MEMORANDUM

FROM THE

LAKE CHAMPLAIN BASIN PROGRAM

To: **Erik Beck** - IJC Contract Officer's Representative **29 September 2009**
U. S. Environmental Protection Agency
New England Region

From: **Bill Howland**, Manager
Lake Champlain Basin Program
54 West Shore Road
Grand Isle, Vermont 05458

cc: **Robert Reynolds,** IJC
Beth Card, NEIWPCC

Re: IJC - New England Interstate Water Pollution Control Commission/Lake Champlain Basin Program Contract, *Missisquoi Bay Basin Project: Identification of Critical Source Areas of Phosphorus Pollution,* **Deliverable: Report on Data Gaps**

Please accept this memorandum and attachments as the deliverable for Task 1 Subtask 3 (9.3.1.3.1) – *Report on Data Gaps* – under the IJC-NEIWPCC contract number 1042-800734.

Appended Files

1. Report on Data Gaps
2. Agenda for the *Workshop on Data Availability and Data Needs*

Missisquoi Bay Basin Project:
Identifying Critical Source Areas of Pollution

Report on Data Gaps

Overview

The Lake Champlain Basin Program (LCBP), as part of Task 1 Subtask 2 under the IJC-NEIWPCC contract number 1042-800734, has been acquiring data to support the identification of critical source areas (CSAs) of phosphorus pollution to the Missisquoi Bay Basin through geospatial modeling. As part of this process, the LCBP convened a workshop on data availability and data needs on April 28, 2009 (see attached agenda). Workshop participants reviewed the current LCBP database for this project in order to determine existing datasets that need to be acquired. They also helped to identify datasets that might be useful for this analysis, if they were to be developed. Additionally, issues surrounding transboundary data unification were discussed.

The LCBP, informed by its data acquisition initiative and workshop, has identified potential gaps in data for CSA identification. Both data gaps for modeling CSAs of phosphorus pollution in the Vermont sector and data gaps that would need to be filled to develop a transboundary understanding of pollutant loads to the Missisquoi Bay are discussed below. Within the Vermont sector, gaps where data does not exist and instances where data exists but is not publicly available are noted. Possible ways of filling gaps are also described.

As this project progresses, with the selection of a modeling approach and a contractor for modeling, additional gaps in data may be determined. These will be documented and addressed by the LCBP to the best of its abilities. Existing available data that has yet to be acquired – due to upcoming release dates, cost and licensing, and undetermined frequency and aggregation of data needed for analysis – is not discussed here.

Data gaps in the Vermont Sector

High-resolution elevation data

Although a significant portion of the Vermont sector of the Basin has been covered by LiDAR sensing, a large area has only very coarse elevation data to-date. The existing statewide 10-meter resolution digital elevation model is adequate for some modeling approaches, but it may be too coarse to detect gullies and ditches which act as important nutrient transport mechanisms. A portion of the Vermont sector of the Missisquoi Basin, which is thought to include many critical sources, has been covered by LiDAR sensing which has been used to generate 1.4-meter resolution elevation data. Unfortunately, since this data does not exist for the whole basin, its use in a model of the entire area would be problematic (significantly changing the resolution of data inputs leads to gross inaccuracies). If high-resolution elevation data is needed throughout the entire Basin, it will require additional LiDAR acquisition.

Crop rotation

Ideally, a layer showing all agricultural fields would be attributed with information on the type and frequency of crop rotations. Crop rotation information may be contained in some Nutrient Management Plans (NMPs) but is not publicly available. Due to the sensitivity of agricultural data, it

is not reasonable to expect the creation of this dataset for this project. However, depending on the scale of modeling, this data may not be necessary. If it is important, assumptions about standard practices can be made from information gathered from NMP contractors, agricultural agencies, and relevant literature.

Agricultural drainage network
Understanding the network of tile drainage and agricultural ditches would help locate where and how transport mechanisms relate to sources of nutrients. In many cases, these built networks are responsible for the movement of nutrient pollution from fields to waterways. For specific CSA locations to be identified, this information will be critical. Agricultural drainage networks could be identified through GPS linework; however, this would require landowner permission and extensive personnel resources. Another approach to identifying the networks is through digitizing orthophotography; however, available orthophotographs may be of inadequate resolution or captured during the wrong season. The Vermont Agency of Natural Resources (ANR) has recently taken unreferenced aerial photos that show some tile drainage. This information could be spatially located for reference, though no accurate linework could be generated. A summer vegetation index might also show drier areas of likely tile drainage, if created from infrared imagery. Its presence could also be predicted by considering land cover and soil drainage characteristics. It may be necessary to make educated guesses about agricultural drainage for the purposes of this project.

Municipal drainage network
The Regional Planning Commissions that represent the Basin have geographic files that show the extent of municipal water and sewer accessibility in towns. They do not have data showing the actual stormwater drains and drainage networks. Water and sewer location data generally exist on hardcopy maps or in computer-aided design files. Some of this data could be digitized and geographically referenced, based on transportation networks.

Wastewater treatment facility outfall locations
The locations and allowed nutrient discharges of wastewater treatment facilities are known in this region; however, the actual outfall locations have never been publicly documented geographically. Often, outfalls are in locations well away from treatment facilities. If these locations were documented, it would be meaningful to link them with monitoring data. This data gap could be filled by visiting and GPSing outfalls or by asking facility managers to locate outfalls on a map.

