AURORA RESEARCH INSTITUTE
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ECHYDR11 Annual Progress Report

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For Environment Canada G&C “Arctic Research and Monitoring”

Figure 1. Buoy and transmitting equipment frozen into the ice on Noell Lake, winter 2012. To the left is the Alaskan tent the field team used to stay warm while troubleshooting the buoy apparatus (*photo by Don Ross*).

The contribution agreement entered into by Aurora Research Institute (ARI) and Environment Canada (EC) enables staff at the Western Arctic Research Centre (WARC; a division of Aurora Research Institute) to provide scientific/technical support, and logistical and laboratory services to EC researchers working on this project in the western Canadian Arctic and using WARC as their operational base. EC researchers are assessing the effects of climate change and resource development on the hydrology, geochemistry and ecology of freshwater systems in the western Canadian Arctic. Information gathered by this research program will be used to obtain baseline information in support of regional environmental and cumulative effects assessment processes.

In 2010, a fully-automated instrumented buoy and subsurface mooring system was put into Noell Lake to monitor the physical and geochemical conditions of the lake, to measure lake ice (initiation; growth over winter; breakup in spring; ice characteristics), to log data year-round, and to transmit project data to project partners via satellite. The buoy is owned and operated by the Water & Climate Impacts Research Centre (W-CIRC) at the University of Victoria and Environment Canada. Technical support, routine maintenance, budgeting and project management are provided by WARC staff from Aurora Research Institute (Aurora College). The following report details some of the work done by WARC staff to maintain and service the buoy during the 2011-12 fiscal year.

No problems in buoy operations were noted during the first winter it was stationed in Noell Lake; however, in spring 2011 the ice shifted during breakup. This led both W-CIRC and WARC staff to initially believe that the buoy had broken away from its anchor, when in fact the buoy had been pulled away from its original location by the movement of the ice flows.

Donald Ross and William Hurst (WARC technicians) traveled to Noell Lake by helicopter to locate the buoy and its subsurface mooring, investigate the condition of the buoy, and assess any damage to the buoy or its mooring. A boat and motor were also slung to the lake by helicopter in order for the technicians to more closely inspect the buoy, which was located quite far from shore. The anchor was disconnected from the buoy, and the buoy was then retrieved from the lake and slung back to the Canadian Helicopters hangar in Inuvik. The buoy anchor was retrieved by boat, brought to shore and then packed into the helicopter to be returned to Inuvik.

The process of retrieving the subsurface mooring proved to be the most difficult part of the process. The mooring was found easily, once the float markers were released, but it had sunk deep into the benthic substrate. This made it extremely difficult to dislodge from the bottom of the lake. After two failed attempts, the mooring was retrieved using 2 outboard motorboats and 5 staff members from Aurora Research Institute (technicians plus Jolie Gareis, Erika Hille and Jonathon Michel). Using both boats and numerous grapple hooks and ropes, the mooring was loosened from the bottom of the lake and hauled to shallower water. A helicopter was used to haul the mooring back to Inuvik, where it received routine maintenance (check of all parts and equipment, maintenance of YSI units) before the entire apparatus was placed back into Noell Lake in fall 2011.

In November 2011, technicians from AXYS noticed that the buoy was not communicating properly via its satellite telemetry. William Hurst and Annika Trimble (WARC staff member) visited the buoy to take photos and inspect the communications instruments and solar

panels. It was determined that the buoy was taking and logging measurements, but not transmitting them.

In January 2012, Donald Ross, William Hurst and George Puritch (a visiting technician from AXYS) left in the morning by snowmobile and arrived at the buoy in Noell Lake about an hour and half later. They used an Alaskan tent for shelter, because of the cold temperatures and the wind chill, and a lantern for heat and light.

Figure 2. George Puritch downloads data and troubleshoots the Noell Lake monitoring buoy during severely cold January conditions (*photo by Don Ross*).

They removed the cover from the buoy, and Mr. Puritch connected the computer to the buoy system. He then rebooted and reconfigured the system so it would be able to send its data via satellite. Once data transmission was confirmed (via cell phone call to another AXYS technician), the tent and gear were repacked. The team then headed back to Inuvik. From the time of this last visit, the buoy and its communications systems have effectively transmitted project data.

This summarizes the major work done on this project by WARC and Aurora Research Institute staff, in partnership with W-CIRC employees, during the 2011-12 fiscal year. In addition to the intensive buoy related-work described above, ARI also provided assistance with collection and laboratory analyses of Noell Lake water quality samples.

This was year 2 of the 5 year G&C contribution “Arctic Research and Monitoring” (referred to as “ECHYDRO” by WARC staff). We look forward to further collaboration with the W-CIRC office on this project in coming years.