Description of Modeling Runs:

Name: 2010_10OCT_08_BumpingShaped_Integrated Plan

Description: A comparison of model results between Future without Integrated Plan (FWIP) and Integrated Plan. This Integrated Plan run applies shaped flow releases at Bumping with a starting date of May 1 during drought years and years Bumping Lake is refilling. The Integrated Plan implements all projects with the following instream flow targets:

Reach	ISF Targets for Integrated Plan Model Run
Tieton River (below Tieton Dam)	125 cfs all year
Bumping River (below Bumping Dam)	During drought years and refilling years: 365 cfs May 1-15 600 cfs May 16-July 15 365 cfs July 16-31 130 cfs August 1-April 30 Other years when reservoir is full: Match existing flow regime as close as possible
Lower Naches River (at Naches)	550 cfs summer flow July 1-September 30
Yakima River – Keechelus to Lake Easton	Pulse with 500 cfs peak near end of April during drought (up to 4000 AF) 500 cfs maximum July 1-31 Ramp from 500 cfs to 120 cfs August 1-31
Yakima River – Easton Reach	Pulse with 1000 cfs peak near end of April during drought (up to 7500 AF) 220 cfs spawning flow October 1-31 250 cfs winter flow November 1-April 30
Cle Elum River	Pulse with 1000 cfs peak near end of April (up to 7000 AF) Try to reduce summer flow by 1000 cfs starting July 1 (minimum 300 cfs) 300 cfs minimum November 1-April 30
Yakima River – Ellensburg Reach	Try to reduce summer flow by 1000 cfs starting July 1 (minimum 1000 cfs)

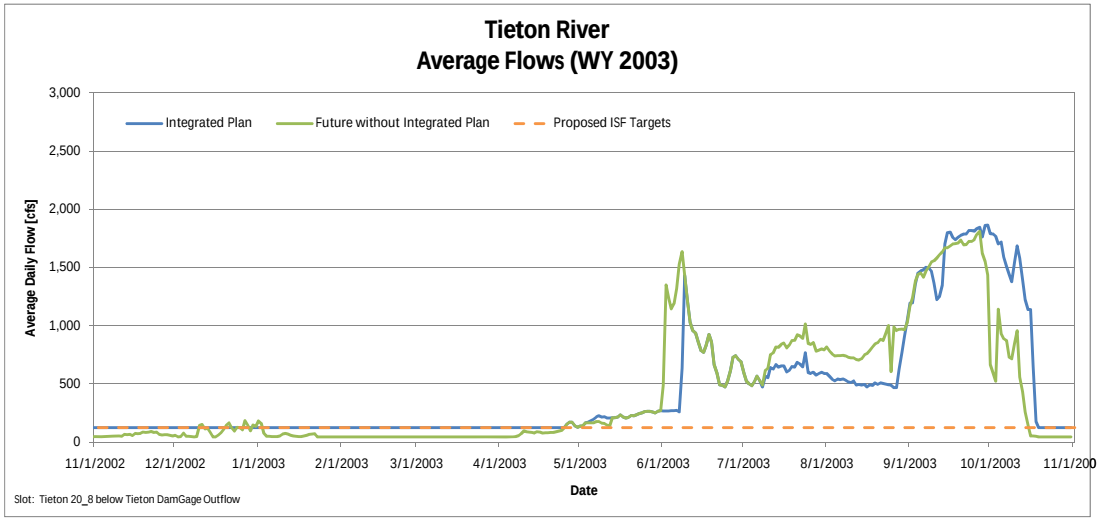
Resource indicator (measurement)	Integrated Plan	Future without Integrated Plan
WATER RESOURCES		
Average for water years 1981–2005 (maf)		
Water supply		
April 1 total water supply available (TWSA)	3.02	2.83
Water distribution		
April–September Parker flow volume	0.59	0.59
April–September diversion	1.64	1.63
September 30 reservoir contents	0.58	0.29
April–September flow volume at mouth of Yakima River	1.00	0.83
1994 dry-year (maf)		
Water supply		
April 1 TWSA	2.18	1.75
Water distribution		
April–September Parker flow volume	0.22	0.26
April–September diversion	1.48	1.28
September 30 reservoir contents	-0.02	0.04
April–September flow volume at mouth of Yakima River	0.45	0.33
Irrigation proration level	70%	35%

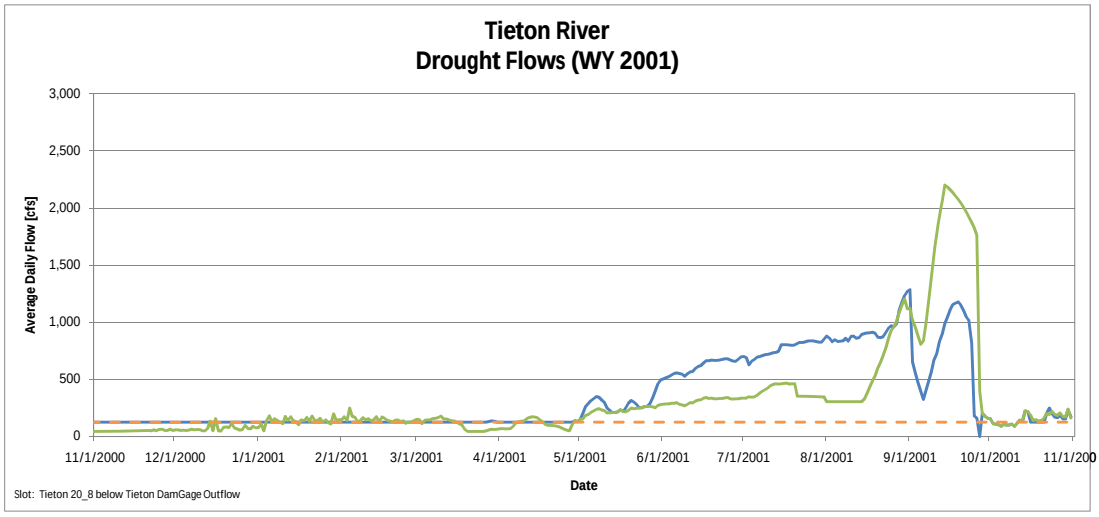
Resource indicator (measurement)	Integrated Plan	Future without Integrated Plan
ANADROMOUS FISH		
Rate of change in flow during flip-flop (average cfs/day August 16–September 14)		
Easton reach	-3	-13
Ellensburg reach	-53	-85
Lower Naches River reach	20	35
Pre- (August 1-15) and post- (September 14-28) flip-flop flow and absolute change in flow		
Easton reach		
Pre-flip-flop flow (cfs)	474	651
Post-flip-flop flow (cfs)	400	287
Absolute change in flow (cfs)	-75	-363
Ellensburg reach		
Pre-flip-flop flow (cfs)	3,188	3,824
Post-flip-flop flow (cfs)	1,647	1,368
Absolute change in flow (cfs)	-1,542	-2,456
Lower Naches River reach		
Pre-flip-flop flow (cfs)	841	771
Post-flip-flop flow (cfs)	1,426	1,772
Absolute change in flow (cfs)	585	1,002

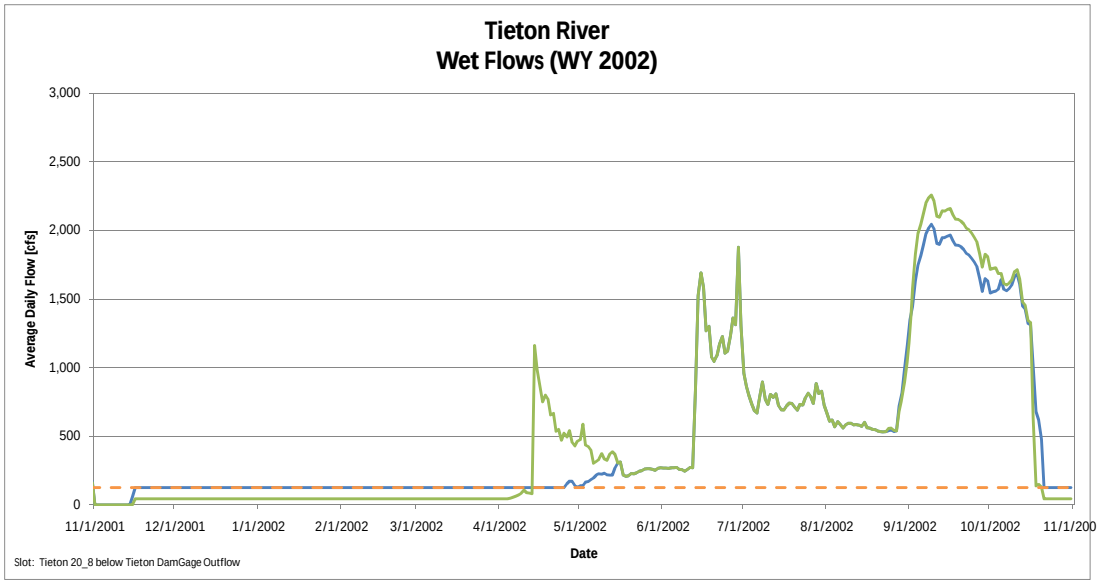
Average, minimum, and maximum reservoir elevation (feet) during bull trout spawning migration: July 15–September 15 (feet)		
Kachess Lake	2240.7 2175.69-2261.96	2240.66 2195.95-2261.96
Keechelus Lake	2479.05 2436.37-2516.96	2467.82 2432.03-2516.88
Rimrock Lake	2909.89 2800.7-2926	2909.19 2828.75-2926

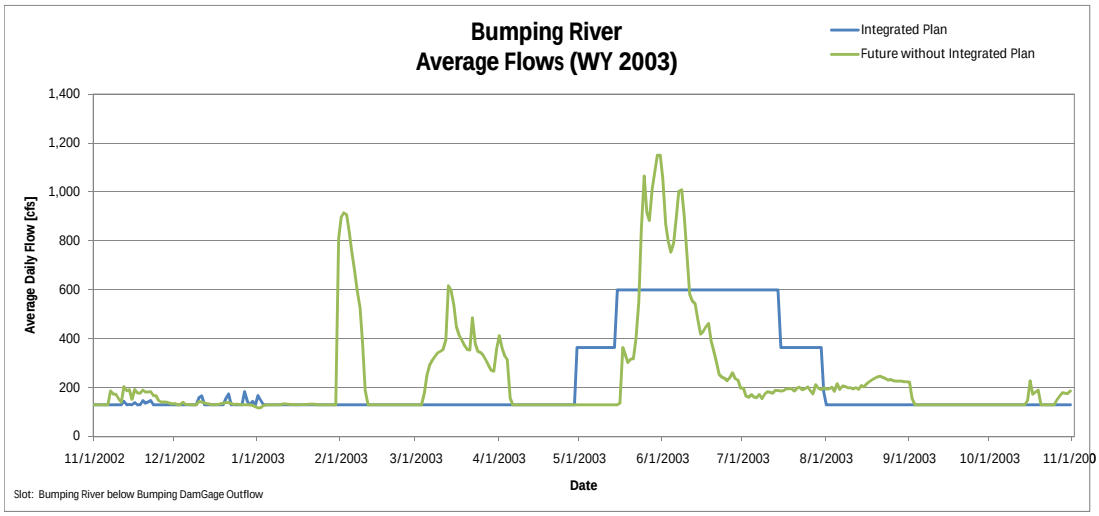
Hydrologic Indicator	Integrated Plan					Future without Integrated Plan				
	Average 1981-2005	Drought Year 1994	Drought Year 2001	Drought Year 2005	Wet Year 1997	Average 1981-2005	Drought Year 1994	Drought Year 2001	Drought Year 2005	Wet Year 1997
April 1 TWSA (maf)						2.83				
April-September flow volume at Parker gage (kaf)	3.02 594	2.18 224	183	2.31 160	4.74 1909	591	1.75 256	1.85 192	1.80 195	4.55 1898
March-October flow volume at Parker gage (kaf)	899	381	2.45 324	286	2630	893	397	315	298	2589
April-September diversion volume upstream of Parker gage (maf)	1.64	1.48	1.54	1.52	1.68	1.63	1.28	1.40	1.38	1.71
September 30 non-Bumping or Wymer reservoir contents (kaf)	393	-31	218	124	740	274	35	38	39	583
October 31 non-Bumping or Wymer reservoir contents (kaf)	366	-42	209	84	811	265	63	63	49	692
September 30 Bumping and Wymer reservoir contents (kaf)	182	3	15	20	238	14	2	3	3	18
April-September flow volume at mouth of Yakima River (kaf)	996	450	383	399	2381	833	329	241	277	2203
Irrigation proration level (percent)[1]	92%	70%	70%	70%	100%	86%	35%	51%	48%	100%

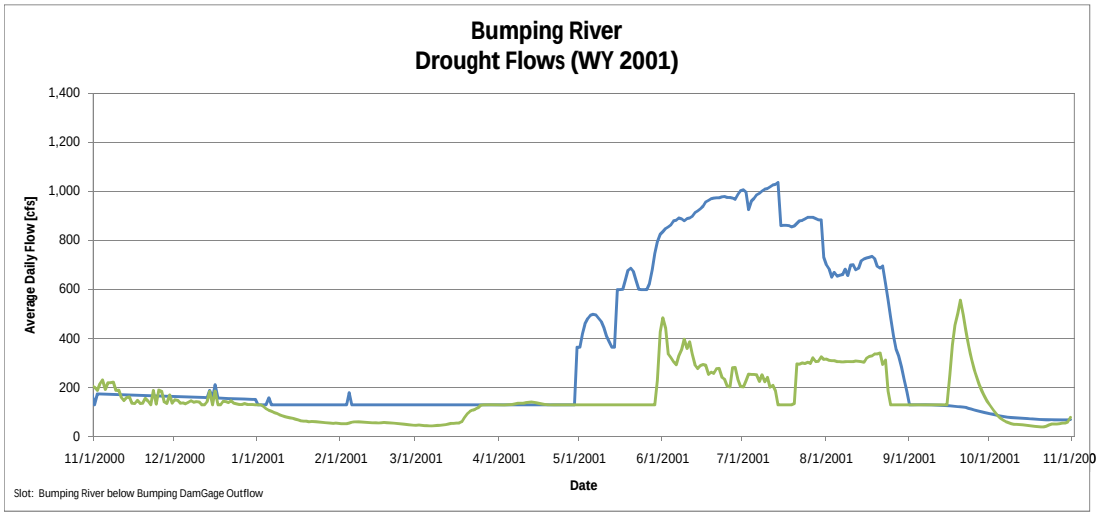
Item	Future without Integrated Plan	Integrated Plan	Improvement
Average 1981-2005			
TWSA [April 1, kaf]	2825.9	3021.0	195.2
March-October flow volume at Parker gage [kaf]	893.0	898.6	5.6
Drought Year 1994			
TWSA [April 1, kaf]	1746.8	2179.3	432.4
March-October flow volume at Parker gage [kaf]	397.5	380.9	-16.6
Drought Year 2001			
TWSA [April 1, kaf]	1848.2	2450.5	602.2
March-October flow volume at Parker gage [kaf]	314.6	323.6	9.0
Drought Year 2005			
TWSA [April 1, kaf]	1803.7	2307.5	503.7
March-October flow volume at Parker gage [kaf]	298.3	286.0	-12.4
Wet Year 1997			
TWSA [April 1, kaf]	4551.9	4735.0	183.1
March-October flow volume at Parker gage [kaf]	2588.9	2629.8	40.8

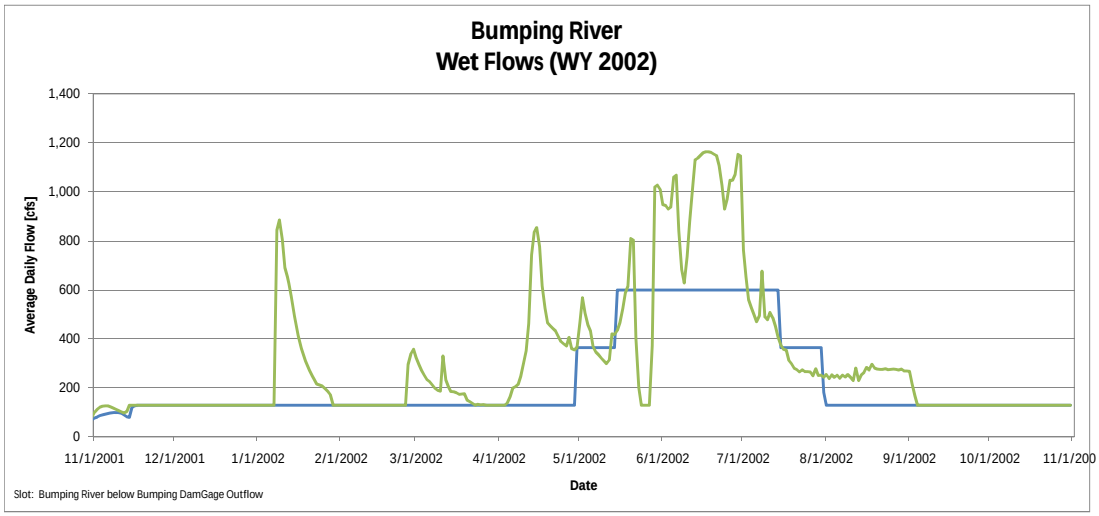

Tieton River
Average Flows (WY 2003)
Integrated Plan
Future without Integrated Plan
Proposed ISF Targets
Average Daily Flow [cfs]
3,000
2,500
2,000
1,500
1,000
500
0
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
10/1/2003
11/1/200
Date
Slot: Tieton 20_8 below Tieton DamGage Outflow

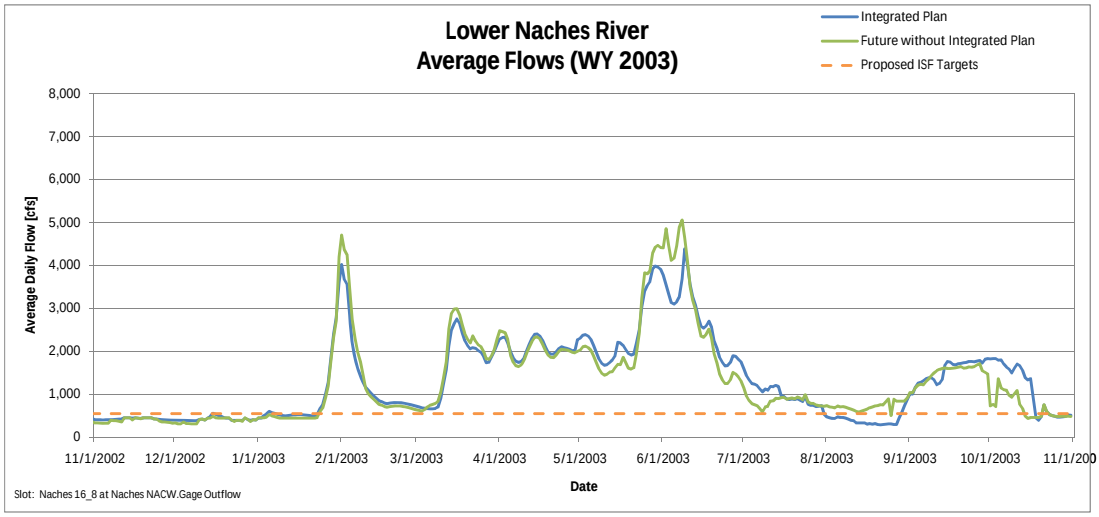

Tieton River
Drought Flows (WY 2001)
Average Daily Flow [cfs]
3,000
2,500
2,000
1,500
1,000
500
0
11/1/2000
12/1/2000
1/1/2001
2/1/2001
3/1/2001
4/1/2001
5/1/2001
6/1/2001
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/200
Date
Slot: Tieton 20_8 below Tieton DamGage Outflow

