SCADA vs. GCD gage?

Glen Canyon Dam Adaptive Management Program
Technical Work Group Meeting
February 26, 2002

Prepared by:
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Arizona Game and Fish Department

TO: Technical Work Group members

FROM: Bill Persons, Arizona Game and Fish Department

DATE: December 11, 2001

RE: Assessment of Glen Canyon Dam Gage and SCADA data

At the last Technical Workgroup meeting (November 13-14,2001) I was asked to evaluate the data obtained from the Glen Canyon Dam Gage (USGS 09379910) and the SCADA system and to make a recommendation to the TWG as to whether to close down the Dam gage and rely soley on the SCADA system for discharge data. I contacted Kirk LaGory, Argonne National Lab, and obtained the SCADA data he used in his assessment of AGC at Glen Canyon Dam and also downloaded Glen Canyon Dam gage data from the USGS web site at (http://dg0daztcn.wr.usgs.gov/rt-cgi/gen_stn_pg?station=09379910).

I compared the two data sets, and found that for some time periods SCADA data were not available, and missing data values were not uncommon. I contacted Kirk LaGory and he confirmed that the data for 19 Mar 2001 - 25 March 2001 and 9 April 2001 - 15 April 2001 were not available and were not on the website that has in the past posted SCADA data. I attempted to contact the website where SCADA data have been posted but was unable to access the site. Kirk confirmed that it is not uncommon for the SCADA system to not report data, and he also reported that the SCADA system gives anomalous reading occasionally.

I've prepared two graphs of a period with missing SCADA data (March 2001), one showing the SCADA system data and one showing the USGS dam gage data, that highlight my concerns with relying on the SCADA system to provide accurate, reliable data. Note that the period of missing data from the SCADA system (19-25 March) corresponds with a period that shows unusually high releases at the USGS gage. The high discharge shown at the dam gage also appears at the Lees Ferry gage.

SCADA system data are not always available, and the system also gives anomalous readings occasionally. The USGS system provides reliable, easily accessible, published discharge and stage data. USGS data can also be accessed "real-time" on the internet. **Therefore, my recommendation is that the USGS gage just downstream of Glen Canyon Dam be maintained.**

Note N/A

data “Not available” for 4/2001, 3/2001, 7/2000

SCADA web page

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12/2001	Dec 3-9	Dec 10-16	Dec 17-23	Dec 24-30	Dec 31-Jan 6
11/2001	Nov 5-11	Nov 12-18	Nov 19-25	Nov 26-Dec 2	
10/2001	Oct 1-7	Oct 8-14	Oct 15-21	Oct 22-28	Oct 29-Nov 4
9/2001	Sep 3-9	Sep 10-16	Sep 17-23	Sep 24-30	
8/2001	Aug 6-12	Aug 13-19	Aug 20-26	Aug 27-Sep 2	
7/2001	Jul 2-8	Jul 9-15	Jul 16-22	Jul 23-29	Jul 30-Aug 5
6/2001	Jun 4-10	Jun 11-17	Jun 18-24	Jun 25-Jul 1	
5/2001	May 7-13	May 14-20	May 21-27	May 28 - Jun 3	
4/2001	Apr 2-8	N/A	Apr 16-22	Apr 23-29	Apr 30-May 6
3/2001	Mar 5-11	Mar 12-18	N/A	Mar 26-Apr 1	
2/2001	Feb 5-11	Feb 12-18	Feb 19-25	Feb26-Mar4	
1/2001	Jan 1-7	Jan 8-14	Jan 15-21	Jan 22-28	Jan 29-Feb 4
12/2000	Dec 4-10	Dec 11-17	Dec 18-24	Dec 25-31	
11/2000	Nov 6-12	Nov 13-19	Nov 20-26	Nov 27-Dec 3	
10/2000	Oct 2-8	Oct 9-15	Oct 16-22	Oct 23-29	Oct 30-Nov 5
9/2000	Sep 4-10	Sep 11-17	Sep 18-24	Sep 25-Oct 1	
8/2000	Aug 7-13	Aug 14-20	Aug 21-27	Aug 28-Sep 3	
7/2000	N/A	N/A	N/A	Jul 24-Jul 30	Jul 31-Aug 6
6/2000	Jun 5-11	Jun 12-18	Jun 19-25	Jun 26-Jul 2	
5/2000	May 01-07	N/A	May 15-21	May 22-28	May 29-June 4
4/2000	Apr 03-09	Apr 10-16	Apr 17-23	Apr 24-30	
3/2000	Mar 06-12	Mar 13-19	Mar 20-26	Mar 27-Apr 02	
2/2000	Feb 07-13	Feb 14-20	Feb 21-21	Feb 28-Mar 05	
1/2000	Jan 03-09	Jan 10-16	Jan 17-23	Jan 24-30	Jan 31-Feb 06

