Glen Canyon Dam Adaptive Management Work Group
Agenda Item Information
May 18, 2011

Agenda Item

WY 2012 Hydrograph Development

Action Requested

☑ Feedback is requested from AMWG members.

Presenter

Dave Trueman, Resources Management Division Manager, Upper Colorado Region, Bureau of Reclamation

Previous Action Taken

N/A

Relevant Science

N/A

Background Information

Reclamation will present an analysis for use by the AMWG in developing a recommendation, in conjunction with the other GCDAMP federal agencies, for the 2012 Hydrograph. This will include results of sand retention modeling and financial analysis for a range of operational scenarios.

The federal work group has proposed and evaluated numerous different combinations of hydrologic and operational scenarios. The final three operational scenarios will be analyzed against three different hydrologic tests. These include an "average" release that does not vary from 9.3 maf throughout the year. The other two hydrologic tests are designed to stress the operational scenarios with late season changes (both up and down).

The operational scenarios include:

(1) 2011 Hydrograph criteria (+100/-100 kaf with 16/22 kcfs limits);
(2) 2011 Variant (+100/-150 kaf with 16/22 kcfs limits) is a variant of the 2011 Hydrograph which allows less water to be released earlier in the year to conserve water in case releases drop to 8.23 maf (more probable in 2012 than 2011);
(3) Targeted approach which would attempt to constrain releases in August-October to preserve new sediment inputs for a fall HFE.

