CAMP

Coordinated Aquatic Monitoring Program

Annual Activity Report

2016/2017

Submitted to:

Minister of Sustainable Development

President/CEO Manitoba Hydro

Submitted by:

MOU Working Group

August 2017

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Playgreen Lake - Aquatic Habitat Surveying

1.0 Summary

The 2016/17 Coordinated Aquatic Monitoring Program (CAMP) marks the ninth year of monitoring since implementation in 2008/09. The program was initiated to address comments received from communities and the Clean Environment Commission about the need for system-wide monitoring to better understand the effects of hydroelectric operations on the aquatic environment. In 2006, a Memorandum of Understanding was signed by Manitoba Sustainable Development and Manitoba Hydro, establishing the CAMP partnership. It outlines the objectives of the program and states the requirement for an annual summary of activities, which is provided in this report.

CAMP uses an ecosystem-based approach and samples key biological/chemical/physical parameters at different levels of the food web. These variables, along with hydrometric data are used to describe the ecological condition and status of aquatic ecosystem health in the waterways in which Manitoba Hydro operates. The selected parameters were scientifically determined based on the best advice of scientists and regulators that participated in annual CAMP workshops that started in November 2007. Attendees included representatives from Manitoba Conservation and Water Stewardship, Manitoba Hydro, Fisheries and Oceans Canada, University of Manitoba, Environment Canada and North/South Consultants Inc.

The program is continually assessed and adjusted, as appropriate to ensure it maintains scientific credibility and sampling consistency, and to ensure it is on scope to meet the objectives of the Memorandum of Understanding.

The past year was very successful and all fieldwork targets were met. A few minor adjustments were made due to weather restrictions, but overall, the planned schedule was completed more efficiently than was anticipated. This allowed CAMP to add an additional study at the end of the year; collecting sediment cores in Southern Indian Lake to help characterize the history of sedimentation and lake productivity.

Recent activities and enhancements to the program include:

- Sedimentation monitoring along the upper Nelson River.
- Using remote sensing to map turbidity levels in lakes.
- Preparation of the 6-year summary report.
- Implementation of activities to meet the new Aquatic Invasive Species Regulations (e.g., permit acquisition, decontamination equipment and processes, etc.)
- Development of digital data-collection templates and a data management system (i.e., STARLims) for biophysical components and the use of “Rapid Capture” software for collection of Physical Environment Data.
- Progress on the Data Integration Strategy to maintain data integrity and allow access for users.
- Collaboration on a research project related to bio-productivity indicators, with the International Institute for Sustainable Development / Experimental Lakes Area (IISD-ELA).
- Initiation of a Communications Plan

Additional program components to be developed over the next few years include:

- Data sharing with the public through an online GIS interface.
- Tendering of the aquatic ecosystem data collection contract. The contract is currently held with North South Consultants but it expires March 31, 2018.
- Consideration of riparian, wetland, and terrestrial monitoring components as referenced in the Clean Environment Commission's (CEC) Lake Winnipeg Regulation License Finalization review and as appropriate, following the CEC's public outreach of the joint Manitoba and Manitoba Hydro, Churchill – Nelson River basin Regional Cumulative Effects Assessment.

The Namao is used for some CAMP water sampling on Lake Winnipeg

2.0 Background

The purpose of this report is to provide the signatories of the "Memorandum of Understanding about the Program of LWR/CRD Monitoring Activities" with a summary of the 2016/17 Coordinated Aquatic Monitoring Program. The MOU, signed in 2006 by the Province of Manitoba and Manitoba Hydro (Appendix 1), outlines the need to develop a system-wide aquatic monitoring program to address concerns related to potential effects associated with Manitoba Hydro operations.

The Coordinated Aquatic Monitoring Pilot Program (CAMPP) was developed and implemented in 2008/09 and operated for the first three years to test sampling methodologies. This 2016/17 annual activity report represents the sixth year of a fully implemented, post-pilot phase, the Coordinated Aquatic Monitoring Program (CAMP).

Several meetings were held throughout the year between different groups relevant to CAMP, including the main CAMP working group, smaller subcommittee, broader workshops, and community meetings. The meetings were used for communication purposes, to share results, and evaluate and revise the program, as needed.

