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Central Coast Watershed Studies

CCoWS

Streamflow gaging at Greenwood Park, Pacific Grove, California: January-April 2012

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Table of Contents

Acknowledgements ii

Citation ii

1 Overview 3

1.1 Background 3

1.2 Work done 4

2 Site map 5

3 Staff plates 6

4 Pressure gages 7

5 Manual flow measurements 9

6 Discharge pressure rating curves 10

7 Discharge hydrographs 12

8 Discharge data 13

1 Overview

This report describes work done by staff & students at the Watershed Institute (CSUMB) for the Monterey Bay Sanctuary Foundation and the City of Pacific Grove.

The overall scope of work was to gage stormwater flow above and below Greenwood Park in the City of PG during the winter of 2011-12.

1.1 Background

1. CoPG operates a storm sewer system with numerous substantial outfalls into the adjacent Area of Special Biological Significance and the Monterey Bay National Marine Sanctuary.
2. CCRWQCB regulates these discharges. CCRWQCB requires reduction in pollutant load to ASBS. This implies that the load must be quantified, and since pollutant load is pollutant concentration multiplied by discharge integrated over time, this requires that the discharge is quantified, which in turn necessitates stream flow gaging or estimation or modeling, or some combination of these.
3. A major stormwater discharge passes through Greenwood Park just before its outfall to the ocean.
4. CoPG is considering installation of a treatment wetland in Greenwood Park, to help reduce the pollutant load from this outfall.
5. The appropriate design of this wetland depends heavily on the expected inflows to the system, characterized in terms of storm hydrographs at selected recurrence intervals, and the associated peak flow rates and total storm flow volumes.
6. Storm hydrographs at selected recurrence intervals will ultimately be estimated using watershed modeling.
7. Such models require calibration against storm flow measurements in order to be reliable.

8. Existing storm flow data for Greenwood Park are minimal and poorly documented. Better storm flow data are required, ideally from a range of storms of different magnitude.

1.2 Work done

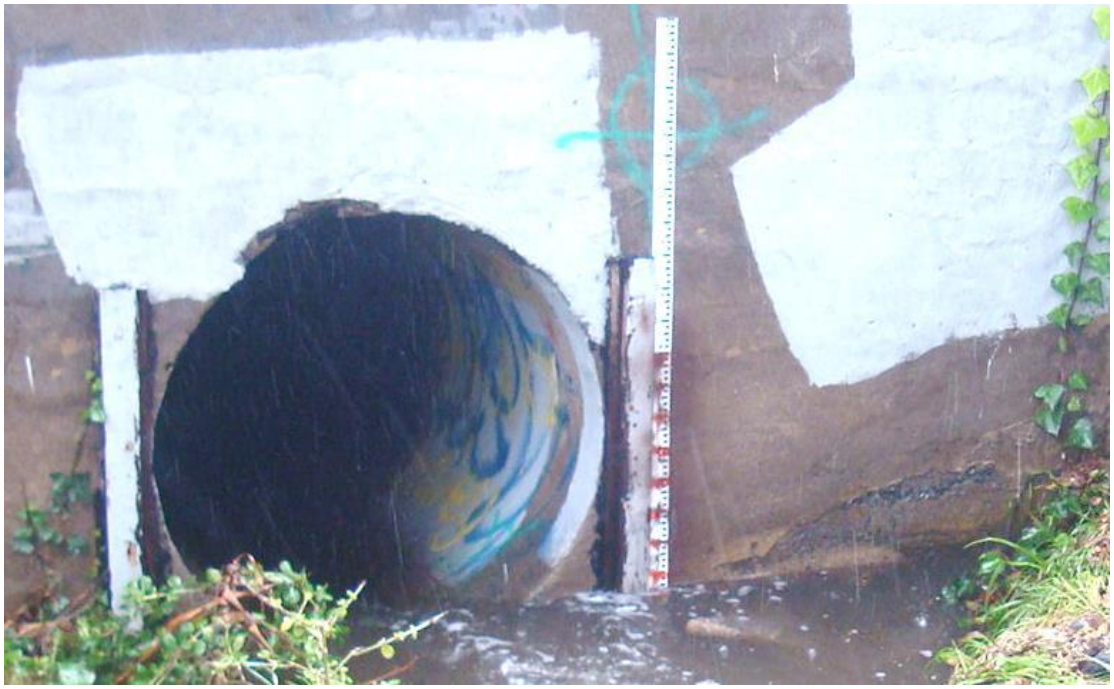
The work done is summarized below. Details appear in the following sections of this report.