Existing but unavailable data
Agricultural data, maintained by the Vermont Agency of Agriculture and the University of Vermont Soil Test Lab as well as private consultants, would be useful for this project but are generally inaccessible to the public. Such data includes: areas with nutrient management plans or best management practices implemented, tilling or cover cropping practices, soil phosphorus concentrations, crop types, manure inputs, and animal numbers. The LCBP will work with willing partners to determine an acceptable level of aggregation and appropriate data formats for use in this project.

Transboundary Data Gaps
Access limitations and differences in data type, accuracy, precision, and classification between Quebec and Vermont are factors when considering transboundary data unification. These considerations are based around different data categories, as outlined below.

Agriculture
Agricultural land cover data in Quebec is available through purchase and licensing agreements. This dataset consists of polygon field boundaries with attributed crop types (hay, corn, wheat, barley, oats, soybeans, canola, other cereals, market garden crops, small fruits or no crop information). It is updated annually by La Financière agricole du Québec and does not contain any other farm information. In Vermont, agricultural parcels were digitized for the Basin based on 2003 orthophotography and divided into only three classes based on visual inspection (corn, hay, and other). It would be possible to create a transboundary agricultural land cover dataset, but with inconsistent time periods and attribute classifications.

Aggregate data describing animal units are available in Vermont and Quebec. In Vermont, this information exists for Medium and Large Farm Operations in their annual reports and could be aggregated on the subwatershed level. In Quebec this data is gathered in the farm census every four years and contains more detailed information on animals by species. Similarly attributed and aggregated data would be required before using the datasets together.

Hydrography
Currently, public hydrography data is compiled at different scales on either side of the border. Quebec is in the process of adding 1:20,000 data to Canada's National Hydrographic Network, and the USGS plans to merge this data with the U.S. National Hydrographic Dataset. The Missisquoi Bay Basin will become a priority in this national endeavor, but work is not yet scheduled. Alternatively, U.S. data could be joined with the current 1:50,000 Quebec data sooner should a funding source be available. If necessary, a contractor may need to edge match datasets for modeling.

Another goal is to standardize stream order classifications and understand how surface water impairment classes relate across the border. The USGS will cross-walk attributes between datasets when it merges them, so that stream order should be relatable. Quebec currently uses a scoring index combining different water quality metrics, and Vermont determines if a stream reach meets defined standards for different types of pollutants. Representatives of the VT ANR and the Ministère du Développement Durable, de l'Environnement et des Parcs (MDDEP) are interested in discussing how to harmonize these systems within the Basin.

Land Use/Land Cover (LULC)
The 2001 LULC dataset covers the entire Lake Champlain Basin, but the 2006 National Oceanic and Atmospheric Administration dataset does not. An updated LULC dataset, if needed for this project, would require generating a new classification using the most recent, common imagery available.

Soils
Soil surveys differ significantly across the border; on the U.S. side, map units do not capture the variability of slope, erodibility, and drainage classifications in river corridors. The Quebec soil survey, done in 1991, has a different resolution than the older U.S. data. The NRCS soon hopes to sample soils across the border in order to make comparisons between soil series classifications possible and to work toward an integrated dataset.

Water Quality Monitoring
Currently, Quebec uses a different test for phosphorus concentration than Vermont. Measuring bioavailable phosphorus and sediment concentrations on both sides of the border may be important in future monitoring. There also are differences in bacteria monitoring and beach closure policies between Vermont and Quebec. These differences should be discussed and resolved by the VT ANR and the MDDEP.

Other Data
The current Vermont orthophotography does not extend north of the border. The U.S. Department of Homeland Security imagery should correct this issue, since it was flown ten miles north of the border. E911-type point data referencing building locations would be helpful in generating a basin-wide density surface. This data exists in Vermont, but no counterpart is known by the LCBP in Quebec. This data could be used in conjunction with sewer line extents to determine where septic systems are located. Vermont maintains a Significant Wetlands Inventory specifying the extent and types of existing wetlands in the state. The status of Quebec wetlands data is not known at this time.

Missisquoi Bay Basin Project:
Identifying Critical Source Areas of Pollution

Workshop on Data Availability and Data Needs
Tuesday, April 28, 2009
10 AM – 2:00 PM
Gordon Center House, Grand Isle, VT

Agenda

I. 10:00 Welcome and Introductions

II. 10:15 Overview of the Missisquoi Bay Basin Project
Bill Howland, LCBP, will review the status of the tasks funded by the International Joint Commission.

III. 10:30 Data Availability
A facilitated discussion to:

- review the matrix of data currently held by the LCBP
- identify additional available datasets
- discuss any issues with access, format and confidentiality

IV. 12:00 Data Gaps
A facilitated discussion to identify other data that would be useful for the Critical Source Area analysis.

12:30 - Break for Lunch (provided)

V. 1:00 Transboundary Data
A facilitated discussion on how to unify datasets available in both Quebec and Vermont. Access limitations and differences in data type, accuracy and precision will be considered.

VI. 2:00 Next Steps and Adjourn