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Table 1: Gauge visits during the summer 2012. Comments: DD=gauge data download, MN=general gauge maintenance (cleaning, bounce sheet, re-level), CV= clear vegetation, CA = calibration with two nozzles, and FI=fence installation.

Date	Gauges Visited	Technicians	Comments
4 Jun 2012	2, 107	Kurt, Greg	CA, DD, MN, CV
5 Jun 2012	308, 311	Greg, Doug	CA, DD, MN, CV
22 Jun 2012	100, 100T, 111	Doug	DD, MN, CV, FI
29 Jun 2012	1, 3	Kurt, Doug	DD, MN, CV
30 Jun 2012	4, 10	Thomas, Greg	DD, MN, CV
1 Jul 2012	103, 110	Ashley, Kurt	MN, CV
6 Jul 2012	300, 301, 302, 308	Robert, Doug	DD, MN, CV
7 Jul 2012	305, 309, 310	Ashley, Greg	DD, MN, CV
9 Jul 2012	303, 306, 311	Robert, Doug	DD, MN, CV
12 Jul 2012	304, 307	Robert, Doug	DD, MN, CV
13 Jul 2012	2, 5, 8, 106	Ashley, Michael	DD, MN, CV
18 Jul 2012	101, 102, 103, 110	Robert, Doug	DD, MN, CV

Gauge visitation in support of the Great Smoky Mountain Rain Gauge Network (GSMRGN) during the summer 2012 occurred over 12 days spanning a period of over six weeks in the June – July 2012 period. The primary purpose of the visits was [1] to complete maintenance tasks, [2] to download gauge observations that were made since the previous gauge visits in the spring 2012, and [3] clear vegetation. Nine technicians and volunteers (listed on the front page) made the visits and performed the required work. It is important to note that the volunteers were NOT directly involved in any of the gauge visit tasks, but were volunteering to assist with personal safety should someone get injured during a particular series of gauge visits.

The general tasks completed at **every** gauge visit consisted of (1) gauge data download from the data loggers [DD in Table 1], (2) general gauge maintenance [MN in Table 1], and (3) clearing of vegetation from the gauge site [CV in Table 1]. Specialized tasks were to download data from the new T/RH sensors for those remaining in the Great Smoky Mountain National Park. Task (1) merely required a serial port link between the field study laptop and the gauge data logger and consisted of pulling the data (often in files having two different formats) onto a desktop folder on the laptop, checking for completeness of the data, and comparing the data logger time to the actual time, making corrections to the data logger clock if necessary. The standard that has been chosen for this study is to maintain the clocks on Eastern Daylight Time, since most of the “warm” precipitation will be occurring during the season when EDT is in effect. Because of concerns regarding accuracy of the time on the ML1 data loggers, a new standard was followed whereby the time from the Garmin GPS locators was used as guidance for accurate time since the GPS time (and each GPS satellite) is synched with the atomic clock of the U.S. Naval Observatory. Most ML1 data logger times were adjusted during the summer 2012 gauge visits to coincide with the EDT given by the GPS locators and a test of the logger time accuracy can be assessed during the autumn 2012 gauge visits. Time corrections during the summer 2012 gauge visits were generally done with the “TA” command since it had been noted that data logger times had been drifting since the previous visits in the fall 2011. Task (2) required the cleaning of debris from the funnel filter, cleaning the tipping buckets of debris (if necessary), cleaning the gauge drain ports, replacement of the old “Bounce” fabric softener sheet inside the case of the gauge, and re-leveling the gauge if it has come unlevelled. Task (3) is required to insure that none of the surrounding vegetation overgrows the funnel top during the growing

season, thereby reducing the catchment of the gauge. In addition, the calibration (CA) task at four gauges in early June involved completing several re-calibration trials using a 50, 100, and 300 mm nozzle, two trials per 50 mm nozzle and three trials per 100 and 300 mm nozzle. This task required carrying extra water and extended each gauge visit by almost 1.5 hours, which presented a logistical challenge during certain trips. The fence installation (FI) task was completed at the Hurricane Ridge site (gauge#111) to test an anti-cow anti-horse fence prototype to prevent their interference in day-to-day operations. Finally, an anti-bird device was installed on the original gauge at Purchase Knob (gauge#100) to prevent a decrease in gauge performance due to a funnel excessively soiled by bird poop. This particular gauge appears to be located in a major bird migration corridor.