Typical water sampling from a float plane

3.0 Summary of Activities

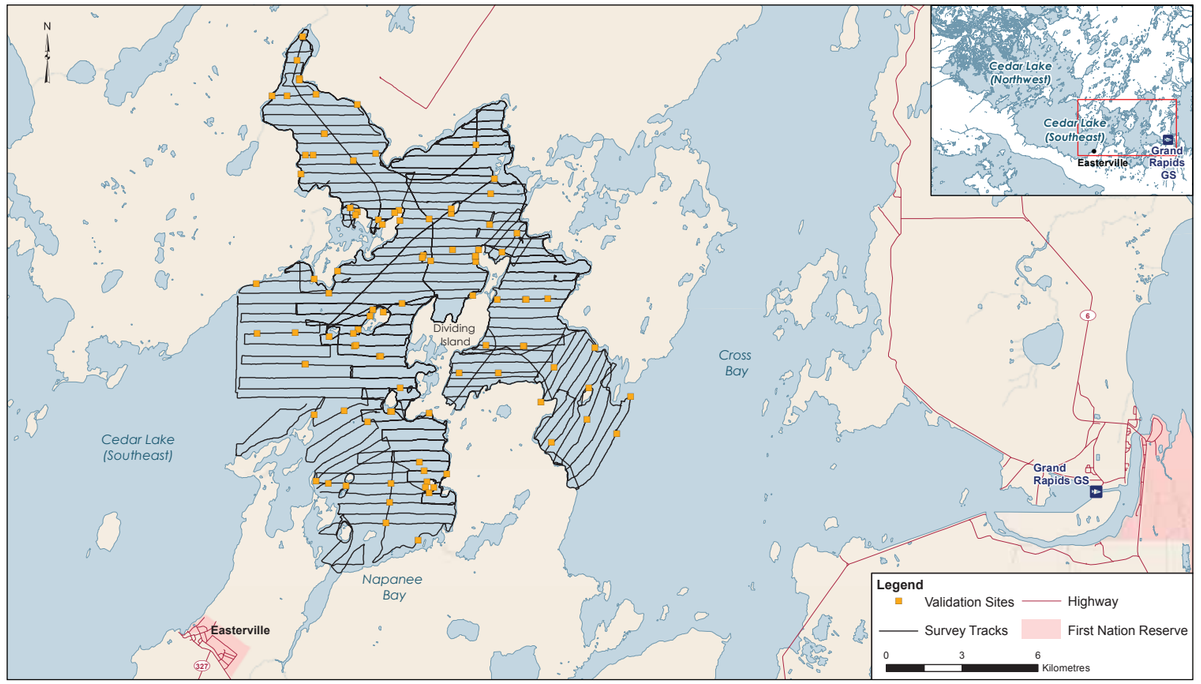
The following summary documents the major activities undertaken by CAMP in 2016/17.

3.1 Program Management

CAMP is a large program that has a broad geographic and topic scope. It comprises waterways across Manitoba (from the Winnipeg River to the Churchill River) and includes a multitude (hundreds) of monitoring parameters that are sampled on an annual or rotational basis. To accomplish the goals of the program, many different groups (i.e., provincial staff, Manitoba Hydro, environmental consultants, technical experts, lab technicians, and community members) perform various duties to:

- plan and direct the work
- manage and budget effectively
- acquire resources
- conduct field sampling
- ensure legislative compliance
- process and analyze results
- report results and progress in various formats
- manage data
- ensure safety
- communicate, share information and receive feedback
- collaborate and develop relationships
- strive for continuous improvement

Since CAMP supports *Water Power Act* licensing, the program is funded through Hydraulic Operations Department at Manitoba Hydro. A Working Group comprising individuals from Manitoba Hydro and Manitoba Sustainable Development directs the program. Smaller subcommittees, with subject matter experts from Manitoba Hydro, Manitoba Sustainable Development, Fisheries and Oceans Canada, Environment Canada, environmental consultants, and other research scientists, are also brought together occasionally to address specific topics and issues. Day to day administration, budgeting and management of the program is conducted by Manitoba Hydro (Environmental Licensing and Protection Department). Monitoring activities (i.e., data collection and fieldwork) are performed by North South Consultants Inc., Manitoba Hydro - Hydraulic Operations Department, and Fisheries and Water Stewardship staff from Manitoba Sustainable Development. The large research vessel, The Namao, operated by the Lake Winnipeg Research Consortium, is used for CAMP water quality sampling in a few locations in the north basin of Lake Winnipeg.



Aquatic Habitat survey map for Cedar Lake

3.1.1 Working Group

On March 30, 2016, a draft workplan for the 2016/17 program was presented to the MOU Working Group. Items that were presented and discussed include:

- Review of the 2015/16 CAMP
- Update on CAMP reporting and data management
- Presentation and discussion of proposed 2016/17 CAMP workplan
- Update on community dialogue efforts.

5 Water quality sampling during winter

No significant concerns or issues were raised by the Working Group members during the meeting or the two week review period and the 2016/17 workplan was subsequently accepted as presented.