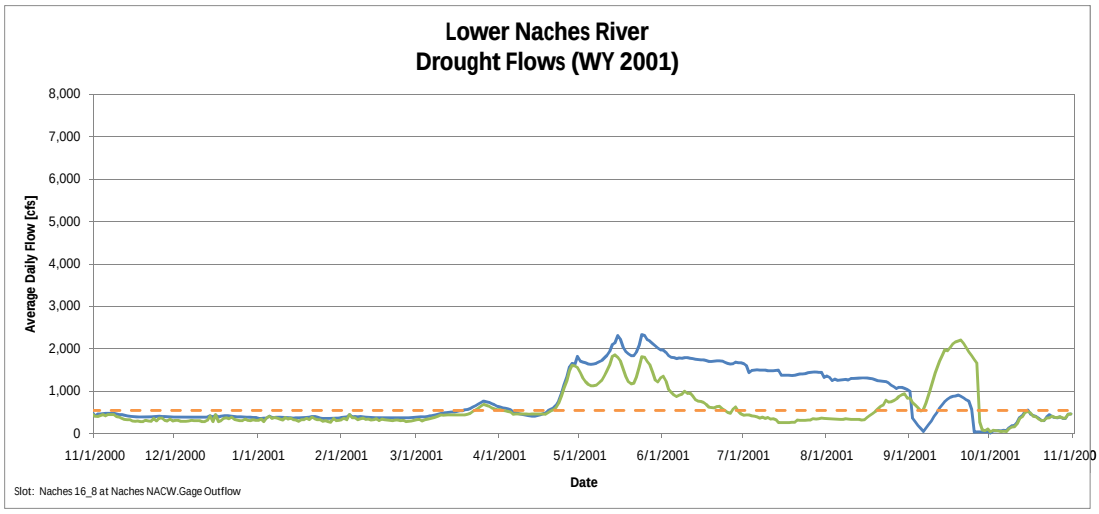

Tieton River
Wet Flows (WY 2002)
Average Daily Flow [cfs]
3,000
2,500
2,000
1,500
1,000
500
0
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/200
Date
Slot: Tieton 20_8 below Tieton DamGage Outflow

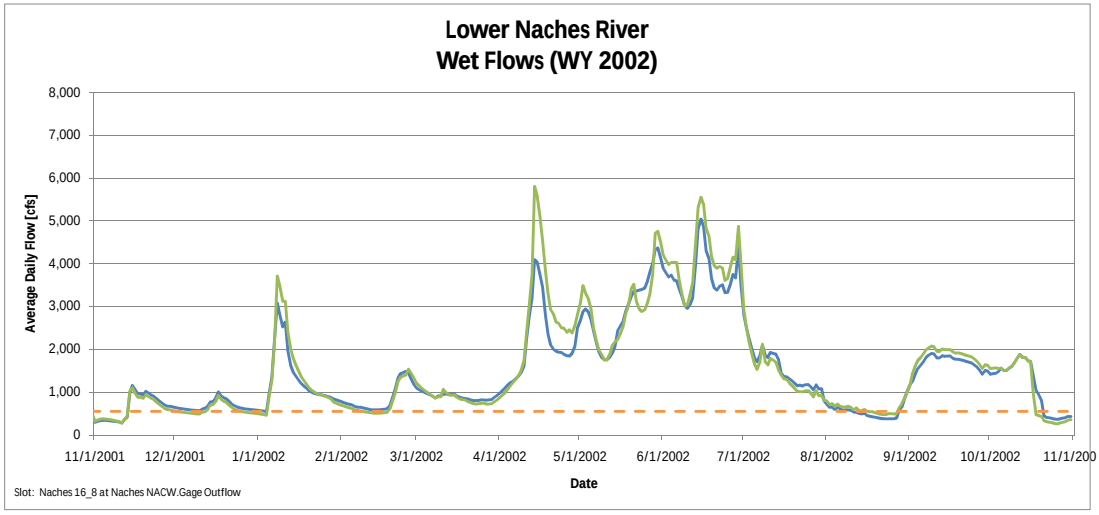

Bumping River
Average Flows (WY 2003)
Integrated Plan
Future without Integrated Plan
Average Daily Flow [cfs]
1,400
1,200
1,000
800
600
400
200
0
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
10/1/2003
11/1/200
Date
Slot: Bumping River below Bumping DamGage Outflow

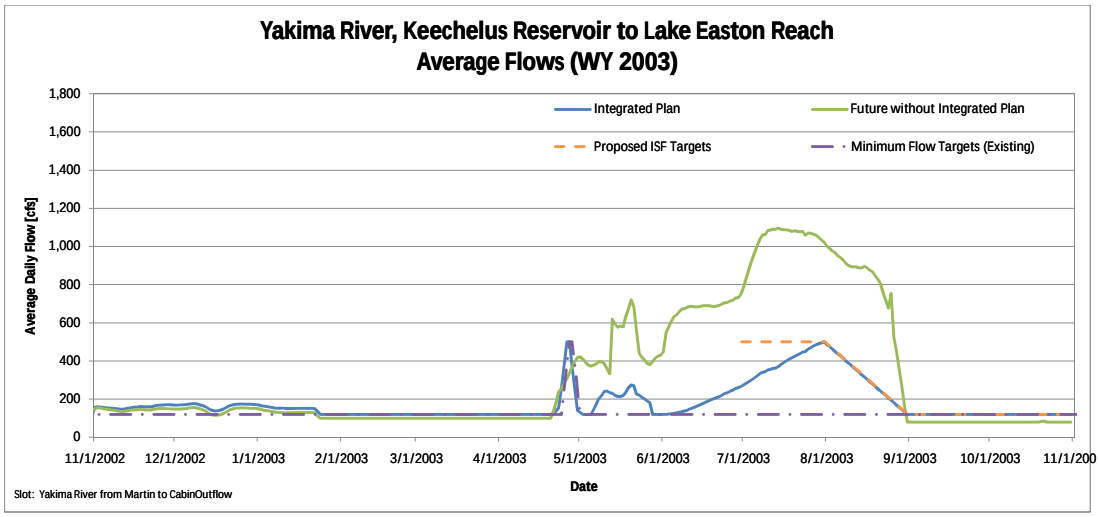

Bumping River
Drought Flows (WY 2001)
Average Daily Flow [cfs]
1,400
1,200
1,000
800
600
400
200
0
11/1/2000
12/1/2000
1/1/2001
2/1/2001
3/1/2001
4/1/2001
5/1/2001
6/1/2001
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/200
Date
Slot: Bumping River below Bumping DamGage Outflow

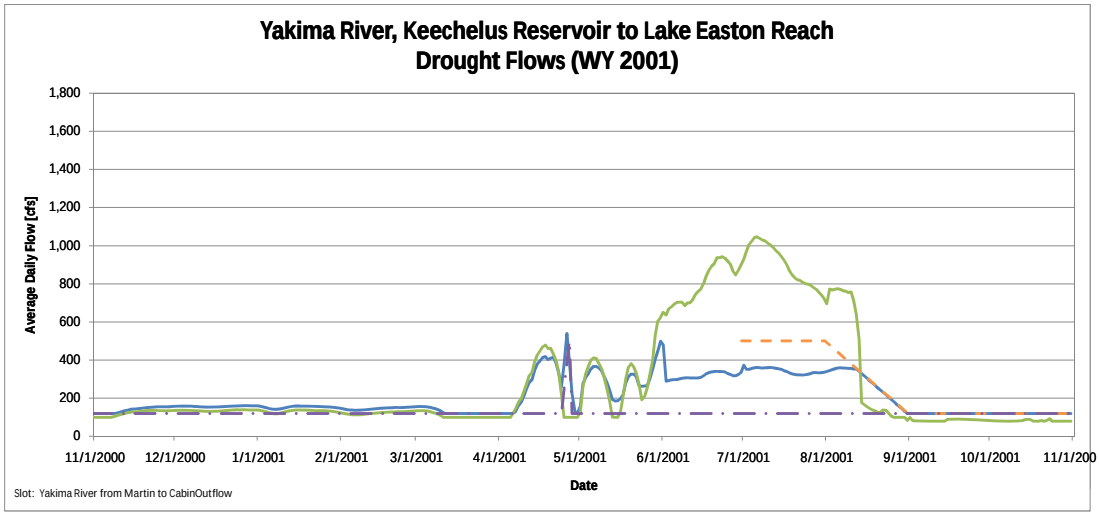

Bumping River
Wet Flows (WY 2002)
Average Daily Flow [cfs]
1,400
1,200
1,000
800
600
400
200
0
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/200
Date
Slot: Bumping River below Bumping DamGage Outflow

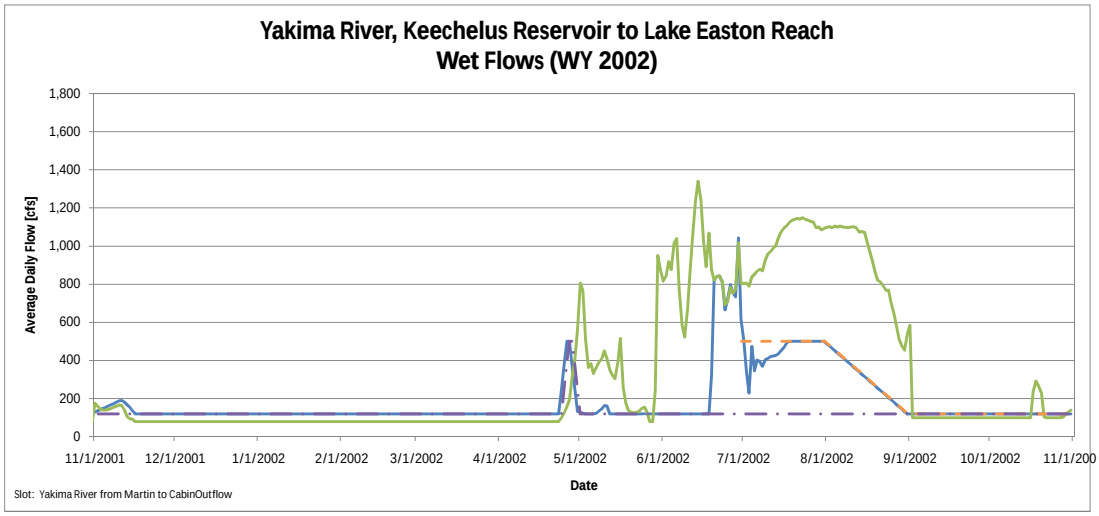

Lower Naches River
Average Flows (WY 2003)
Integrated Plan
Future without Integrated Plan
Proposed ISF Targets
Average Daily Flow [cfs]
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
10/1/2003
11/1/200
Date
Slot: Naches 16_8 at Naches NACW.Gage Outflow

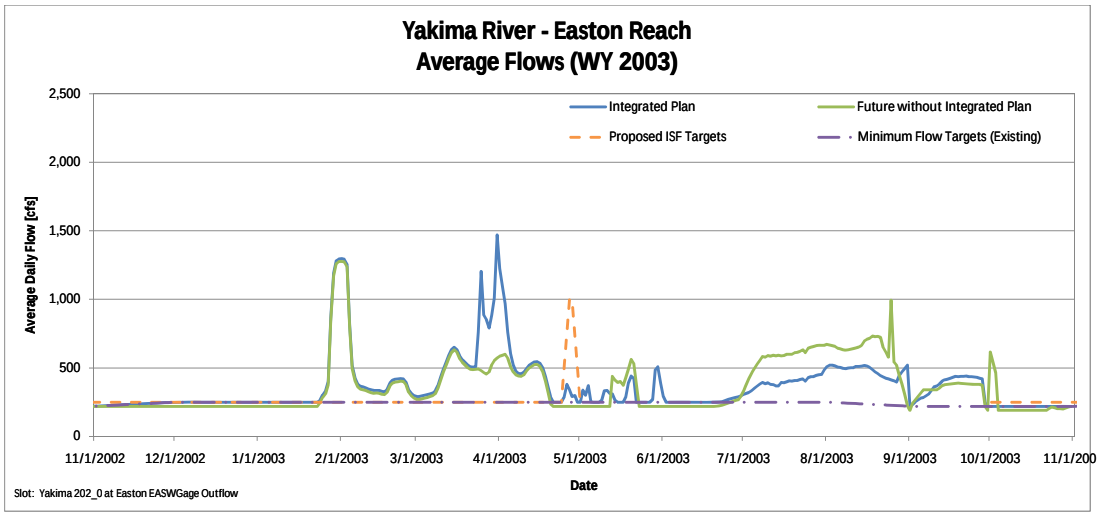

Lower Naches River
Drought Flows (WY 2001)
Average Daily Flow [cfs]
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
11/1/2000
12/1/2000
1/1/2001
2/1/2001
3/1/2001
4/1/2001
5/1/2001
6/1/2001
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/200
Date
Slot: Naches 16_8 at Naches NACW.Gage Outflow

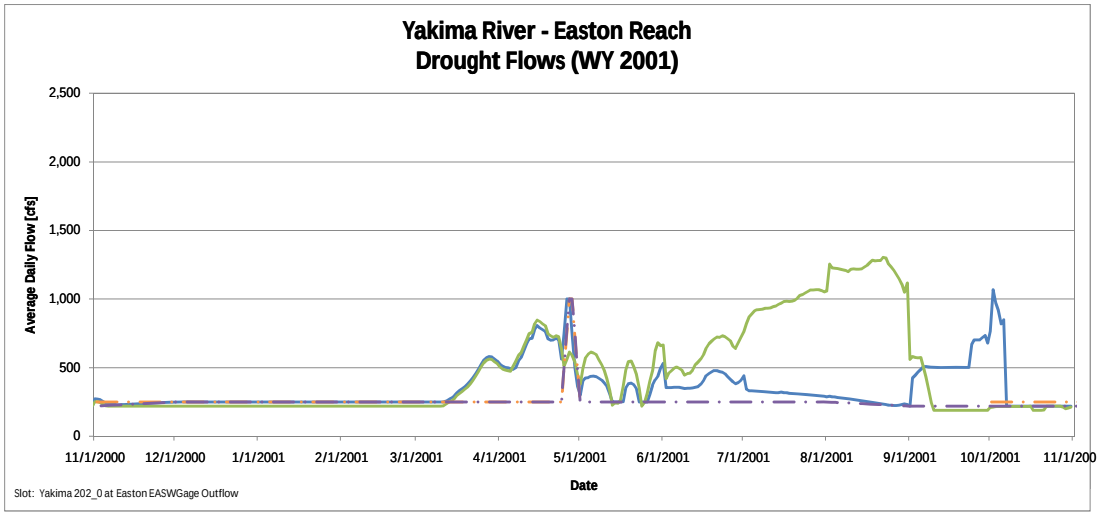

Lower Naches River
Wet Flows (WY 2002)
Average Daily Flow [cfs]
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/200
Date
Slot: Naches 16_8 at Naches NACW.Gage Outflow

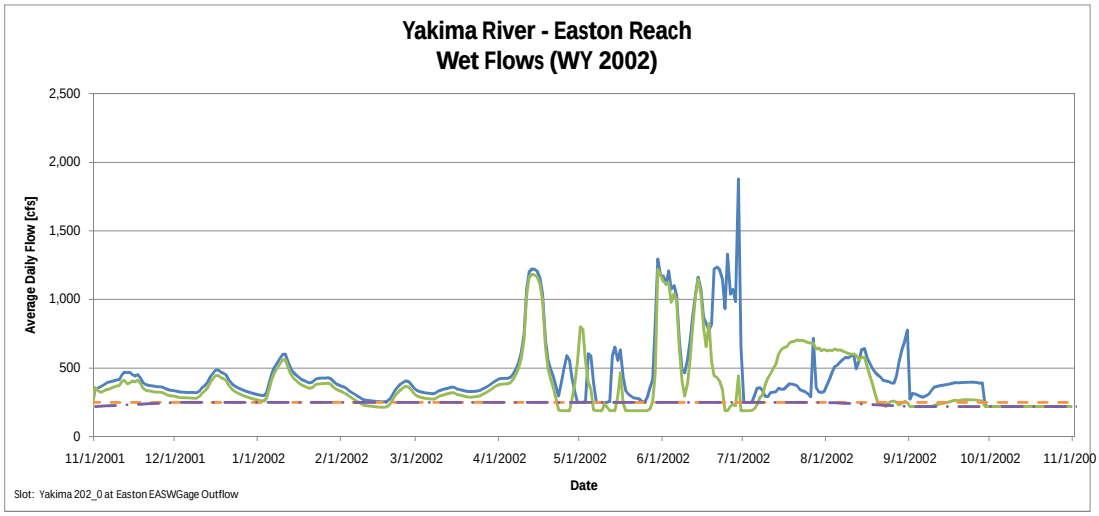

Yakima River, Keechelus Reservoir to Lake Easton Reach
Average Flows (WY 2003)
Integrated Plan
Future without Integrated Plan
Proposed ISF Targets
Minimum Flow Targets (Existing)
Average Daily Flow [cfs]
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
10/1/2003
11/1/200
Date
Slot: Yakima River from Martin to CabinOutflow

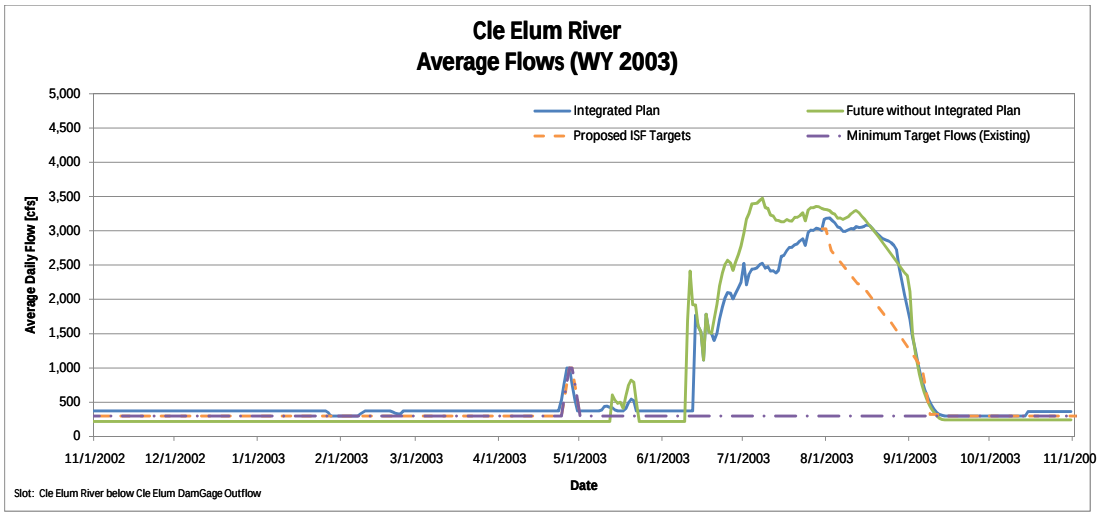

Yakima River, Keechelus Reservoir to Lake Easton Reach
Drought Flows (WY 2001)
Average Daily Flow [cfs]
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
11/1/2000
12/1/2000
1/1/2001
2/1/2001
3/1/2001
4/1/2001
5/1/2001
6/1/2001
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/200
Date
Slot: Yakima River from Martin to CabinOutflow