2012 Hydrograph Development

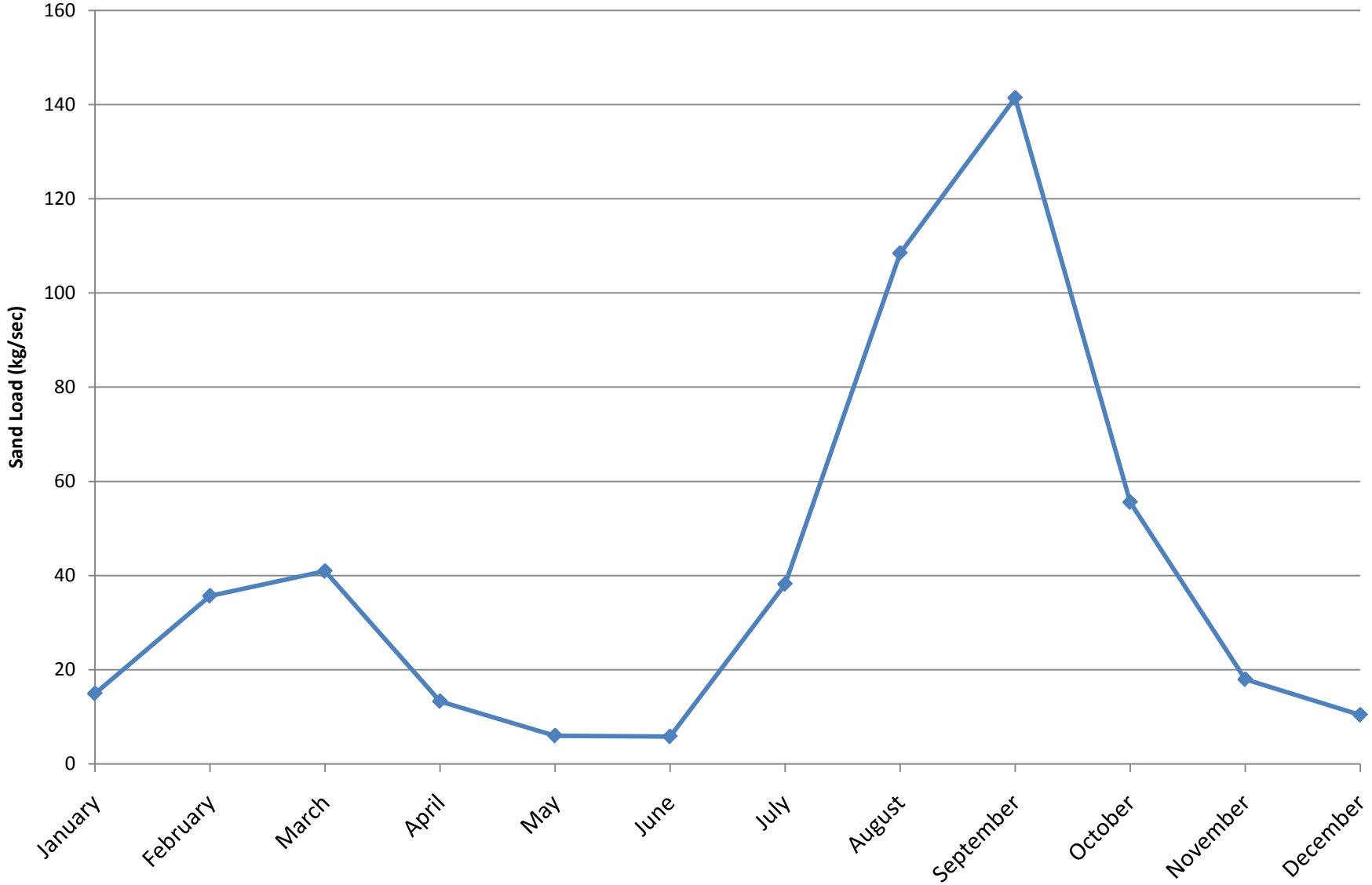
Status

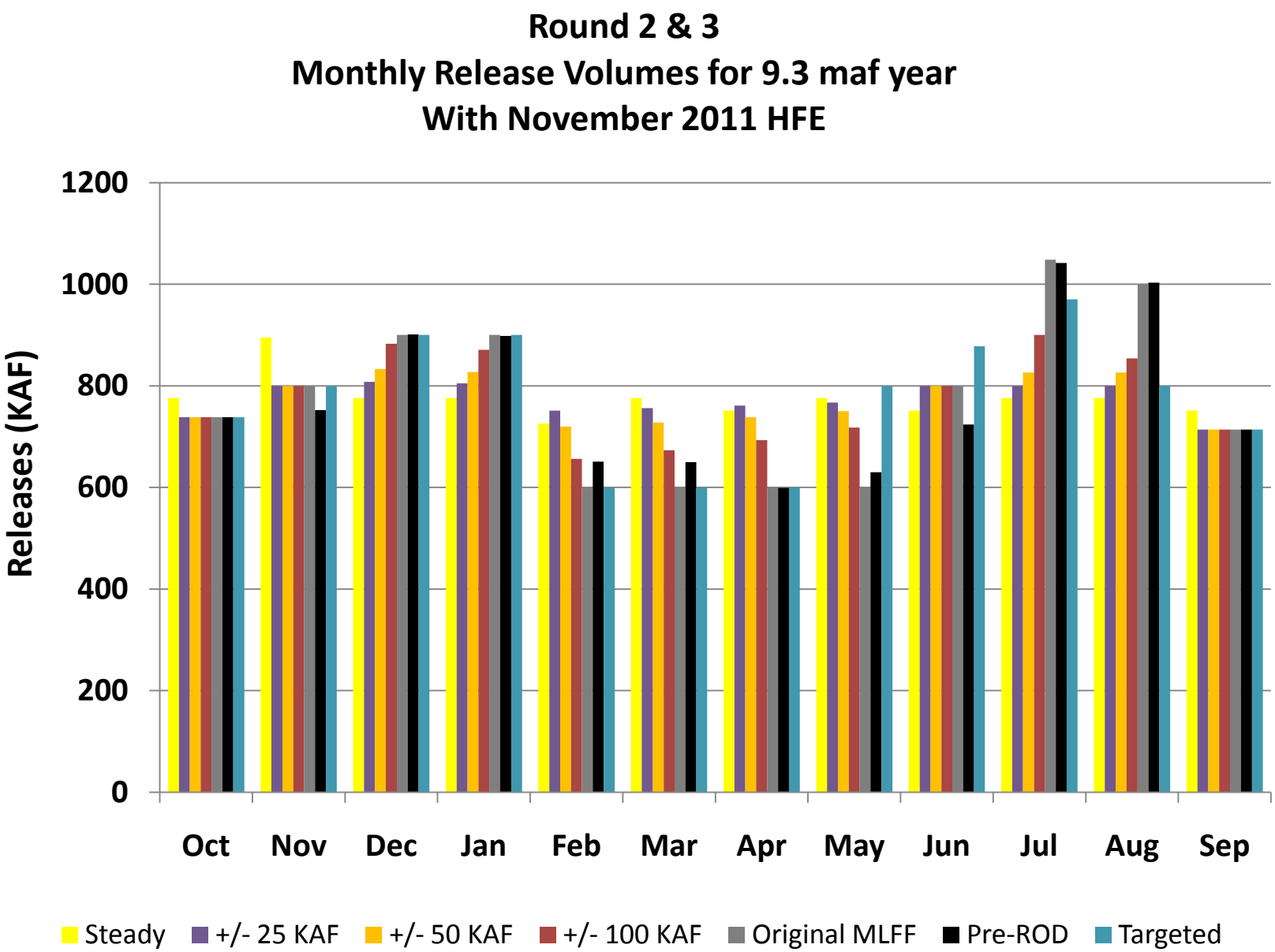
May 16, 2011

2012 Hydrograph Development

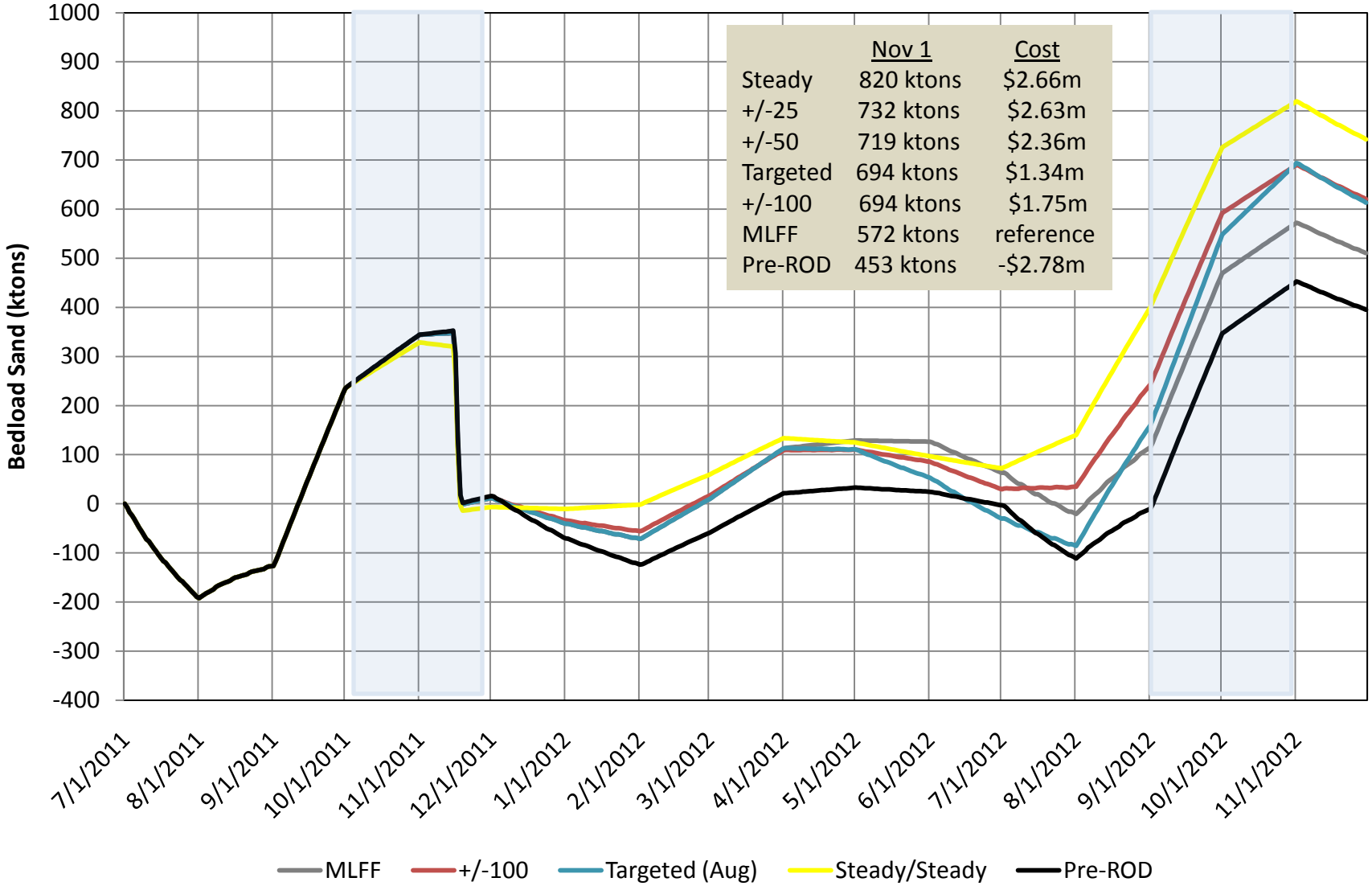
- Start with 2011 Hydrograph
  (+/-100 kaf w/16,000 & 22,000 cfs limits)
- Consider operating experiences from 2011
- Look to improve cost and/or benefit
- Within existing environmental compliance
- Non-MLFF ideas may be referred to LTEMP

Average Monthly Sediment Inputs
(values used in model)

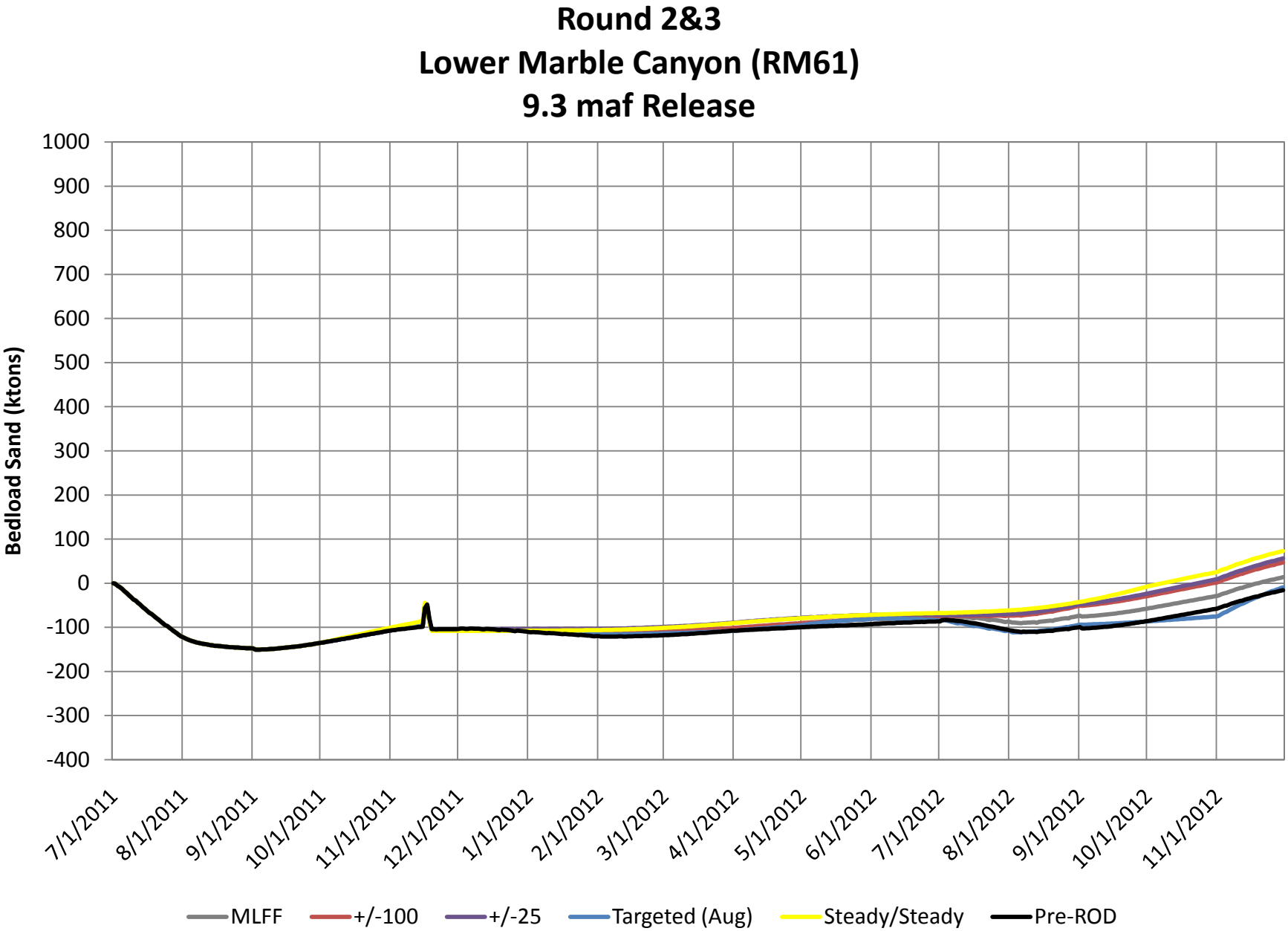



Round 2 & 3
Monthly Release Volumes for 9.3 maf year
With November 2011 HFE
Releases (KAF)
1200
1000
800
600
400
200
0
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Steady
+/- 25 KAF
+/- 50 KAF
+/- 100 KAF
Original MLFF
Pre-ROD
Targeted

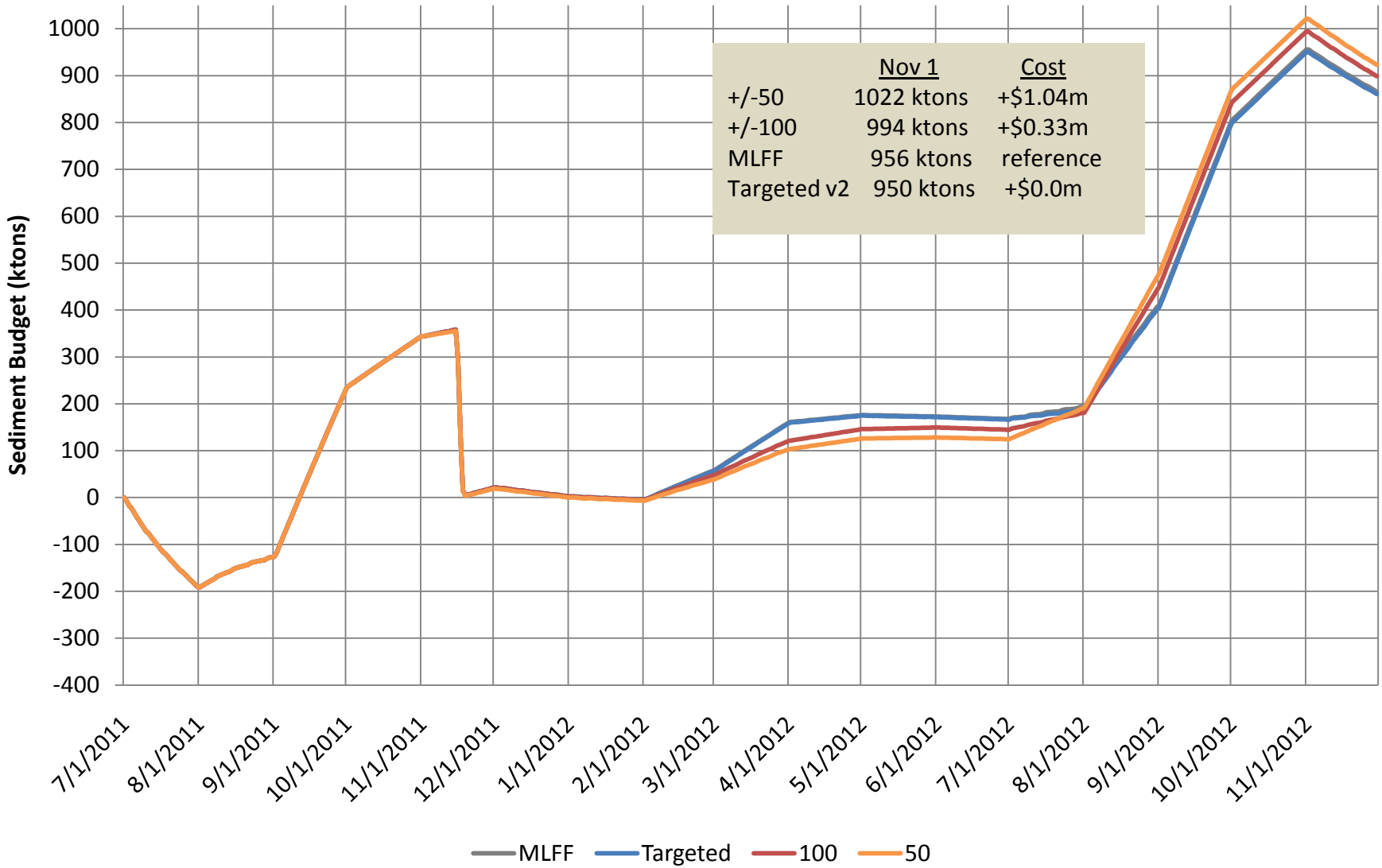
Round 2&3
Upper Marble Canyon (RM30)
9.3 maf Release