Note: This SCADA information is believed to be reliable but is not guaranteed to be correct. It is subject to change…

SCADA web page (2)

12/1999	Dec 06-12	Dec 13-19	Dec 20-26	Dec 27-Jan 02	
11/1999	Nov 1- 7	Nov 8-14	Nov15-21	Nov 22-28	Nov 29-Dec05
10/1999	Oct 4-10	Oct 11-17	Oct 18-24	Oct 25-31	
9/1999	Sep 6-12	Sep13-19	Sep 20-26	Sep 27-Oct 3	
8/1999	Aug 2-8	Aug 9-15	Aug 16-22	Aug 23-29	Aug 30-Sep 5
7/1999	Jul. 5-11	Jul 12-18	Jul 19-25	Jul 26-Aug 1	
6/1999	Jun 7-13	Jun. 14-20	Jun. 21-27	Jun 28-Jul 4	
5/1999	May 3-9	May10-16	May 17-23	May 24-30	May 31-Jun 6
4/1999	Apr 5-11	Apr12-18	Apr 19-25	Apr 26-May 2	
3/1999	Mar 1-7	Mar 8-14	Mar 15-21	Mar 22-28	Mar 29-Apr 4
2/1999	Feb 1-7	Feb 8-14	Feb 15-21	Feb 22-28	
1/1999	Jan 4-10	Jan 11-17	Jan 18-24	Jan 25-31	
12/1998	Dec 7-13	Dec 14-20	Dec 21-27	Dec 28-Jan 3	
11/1998				Nov 23-29	Nov 30-Dec 6