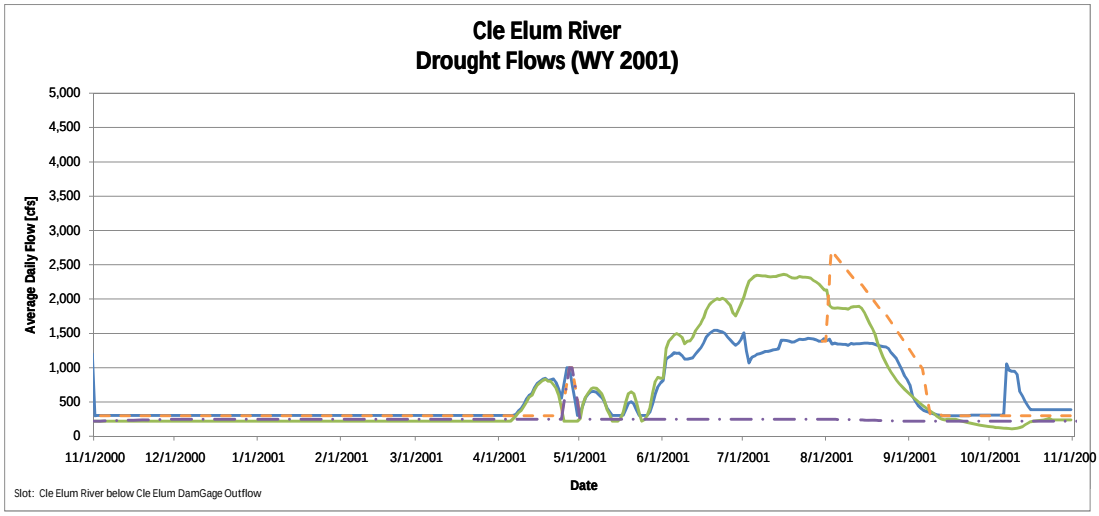

Yakima River, Keechelus Reservoir to Lake Easton Reach
Wet Flows (WY 2002)
Average Daily Flow [cfs]
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/200
Date
Slot: Yakima River from Martin to CabinOutflow

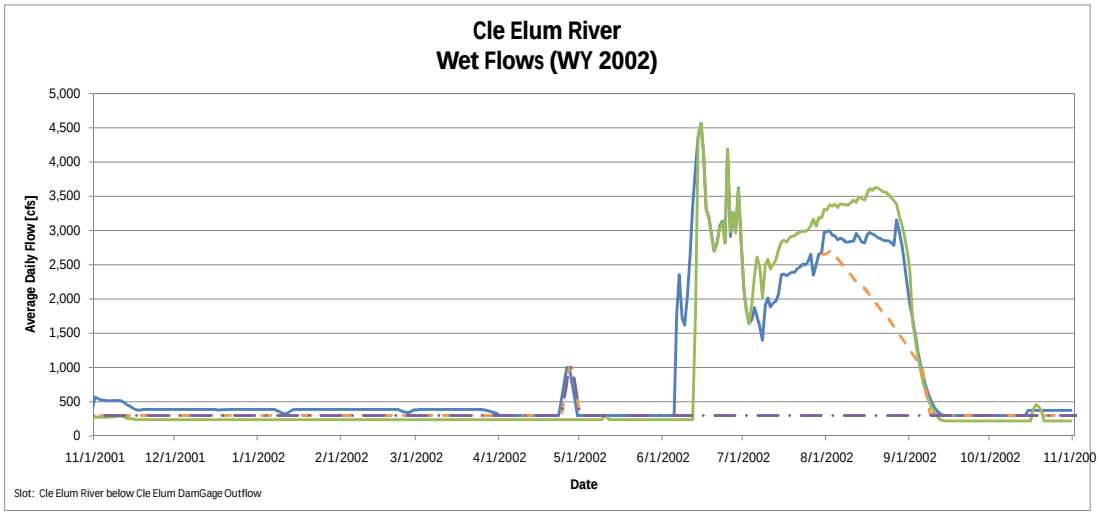

Yakima River - Easton Reach
Average Flows (WY 2003)
Integrated Plan
Future without Integrated Plan
Proposed ISF Targets
Minimum Flow Targets (Existing)
Average Daily Flow [cfs]
2,500
2,000
1,500
1,000
500
0
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
10/1/2003
11/1/200
Date
Slot: Yakima 202_0 at Easton EASWGage Outflow

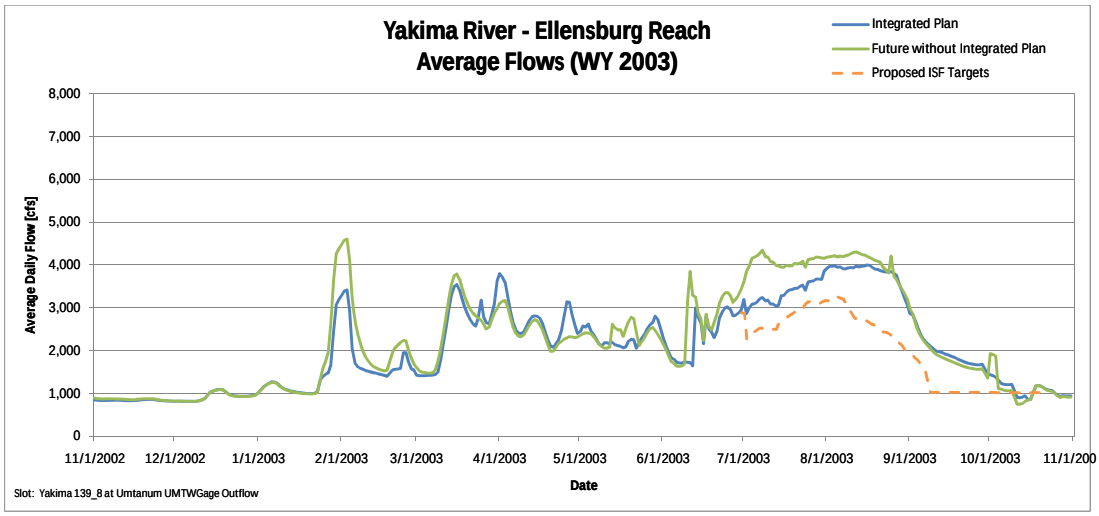

Yakima River - Easton Reach
Drought Flows (WY 2001)
Average Daily Flow [cfs]
2,500
2,000
1,500
1,000
500
0
11/1/2000
12/1/2000
1/1/2001
2/1/2001
3/1/2001
4/1/2001
5/1/2001
6/1/2001
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/200
Date
Slot: Yakima 202_0 at Easton EASWGage Outflow

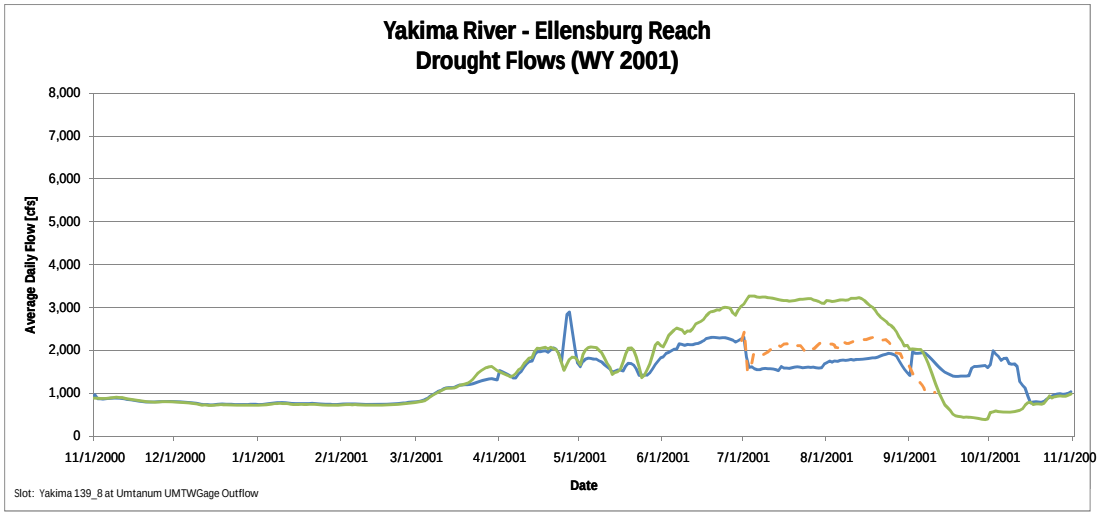

Yakima River - Easton Reach
Wet Flows (WY 2002)
Average Daily Flow [cfs]
2,500
2,000
1,500
1,000
500
0
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/200
Date
Slot: Yakima 202_0 at Easton EASWGage Outflow

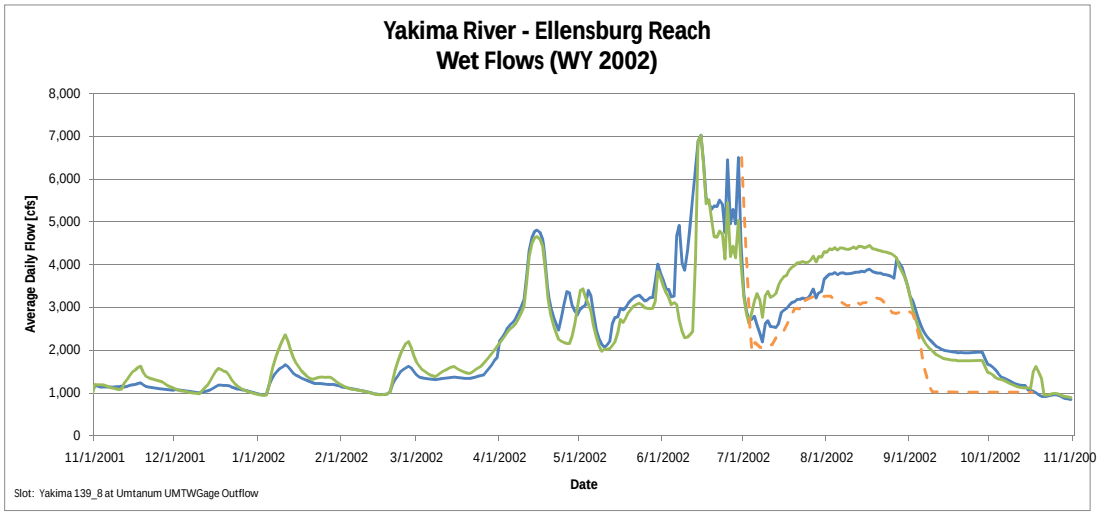

Cle Elum River
Average Flows (WY 2003)
Integrated Plan
Future without Integrated Plan
Proposed ISF Targets
Minimum Target Flows (Existing)
Average Daily Flow [cfs]
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
10/1/2003
11/1/200
Date
Slot: Cle Elum River below Cle Elum DamGage Outflow

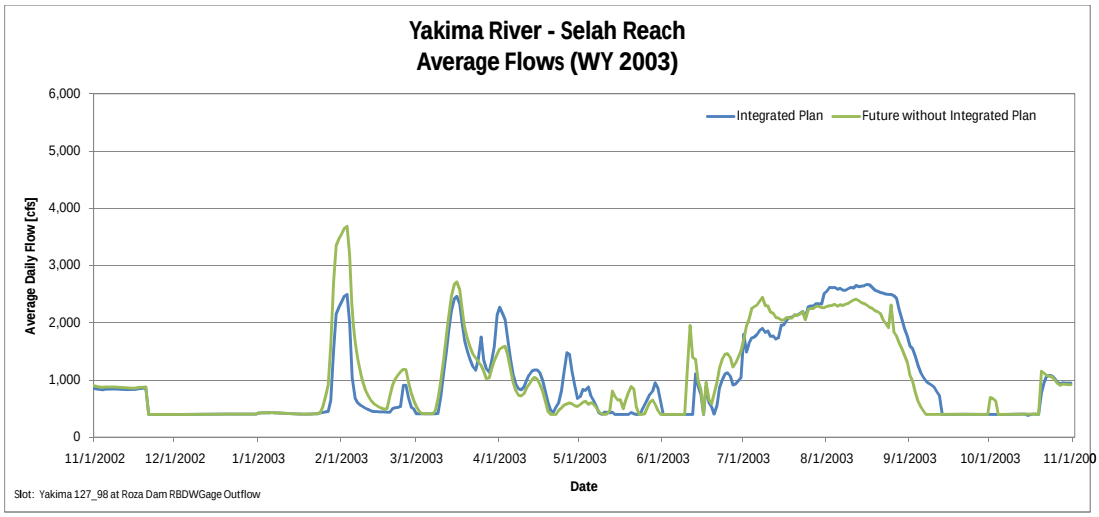

Cle Elum River
Drought Flows (WY 2001)
Average Daily Flow [cfs]
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
11/1/2000
12/1/2000
1/1/2001
2/1/2001
3/1/2001
4/1/2001
5/1/2001
6/1/2001
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/200
Date
Slot: Cle Elum River below Cle Elum DamGage Outflow

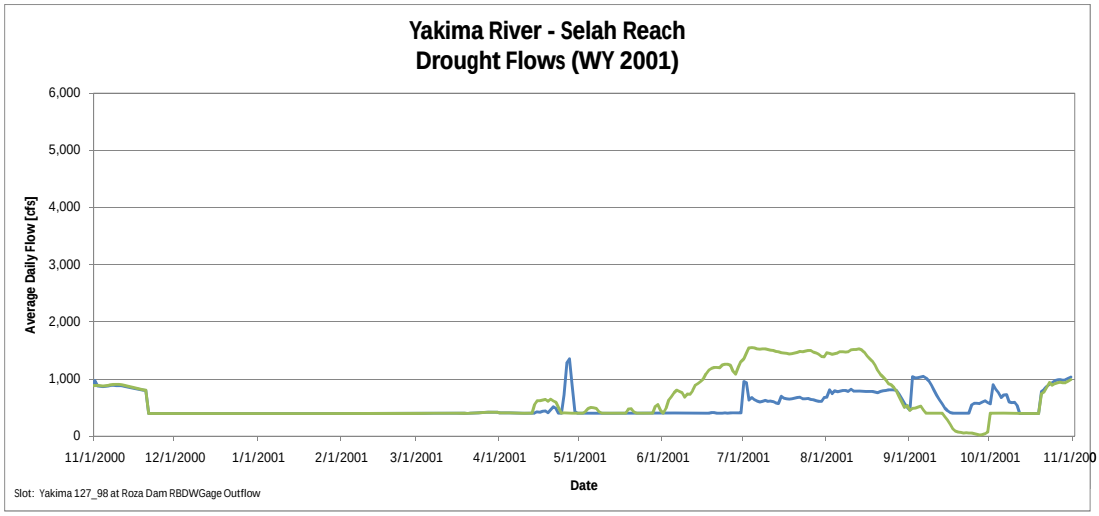

Cle Elum River
Wet Flows (WY 2002)
Average Daily Flow [cfs]
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/200
Date
Slot: Cle Elum River below Cle Elum DamGage Outflow

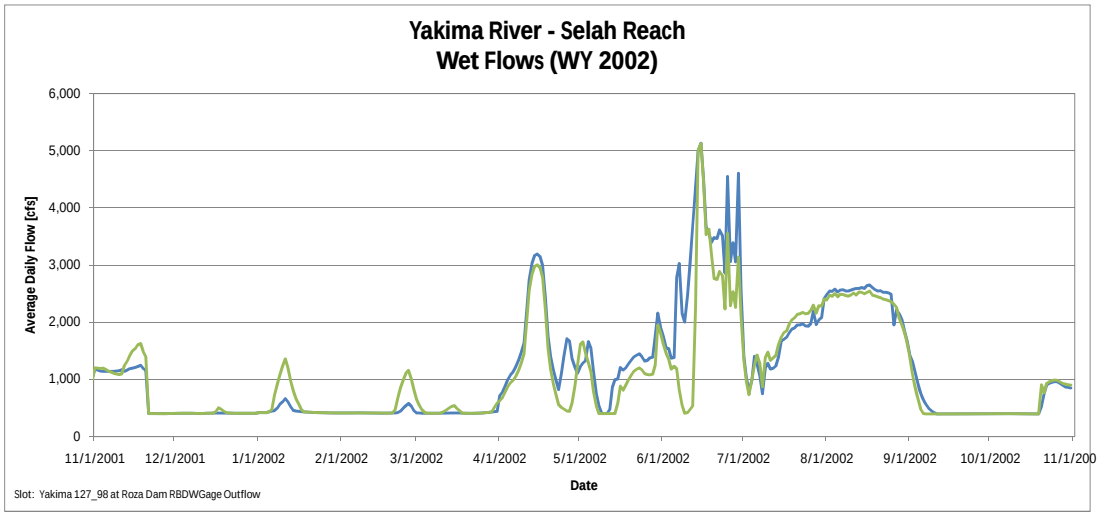

Yakima River - Ellensburg Reach
Average Flows (WY 2003)
Integrated Plan
Future without Integrated Plan
Proposed ISF Targets
Average Daily Flow [cfs]
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
10/1/2003
11/1/200
Date
Slot: Yakima 139_8 at Umtanum UMTWGage Outflow

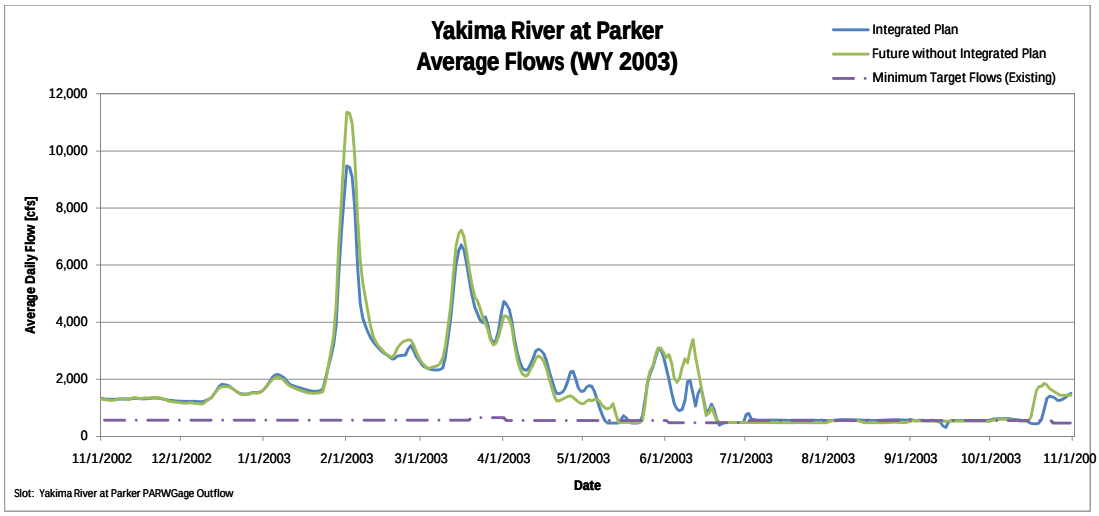

Yakima River - Ellensburg Reach
Drought Flows (WY 2001)
Average Daily Flow [cfs]
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
11/1/2000
12/1/2000
1/1/2001
2/1/2001
3/1/2001
4/1/2001
5/1/2001
6/1/2001
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/200
Date
Slot: Yakima 139_8 at Umtanum UMTWGage Outflow