	Nov 1	Cost
Steady	820 ktons	$2.66m
+/-25	732 ktons	$2.63m
+/-50	719 ktons	$2.36m
Targeted	694 ktons	$1.34m
+/-100	694 ktons	$1.75m
MLFF	572 ktons	reference
Pre-ROD	453 ktons	-$2.78m

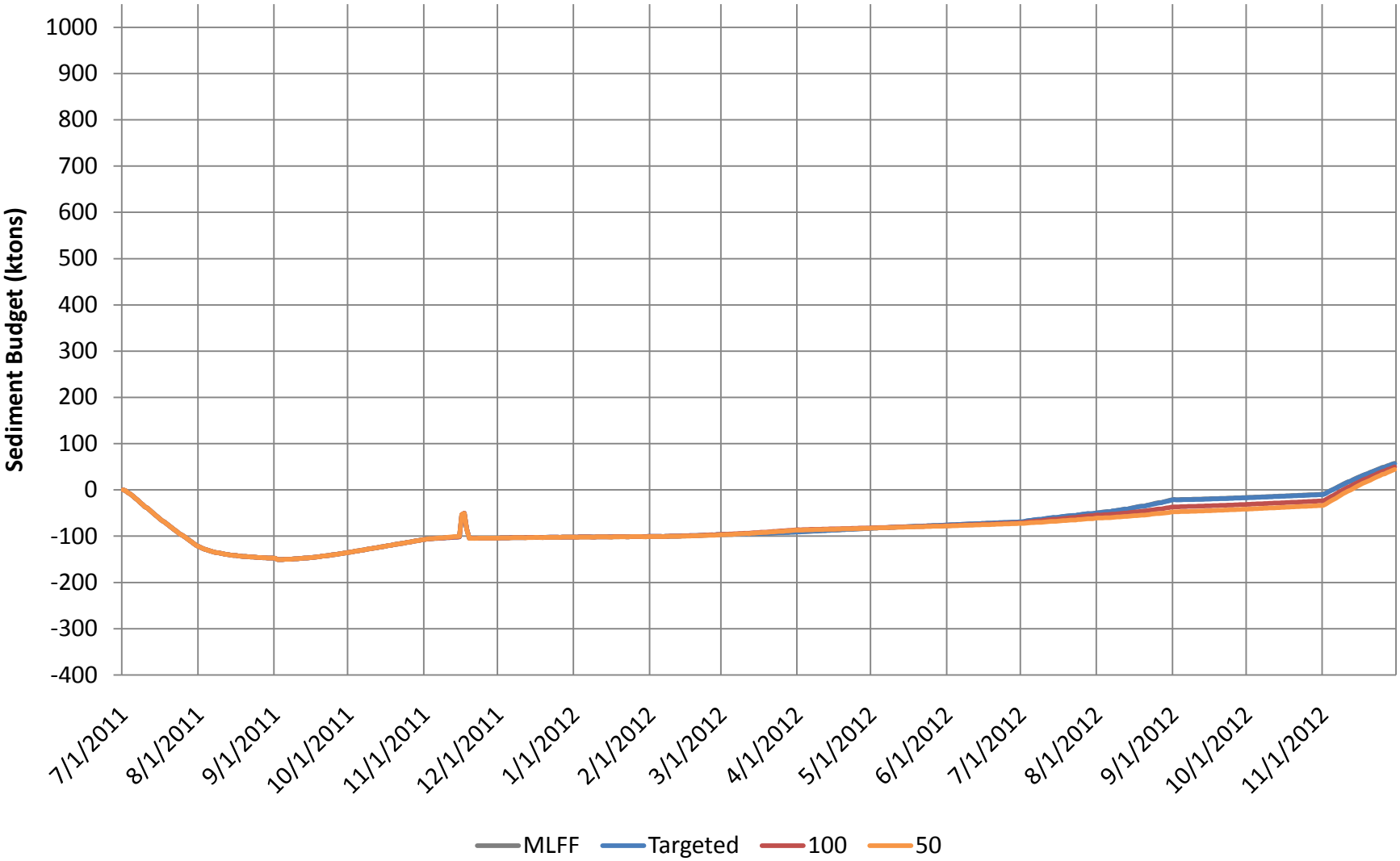

Round 2&3
Lower Marble Canyon (RM61)
9.3 maf Release
Bedload Sand (ktons)
1000
900
800
700
600
500
400
300
200
100
0
-100
-200
-300
-400
7/1/2011
8/1/2011
9/1/2011
10/1/2011
11/1/2011
12/1/2011
1/1/2012
2/1/2012
3/1/2012
4/1/2012
5/1/2012
6/1/2012
7/1/2012
8/1/2012
9/1/2012
10/1/2012
11/1/2012
MLFF
+/-100
+/-25
Targeted (Aug)
Steady/Steady
Pre-ROD

Round 4
Upper Marble Canyon (RM30)
9.3 maf > 8.23 maf



	Nov 1	Cost
+/-50	1022 ktons	+$1.04m
+/-100	994 ktons	+$0.33m
MLFF	956 ktons	reference
Targeted v2	950 ktons	+$0.0m

Round 4
Lower Marble Canyon (RM61)
9.3 maf > 8.23 maf



Round 5

- +/-100 with 16/22 kcfs caps
- Targeted using percentages (see table)
- +100/-150 with 16/22 kcfs caps
- 3 hydrologic scenarios
- Nov/Dec/Jan releases lowered from 900 maf to 800 maf due to increased chance of 8.23 maf

Round 5a
9.3 maf Release

+/-100 KAF (SCENARIO 18)

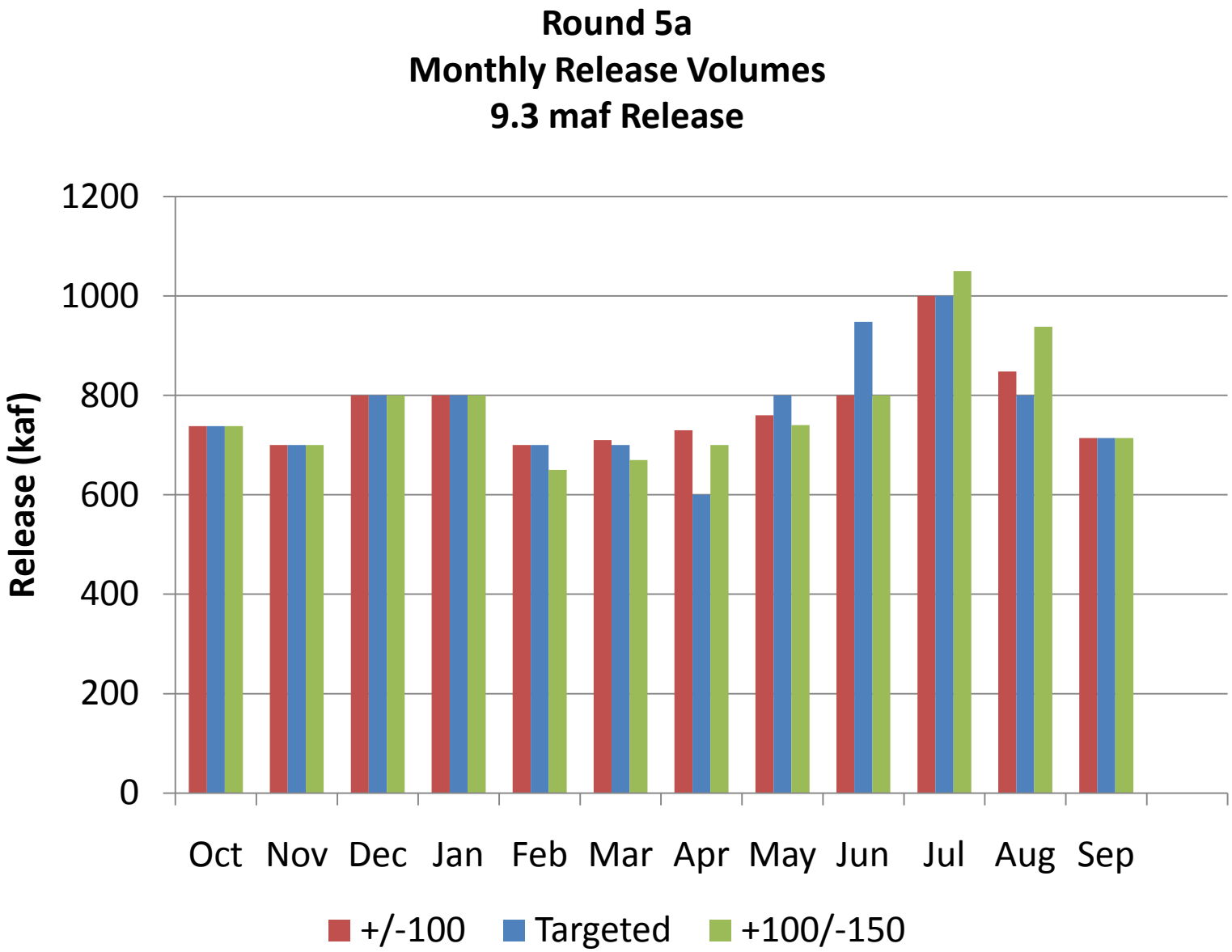
	Release (kaf)	Annual Forecast (maf)	Sept Steady Flow Target (kaf)	Min Monthly Release (Avg - 100 kaf) (kaf)	Max Monthly Release (Avg + 100 kaf) (kaf)
Oct	738	9.30	714	738	738
Nov	700	9.30	714	685	885
Dec	800	9.30	714	694	894
Jan	800	9.30	714	693	893
Feb	700	9.30	714	693	893
Mar	710	9.30	714	708	908
Apr	730	9.30	714	728	928
May	760	9.30	714	752	952
Jun	800	9.30	714	783	983
Jul	1,000	9.30	714	824	1,024
Aug	848	9.30	714	748	948
Sep	714	9.30	714		