1. Installed manual staff plates in the channel above and below Greenwood Park
2. Temporarily installed two pressure gaging sensors and loggers in the flow path above and below Greenwood Park
3. Operated pressure sensors during storms in the 2011-12 winter, to obtain time series of pressure readings
4. Took manual measurements of discharge during storms at selected times representing a range of flow conditions.
5. Fitted a discharge-pressure rating curve to enable estimation of a discharge time series from a pressure time series
6. Posted discharge time series on web

2 Site map

Location of the project area in Greenwood Park, Pacific Grove, California. Water flows westward toward the ocean, visible on the left side of the image.

3 Staff plates



Staff plate installed at lower end of Greenwood Park
(plates are visible to right of culvert entrance)

Set of three staff plates installed at upper end of Greenwood Park

4 Pressure gages

Pressure sensor installed at lower end of Greenwood Park
(sensor is beneath grating visible under water surface)

Pressure sensor installed at upper end of Greenwood Park, adjacent to staff plate
(outer housing barely visible under water surface; inner housing shown while being removed for download; cap of outer housing also visible)

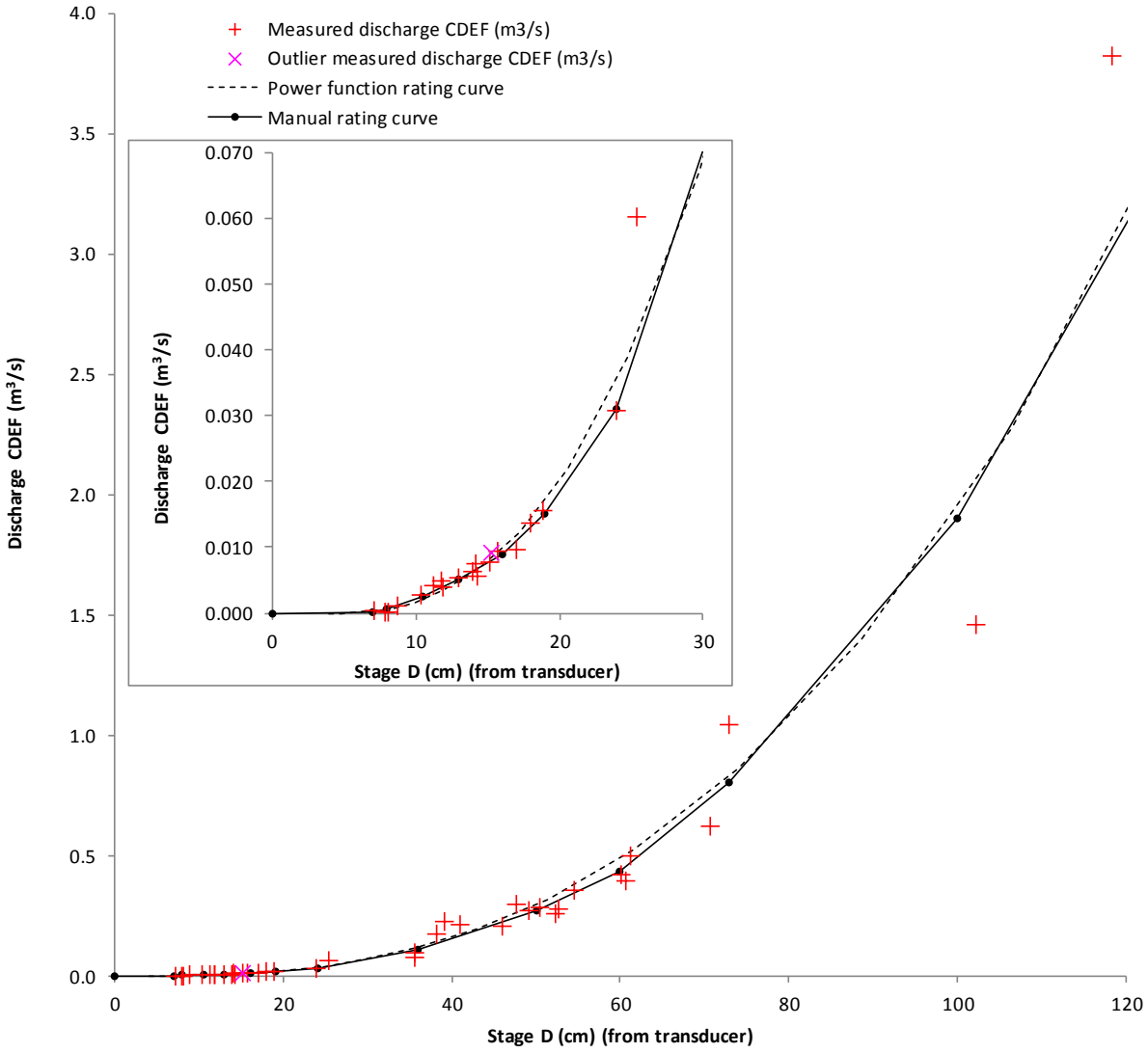
Pressure sensor & built-in logger visible inside inner casing during temporary removal for download.