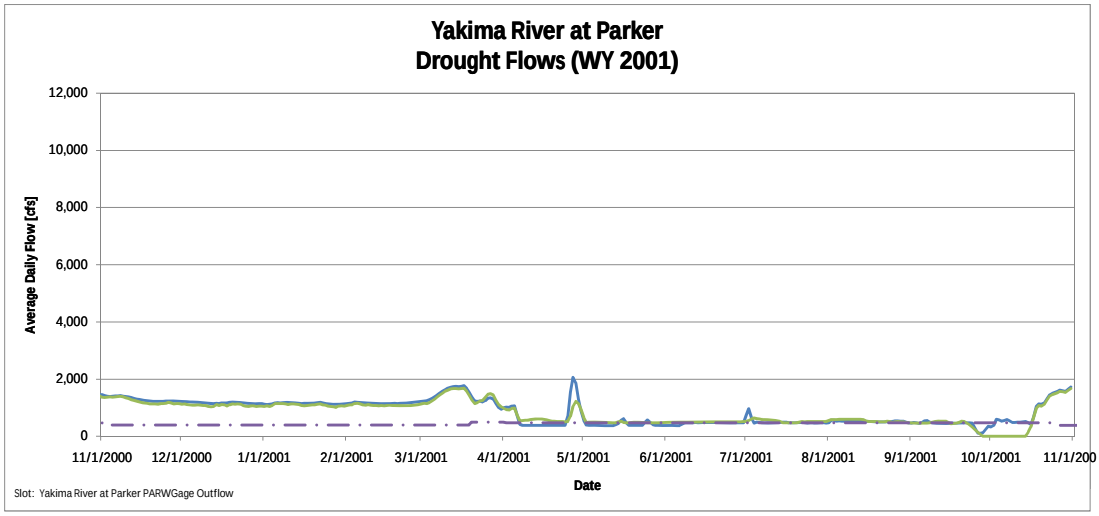

Yakima River - Ellensburg Reach
Wet Flows (WY 2002)
Average Daily Flow [cfs]
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/200
Date
Slot: Yakima 139_8 at Umtanum UMTWGage Outflow

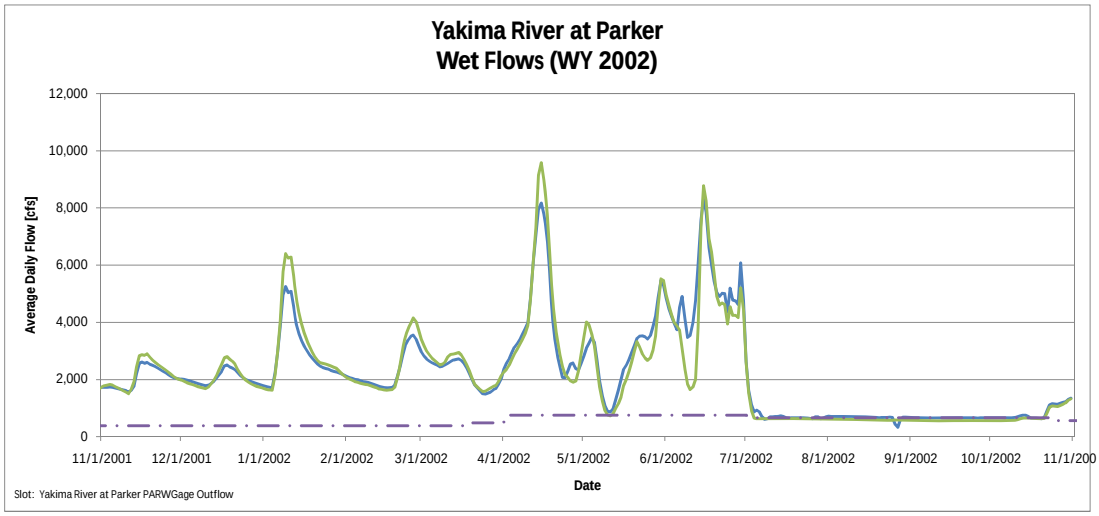

Yakima River - Selah Reach
Average Flows (WY 2003)
Integrated Plan
Future without Integrated Plan
Average Daily Flow [cfs]
6,000
5,000
4,000
3,000
2,000
1,000
0
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
10/1/2003
11/1/200
Date
Slot: Yakima 127_98 at Roza Dam RBDWGage Outflow

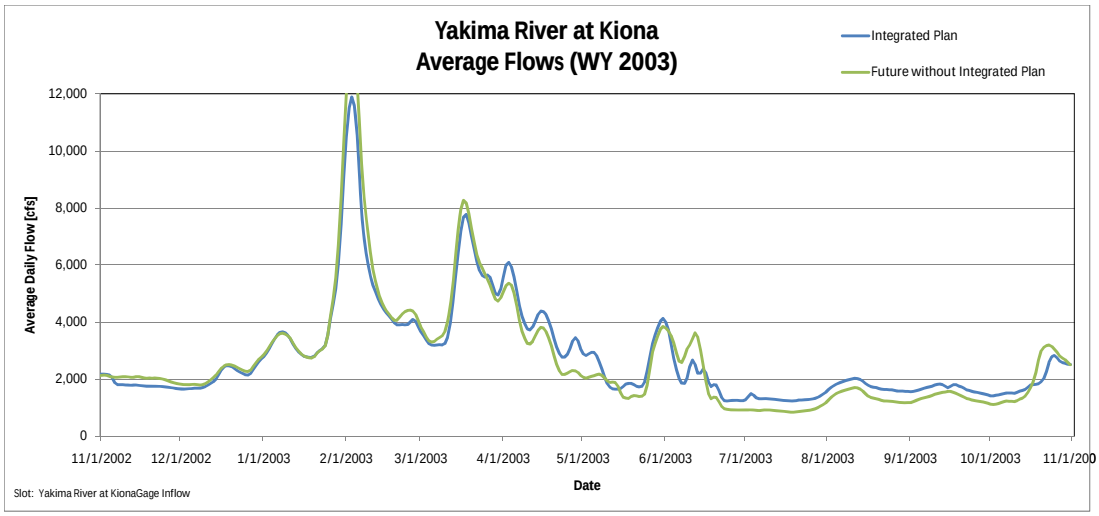

Yakima River - Selah Reach
Drought Flows (WY 2001)
Average Daily Flow [cfs]
6,000
5,000
4,000
3,000
2,000
1,000
0
11/1/2000
12/1/2000
1/1/2001
2/1/2001
3/1/2001
4/1/2001
5/1/2001
6/1/2001
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/200
Date
Slot: Yakima 127_98 at Roza Dam RBDWGage Outflow

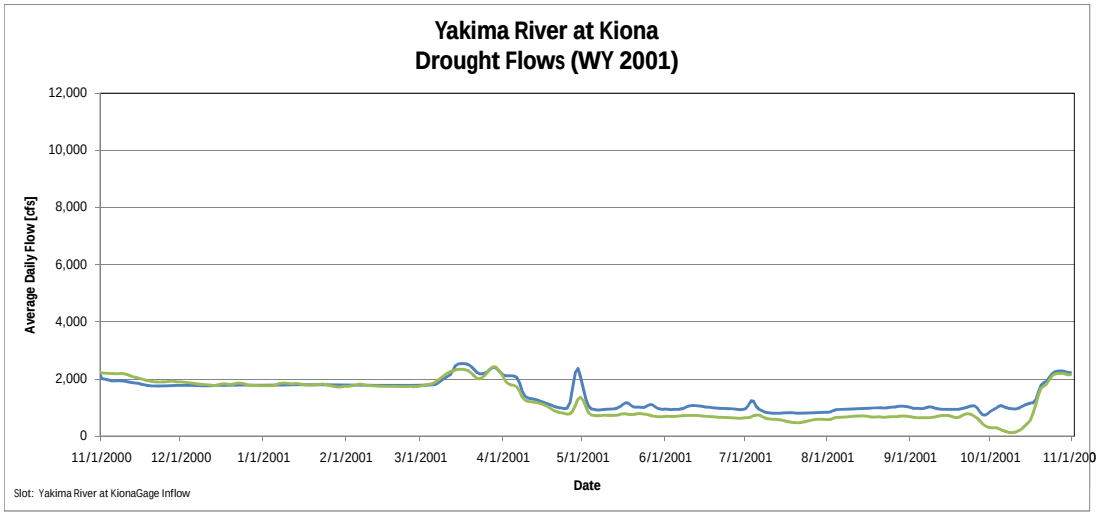

Yakima River - Selah Reach
Wet Flows (WY 2002)
Average Daily Flow [cfs]
6,000
5,000
4,000
3,000
2,000
1,000
0
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/200
Date
Slot: Yakima 127_98 at Roza Dam RBDWGage Outflow

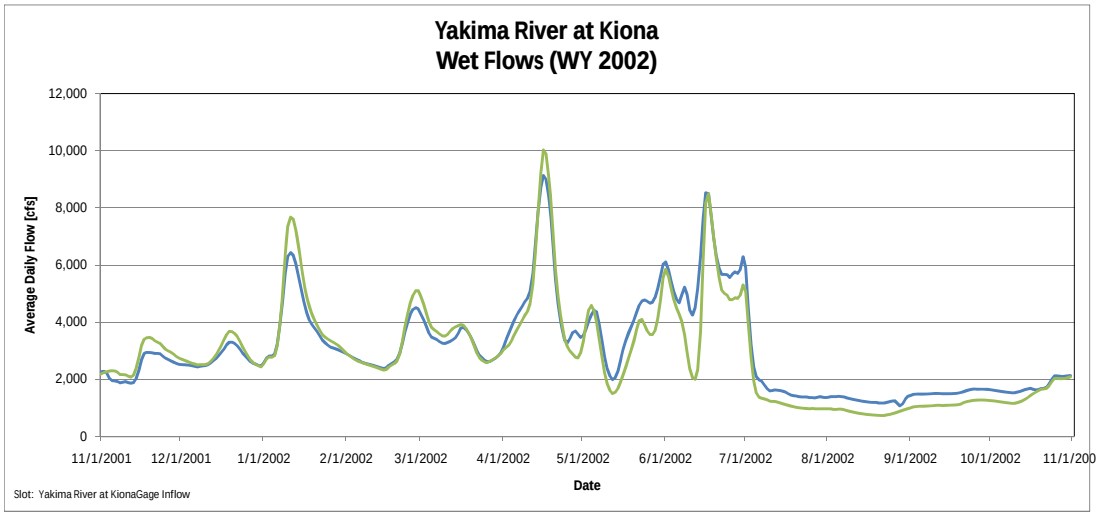

Yakima River at Parker
Average Flows (WY 2003)
Integrated Plan
Future without Integrated Plan
Minimum Target Flows (Existing)
Average Daily Flow [cfs]
12,000
10,000
8,000
6,000
4,000
2,000
0
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
10/1/2003
11/1/200
Date
Slot: Yakima River at Parker PARWGage Outflow

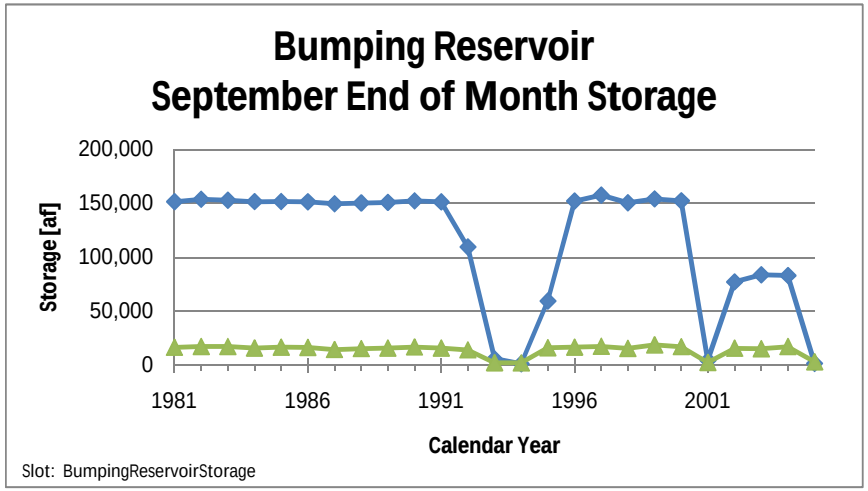

Yakima River at Parker
Drought Flows (WY 2001)
Average Daily Flow [cfs]
12,000
10,000
8,000
6,000
4,000
2,000
0
11/1/2000
12/1/2000
1/1/2001
2/1/2001
3/1/2001
4/1/2001
5/1/2001
6/1/2001
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/200
Date
Slot: Yakima River at Parker PARWGage Outflow

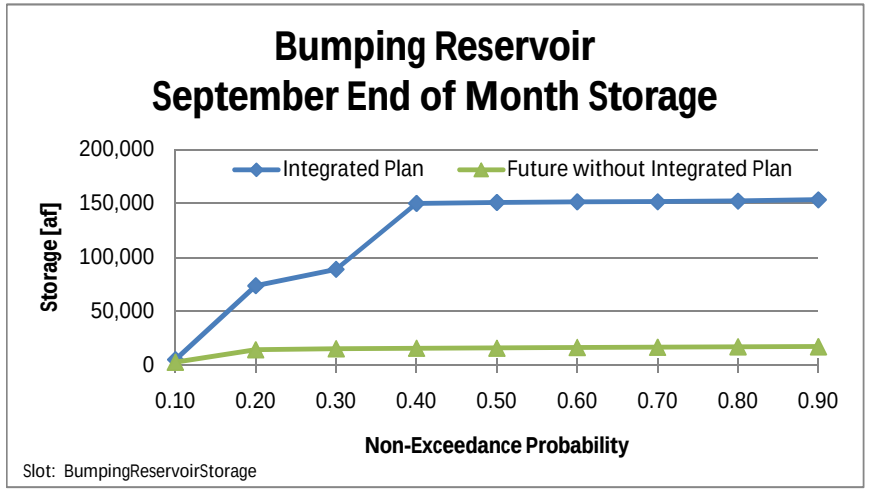

Yakima River at Parker
Wet Flows (WY 2002)
Average Daily Flow [cfs]
12,000
10,000
8,000
6,000
4,000
2,000
0
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/200
Date
Slot: Yakima River at Parker PARWGage Outflow

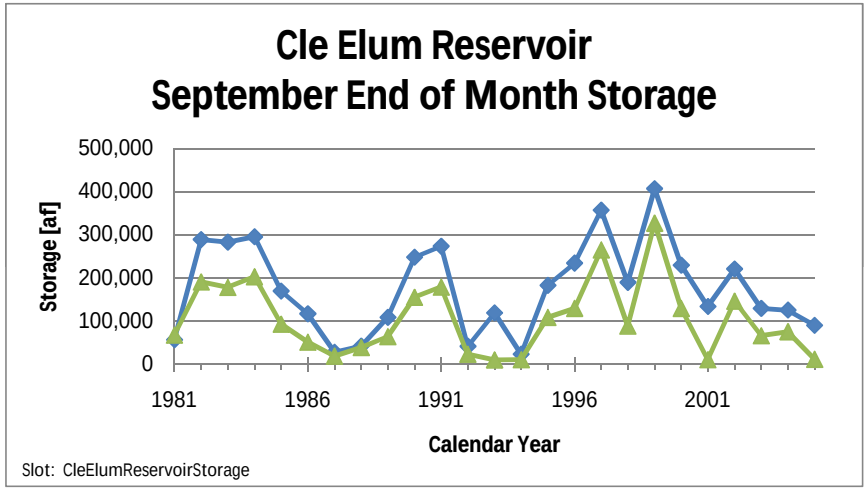

Yakima River at Kiona
Average Flows (WY 2003)
Integrated Plan
Future without Integrated Plan
Average Daily Flow [cfs]
12,000
10,000
8,000
6,000
4,000
2,000
0
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
10/1/2003
11/1/200
Date
Slot: Yakima River at KionaGage Inflow

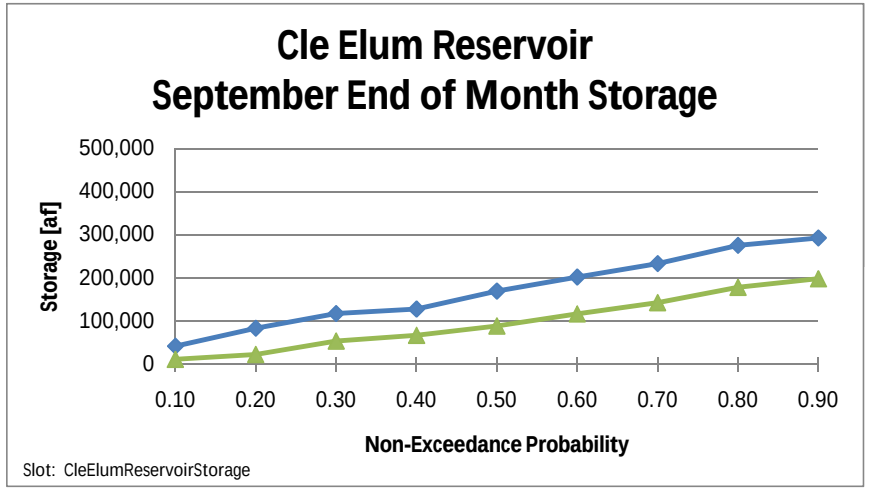

Yakima River at Kiona
Drought Flows (WY 2001)
Average Daily Flow [cfs]
12,000
10,000
8,000
6,000
4,000
2,000
0
11/1/2000
12/1/2000
1/1/2001
2/1/2001
3/1/2001
4/1/2001
5/1/2001
6/1/2001
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/200
Date
Slot: Yakima River at KionaGage Inflow

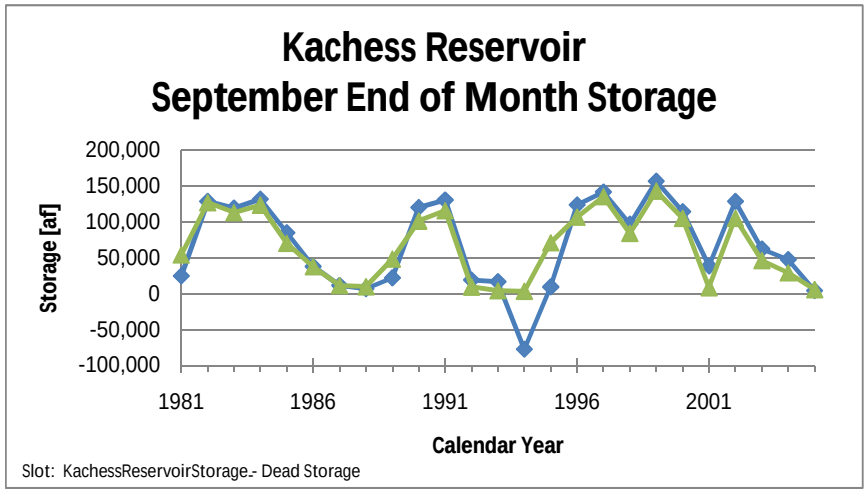

Yakima River at Kiona
Wet Flows (WY 2002)
Average Daily Flow [cfs]
12,000
10,000
8,000
6,000
4,000
2,000
0
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/200
Date
Slot: Yakima River at KionaGage Inflow

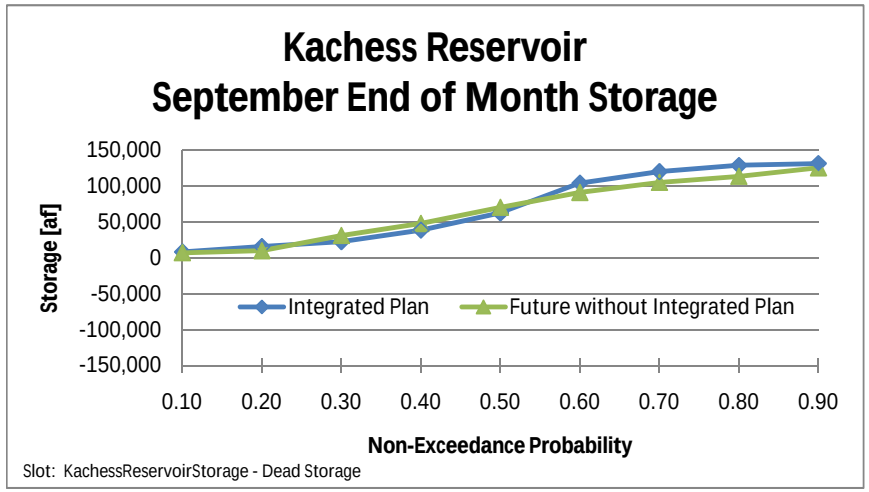

Bumping Reservoir
September End of Month Storage
Storage [af]
200,000
150,000
100,000
50,000
0
1981
1986
1991
1996
2001
Calendar Year
Slot: BumpingReservoirStorage