Targeted (SCENARIO 19)

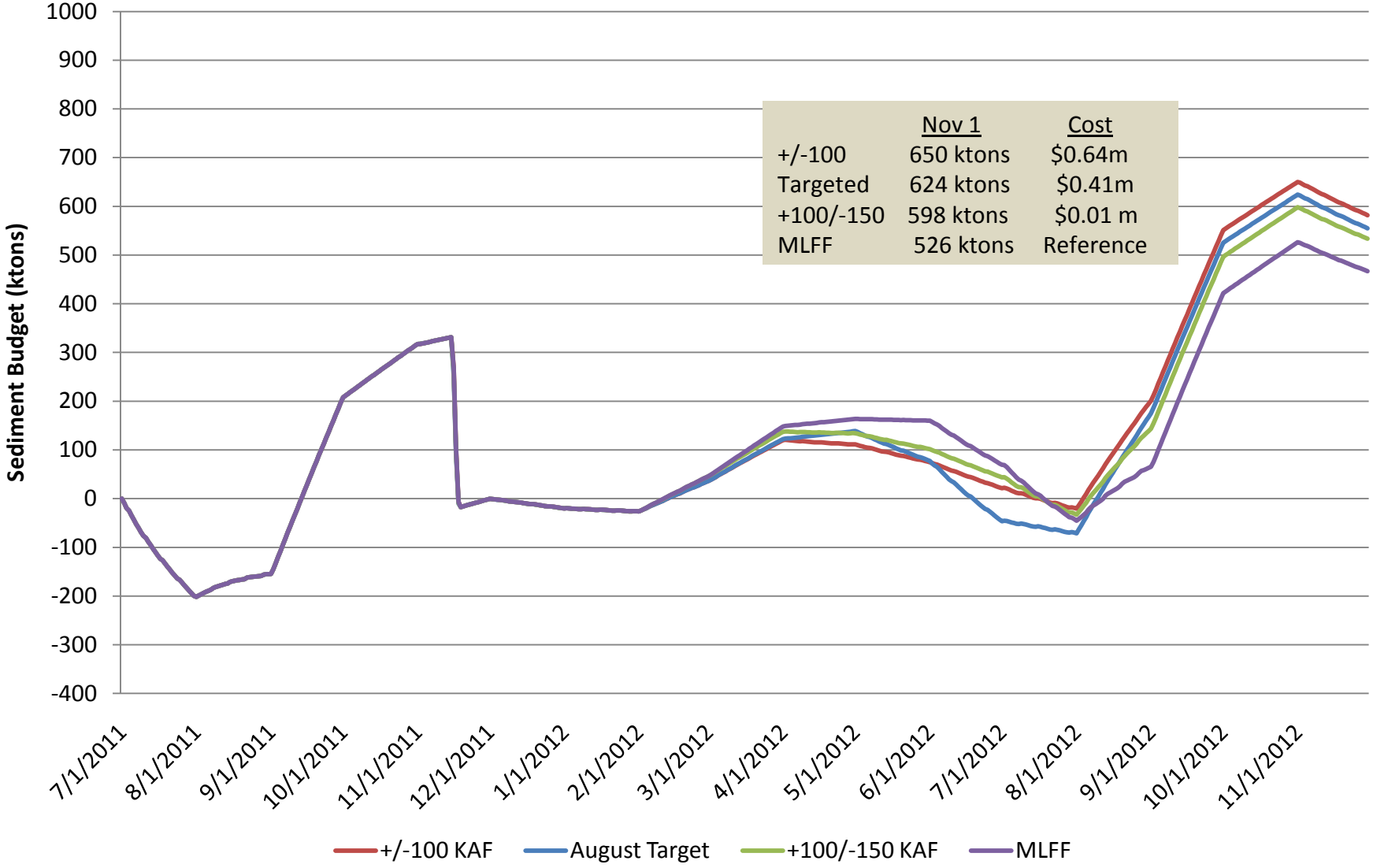
	Release (kaf)	Annual Forecast (maf)	Sept Steady Flow Target (kaf)	August Target Percent	August Target Volume (kaf)
Oct	738	9.30	714		800
Nov	700	9.30	714		800
Dec	800	9.30	714		800
Jan	800	9.30	714	10	800
Feb	700	9.30	714	10	800
Mar	700	9.30	714	12	800
Apr	600	9.30	714	15	800
May	800	9.30	714	20	800
Jun	948	9.30	714	25	800
Jul	1,000	9.30	714	40	800
Aug	800	9.30	714	100	800
Sep	714	9.30	714		

+100 /-150 KAF (SCENARIO 23)

	Release (kaf)	Annual Forecast (maf)	Sept Steady Flow Target (kaf)	Min Monthly Release (Avg - 150 kaf) (kaf)	Max Monthly Release (Avg + 100 kaf) (kaf)
Oct	738	9.30	714	738	738
Nov	700	9.30	714	635	885
Dec	800	9.30	714	644	894
Jan	800	9.30	714	643	893
Feb	650	9.30	714	643	893
Mar	670	9.30	714	666	916
Apr	700	9.30	714	696	946
May	740	9.30	714	732	982
Jun	800	9.30	714	779	1,029
Jul	1,050	9.30	714	844	1,094
Aug	938	9.30	714	788	1,038
Sep	714	9.30	714		

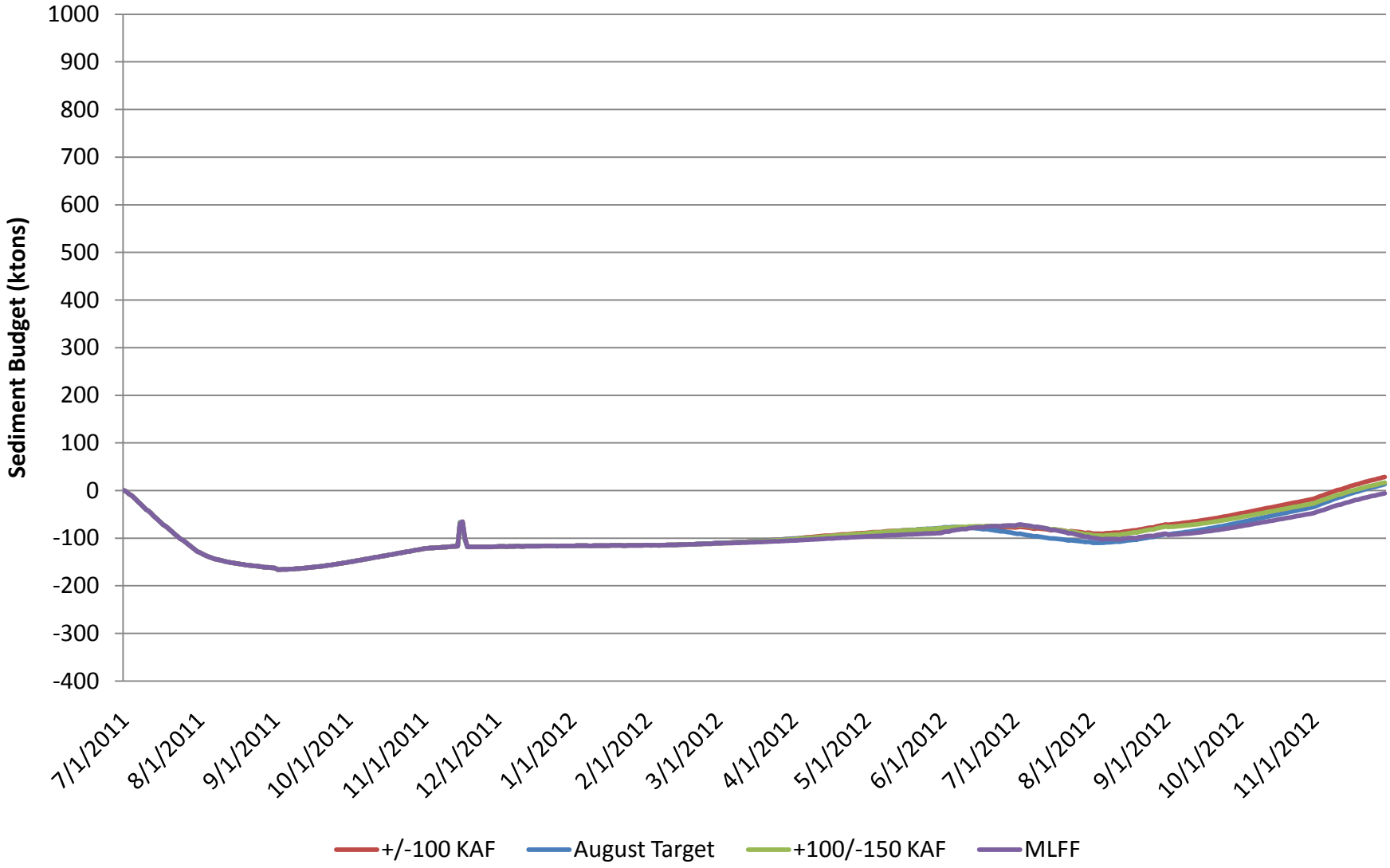

Round 5a
Monthly Release Volumes
9.3 maf Release
Release (kaf)
1200
1000
800
600
400
200
0
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
+/-100
Targeted
+100/-150