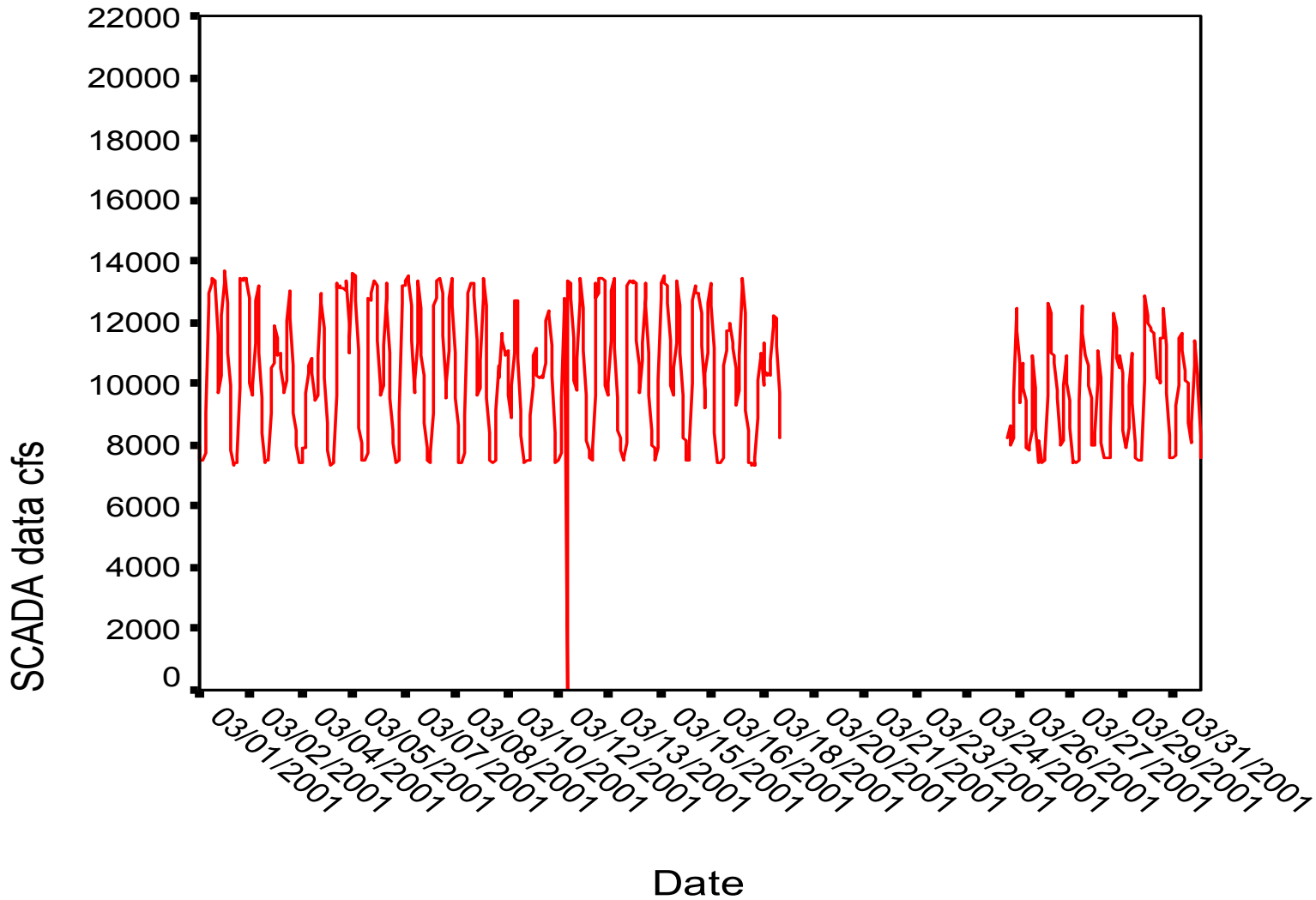
Monthly SCADA Data Files

(500k File Size)	Nov. 1998	Oct. 1998	Sep. 1998	Aug. 1998	Jul. 1998
Jun. 1998	May 1998	Apr. 1998	Mar. 1998	Feb. 1998	Jan. 1998
Dec. 1997	Nov. 1997	Oct. 1997	Sep. 1997	Aug. 1997	Jul. 1997
Jun. 1997	May 1997	Apr.1997	Mar. 1997	Feb. 1997	Jan. 1997
Dec. 1996	Nov. 1996	Oct. 1996	Sep. 1996	Aug. 1996	Jul. 1996
Jun.1996	May 1996	Apr. 1996	Mar. 1996	Feb. 1996	Jan. 1996
Dec. 1995	N/A	N/A	N/A	N/A	N/A
N/A	N/A	Apr. 1995	Mar. 1995	Feb. 1995	Jan. 1995
Dec. 1994	Nov. 1994	Oct. 1994	Sep. 1994	Aug. 1994	Jul. 1994
Jun. 1994	May 1994	Apr. 1994	Mar. 1994	Feb. 1994	Jan. 1994
Dec. 1993	Nov. 1993	Oct. 1993	Sep. 1993	N/A	Jul. 1993
Jun. 1993	May 1993	N/A	Mar. 1993	Feb. 1993	Jan. 1993

Note: This SCADA information is believed to be reliable but is not guaranteed to be correct. It is subject to change without notice as additional information is received.