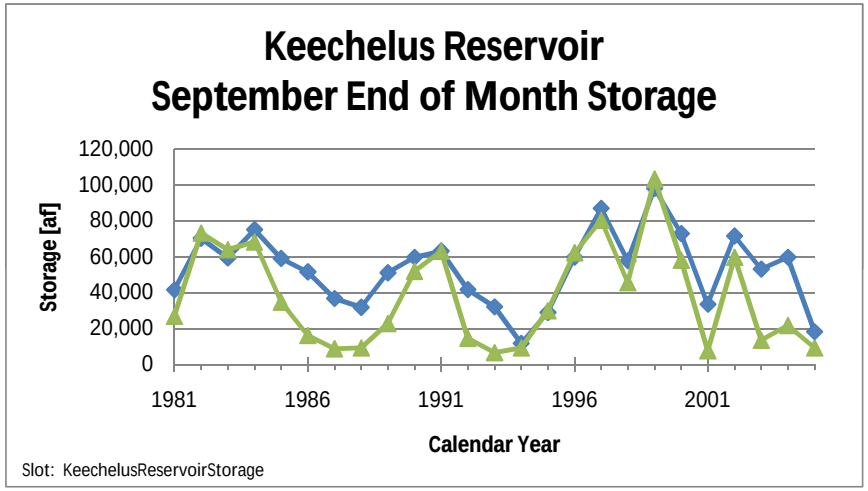

Bumping Reservoir
September End of Month Storage
Integrated Plan
Future without Integrated Plan
Storage [af]
200,000
150,000
100,000
50,000
0
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
0.90
Non-Exceedance Probability
Slot: BumpingReservoirStorage

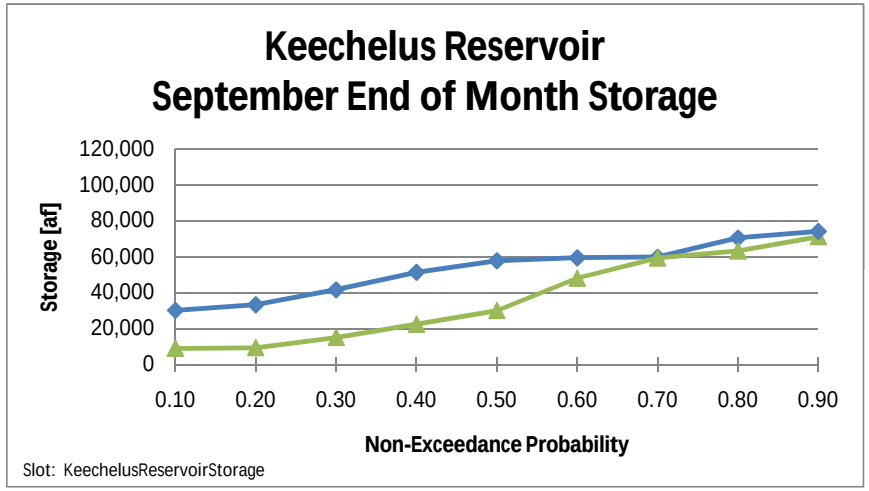

Cle Elum Reservoir
September End of Month Storage
Storage [af]
500,000
400,000
300,000
200,000
100,000
0
1981
1986
1991
1996
2001
Calendar Year
Slot: CleElumReservoirStorage

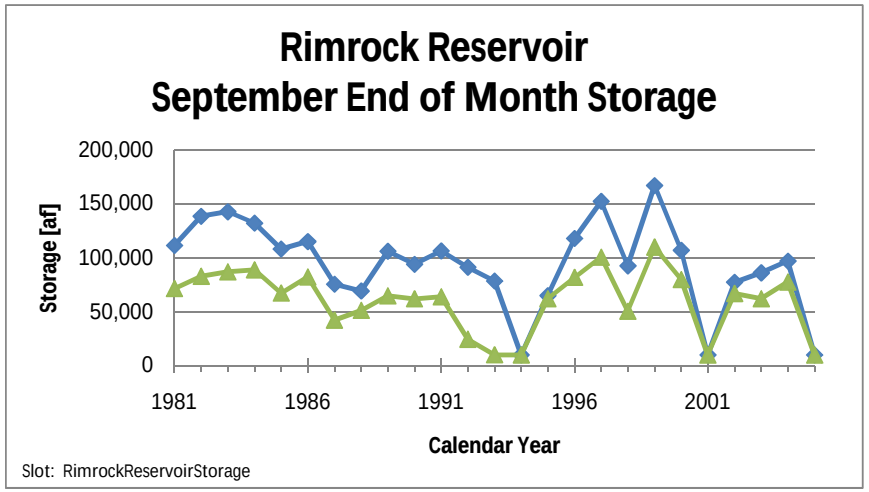

Cle Elum Reservoir
September End of Month Storage
Storage [af]
500,000
400,000
300,000
200,000
100,000
0
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
0.90
Non-Exceedance Probability
Slot: CleElumReservoirStorage

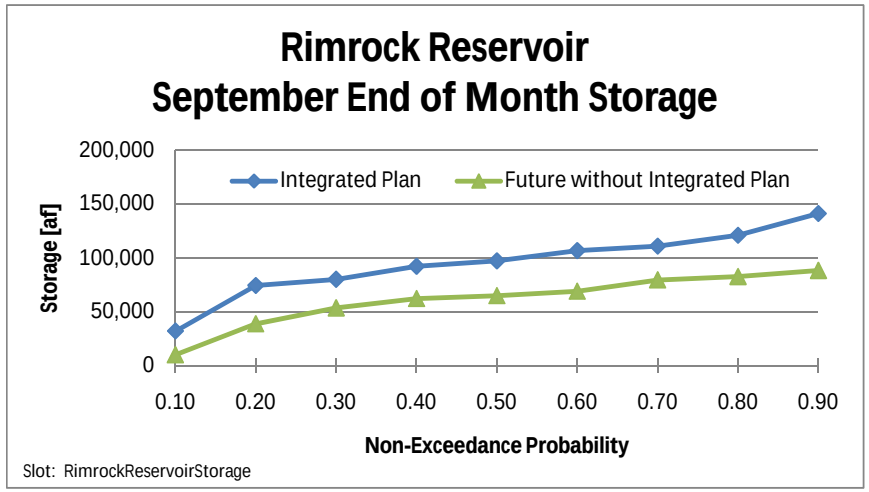

Kachess Reservoir
September End of Month Storage
Storage [af]
200,000
150,000
100,000
50,000
0
-50,000
-100,000
1981
1986
1991
1996
2001
Calendar Year
Slot: KachessReservoirStorage.- Dead Storage

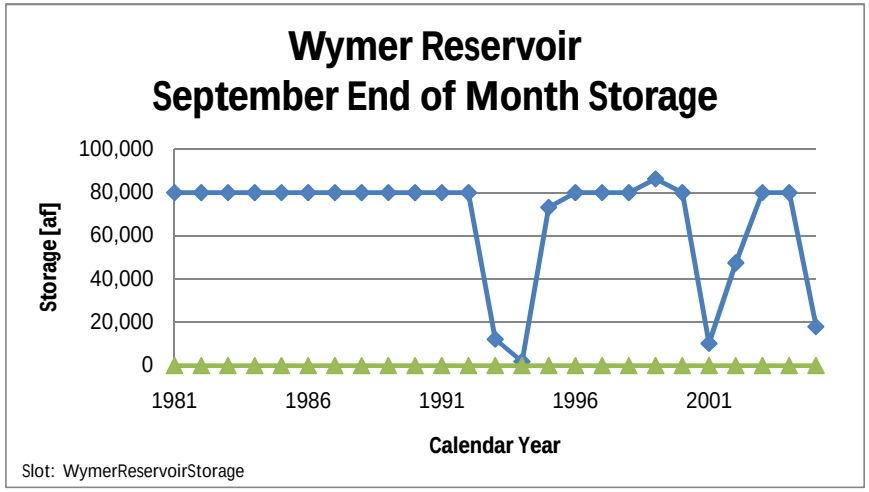

Kachess Reservoir
September End of Month Storage
Storage [af]
150,000
100,000
50,000
0
-50,000
-100,000
-150,000
Integrated Plan
Future without Integrated Plan
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
0.90
Non-Exceedance Probability
Slot: KachessReservoirStorage - Dead Storage

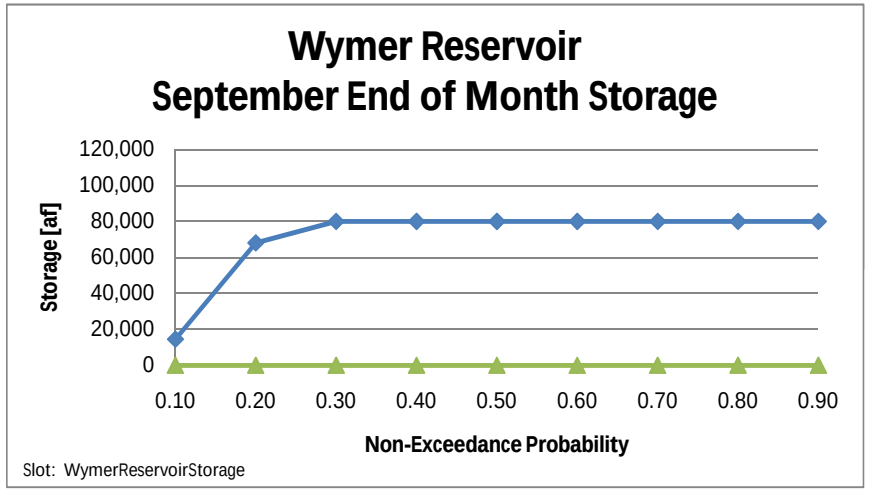

Keechelus Reservoir
September End of Month Storage
Storage [af]
120,000
100,000
80,000
60,000
40,000
20,000
0
1981
1986
1991
1996
2001
Calendar Year
Slot: KeechelusReservoirStorage

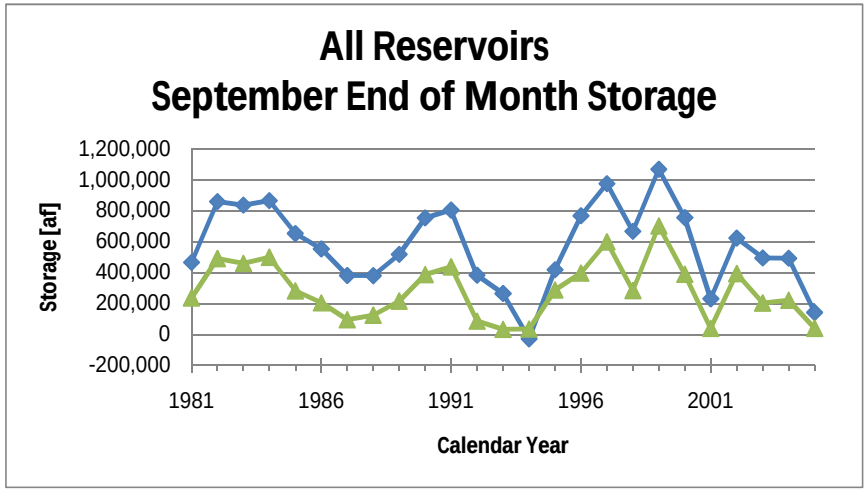

Keechelus Reservoir
September End of Month Storage
Storage [af]
120,000
100,000
80,000
60,000
40,000
20,000
0
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
0.90
Non-Exceedance Probability
Slot: KeechelusReservoirStorage

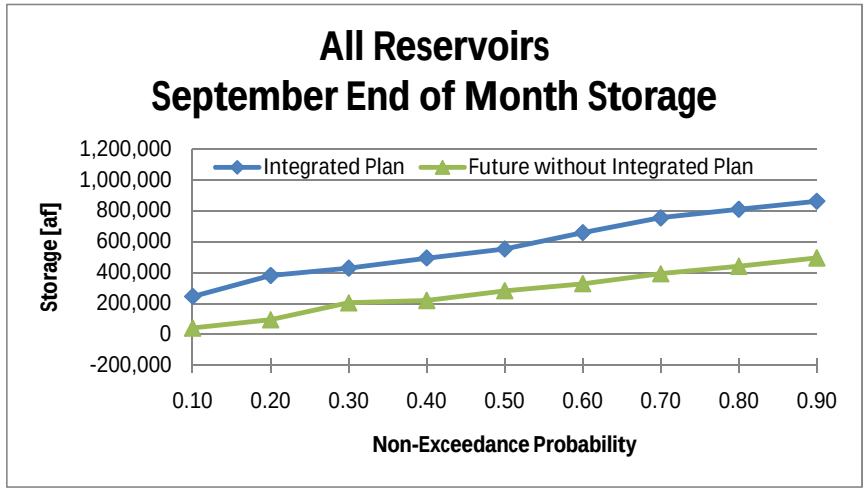

Rimrock Reservoir
September End of Month Storage
Storage [af]
200,000
150,000
100,000
50,000
0
1981
1986
1991
1996
2001
Calendar Year
Slot: RimrockReservoirStorage

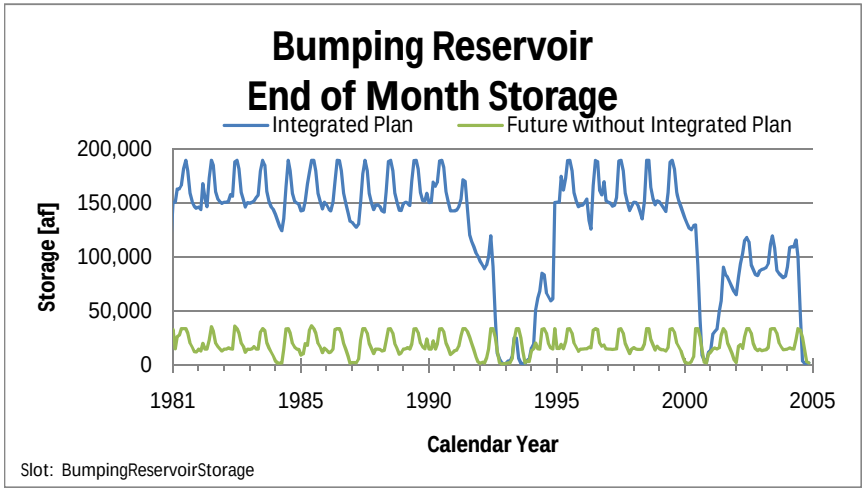

Rimrock Reservoir
September End of Month Storage
Integrated Plan
Future without Integrated Plan
Storage [af]
200,000
150,000
100,000
50,000
0
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
0.90
Non-Exceedance Probability
Slot: RimrockReservoirStorage

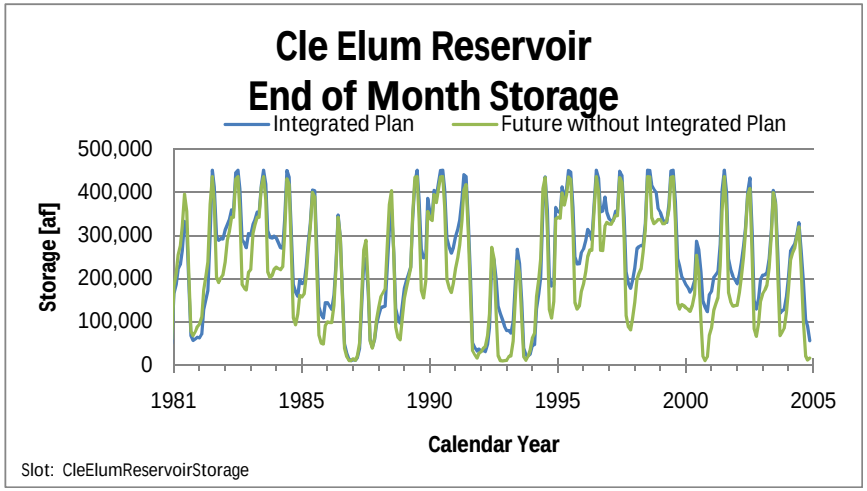

Wymer Reservoir
September End of Month Storage
Storage [af]
100,000
80,000
60,000
40,000
20,000
0
1981
1986
1991
1996
2001
Calendar Year
Slot: WymerReservoirStorage

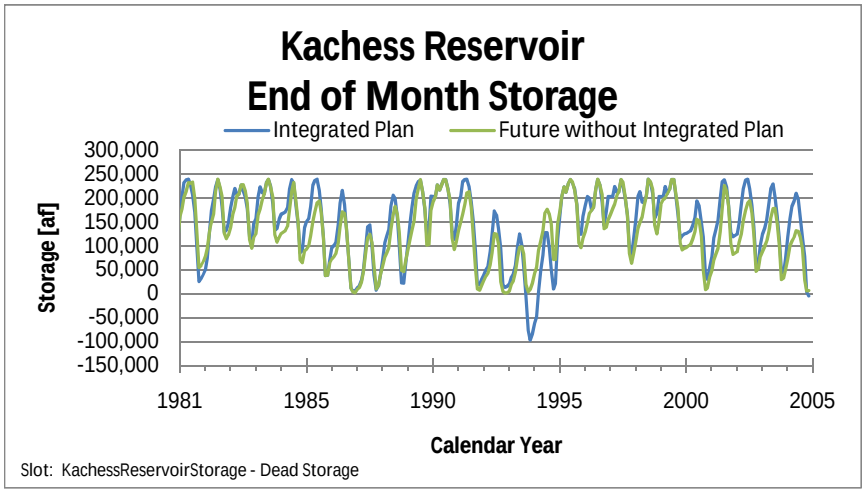

Wymer Reservoir
September End of Month Storage
Storage [af]
120,000
100,000
80,000
60,000
40,000
20,000
0
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
0.90
Non-Exceedance Probability
Slot: WymerReservoirStorage

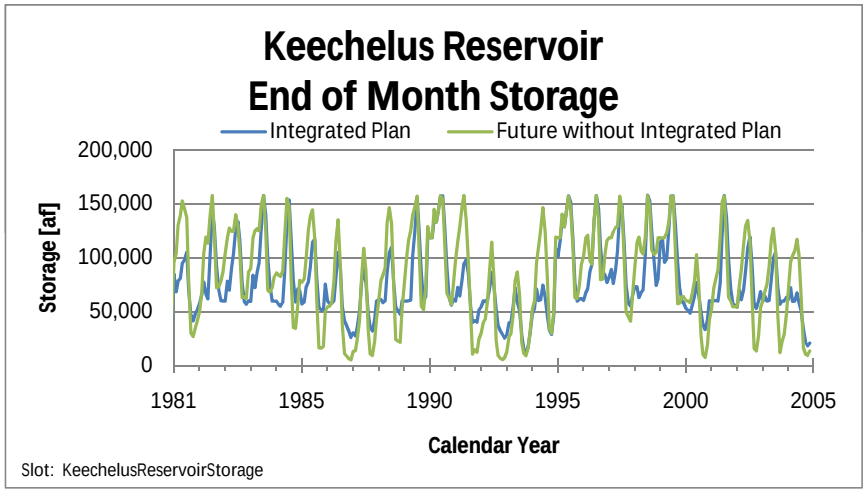

All Reservoirs
September End of Month Storage
Storage [af]
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
-200,000
1981
1986
1991
1996
2001
Calendar Year