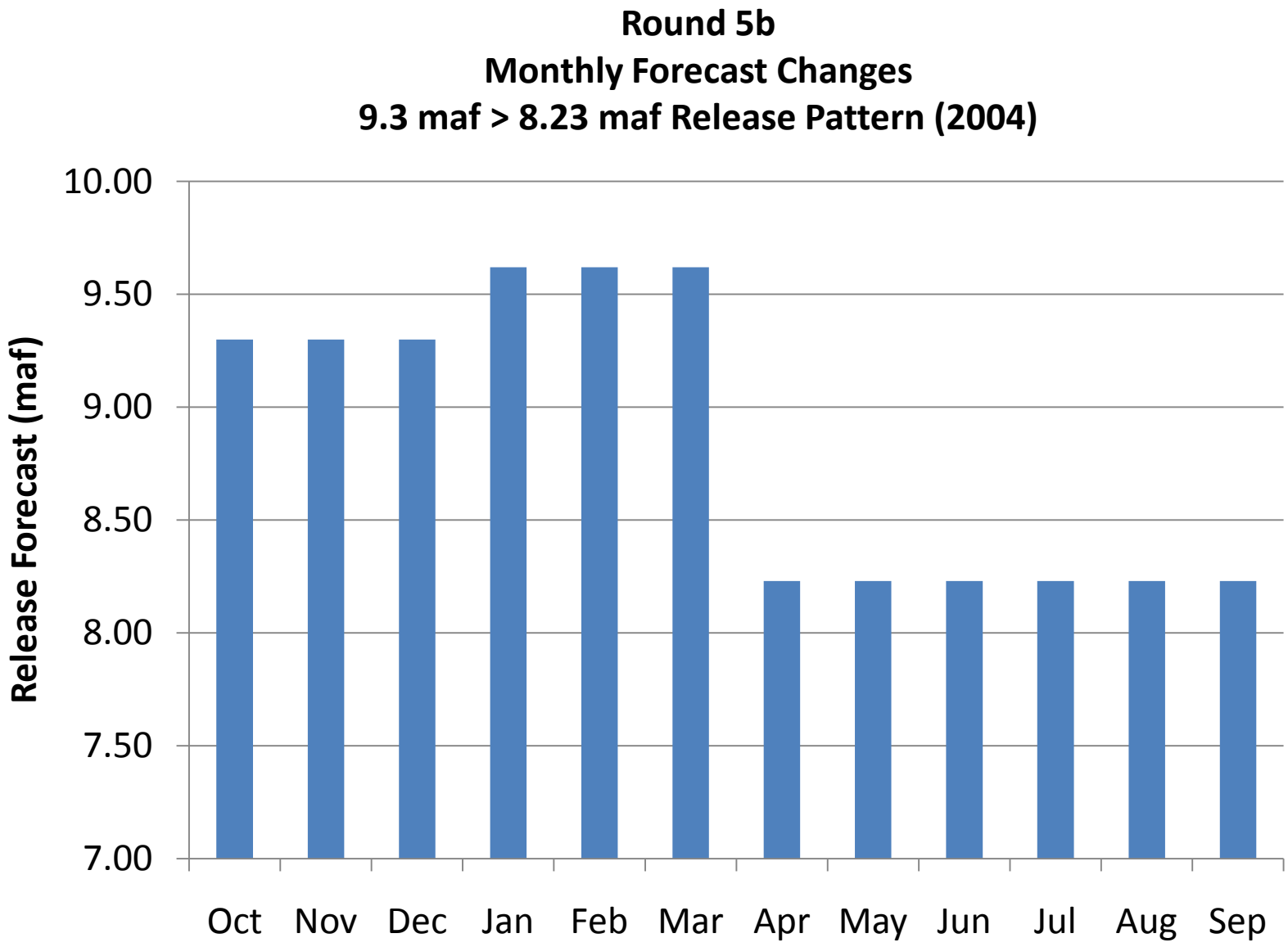
Round 5a
Upper Marble Canyon (RM30)
9.3 maf

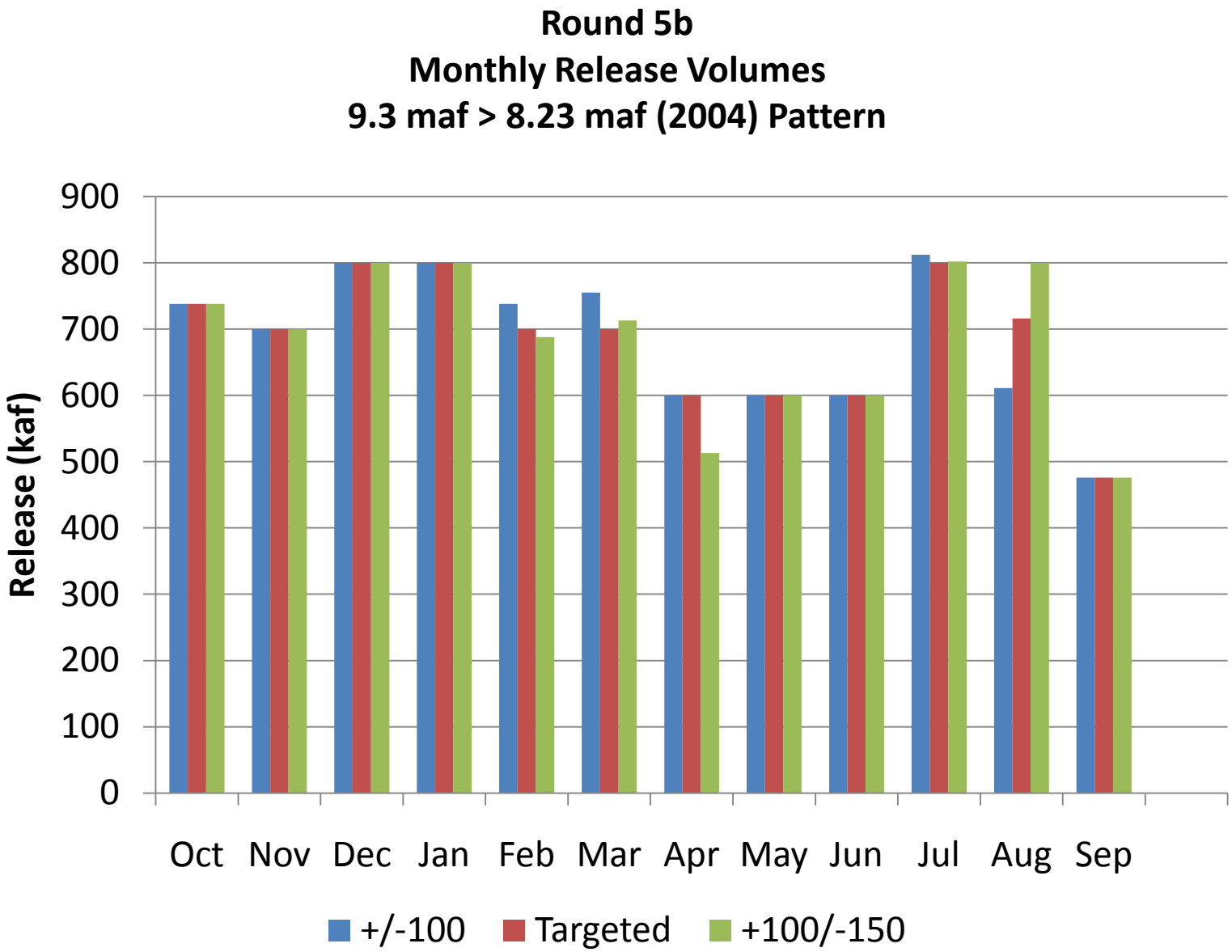


	Nov 1	Cost
+/-100	650 ktons	$0.64m
Targeted	624 ktons	$0.41m
+100/-150	598 ktons	$0.01 m
MLFF	526 ktons	Reference

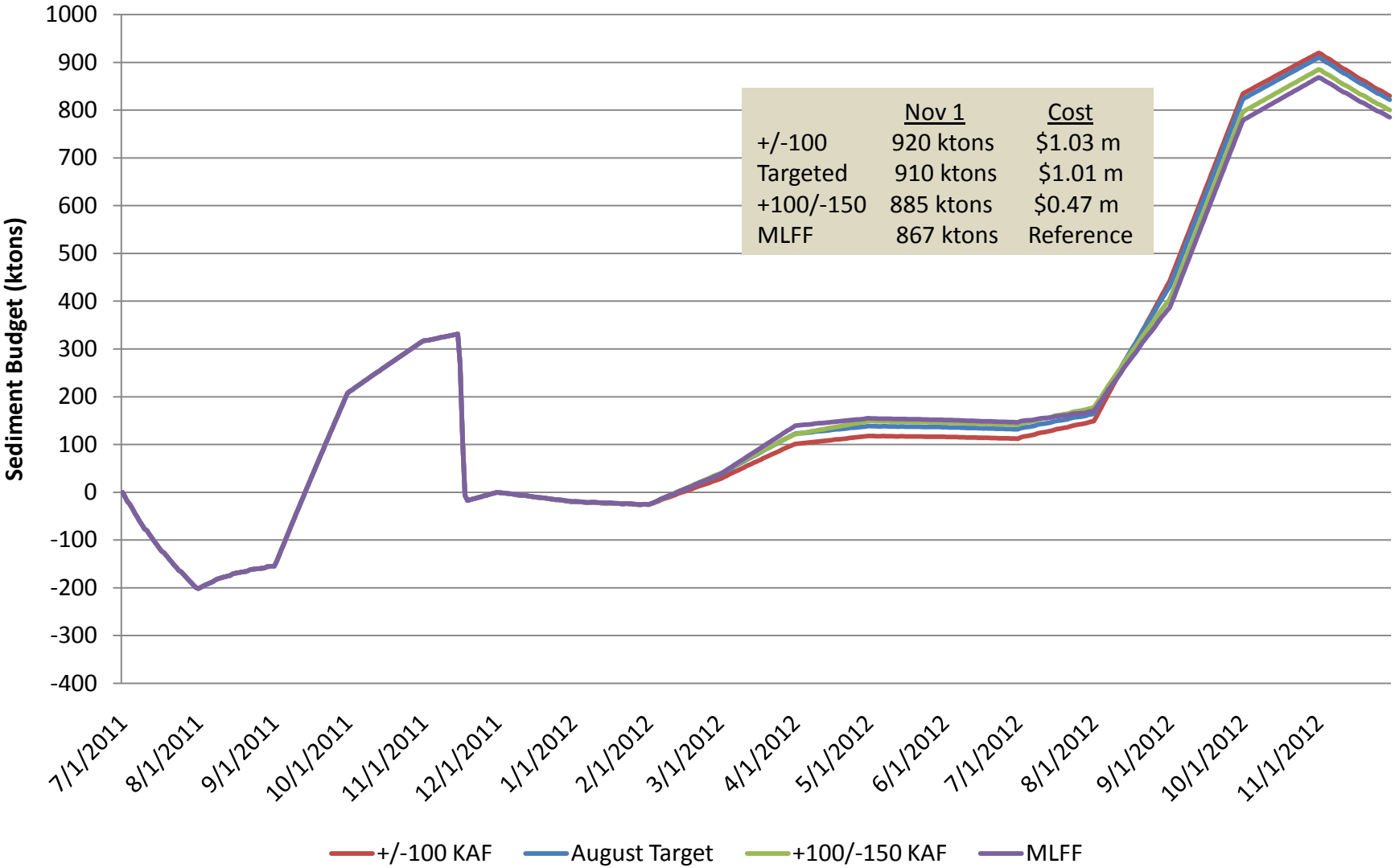
Round 5a
Lower Marble Canyon (RM61)
9.3 maf