3.1.2 Subcommittee

The subcommittee is composed of groups of technical experts for each of the specific parameters sampled in CAMP. There were no specific technical subcommittee meetings during 2016/17. Instead, the March and November 2016 meetings were sufficient to address any questions.

3.1.3 Annual Workshop

Usually one annual CAMP workshop is held with approximately 30 people representing federal and provincial agencies, private consultants, research groups, and Manitoba Hydro staff. The intent of the workshop is to disseminate information related to CAMP activities and receive feedback on future directions. This year, one workshop was held to review the substantial CAMP progress since inception and discuss future activities. The workshop was held on November 23, 2016.

3.2 Ecosystem Monitoring

A total of 36 waterbodies or riverine reaches (39 on-system and 11 off-system) were sampled for water quality, benthic macroinvertebrates, fish community, mercury in fish, and phytoplankton during the 2016/17 CAMP (Appendix 4). In addition, physical environment parameters (water quality and turbidity) were sampled in the Upper Nelson River from Two-Mile Channel to Split Lake. Note that not all sites are sampled for all parameters annually. The table in Appendix 4 shows the parameters that were sampled in each of the waterbodies in 2016/17.

3.2.1 Program Changes

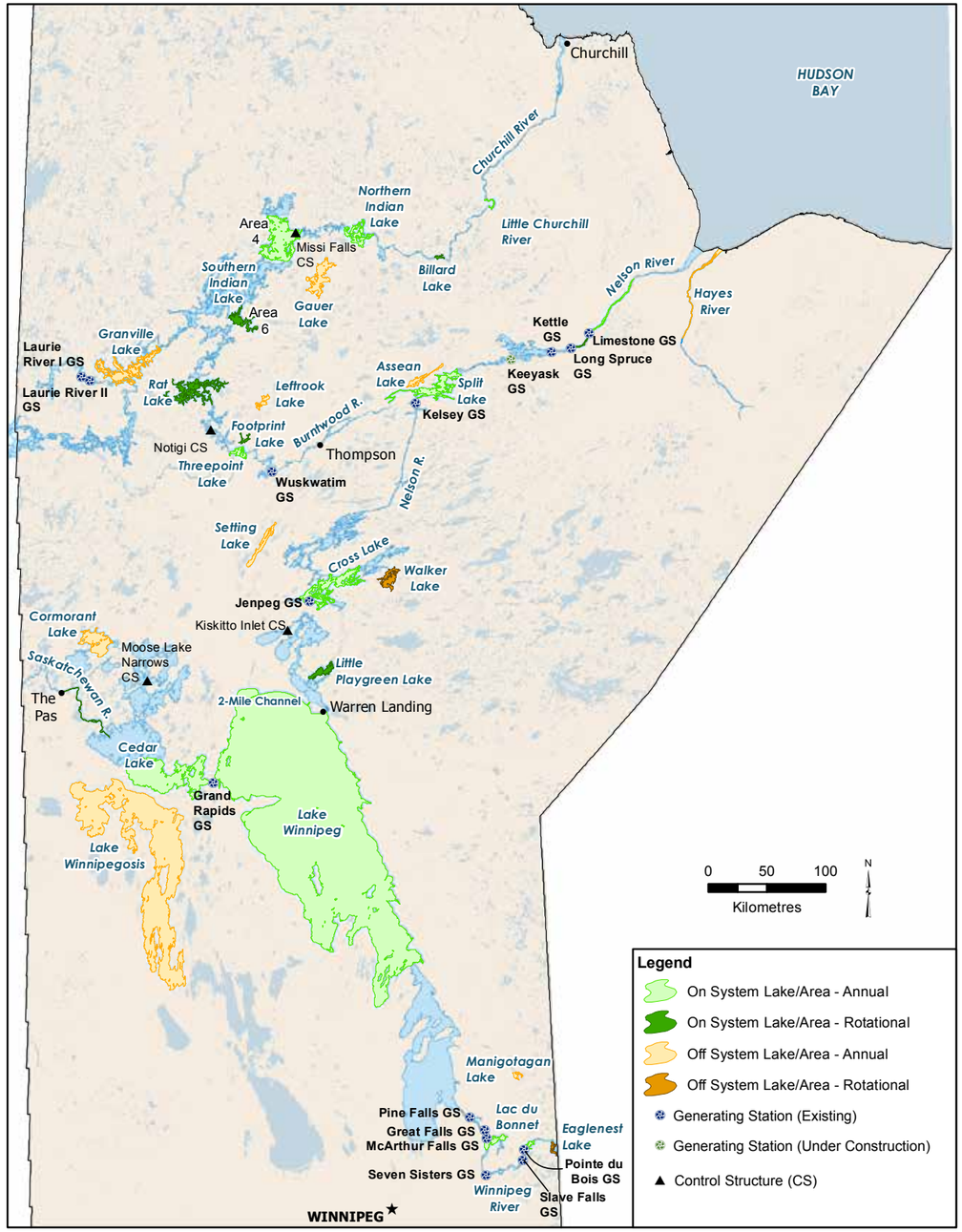
There were no substantive changes, and no new waterbodies or sites added, to the CAMP program in 2016/17.