The challenges encountered during some of the gauge visits in the summer 2012 were related primarily to dealing with isolated thunderstorms and record warm temperatures during late June and early July. Gauges# 101 and 103 required a second visit as the field laptop became unreliable during the 1 July 2012 visits, most likely due to record warm temperatures, and data was unable to be downloaded due to an unresponsive <enter> key. A secondary (large) laptop was used for the gauge visits after 1 July and new HP mini laptop has been ordered in time for the gauge visits in the autumn 2012. Some ML1 data loggers continue to show significant time drift and will need to be monitored carefully for continued poor performance during the gauge visits in the autumn 2012.

Details of every gauge visit along with each gauge precipitation and calibration data record can be found at http://blizzard.atms.unca.edu/dmiller/sum2012_visit.zip which contains sub-folders for each gauge that consist of the individual data files (often having at least two different formats), pictures taken at the gauge site during the visit, screenshots of the GPS (laptop) and ML1 logger time comparison, and a MS Word document that mirrors exactly the notes made in the field journal during each gauge visit.

Plans for the autumn months of 2012

Table 2: Planned gauge visits during the autumn 2012. Comments: DD=gauge data download, MN=general gauge maintenance (cleaning, bounce sheet, re-level), and CV= clear vegetation.

Date	Gauges Visited	Technicians	Comments
30 Sep 2012	1, 3	TBD	DD, MN, CV
28 Sep 2012	2, 5, 8, 106	TBD	DD, MN, CV
29 Sep 2012	4, 10, 104	TBD	DD, MN, CV
5 Oct 2012	111, 112	TBD	DD, MN, CV
6 Oct 2012	101, 102, 103, 110	TBD	DD, MN, CV
7 Oct 2012	105, 108	TBD	DD, MN, CV
12 Oct 2012	100, 100T, 107, 109	TBD	DD, MN, CV
13 Oct 2012	304, 307	TBD	DD, MN, CV
14 Oct 2012	305, 309, 310	TBD	DD, MN, CV
19 Oct 2012	303, 306, 311	TBD	DD, MN, CV
20 Oct 2012	300, 308	TBD	DD, MN, CV
21 Oct 2012	301, 302	TBD	DD, MN, CV

Gauge visitation in support of the GSMRGN during the autumn 2012 will occur over at least 12 days spanning a period of nearly five weeks in September/October 2012. The primary purpose of the visits will be to perform maintenance, download precipitation observations that were made since the previous gauge visits in June - July 2012, and check if the time adjustment (“TA”) command has fixed the tendency of many data logger time stamps to gradually drift between visits. A primary maintenance issue will be to clear each gauge funnel of typical autumn season debris (leaves, bird poop), to keep the “field-of-view” of the gauges clear of vegetation overgrowth, and to replace the HOBO 3V (2032) batteries. The higher elevation gauges during the September/October period will be visited last as they were most recently visited in the summer 2012.

The general tasks completed at every gauge visit will consist of (1) gauge data download from the data loggers [DD in Table 2], (2) general gauge maintenance [MN in Table 2], and (3) clearing of vegetation from the gauge site [CV in Table 2].

Details of every gauge visit along with each gauge precipitation data record will be updated at http://blizzard.atms.unca.edu/dmiller/fall2012_visits.zip which will contain sub-folders for each gauge that consist of the individual data files (often having at least two different formats), pictures taken at the gauge site during the visit, screenshots of the GPS (laptop) and ML1 logger time comparison, and a MS Word document that mirrors exactly the notes made in the field journal during each gauge visit.

An earlier visit to the Hurricane Ridge gauge (g#111) will be made in August 2012 to verify that the fence has withstood weather and cattle and can effectively serve as an animal deterrent for other gauges located in pastures (e.g., gauges #102, 106, and 107).

Kurt Hibbert is a new undergraduate research student at UNC Asheville who has been added to the technician team to help replace students who graduated in May 2012 and will be leaving town before the gauge visits in the autumn 2012. It is hoped that a new undergraduate research student will be added to the team during the fall 2012 academic semester.