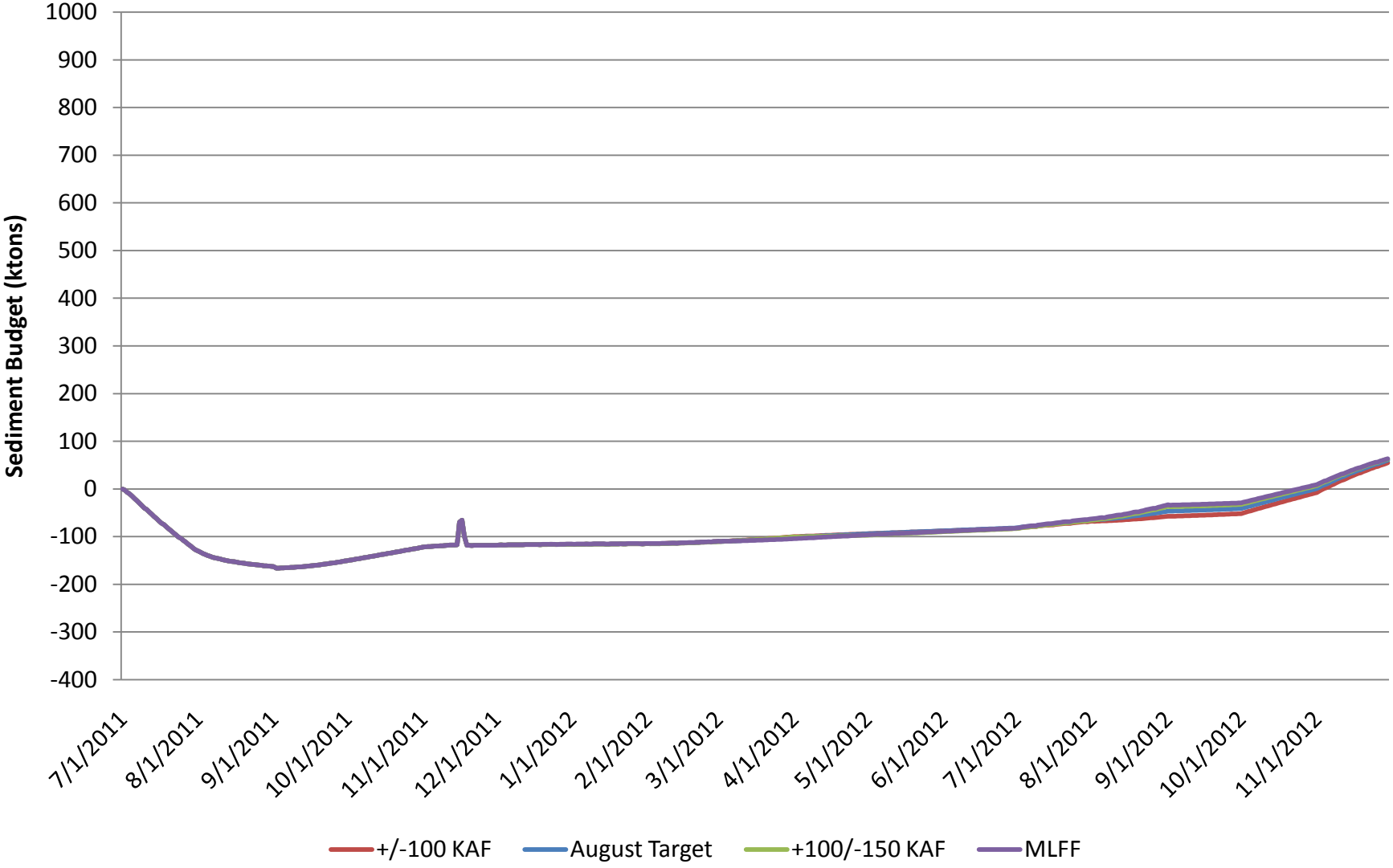

Round 5b
Monthly Forecast Changes
9.3 maf > 8.23 maf Release Pattern (2004)
Release Forecast (maf)
10.00
9.50
9.00
8.50
8.00
7.50
7.00
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep

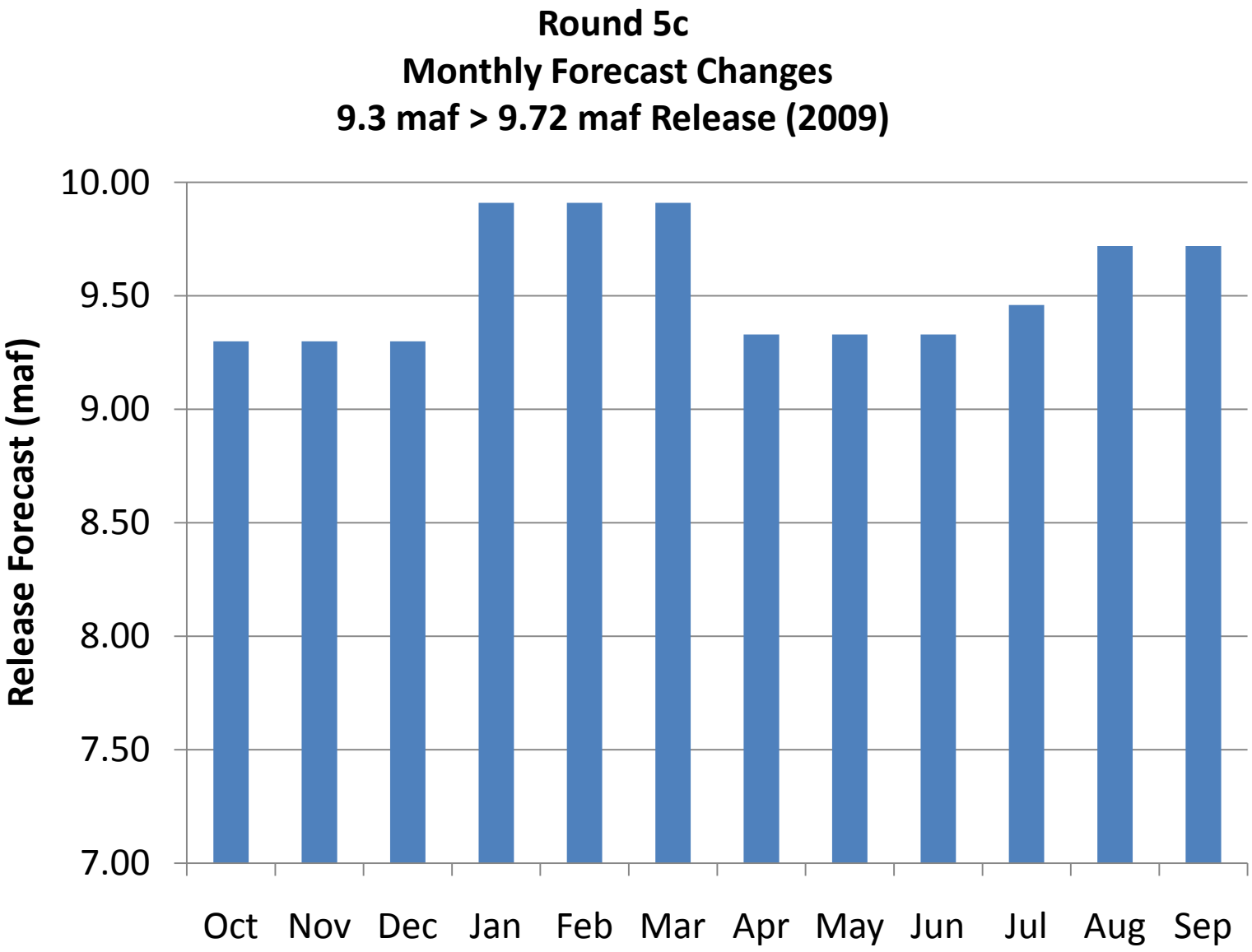

Round 5b
Monthly Release Volumes
9.3 maf > 8.23 maf (2004) Pattern
Release (kaf)
900
800
700
600
500
400
300
200
100
0
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
+/-100
Targeted
+100/-150