The main change to the program was related to Aquatic Invasive Species (AIS). New AIS regulations came into force in October 2015, which outline requirements for limiting the spread of invasive species. For CAMP, zebra mussels and spiny waterflea are the main concerns. To comply with the regulations, the following measures were taken:

- Adjusted sampling order for some components (e.g., low to high risk areas)
- Implemented various forms of decontamination:
  - Chemical (hydrogen peroxide, vinegar, bleach)
  - Heat and pressure
  - Drying, draining, and wiping.
- Purchased additional gear
- Obtained permits to address instances where AIS Regulations could not be met

3.2.2 Aquatic Habitat

Characterizing the aquatic habitat of a waterbody helps inform our understanding of the ecosystem components, such as fish and invertebrates. CAMP aquatic habitat surveys are done using boat based hydroacoustic equipment to produce lake bathymetry and substrate / bottom typing. Surveys are conducted each year in a different waterbody as budget allows



Water Bodies Sampled in 2016/2017

to build an inventory of maps over time to assist with interpreting monitoring results. In 2016/17, a portion of Cedar Lake was surveyed and mapped. The remainder of Cedar Lake is proposed to be surveyed in 2017/18.

3.2.3 Water Quality

Water quality is sampled four times a year in annual and rotational water bodies. Three samples are collected during the open-water season (spring, summer, fall) and one is conducted during winter, under ice conditions. Over 50 parameters are analyzed in the water quality samples.


Offshore benthic invertebrate sampling

Water quality sampling was completed at all sites as planned in 2016/17 (Appendix 3); however, North South Consultants had to perform some of the sampling that was planned for Manitoba Sustainable Development. MSD was unable to complete some of the planned sampling in spring and fall due to additional time and logistical challenges resulting from the new AIS regulations. Specifically, issues were encountered related to gear decontamination on the float plane, additional time for proper site sequencing, and weather constraints.

3.2.4 Benthic Invertebrates

Benthic invertebrates (i.e. bugs in the sediment) are often used as indicators of ecosystem health as they are a primary food source (i.e. lower trophic level) for higher level consumers, such as fish. As well, they are susceptible to environmental changes and can reveal trends that may be occurring.

Benthic invertebrate sampling was completed at all sites as planned in 2016/17 (Appendix 4), however, additional time and effort were required during sampling to comply with AIS regulations (e.g. decontamination).

3.2.5 Phytoplankton

Samples for phytoplankton analysis (i.e., community composition and biomass) were collected from the four routine annual monitoring sites (Cross, Setting, Split and Assean lakes) in the open-water season and submitted for analysis, as planned.

3.2.6 Fish Community

Fish community sampling is conducted once per year at annual and rotational sites. The intent of the analysis is to estimate population abundance and diversity, and to collect information on fish condition (e.g., size, weight, age, condition, etc.) Fish community sampling was completed at all sites as planned (Appendix 4). As mentioned previously, additional time and effort were required for AIS decontamination.


Gill net sampling

3.2.7 Mercury in Fish

Mercury in fish is monitored in CAMP waterbodies every three years, except for two sites that are monitored annually (Threepoint and Leftrook lakes). 2016/17 was a year when mercury was sampled at all annual and rotational sites (except for Cedar Lake, which was overlooked and will be added to the 2017/18 program). Fish tissue samples (i.e., muscle) that were collected during fish community monitoring were analysed for mercury.

3.2.8 Physical Environment

The 2016 sedimentation field monitoring program included continuous monitoring and discrete Total Suspended Solids (TSS) and water quality (turbidity, conductivity, dissolved oxygen and temperature) monitoring at ten sites on the upper Nelson River. The monitoring was conducted at lake inlets and outlets from Lake Winnipeg to Kelsey GS to provide an understanding of the sediment transport entering and leaving the lakes. Discrete water samples were collected to verify the continuous data and to establish TSS – Turbidity relationships at the various locations.

In the winter, testing was initiated at the Limestone GS to see if sensors could be installed inside the generating station and achieve the same results as in the river. Monitoring inside a generating station is seen as a possible means to reduce the level of effort needed to collect data, improve safety, and better protect monitoring equipment.


