Run-off is measured at the Lutz catchment area from the water level in a 120° V-notch weir. The Lutz catchment is a 9.73 ha area, drained by the Lutz creek on the Northeast slope of Barro Colorado Island (see Figures 1 & 2).

History

The Lutz weir was constructed in 1972. Initially, stream stage was measured by a Stevens A-71 strip-chart water level recorder (see Figure 3). On July 19, 1989 an A/F encoder reading every 5 minutes was added to the A-71. On Sept. 1, 1996 an ISCO 3230 Bubble Flow Meter (also recording at 5-minute intervals) was added and used as the primary data source. Data from the Chart recorder was used as backup. On Jan 13, 2013 the ISCO failed and was replaced in Jan 2014 with a Sutron Radar 56-0540 (recording at 5-minute intervals). The A-71 was maintained as a back-up device throughout and was the primary device when the ISCO failed in 2013 until the Radar was installed.

Methods

The primary reported data are from the electronic devices. When there are gaps in the electronic data, the corresponding period from the chart recorder paper is manually digitized using a digitizing tablet and custom software. The source of the data is indicated in the table.

Calibration weir-height measurements are taken manually by a technician at approximately 9-10am during workdays (see Figure 6). These data are used to check the calibration of both the electronic and chart recorder.

The Stevens A-71 strip-chart recorder does not have a constant paper movement through the device. As the manually wound spring loses its tension, the paper passes less quickly. In order to temporally calibrate the recorder, the technician marks the chart paper with the time and date at approximately the same time that the height calibration is made (see Figure 3).

Sediments that collect in the stilling pond of the weir are removed and deposited below the weir (see Figure 7), usually in the month of April when stream flow in the Lutz creek is usually at its lowest. Cleaning of the weir requires the stilling pond be emptied. Any data lost is usually minimal and can usually be accurately estimated based on the flow just before and after cleaning. The amount of sediment removed from the pond is recorded.

Discharge Calculations

The formula used to convert stage to discharge is:

$$\text{Discharge} = 122.612 * (\text{Stage} / 304.8)^{2.5}$$

Where Discharge is in m^3 and Stage is in mm

Quality Control
All data are visually inspected using custom-built software that allows the visualization of the data. The program permits the correction of a number of known issues:

- recorder pen reading low due to build-up of dust on recorder parts
- obstruction of weir 'V' by vegetation
- immersion of large animals in still pond
- small gaps in the data

The original data are maintained, however only the corrected data are published.

Records are provided with two Quality Control flags. Flag one indicates the fitness for use of each records. Possible values are: good, bad, doubtful, missing. Records are marked as bad if they fail one or more QC tests. Likewise, records are marked as doubtful if they are potentially bad, but without sufficiently strong evidence to be marked as bad. The second QC variable provides that reason for marking a variable as bad or doubtful. Potential values are: range, step, persistence, drift. At this time, only range tests have been applied.
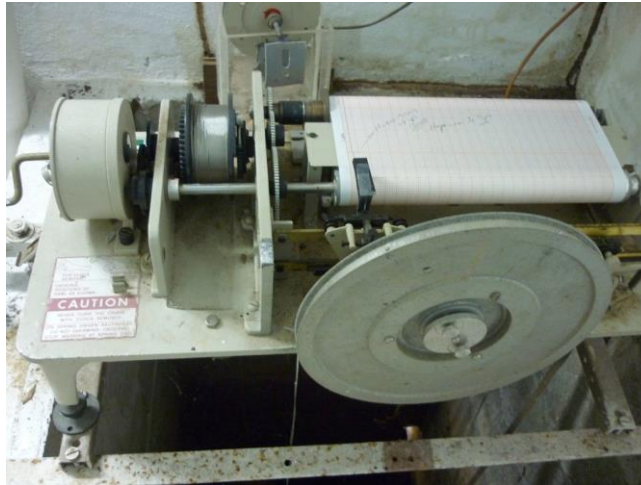
Figure 1
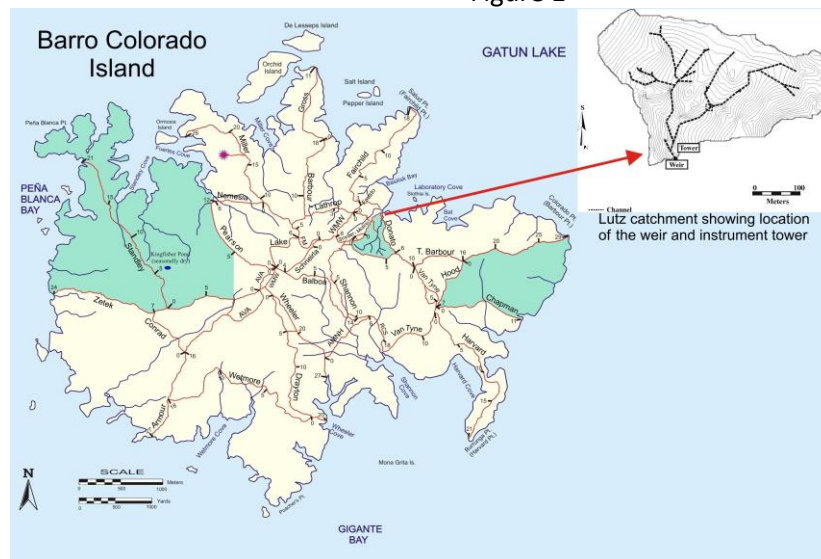
Barro Colorado Island showing location of Lutz Weir Catchment.

Figure 2
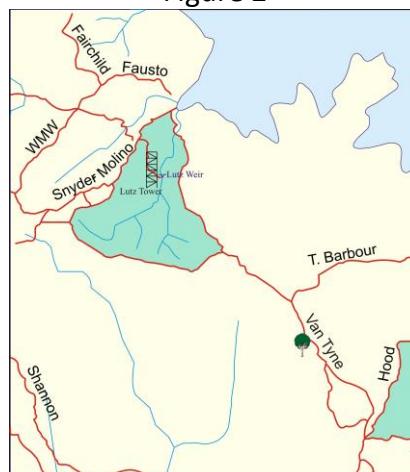
Lutz Weir Catchment and near-by trails

Figure 3

Stevens A-71 strip-chart, water level recorder

Figure 4

ISCO 3230 Bubbler

Figure 5

New Sutron Radar device installed in 2014

Figure 6

Lutz weir with technician taking morning depth calibration reading at base of the weir's 'V'

Figure 7

Stilling pond at end of wet season showing accumulated sediment