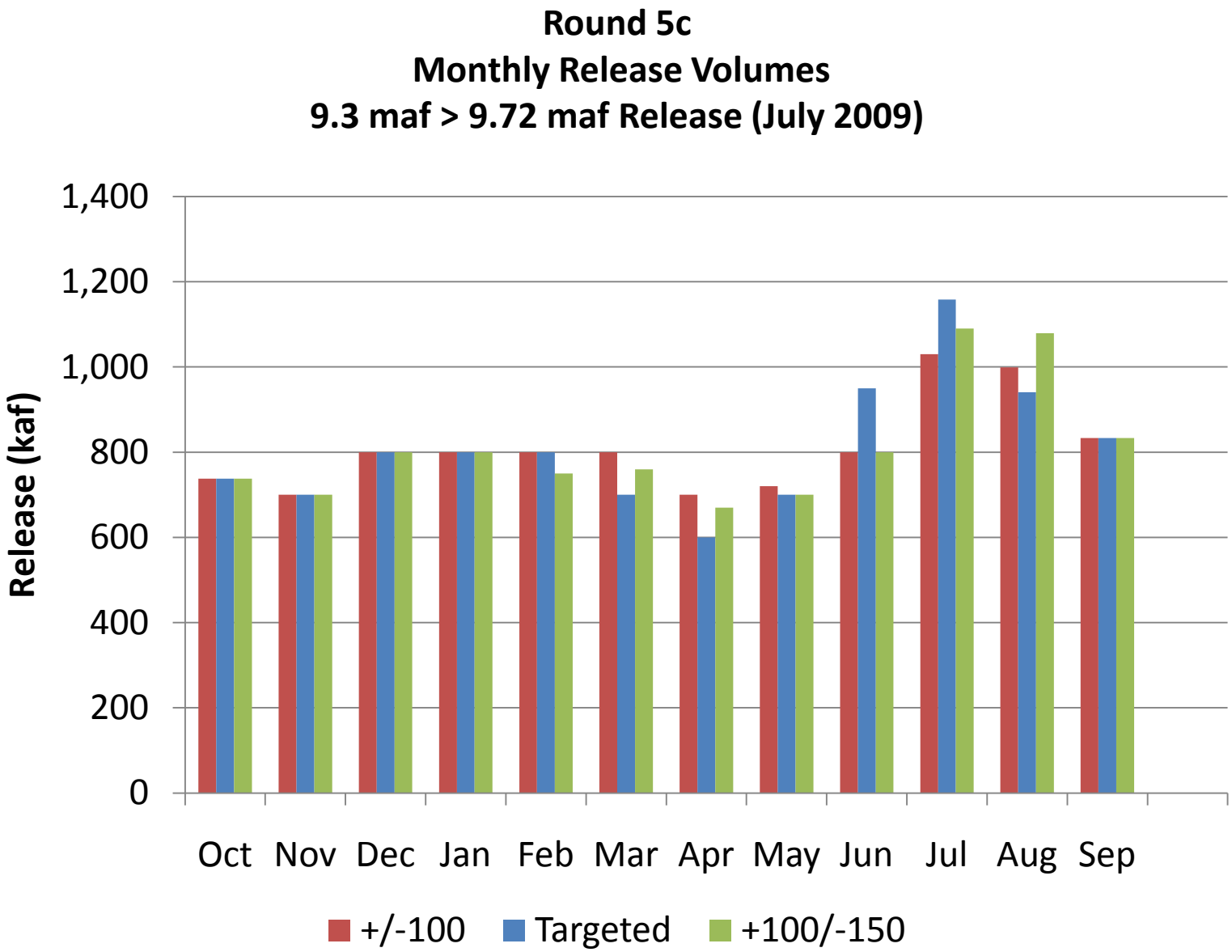
Round 5b
Upper Marble Canyon (RM30)
9.3 maf > 8.23 maf



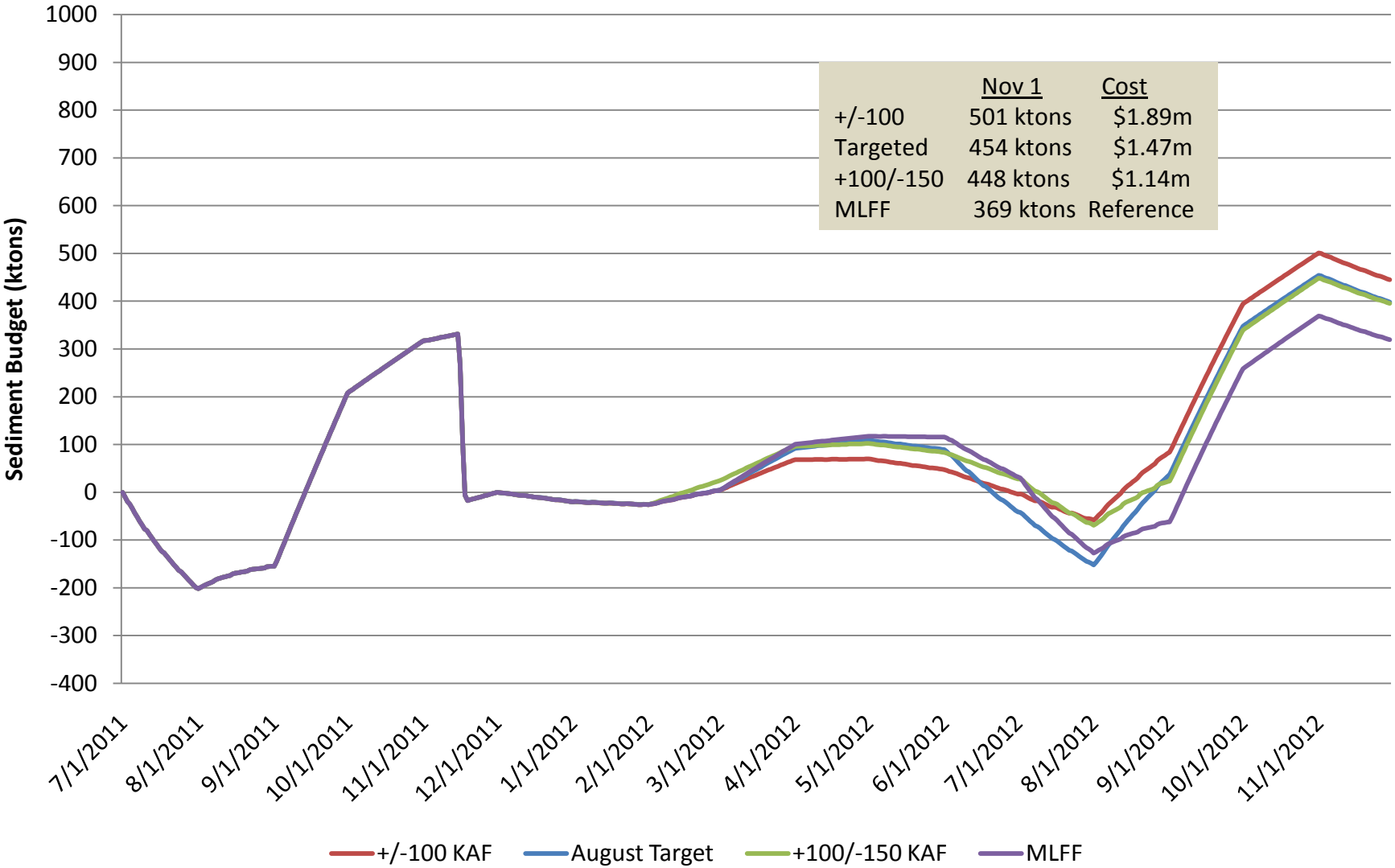
Round 5b
Lower Marble Canyon (RM61)
9.3 maf > 8.23 maf




Round 5c
Monthly Forecast Changes
9.3 maf > 9.72 maf Release (2009)
Release Forecast (maf)
10.00
9.50
9.00
8.50
8.00
7.50
7.00
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep

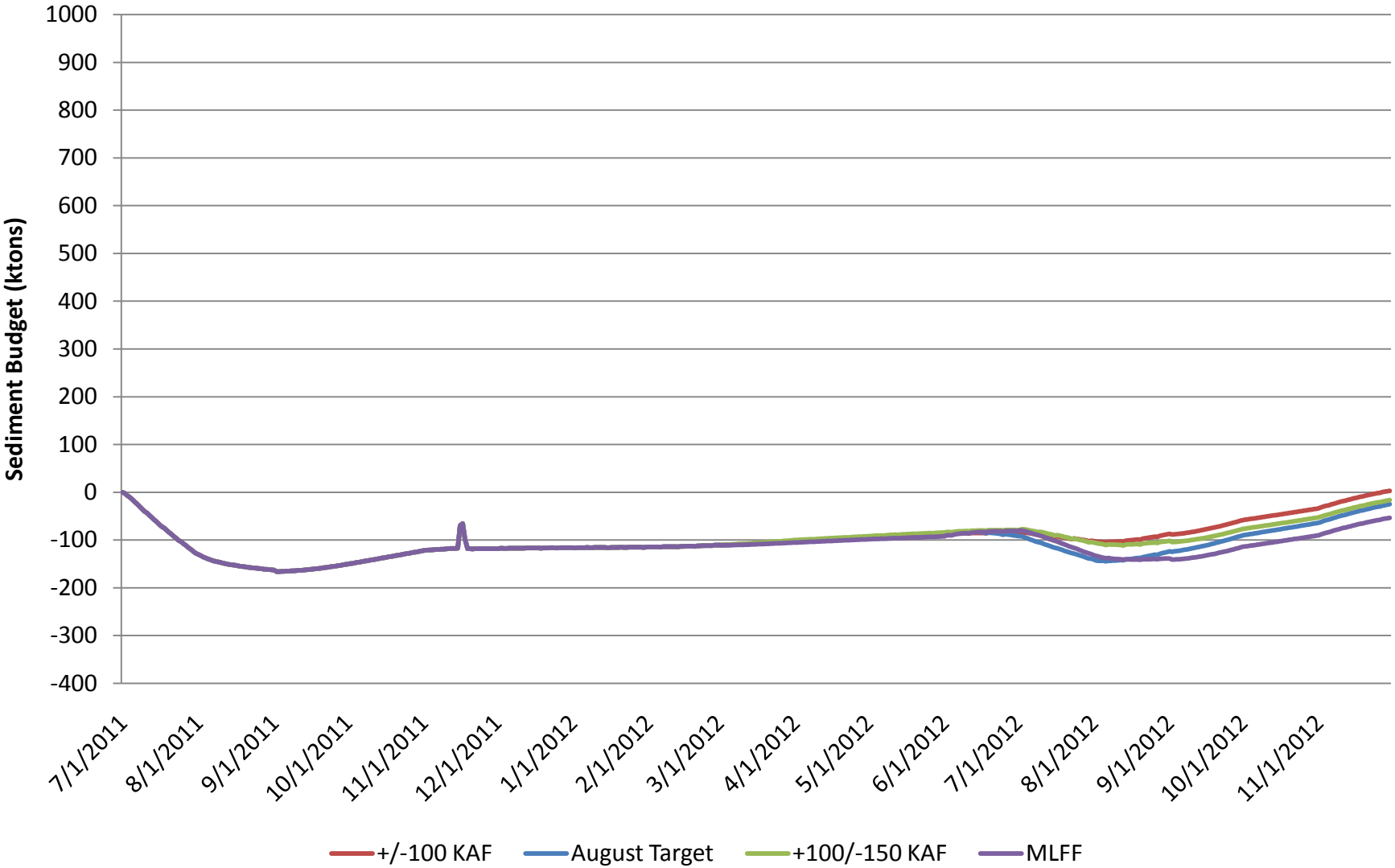

Round 5c
Monthly Release Volumes
9.3 maf > 9.72 maf Release (July 2009)
Release (kaf)
1,400
1,200
1,000
800
600
400
200
0
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
+/-100
Targeted
+100/-150