Water quality monitoring equipment in Limestone Generating Station

3.3 Communications

Increasing awareness of CAMP and sharing information and results have become a top priority or the program. Technically, the program has evolved from establishing the technical parameters of the program into communicating the data and value of the program.

Winter water quality sampling on the Churchill River

3.3.1 Community Meetings

Consistent with every year to date, CAMP representatives from Manitoba Sustainable Development presented and discussed CAMP at a variety of community meetings in 2016/17. Communications this year focused on completing presentation of the CAMP 3-Year Summary Report to Resource Management Boards that had yet not received it. A list of these community meetings is provided in Appendix 3.

3.3.2 Reporting

The Six-Year Technical Report covering 2008-2014 is being prepared by North/South Consultants to analyse and report on trends in key aquatic indicators. The report was expected to be completed in 2015/16; however, the Regional Cumulative Effects Assessment (RCEA) reporting took priority and resources were redirected from the CAMP report to meet RCEA deadlines. The Six-Year report is now expected to be completed in 2017/18 and upon completion the IISD-ELA will conduct a peer review of it to identify potential areas of improvement for the program.

The CAMP website (www.campmb.com) will continue to be updated with data as it is collected, and made available to the public.

3.3.3 Data Sharing

Requests for CAMP data continue to be received. Eleven requests for data were received in 2016/17, and included university researchers, students, Manitoba Hydro staff and communities. Currently, anyone requesting CAMP information must fill out a form identifying the data of interest, then the CAMP data manager manually extracts the data from the database and then it is emailed to the requester, along with a data sharing agreement. The future plan is that web-based technologies will enable the public to access the data directly, increasing efficiency in sharing and eliminating red tape. Being transparent and providing data to the public is one of CAMP's core principles.

3.3.4 Other Meetings

On December 6th 2016, a presentation was made at a Lake Winnipeg Research Consortium meeting to provide general information about CAMP to the members and other scientific attendees. Lake Winnipeg water quality sampling under CAMP is conducted from the Namao research vessel, which is owned by the Consortium. The information presented was well received and very enlightening to the audience, as many had heard of CAMP but were not aware of the objectives or activities of the program.

On January 10th 2017, a few members of the CAMP working group participated in a meeting hosted by Fisheries and Oceans Canada (DFO) Science group; the meeting also included representation from Manitoba Sustainable Development, DFO Fisheries Protection Program, and International Institute for Sustainable Development – Experimental Lakes Area (IISD-ELA). The objectives of the meeting (and future meetings for the group) were to network and build relationships among organizations, discuss priorities for each group, identify needs, gaps, research, collaboration opportunities, share projects and educate others.

4.0 Emerging Items

4.1 Data Management Strategy

Manitoba Hydro continues to work on migrating the EnvIS (Environmental Information System) data management operations, which will also handle CAMP data, into a system called Star LIMS. Star LIMS will be used to manage the CAMP sample collection and lab results with implementation beginning in 2017/18. The CAMP Data Integration will start in May of 2018.

CAMP website data updates are being managed with data templates populated by North South Consultants and loaded to the CAMP website database that allow for dynamic charting (i.e. graphs are created automatically on the site from uploaded data, rather than having to create images for each graph and uploading them individually).

With the use of ArcGIS Server/Online and Kisters KiWIS, Manitoba Hydro has started some preliminary work on integrating EnvIS CAMP data, erosion and sediment data, and hydrometric data into a single web based environment. This is a starting point for the CAMP working group to explore web technologies that enable data to be integrated from different systems and shared publicly.

4.2 Physical Environment

The team is refining the methods and expanding the use of remote sensing to understand distribution of suspended sediment in lakes and rivers. The objective is to have a practical, efficient method for monitoring suspended sediment on a system-wide scale. It will also provide a greater understanding of sediment dynamics, including timing and duration of high turbidity events.

Plans are in place to review and develop shoreline erosion monitoring (large scale for ecosystem assessments), in addition to suspended sediment, using remote sensing.

4.3 Aquatic Ecosystem Data Collection Contract

The aquatic ecosystem data collection contract (5-year term) that is currently with North South Consultants will need to be reviewed/revised and tendered. The contract expires March 31, 2018.

5.0 Conclusion

Since its inception in 2006, CAMP has grown in scope, functionality and value. It has become an integral and well-respected program for MB Hydro and Manitoba, as evidenced during the Clean Environment Commission hearings for the Keeyask Generation Project and Lake Winnipeg Regulation. Several positive references were made about the program by the CEC and other groups, including how it is helping inform decision-making and enhance the collective scientific understanding of hydroelectric effects on the aquatic environment. The RCEA was also informed by CAMP data.

