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Table 1: Gauge visits during the spring 2010. Comments: DD=gauge data download, MN=general gauge maintenance (cleaning, bounce sheet, re-level), CV= clear vegetation, DL=data logger issue, and EM=extra maintenance required.

Date	Gauges Visited	Technicians/volunteers	Comments
1 May 2010	1, 3	A. Woodward, A. Wilson	DD, MN, CV
7 May 2010	2, 5, 8, 106	D. Martin, H. Parrot, D. Miller	DD, MN, CV
12 May 2010	4, 10, 104	D. Martin, D. Miller	DD, MN, CV
15 May 2010	111, 112	W. Groetsema, D. Martin	DD, MN, CV, DL
19 May 2010	101, 102, 103, 108, 110	M. Talley, D. Miller	DD, MN, CV
21 May 2010	305, 309, 310	D. Martin, D. Miller	DD, MN, CV, DL
22 May 2010	100, 100T, 105, 107, 109, 111	W. Groetsema, A. Wilson	DD, MN, CV, DL
24 May 2010	305, 310	L. Miller, D. Miller	DD, MN, CV, DL
26 May 2010	303, 306, 311	D. Martin, D. Miller	DD, MN, CV, DL
28 May 2010	111, 305, 310	D. Miller	DD, MN, CV, DL
29 May 2010	300, 301, 302, 308	D. Martin, P. Papin, D. Miller	DD, MN, CV
5, 6 Jun 2010	304, 307	B. Dement, N. Miller, W. Nyman, D. Miller	DD, MN, CV
12 Jun 2010	107	D. Martin, A. Wilson	DD, MN, CV, EM

Gauge visitation in support of the Great Smoky Mountain Rain Gauge Network (GSMRGN) during the spring 2010 occurred over 14 days spanning a period of nearly six weeks in May and June 2010. The primary purpose of the visits was to perform maintenance after a rather snowy and cold winter season and to download gauge observations that were made since the previous gauge visits in October and November 2009. Twelve 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 dataloggers [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]. 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. Task (2) required the cleaning of debris from the funnel filter, cleaning the tipping buckets of debris (if necessary), cleaning the gauge drain ports, fixing a fresh “Bounce” fabric softener sheet inside the case of the gauge (throwing out the old sheet), 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.

The specialized tasks completed during some of the gauge visits in the spring 2010 consisted of dealing with data logger issues [DL in Table 1] and extra maintenance [EM in Table 1]. Close inspection of the gauge visits in Table 1 reveals multiple visits at some of the gauge locations. It

was discovered during the DD process that several gauges (Gauges# 111, 305, 306, and 310) had incomplete data records, with an abrupt end-of-record marker appearing well before the date/time of the gauge visit. Inquiries to Peter Ward of Hydrological Services America (HSA) about the source of the problem revealed that the data loggers (MiniLog ML1) had been installed with lithium batteries that were not produced up to the operating voltage specifications expected by the data loggers. The operating voltage was dropping below the threshold assumed by the HSA software and so the software was assuming a failure and was forcing an end-of-record marker in the data file. Fortunately, Mr. Ward was able to assure us that current precipitation observations were still being made and provided a temporary solution that would allow us to bypass the end-of-record marker and download the full time series of precipitation observations. Mr. Ward's temporary solution allowed us to successfully download the full data records at Gauges# 111, 305, and 310. The full data record at Gauge# 306 will be downloaded during the gauge visit that will take place in fall 2010.

A single gauge (Gauge# 107, Lookout Point) had shown evidence of tampering by a cow of the nearby pasture. A modest re-shaping of the gauge case and installation of special washers with the case bolts has allowed the gauge to remain operational.

Other complications encountered during the spring 2010 gauge visits were the closure of a road to Balsam Mountain Ridge that was undergoing stimulus money-funded repairs, thereby requiring a backpack trip to reach Gauges# 304 and 307 on 5, 6 June. The UNC Asheville Chevy Suburban vehicle suffered blown tires during the visits of 21 and 24 May 2010 to Mt. Sterling Ridge. The tires on these vehicles have been completely replaced and should not cause difficulties in the upcoming gauge visits in the fall 2010. A rattlesnake was encountered on 26 May 2010 during a visit to Gauge#311 but was not aggressive, so no injury occurred.

Details of every gauge visit along with each gauge precipitation data record can be found in folder "GAUGE-DATA-PMM" which contains sub-folders for each gauge that consists of the individual data files (often having at least two different formats) and a "history" MS Word document that mirrors exactly the notes made in the field journal during each gauge visit. The "history" files for each gauge were last updated by Anna Wilson on 14 June 2010.

Plans for the remaining months of 2010

Table 2: Planned gauge visits during the fall 2010. Comments: DD=gauge data download, MN=general gauge maintenance (cleaning, bounce sheet, re-level), CV= clear vegetation, and DL=data logger issue.

Date	Gauges Visited	Technicians	Comments
13 Nov 2010	1, 3	TBD	DD, MN, CV
12 Nov 2010	2, 5, 8, 106	TBD	DD, MN, CV
6 Nov 2010	4, 10, 104	TBD	DD, MN, CV
7 Nov 2010	111, 112	TBD	DD, MN, CV, DL
31 Oct 2010	101, 102, 103, 108, 110	TBD	DD, MN, CV
24 Oct 2010	305, 309, 310	TBD	DD, MN, CV, DL
30 Oct 2010	100, 100T, 105, 107, 109	TBD	DD, MN, CV, DL
17 Oct 2010	303, 306, 311	TBD	DD, MN, CV, DL
16 Oct 2010	300, 301, 302, 308	TBD	DD, MN, CV
23 Oct 2010	304, 307	TBD	DD, MN, CV

Gauge visitation in support of the GSMRGN during the fall 2010 will occur over at least 10 days spanning a period of nearly six weeks in October and early November 2010. The primary purpose of the visits will be to perform maintenance after a rather warm and moist growing season and to download precipitation observations that were made since the previous gauge visits in May and June 2010. A primary maintenance issue will be to clear each gauge funnel of leaves. This is the reason for the proposed reversal in gauge visitation shown in Table 2 compared to the spring visits. The relatively high elevation gauges will be visited earliest in the fall 2010 schedule since the leaves drop from trees at higher elevations at an earlier date. The final visits in the upcoming fall will be to gauges at relatively low elevation locations.

The general tasks completed at every gauge visit will consist of (1) gauge data download from the dataloggers [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].

Those gauges showing a problem with the data logger end-of-record [DL in Table 2] will have their software updated using a patch provided by HSA (MiniLog ML1 Firmware Rev 1.16) that will end the premature end-of-record problem without having to replace the logger/lithium battery.

Details of every gauge visit along with each gauge precipitation data record will be updated in folder "GAUGE-DATA-PMM" which contains sub-folders for each gauge that consists of the individual data files (often having at least two different formats) and a "history" MS Word document that mirrors exactly the notes made in the field journal during each gauge visit.

It is anticipated that a new undergraduate research student at UNC Asheville will be added to the technician team in time for the fall 2010 gauge visits to replace Anna Wilson who is currently focusing on graduate studies at Duke University. This individual will be a younger student (e.g. sophomore) who can be trained and retained as a member of the GSMRGN research team for several years before reaching graduation.