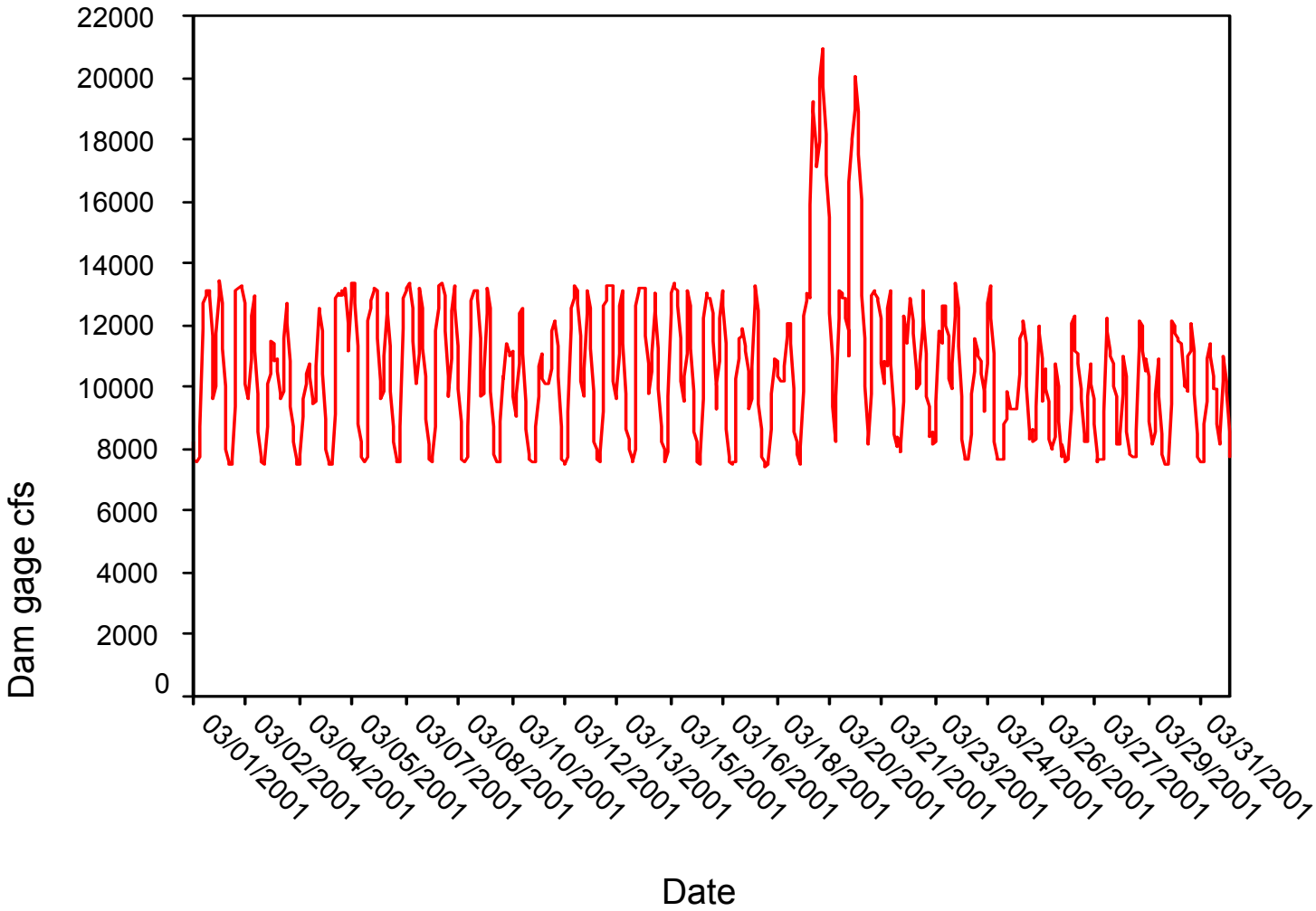
Note missing data

SCADA data March 2001



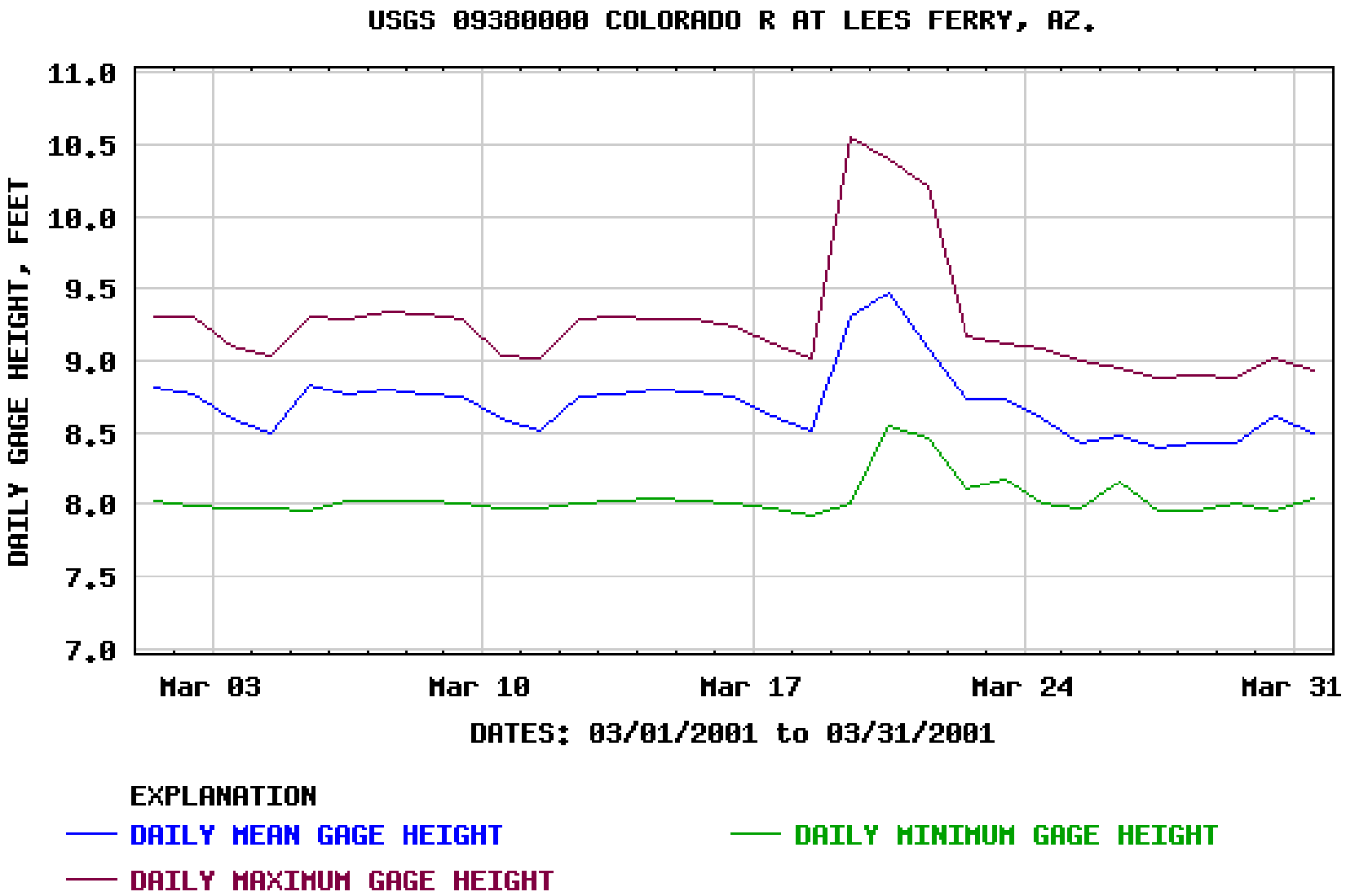
Note complete data for March

GCD gage data March 2001



Lees Ferry gage confirms GCD gage for March 2001.

Lees Ferry gage March 2001



Note ease of retrieving data.

Example of USGS data query screen

Data retrieval is awkward with SCADA system

Example of SCADA file format

GLEN		1-Dec-31							
Hour	Elev.	Tail	Head	Gen.	Pow_rel	Spillway	Bypass	Tot_rel	Ramping
100	3656.28	3135.09	521.19	385	9960	0	0	9960	
200	3656.29	3134.78	521.51	360	9310	0	0	9310	-650
300	3656.3	3134.78	521.52	357	9240	0	0	9240	-70
400	3656.31	3134.78	521.53	359	9290	0	0	9290	50
500	3656.31	3135.05	521.26	364	9420	0	0	9420	130
600	3656.29	3135.9	520.39	420	10870	0	0	10870	1450
700	3656.28	3137.12	519.16	548	14180	0	0	14180	3310
800	3656.27	3137.75	518.52	645	16690	0	0	16690	2510