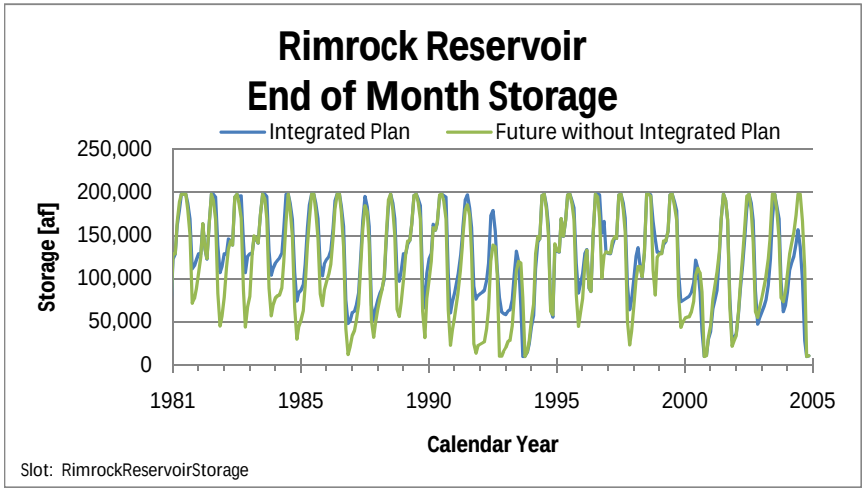

All Reservoirs
September End of Month Storage
Integrated Plan
Future without Integrated Plan
Storage [af]
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
-200,000
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
0.90
Non-Exceedance Probability

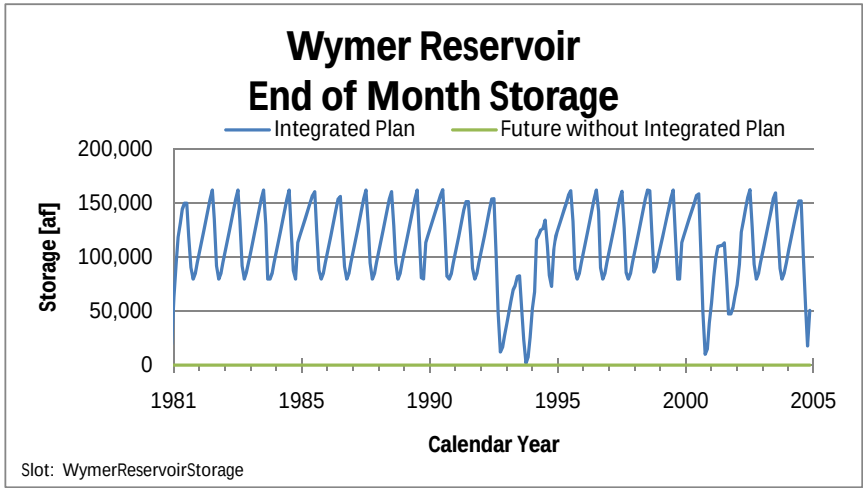

Bumping Reservoir
End of Month Storage
Integrated Plan
Future without Integrated Plan
Storage [af]
200,000
150,000
100,000
50,000
0
1981
1985
1990
1995
2000
2005
Calendar Year
Slot: BumpingReservoirStorage

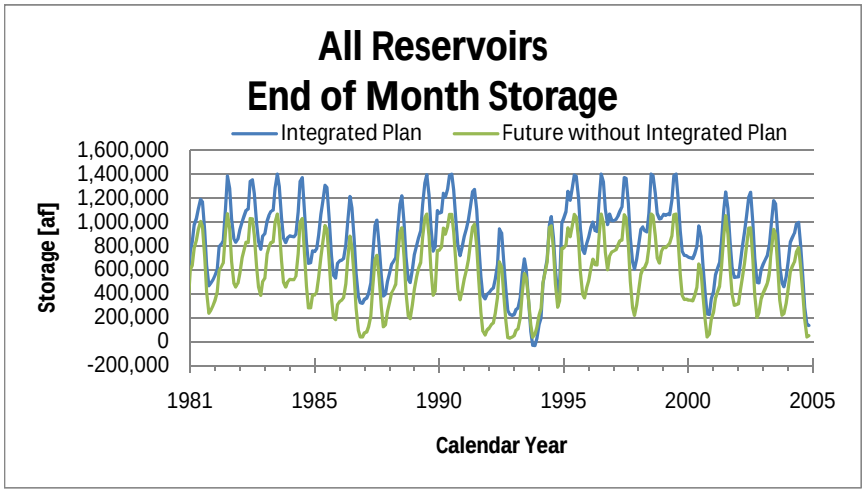

Cle Elum Reservoir
End of Month Storage
Integrated Plan
Future without Integrated Plan
Storage [af]
500,000
400,000
300,000
200,000
100,000
0
1981
1985
1990
1995
2000
2005
Calendar Year
Slot: CleElumReservoirStorage

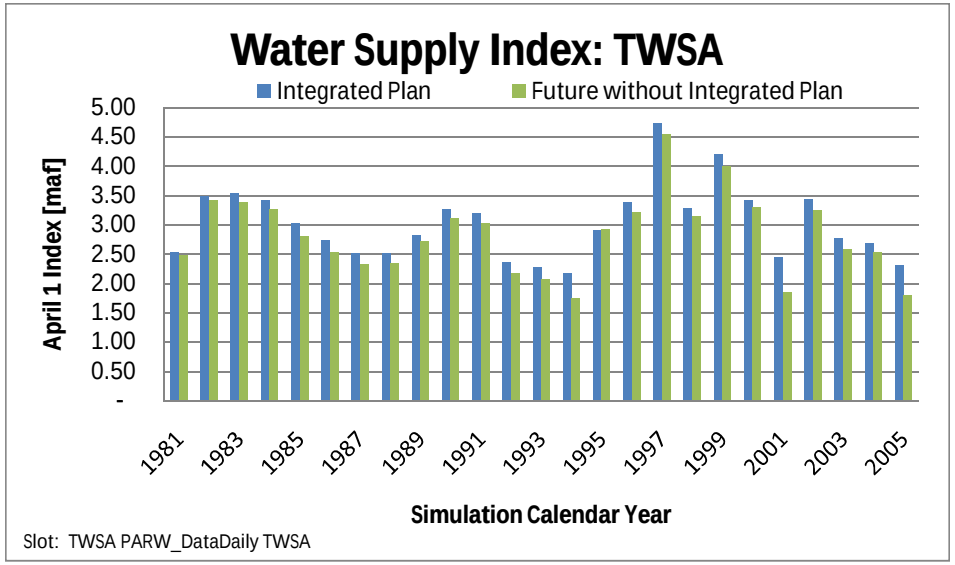

Kachess Reservoir
End of Month Storage
Integrated Plan
Future without Integrated Plan
Storage [af]
300,000
250,000
200,000
150,000
100,000
50,000
0
-50,000
-100,000
-150,000
1981
1985
1990
1995
2000
2005
Calendar Year
Slot: KachessReservoirStorage - Dead Storage

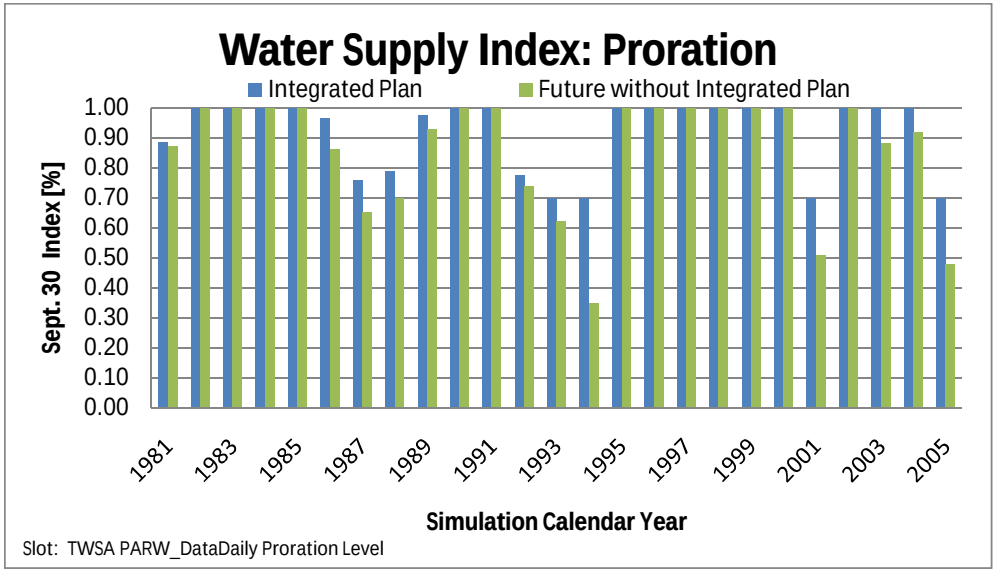

Keechelus Reservoir
End of Month Storage
Integrated Plan
Future without Integrated Plan
Storage [af]
200,000
150,000
100,000
50,000
0
1981
1985
1990
1995
2000
2005
Calendar Year
Slot: KeechelusReservoirStorage

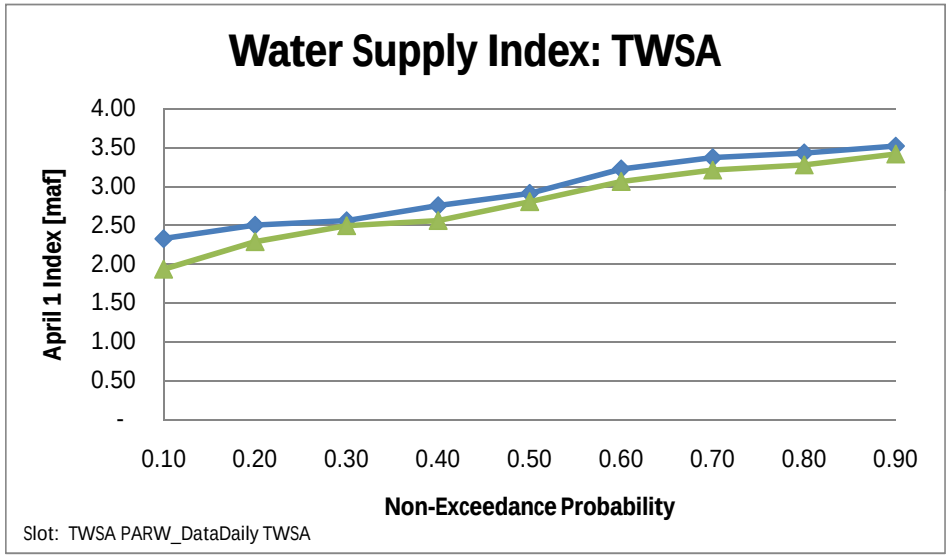

Rimrock Reservoir
End of Month Storage
Integrated Plan
Future without Integrated Plan
Storage [af]
250,000
200,000
150,000
100,000
50,000
0
1981
1985
1990
1995
2000
2005
Calendar Year
Slot: RimrockReservoirStorage

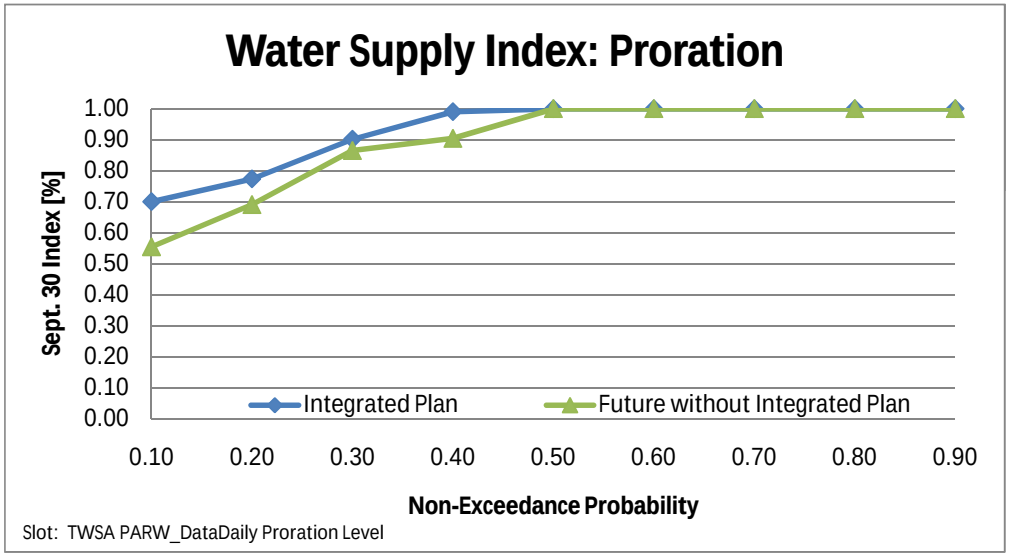

Wymer Reservoir
End of Month Storage
Integrated Plan
Future without Integrated Plan
Storage [af]
200,000
150,000
100,000
50,000
0
1981
1985
1990
1995
2000
2005
Calendar Year
Slot: WymerReservoirStorage


All Reservoirs
End of Month Storage
Integrated Plan
Future without Integrated Plan
Storage [af]
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
-200,000
1981
1985
1990
1995
2000
2005
Calendar Year

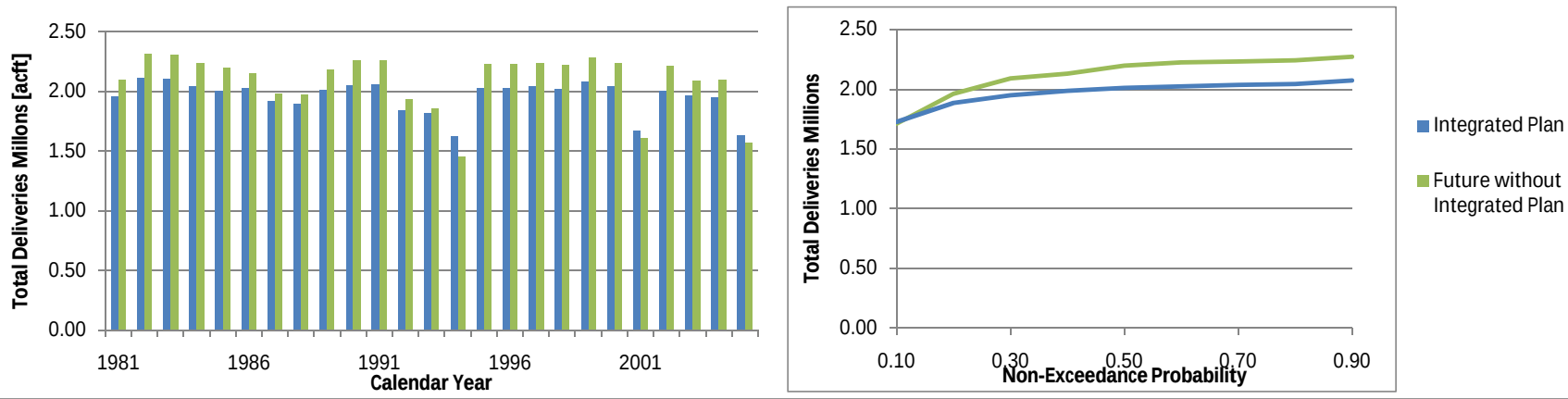

Water Supply Index: TWSA
Integrated Plan
Future without Integrated Plan
April 1 Index [maf]
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
-
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
Simulation Calendar Year
Slot: TWSA PARW_DataDaily TWSA


Water Supply Index: Proration
Integrated Plan
Future without Integrated Plan
Sept. 30 Index [%]
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
Simulation Calendar Year
Slot: TWSA PARW_DataDaily Proration Level

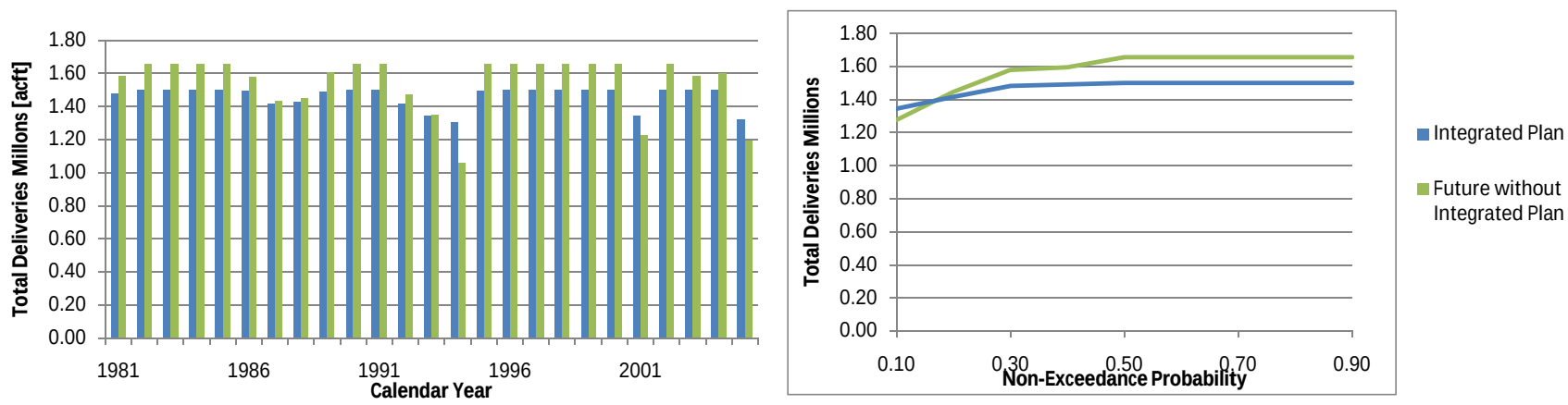

Water Supply Index: TWSA
April 1 Index [maf]
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
-
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
0.90
Non-Exceedance Probability
Slot: TWSA PARW_DataDaily TWSA


Water Supply Index: Proration
Sept. 30 Index [%]
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Integrated Plan
Future without Integrated Plan
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
0.90
Non-Exceedance Probability
Slot: TWSA PARW_DataDaily Proration Level