5 Manual flow measurements

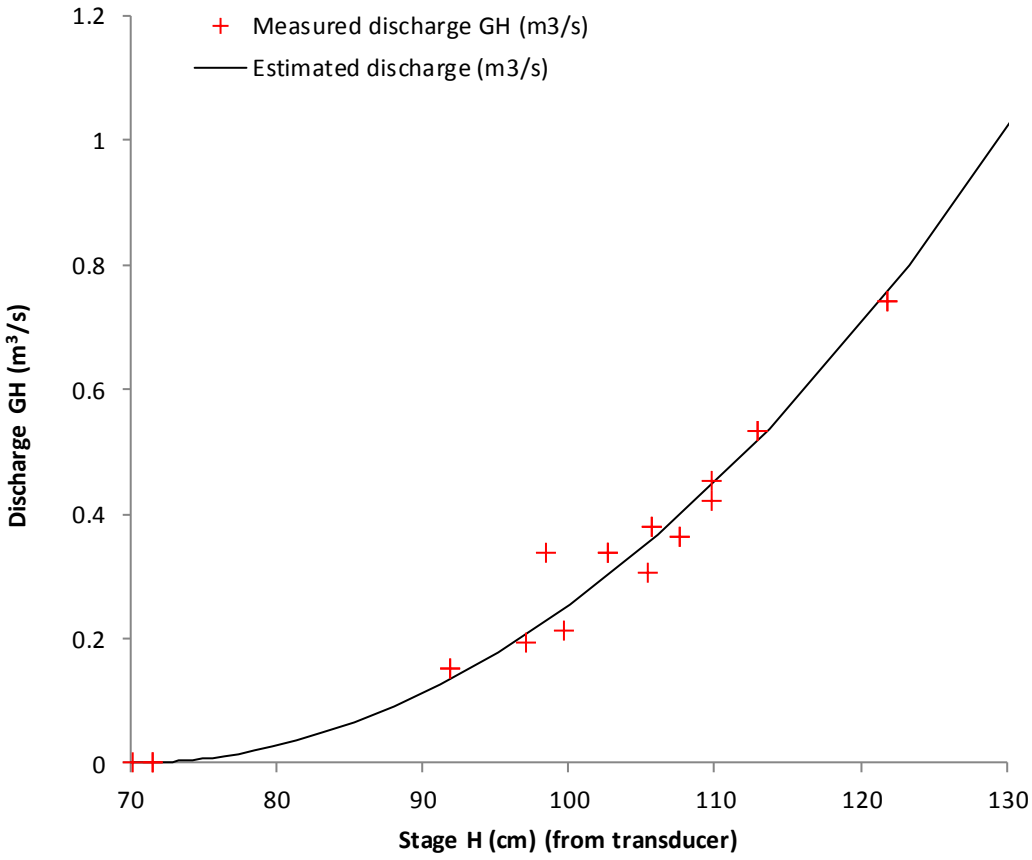
Low flow measurements were taken with either a 3-inch Parshall flume or a bucket placed under an old weir. Medium flow measurements were taken with a Flow Tracker acoustic Doppler velocity meter. Extreme flows were estimated from the velocity of a disposable/degradable surface float in combination with channel-elevation cross-sections measured post-hoc.