As well, CAMP is positioned to support broad-area planning initiatives; it is divided into regions where the data could help decision-making for management of the resources in those areas. The information that CAMP has amassed is invaluable.

Depending on the outcome of RCEA public outreach program, it is possible that CAMP monitoring will be modified / enhanced to address issues raised during those processes.

Overall, CAMP has become a positive, high-profile project for the corporation and province, and it is expected to continue to grow in utility and support in the coming years.

6.0 Appendices

Appendix 1: Memorandum of Understanding

Memorandum of Understanding about Program of LWR/CRD Monitoring Activities, dated October 16 , 2006.

The Government of Manitoba and Manitoba Hydro are committed to work together on matters relating to monitoring of hydrometric (water level and stream flow) and environmental data in certain areas in the Lake Winnipeg Regulation and Churchill River Diversion system.

Manitoba and Manitoba Hydro have the common objective of developing a program of activities ("the activities"), building on the existing monitoring program of Manitoba Hydro, that would provide objective information about hydrometric and environmental effects of hydro-electric development on agreed rivers and lakes comprising the Lake Winnipeg Regulation and Churchill River Diversion systems ("the system"). The information from the activities could be of benefit to Manitoba, Manitoba Hydro and other interested parties, including communities in the area of the Lake Winnipeg Regulation/Churchill River Diversion project. Objectives of the program of activities would include:

(a) assisting in evaluating whether and to what extent the water regime in areas of the system is or will be affected by the addition of additional hydro-electric facilities;

(b) assisting in identifying adverse effects and positive effects resulting from effects on the water regime; and

(c) assisting in considering measures that may be undertaken to address any identified adverse effects.

Manitoba and Manitoba Hydro may establish additional objectives of the activities.

Manitoba and Manitoba Hydro recognize that Manitoba Hydro has made commitments to monitoring and follow up programs as part of the environmental licensing process for the Wuskwatim Generating Station. These commitments will be considered in developing the activities.

The program of activities will be reviewed each year and annual workplans will developed by Manitoba and Manitoba Hydro to assist in achieving the program of activities. The agreed workplan for the fiscal year ending March 31, 2007 is attached as Appendix A to this Memorandum.

Manitoba and Manitoba Hydro will consider methods of making information from the activities available to interested parties.

It is intended that the nature and scope of activities will be developed starting in Fiscal Year 2006-07 (starting April 1, 2006) and will continue until Manitoba and Manitoba Hydro agree to no longer proceed with a program of activities.

As part of the development of the annual program of activities, Manitoba and Manitoba Hydro will consider the resources each will provide in order to carry out the activities

It is intended that Manitoba and Manitoba Hydro personnel will prepare an Annual Report to be delivered to the Minister of Water Stewardship and the Minister of Conservation, on behalf of Manitoba and to the President and CEO of Manitoba Hydro. Additional reports may be prepared as Manitoba and Manitoba Hydro determine to be appropriate. The Annual Report may include:

- a description of the activities for that year;
- a description of any information determined as a result of the activities;
- information about any circumstances where water levels or flows were outside of ranges provided for in licences;
- methods of making the information available to interested parties and to the public;
- any other matters that are considered appropriate. It is expected that Manitoba and Manitoba Hydro will make the Annual Reports available to the public.

Manitoba and Manitoba Hydro may amend this Memorandum from time to time by further Memorandum.

for Manitoba

for Manitoba Hydro

Oct. 16, 2006
Date

06 09 06
Date

Appendix 2 - Summary of 2016/17 CAMP Meetings

MOU Working Group Meeting – March 30, 2016

AGENDA

- Welcome and review of 2015 Working Group meeting minutes
- Review of the 2015/16 CAMP
- Review of the 2015/16 Erosion and Sediment Monitoring
- Reporting Update and New Initiatives
  - 6-Year Report, IISD-ELA review
  - R&D Project – IISD/ELA
  - Communication Update
  - Communication Plan
  - Website & Data management
- Discussion of proposed 2016/17 CAMP work plan
  - Additional items for consideration
  - Habitat mapping/bathymetry: lake selection
  - Sediment coring in Southern Indian Lake
  - Fall sediment trap sampling
  - Nearshore productivity estimates in eroding vs. non-eroding zones
- Update on the system-wide community dialogue (Don Macdonald)
- Other Business
  - Status of licencing
  - RCEA/LWR updates and CAMP implications

Workshop – November 23, 2016

AGENDA

- Welcome and review of the 2016 program
- Sedimentation monitoring update
- Update on 2016 results and the 6-Year Summary Report
- Research Project update (productivity indicators) and information on continuous monitoring
- Communications Plan update
- Website & Data Integration Strategy
- Next Steps

Monthly management meetings are also held with subject matter experts (Manitoba, Manitoba Hydro and consultants) to maintain communication, discuss progress and address any issues.