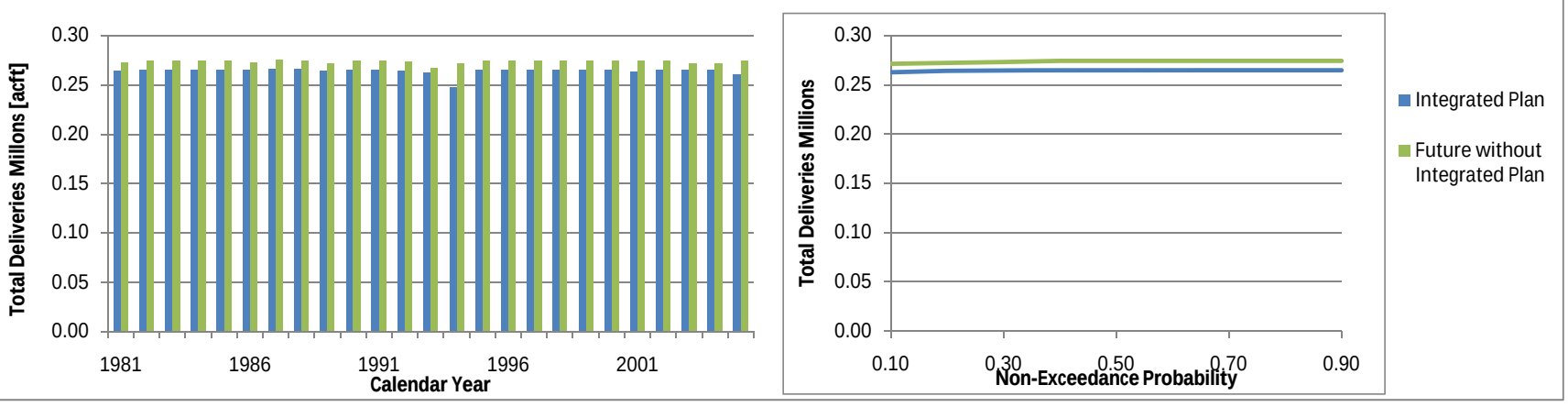
Main Canal Deliveries



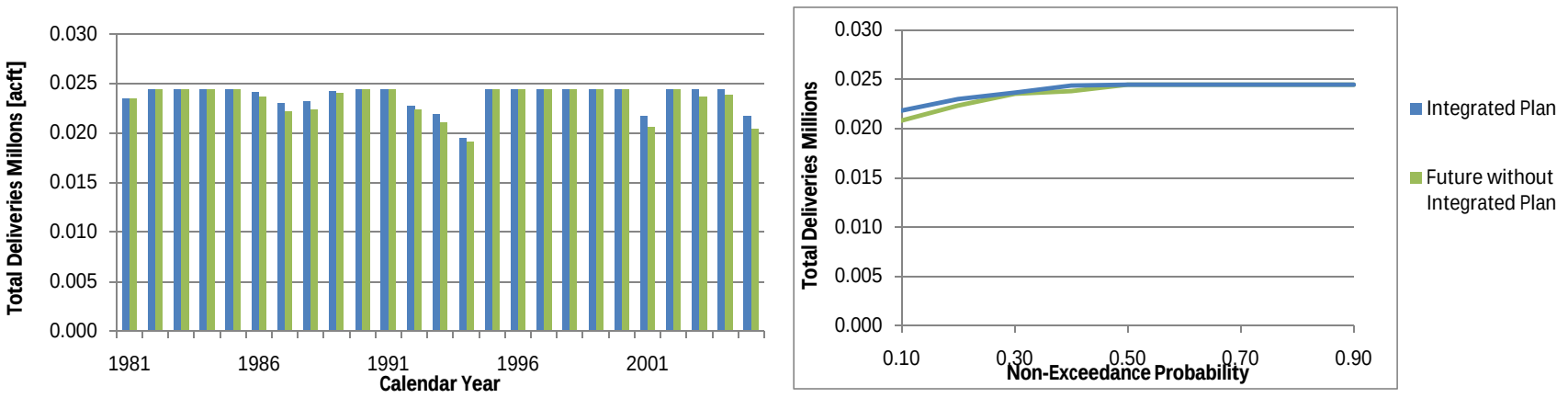
Sunnyside, KRD Irrigation, Roza Irrigation, New Reservation Canal, Tieton, and Kennewick Deliveries

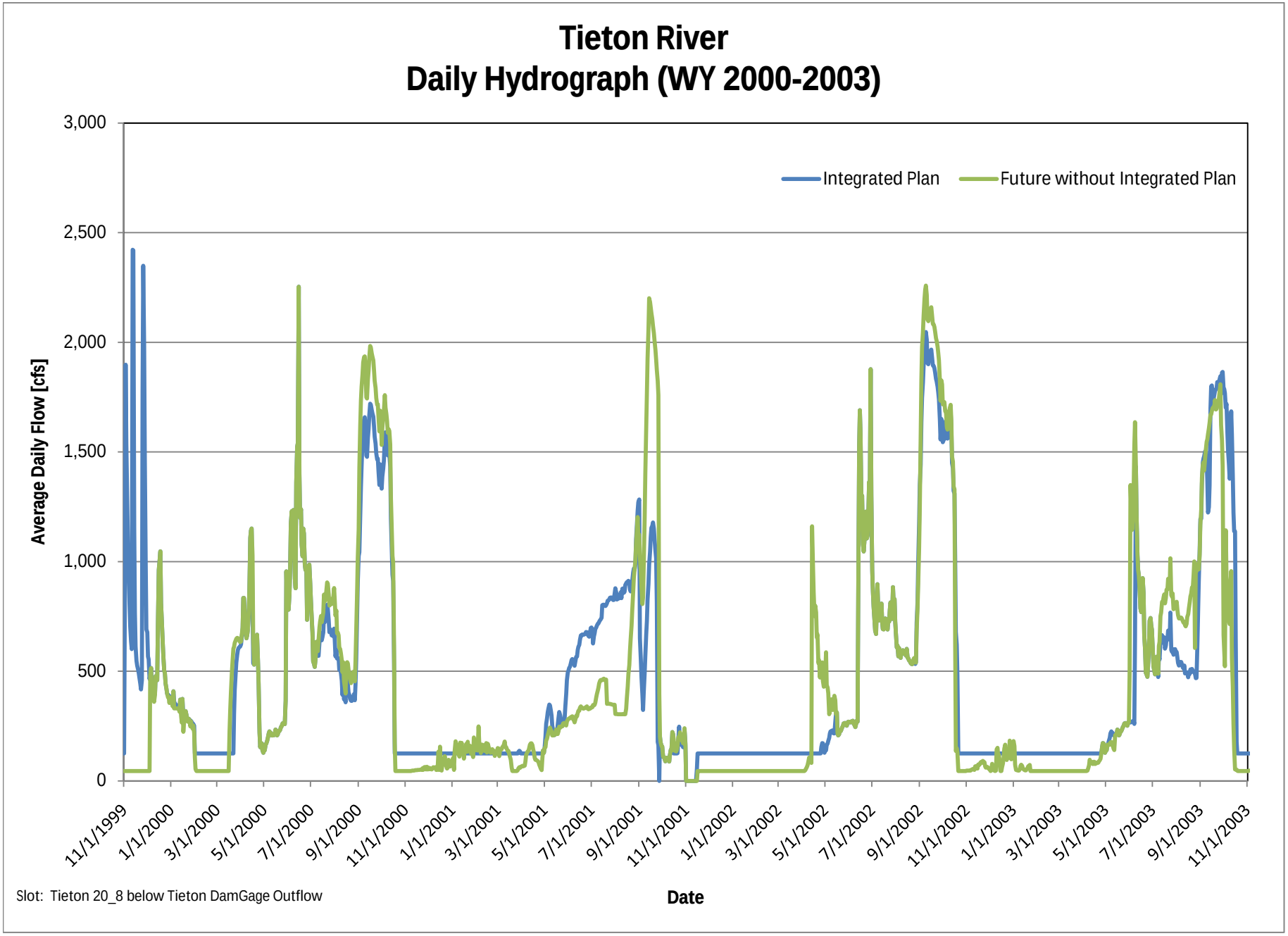


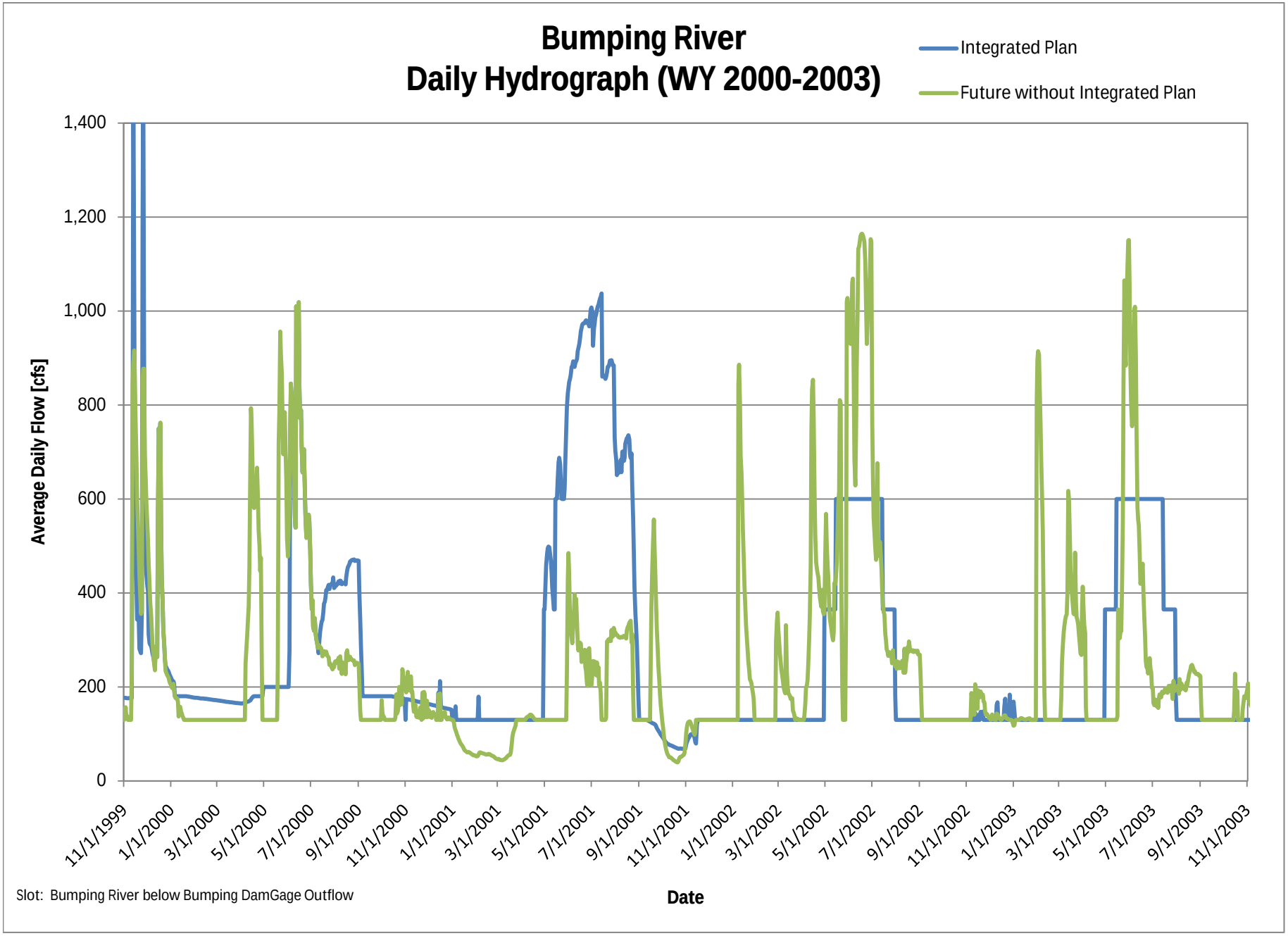
Smaller Canal Deliveries

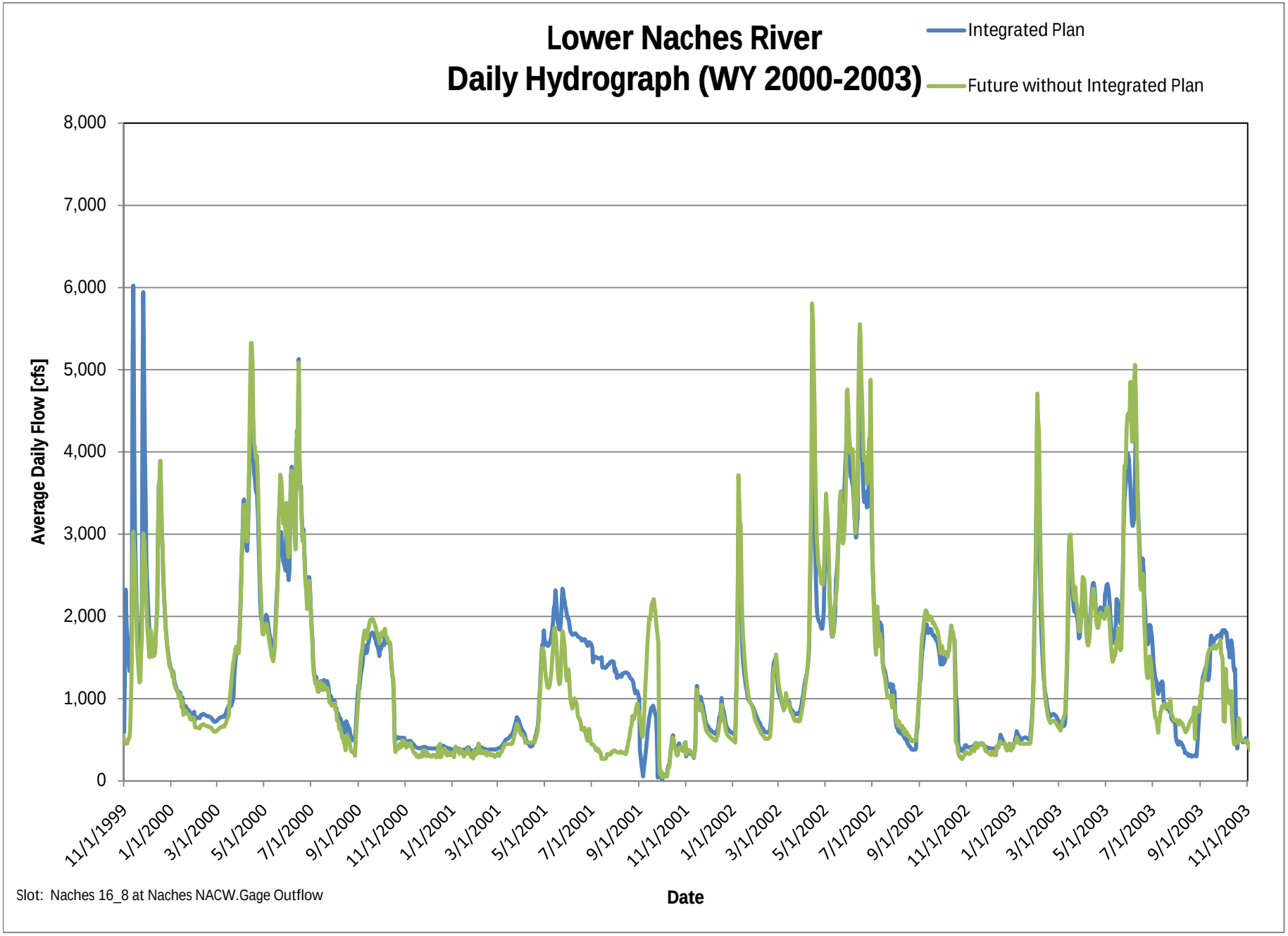


M&I Surface Water Deliveries

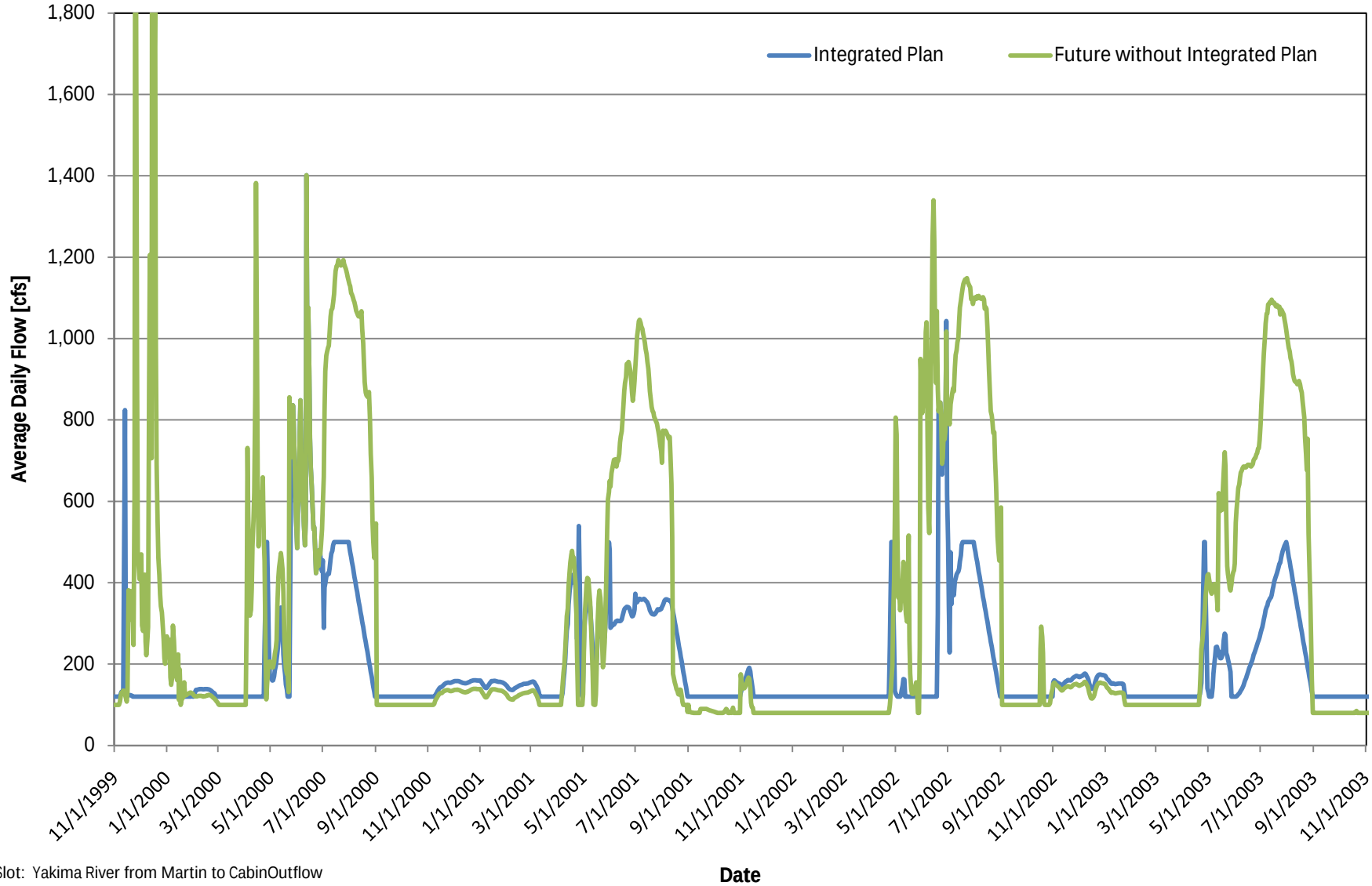



Tieton River
Daily Hydrograph (WY 2000-2003)
Integrated Plan
Future without Integrated Plan
Average Daily Flow [cfs]
3,000
2,500
2,000
1,500
1,000
500
0
11/1/1999
1/1/2000
3/1/2000
5/1/2000
7/1/2000
9/1/2000
11/1/2000
1/1/2001
3/1/2001
5/1/2001
7/1/2001
9/1/2001
11/1/2001
1/1/2002
3/1/2002
5/1/2002
7/1/2002
9/1/2002
11/1/2002
1/1/2003
3/1/2003
5/1/2003
7/1/2003
9/1/2003
11/1/2003
Date
Slot: Tieton 20_8 below Tieton DamGage Outflow