Manual discharge measurement using acoustic Doppler flow velocity meter recordings along cross-section across stream

6 Discharge pressure rating curves

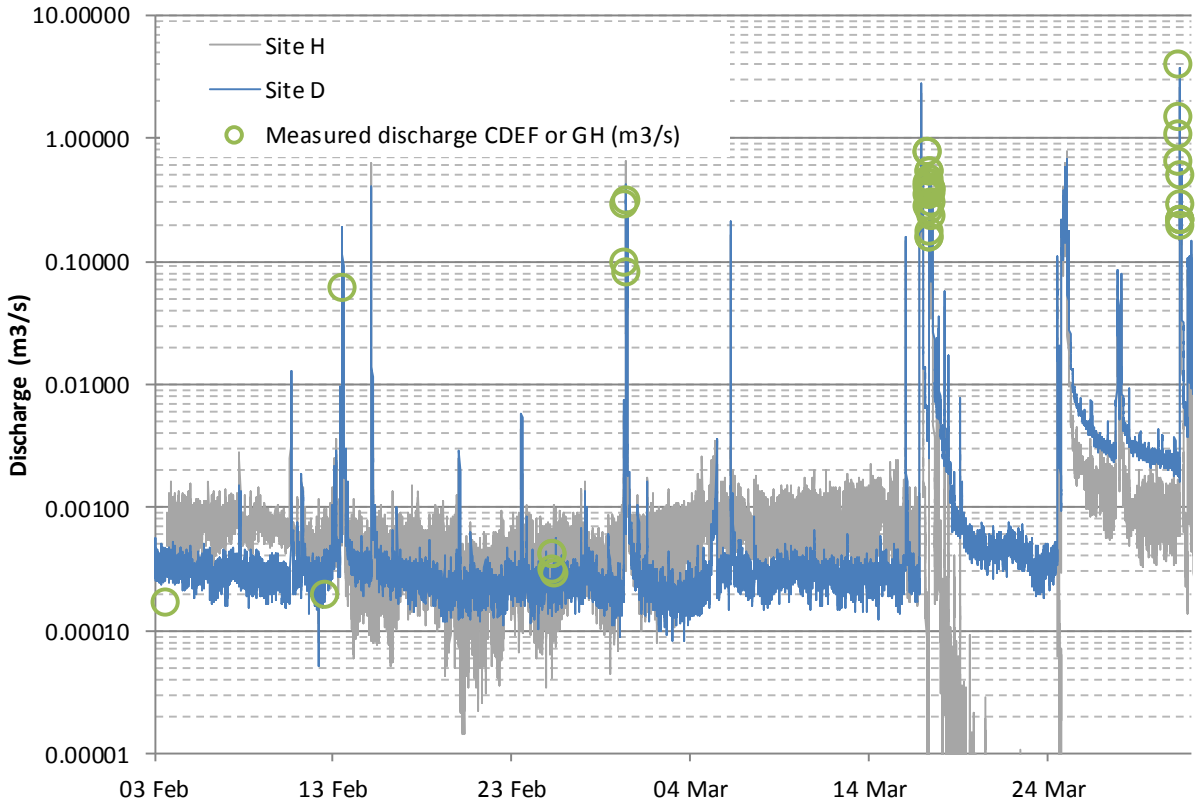


Rating curve for estimation of discharge (m3/s) at the lower end of Greenwood Park (Sites C, D, E, & F), based on pressure measurements (converted to stage, cm) logged at Site D



Rating curve for estimation of discharge (m3/s) at the upper end of Greenwood Park (Sites G & H), based on pressure measurements (converted to stage, cm) logged at Site H

7 Discharge hydrographs



Streamflow discharge at Greenwood Park estimated from pressure transducers rated against manual discharge measurements – early 2012. Low flow estimates are inaccurate after mid-March due to storm-induced changes in channel bedform.

8 Discharge data

Discharge estimates are available at the following link:

http://ccows.csumb.edu/pubs/proj_pubs/2012/CityOfPG_StormFlow/index.htm