900	3656.26	3137.8	518.46	655	16950	0	0	16950	260
1000	3656.25	3137.79	518.46	654	16920	0	0	16920	-30
1100	3656.25	3137.99	518.26	658	17030	0	0	17030	110
1200	3656.26	3137.7	518.56	650	16820	0	0	16820	-210
1300	3656.26	3137.38	518.88	601	15550	0	0	15550	-1270
1400	3656.27	3137.06	519.21	567	14670	0	0	14670	-880
1500	3656.26	3136.74	519.52	529	13690	0	0	13690	-980
1600	3656.24	3136.75	519.49	523	13530	0	0	13530	-160
1700	3656.21	3136.79	519.42	517	13380	0	0	13380	-150
1800	3656.22	3137.81	518.41	651	16850	0	0	16850	3470
1900	3656.2	3137.81	518.39	658	17030	0	0	17030	180
2000	3656.18	3137.82	518.36	653	16900	0	0	16900	-130
2100	3656.18	3137.54	518.64	624	16150	0	0	16150	-750
2200	3656.16	3137.18	518.98	572	14800	0	0	14800	-1350
2300	3656.18	3136.45	519.73	517	13380	0	0	13380	-1420
2400	3656.17	3135.9	520.27	438	11340	0	0	11340	-2040
Aver.	3656.25	3136.74	519.5	538	13915	0	0	13915	
Total					27600	0	0	27600	
A.F.									

