler): Macrophytes are not a target of the model,
but can be included in a summary report. Part of a whole-lake management effort. **Jeff Myers** stated that DEC would like to see progress with updating the Restoration and Protection Plan (RPP).

- **Jose Lozano** stated that the QAPP is an excellent, thorough document. He is concerned that the program would not support a TMDL analysis for pathogens and silt/sediment.

- **Herb Engman** asked why the QAPP formal submittal is tied to the final SPDES permit renewal for LSC, and that there was an apparent “quid pro quo”. **Response (Myers):** Cornell and NYSDEC are partnering on this effort, for the benefit of Cayuga Lake. Without the permit renewal in place, Cornell has no reason to commit to the CLMP. NYSDEC has not been able to complete the TMDL with internal resources. **Bert Bland** added that the QAPP addresses nutrient monitoring and modeling for the lake, not just for LSC.

- **Roxy Johnston** offered several additional specific comments on the draft QAPP.
  - Remove references to the TMDL model (for example, on p. 30). Be clear and consistent that the model is a tool that NYSDEC may apply to a TMDL allocation, or other watershed management strategy that is appropriate for Cayuga Lake.
  - Commit to archiving project data on the Cayuga Lake section of e-Commons
  - Update description of wastewater treatment plants to include Cayuga Heights
  - Consider involving volunteers and WWTP personnel with the sampling, to benefit public relations and information exchange. Not on boat (liability).
  - Passed comment along from **Dave Bouldin**, concerned that no winter sampling.
  - Asked for clarification of why UFI is proposing a 2D model rather than a 3D model. **Response (Effler):** Model complexity depends on parameters. Nutrients and eutrophication well suited to 2D application, very good for long narrow lakes.

9. **Closing remarks (Roxy Johnston)**

- Quarterly meetings might be helpful (not during field season), conference calls an option. **Jeff Myers** committed NYSDEC continued involvement.
  - SWCD representatives from counties in addition to Tompkins
  - Town of Ithaca- Herb Engman or Rich DePaolo
  - Roxy is Partnership contact
- Contact to project team regarding datasets, references, etc. through EcoLogic- Liz Moran lmoran@ecologicllc.com
- Thanks to all participants