Appendix 3 - 2016/17 CAMP Community Discussions/Presentations

This is the ninth year of CAMP and most communities and/or Resource Management Boards (RMB) are aware of the program. Communications this year remained focused on completing presentation of the CAMP 3 Year Summary Report to Resource Management Boards (RMBs) that have not received it yet. The discussions with communities occurred between May 4, 2016 and March 31, 2017.

Community/RMB meetings were attended by Don Macdonald, Regional Fisheries Manager, Manitoba Sustainable Development (unless otherwise noted):

- May 4, 2016. Southern Indian Lake Environmental Steering Committee. Used the CAMP habitat map of Area 4 to discuss shoreline erosion concerns. Advisor Ian Hallket noted that about 27% of Area 4 shoreline is now controlled, up from Hecky and McCulloch's 15%, yet erosion continues to be high.
- **June 8, 2016. Southern Indian Lake Environmental Steering Committee.** Met in Leaf Rapids, draft SIL A4 map used in discussion.
- **August 9, 2016. Nisichawayasihk Cree Nation Churchill River Diversion Consultation public meeting.** Although not specifically about CAMP, it was discussed. Most of the discussion was about the desire for more information about the program and its results and the challenge of making this information available to community members. I described the intent of CAMP was to make information available to resource users. Methods include the web site and 3 year report. The primary tool for introducing and developing CAMP was the RMB, but there have been problems meeting with them. The intent is there, but difficult to reconcile schedules. It can be difficult to make monitoring interesting or relevant, but the program needs to try.
- **September 15, 2016. Manitoba Hydro Indigenous Relations Division meeting (Thompson).** Presented northern field staff on a number of Fisheries programs of interest. Lead off with CAMP. The group was particularly interested in the mapping and the erosion sedimentation studies, including using LandSat to measure turbidity.
- **Sept. 2016. Naponee Bay Fisherman's Association**. Ian Kitch, Western/Northwest Fisheries Manager. Discussed progress on the Cedar Lake depth sounding. The east end of the lake was sounded this year. The plan is to continue annual sounding until the lake is completed.
- **Dec 6, 2017 Norway House Cree Nation Article 7 meeting.** Presented on CAMP. Presentation included a summary of the 2013 erosion studies on Playgreen Lake and the recent work being done with LandSat and turbidity. Primary comment was from Loretta Mowatt, Norway House Environmental Monitoring Agency, who said that it would be nice to have more of the information available and accessible to people. We plan to meet and talk about what that could look like. There was also a discussion about AIS. Although some AIS information has been collected under CAMP, it is not a CAMP component. Told them about the poster map of Playgreen Lake, and promised to deliver it to Norway House.
- **Dec. 14, 2016. Sustainable Development NE Regional Meeting (Thompson).** Presented on various subjects including CAMP to Sustainable Development staff from the NE Region. Gave a brief overview for new staff. Described one of the interesting things discovered using CAMP data was changes in Walleye condition in Lake Winnipeg and on the Nelson River associated with reduction in smelt numbers. Also described new components under development such as remote sensing of turbidity and increased continuous turbidity monitoring.
- **Jan. 25, 2017. Moose Lake Commercial Fishers meeting.** Ron Campbell, NW Region Biologist, presented the Moose Lake bathymetry/habitat map to the fishers association.
- **Feb 8, 2017. Southern Indian Lake Environmental Steering Committee.** Provided poster quality CAMP maps for SIL A4 as well as pre-CRD map from LWCNR Study Board report.
- **Feb. 24, 2017. Split Lake RMB.** Presented poster maps of Assean and Billard lakes. Also provide booklet of draft Split Lake bathymetric map. Described the habitat mapping program. Some discussion questioning what the lake level was when the map was made and how the lake is becoming shallower in places. The accumulation of silt at the mouth of the Burntwood River was mentioned as a concern, as was the fact that when CRD flows are high, highly turbid water flows along the north shore. The difference between CRD and LWR flows is quite apparent. Described efforts to measure turbidity with remote sensing, and the fact that CRD and LWR sediments reflect light differently. This means that while turbidity can be measured accurately on either CRD or LWR, on Split Lake the difference is apparent, you can tell which one is which, but it is not as simple to determine the lake turbidity.
- **March 14, 2017, Southern Indian Lake Environmental Steering Committee.** Confirmed that bottom coring will proceed this month as a CAMP program. Described core sites and that coring was part of the pre-project assessment reported in the Lake Winnipeg, Churchill and Nelson River Study Board Report. Coring will focus on Area 4 with an additional core from Area 1 if time and circumstances allow. The Area 1 site will attempt to sample near the pre-project site. The Area 4 sites will focus on the deepest basin.
- **March 16, 2017. Nelson House RMB.** Presented the 3 year Pilot Project report to the Board. This presentation has been repeatedly delayed because of meeting cancellations and scheduling conflicts. Described the program to Board members, all of whom are new to the Board since the last time CAMP was discussed. Advised them that the 6 year report will be coming soon. Presented copies of the poster quality map of Threepoint Lake. The Board had questions about employment opportunities and their desire to take over environmental monitoring activities within the Resource Area. Pointed out that as a long term high level monitoring program, CAMP did not generate the level of monitoring activity that environmental assessment programs did. If they have students enrolled in post secondary resource management or biological studies, asked that they advise those students to apply for seasonal employment opportunities.