Summary:

SCADA

- Not always available
- Unreliable
- Occasional anomalous reading
- Difficult format to convert to usable datafiles

USGS

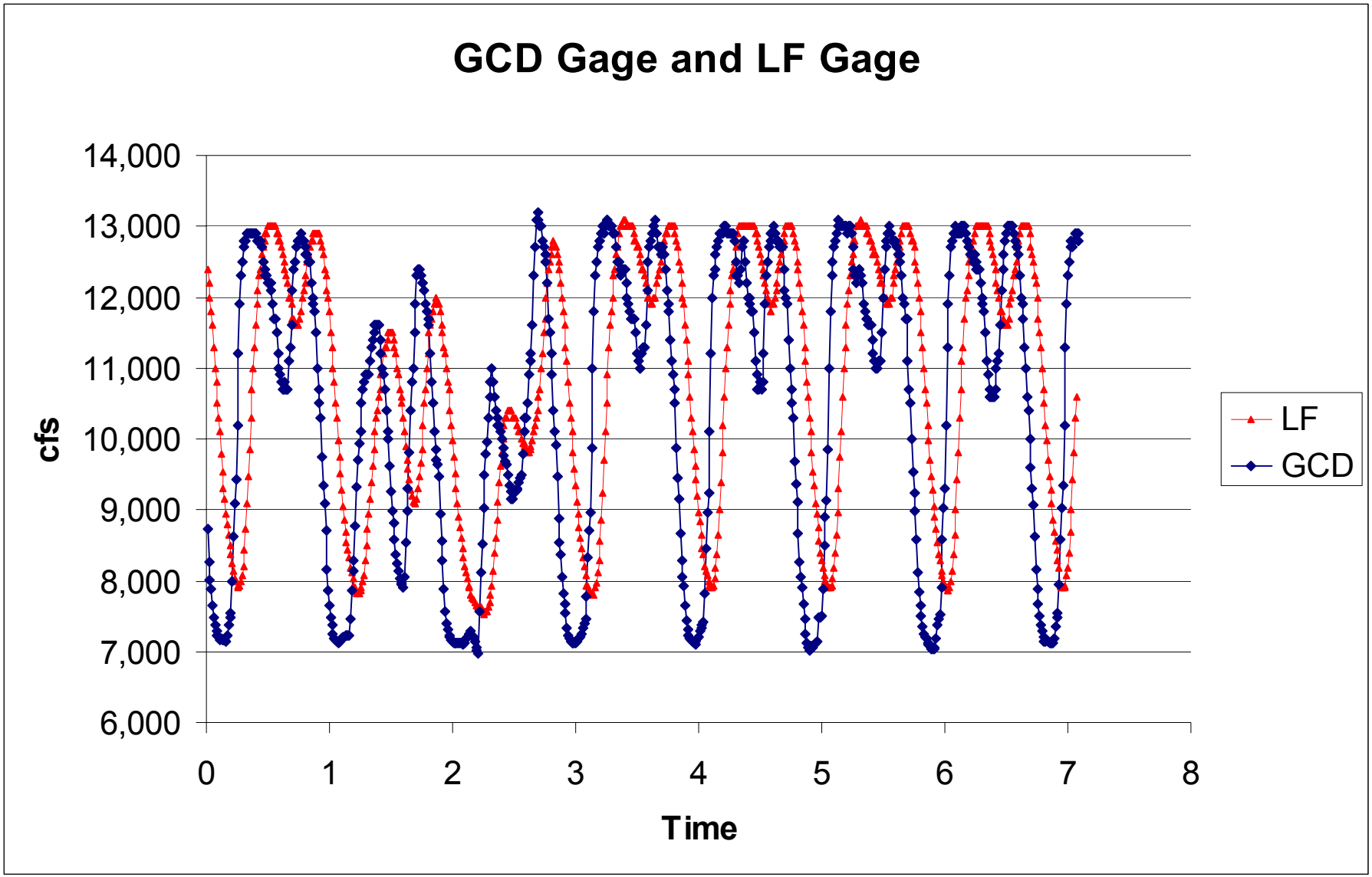
- Easily available
- Reliable
- Published discharge and stage data
- Consistent format for conversion to datafiles

Example data from USGS web sites for

Glen Canyon Dam gage and

Lees Ferry gage,

February 15 – 22, 2002.


GCD Gage and LF Gage
14,000
13,000
12,000
11,000
10,000
9,000
8,000
7,000
6,000
cfs
0
1
2
3
4
5
6
7
8
Time
LF
GCD