Round 5c
Upper Marble Canyon (RM30)
9.3 maf > 9.7 maf



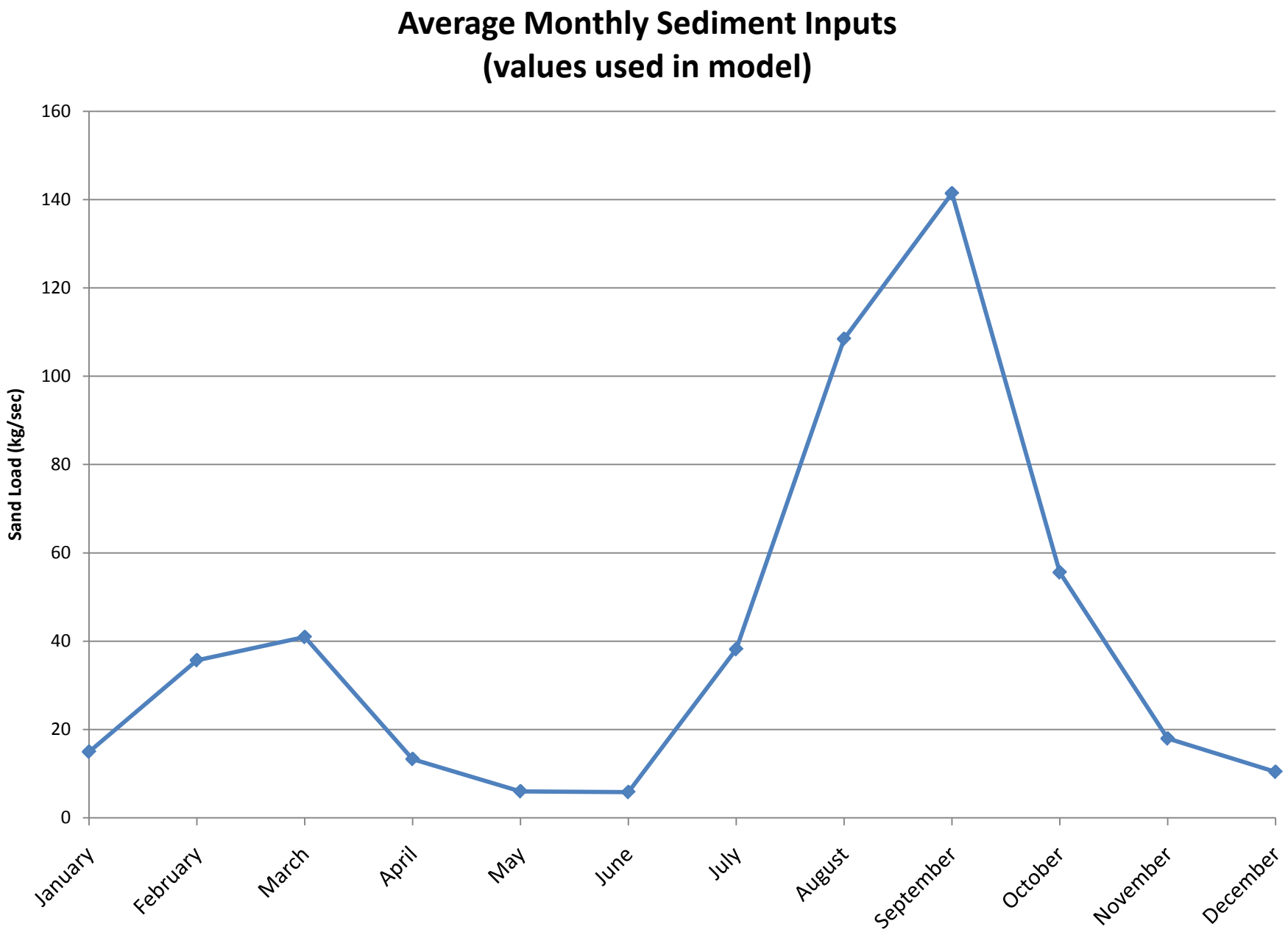
	Nov 1	Cost
+/-100	501 ktons	$1.89m
Targeted	454 ktons	$1.47m
+100/-150	448 ktons	$1.14m
MLFF	369 ktons	Reference

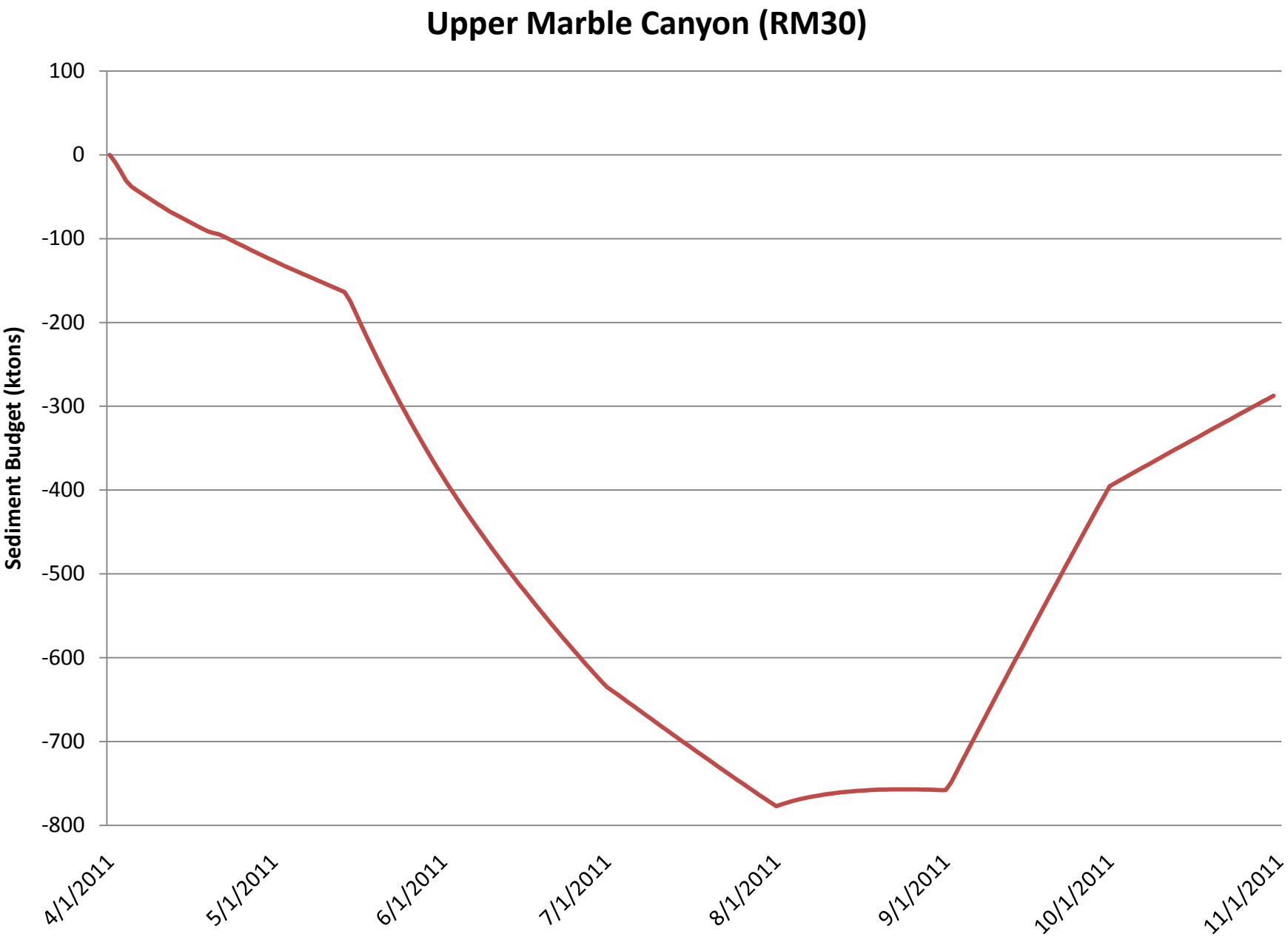
Round 5c
Lower Marble Canyon (RM61)
9.3 maf > 9.7 maf



Hydrology Update

- Rounds 1-5 assumed 11.2 maf release for WY11.
- May 24 Month Study update has 12.5 maf released in WY11 plus 850 kaf equalization in fall.
- Equalization releases continuing thru November.
- This will have a significant effect on potential Nov 2011 HFE assumption.
- This may impact HFE's in WY12 (starting low).


Average Monthly Sediment Inputs
(values used in model)
Sand Load (kg/sec)
160
140
120
100
80
60
40
20
0
January
February
March
April
May
June
July
August
September
October
November
December


Upper Marble Canyon (RM30)
Sediment Budget (ktons)
100
0
-100
-200
-300
-400
-500
-600
-700
-800
4/1/2011
5/1/2011
6/1/2011
7/1/2011
8/1/2011
9/1/2011
10/1/2011
11/1/2011