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Appendix 4: 2016/17 CAMP Sampling Schedule

Region	Site	On-system	Off-system	Fish Community	Water Quality	Benthic Invertebrate	Hg in Fish	Sediment Quality	Phytoplankton Community
Winnipeg River	Upstream of Pointe du Bois	X		Annual	Annual	Annual	16/17 & 19/20	17/18	
	Lac du Bonnet	X		Annual	Annual	Annual		17/18	
	Manigotagan Lake		X	Annual	Annual	Annual	16/17 & 19/20	17/18	
	Eaglenest Lake		X	16/17 & 19/20	16/17 & 19/20	16/17 & 19/20			
Saskatchewan River	Cedar Lake - southeast	X		Annual	Annual	Annual	16/17 & 19/20 (site was missed)	17/18	
	Cormorant Lake		X	Annual	Annual	Annual	16/17 & 19/20	17/18	
	Saskatchewan River	X		16/17 & 19/20	16/17 & 19/20	16/17 & 19/20			
Lake Winnipeg	Lake Winnipeg - Mossy Bay	X		Annual		Annual	16/17 & 19/20	17/18	
	Lake Winnipeg - Grand Rapids	X		Annual	Annual (site W2)	Annual			
	Lake Winnipeg - Sturgeon Bay	X		Annual					
	Lake Winnipegosis		X	Annual	Annual	Annual		17/18	
Upper Churchill River	Southern Indian Lake (Area 4)	X		Annual	Annual	Annual	16/17 & 19/20	17/18	
	Granville Lake		X	Annual	Annual	Annual	16/17 & 19/20	17/18	
	Southern Indian Lake (Area 6)	X		16/17 & 19/20	16/17 & 19/20	16/17 & 19/20	16/17 & 19/20		
Lower Churchill River	Northern Indian Lake	X		Annual	Annual	Annual	16/17 & 19/20	17/18	
	Churchill R. at Little Churchill R.	X		Annual	Annual	Annual	16/17 & 19/20	17/18	
	Gauer Lake		X	Annual	Annual	Annual	16/17 & 19/20	17/18	
	Billard Lake	X		16/17 & 19/20	16/17 & 19/20	16/17 & 19/20			
Churchill River Diversion	Threepoint Lake	X		Annual	Annual	Annual	Annual	17/18	
	Leftrook Lake		X	Annual	Annual	Annual	Annual	17/18	
	Rat Lake	X		16/17 & 19/20	16/17 & 19/20	16/17 & 19/20	16/17 & 19/20		
	Footprint Lake	X		16/17 & 19/20	16/17 & 19/20	16/17 & 19/20			
Upper Nelson River	Cross Lake - West basin	X		Annual	Annual	Annual	16/17 & 19/20	17/18	Annual
	Setting Lake		X	Annual	Annual	Annual	16/17 & 19/20	17/18	Annual
	Little Playgreen	X		16/17 & 19/20	16/17 & 19/20	16/17 & 19/20	16/17 & 19/20		
	Walker Lake		X	16/17 & 19/20	16/17 & 19/20	16/17 & 19/20			
	2-Mile Channel	X			Annual				
	Warren Landing	X			Annual				
Lower Nelson River	Split Lake	X		Annual	Annual	Annual	16/17 & 19/20	17/18	Annual
	Assean Lake		X	Annual	Annual	Annual	16/17 & 19/20	17/18	Annual
	Nelson R. Mainstem - d/s Limestone GS	X		Annual	Annual	Annual	16/17 & 19/20	17/18	
	Hayes River		X	Annual	Annual	Annual	16/17 & 19/20	17/18	
	Limestone Forebay	X		16/17 & 19/20	16/17 & 19/20	16/17 & 19/20	16/17 & 19/20		

Sampling conducted by MSD - Water Quality Section, MSD - Fisheries Branch, and Consultants

Coordinated Aquatic Monitoring Program

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