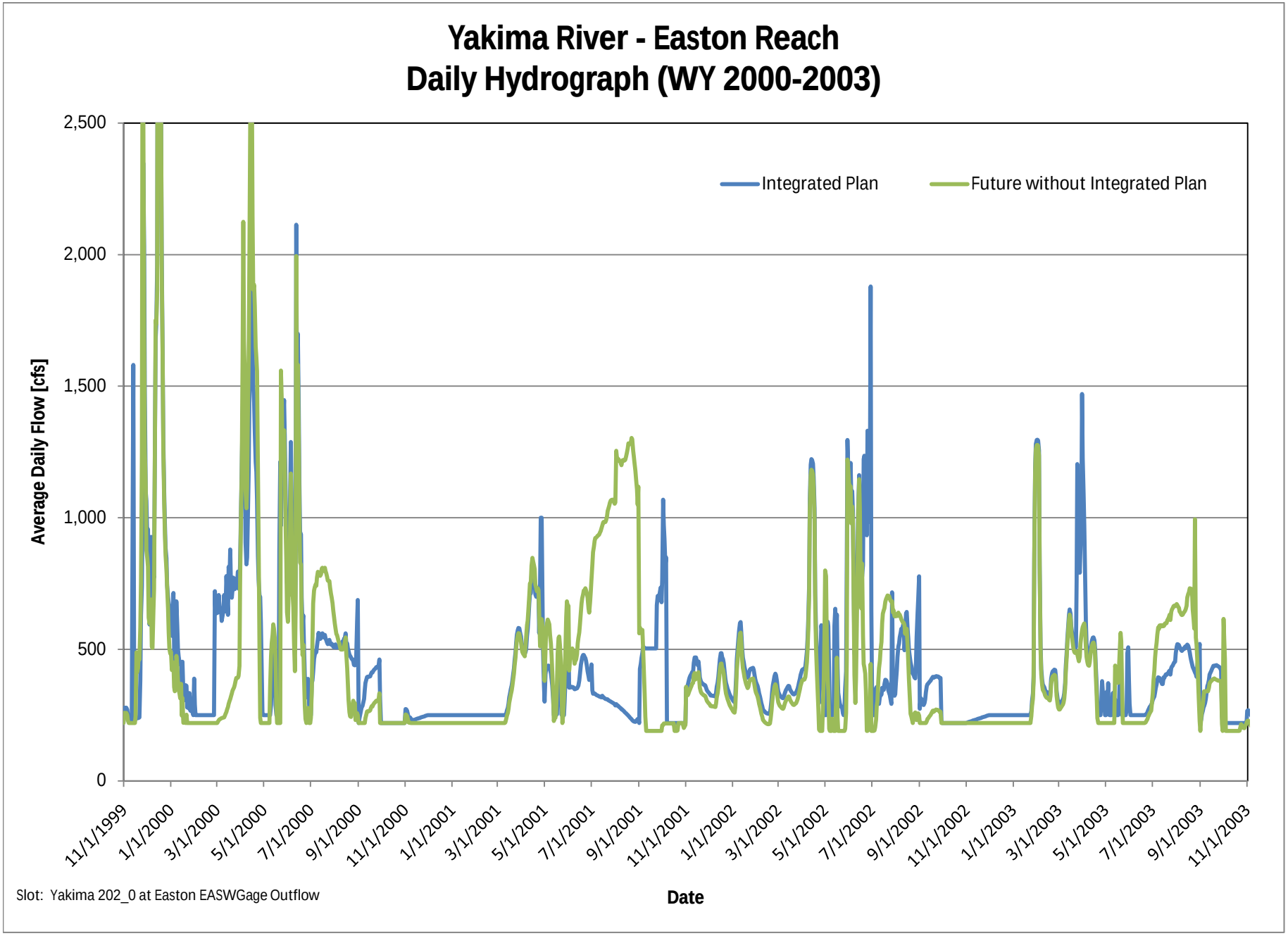

Bumping River
Daily Hydrograph (WY 2000-2003)
Integrated Plan
Future without Integrated Plan
Average Daily Flow [cfs]
1,400
1,200
1,000
800
600
400
200
0
11/1/1999
1/1/2000
3/1/2000
5/1/2000
7/1/2000
9/1/2000
11/1/2000
1/1/2001
3/1/2001
5/1/2001
7/1/2001
9/1/2001
11/1/2001
1/1/2002
3/1/2002
5/1/2002
7/1/2002
9/1/2002
11/1/2002
1/1/2003
3/1/2003
5/1/2003
7/1/2003
9/1/2003
11/1/2003
Date
Slot: Bumping River below Bumping DamGage Outflow

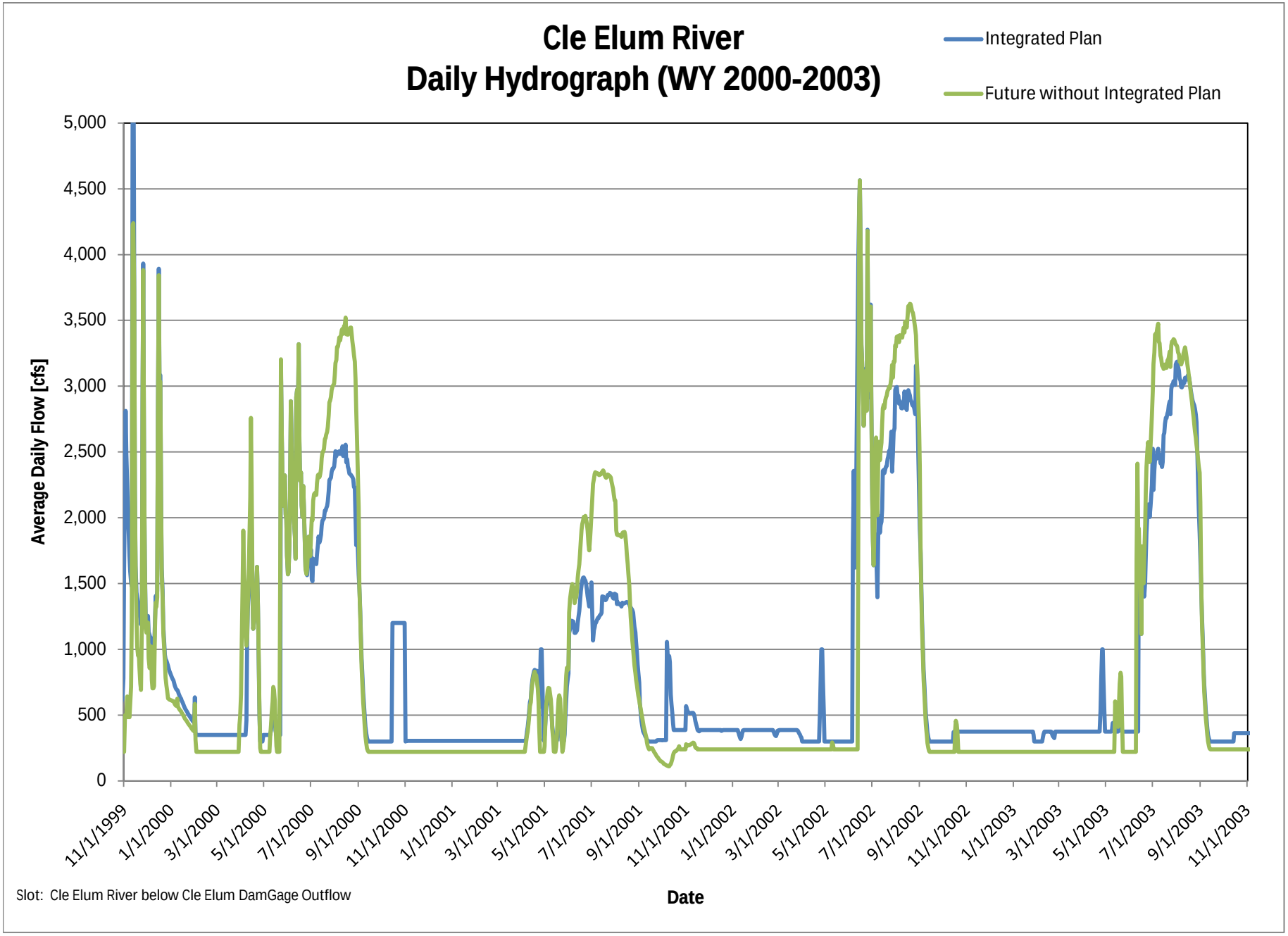

Lower Naches River
Daily Hydrograph (WY 2000-2003)
Integrated Plan
Future without Integrated Plan
Average Daily Flow [cfs]
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
11/1/1999
1/1/2000
3/1/2000
5/1/2000
7/1/2000
9/1/2000
11/1/2000
1/1/2001
3/1/2001
5/1/2001
7/1/2001
9/1/2001
11/1/2001
1/1/2002
3/1/2002
5/1/2002
7/1/2002
9/1/2002
11/1/2002
1/1/2003
3/1/2003
5/1/2003
7/1/2003
9/1/2003
11/1/2003
Date
Slot: Naches 16_8 at Naches NACW.Gage Outflow

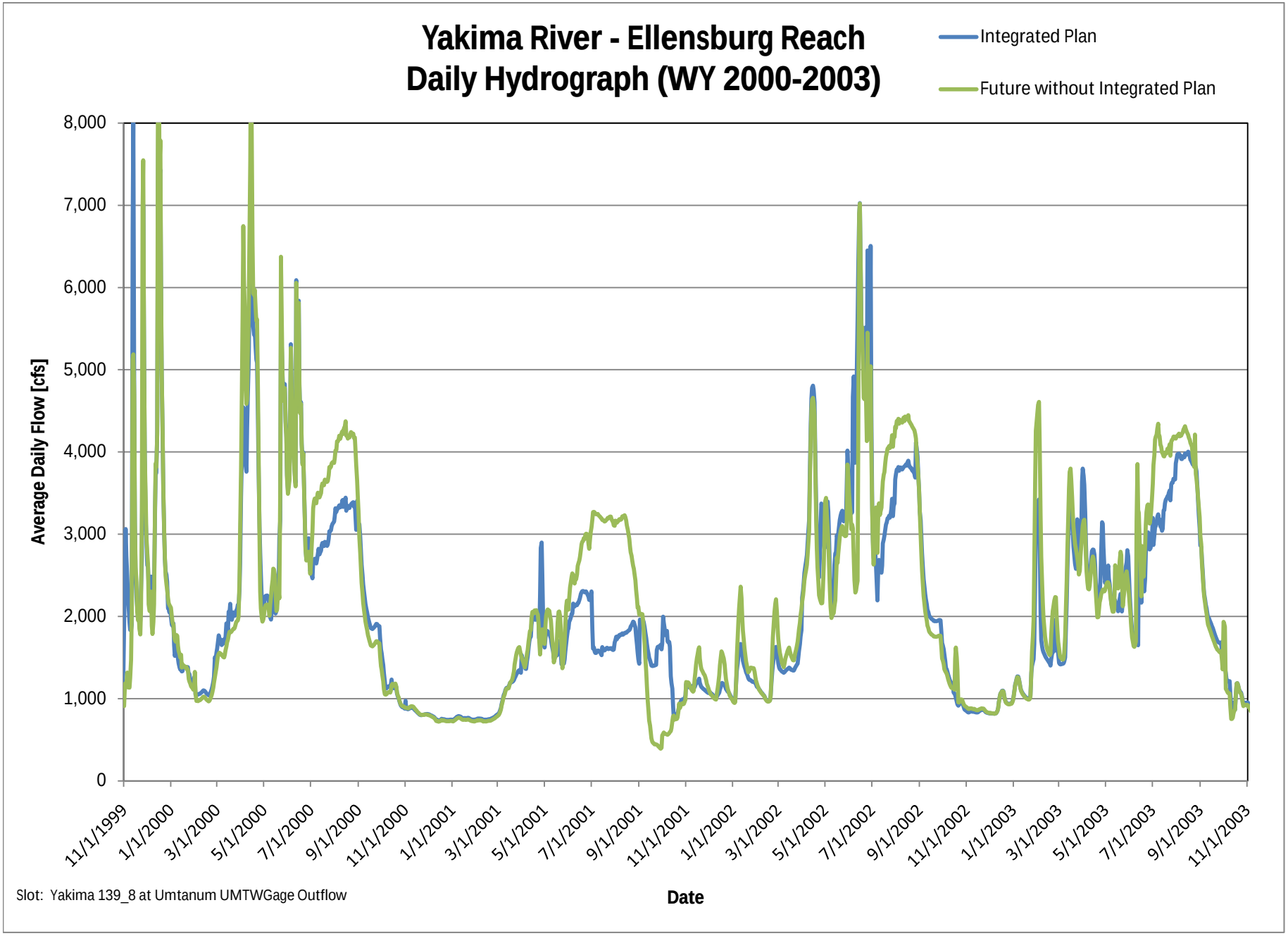
Yakima River, Keechelus Reservoir to Lake Easton Reach
Daily Hydrograph (WY 2000-2003)

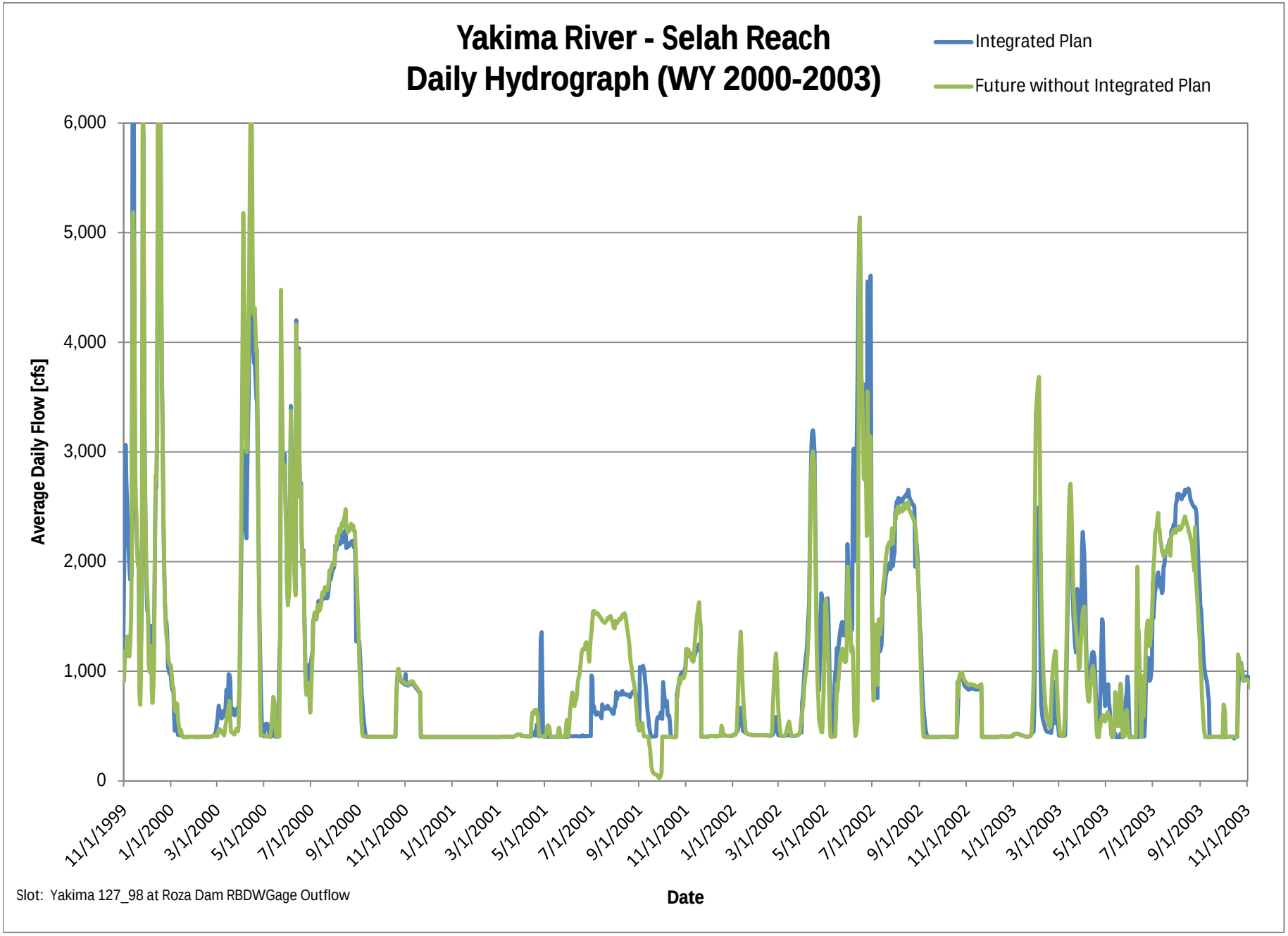


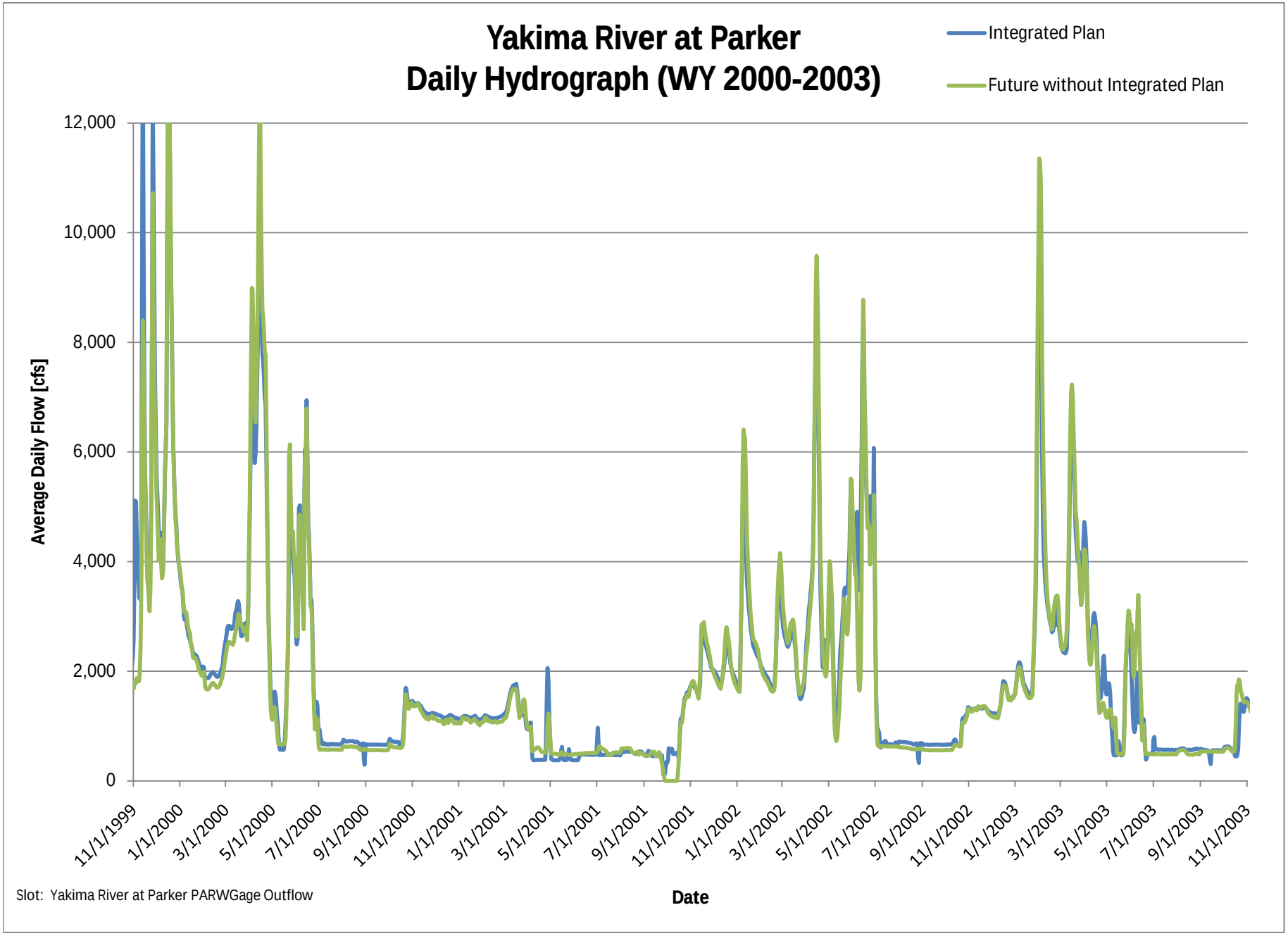
Slot: Yakima River from Martin to CabinOutflow

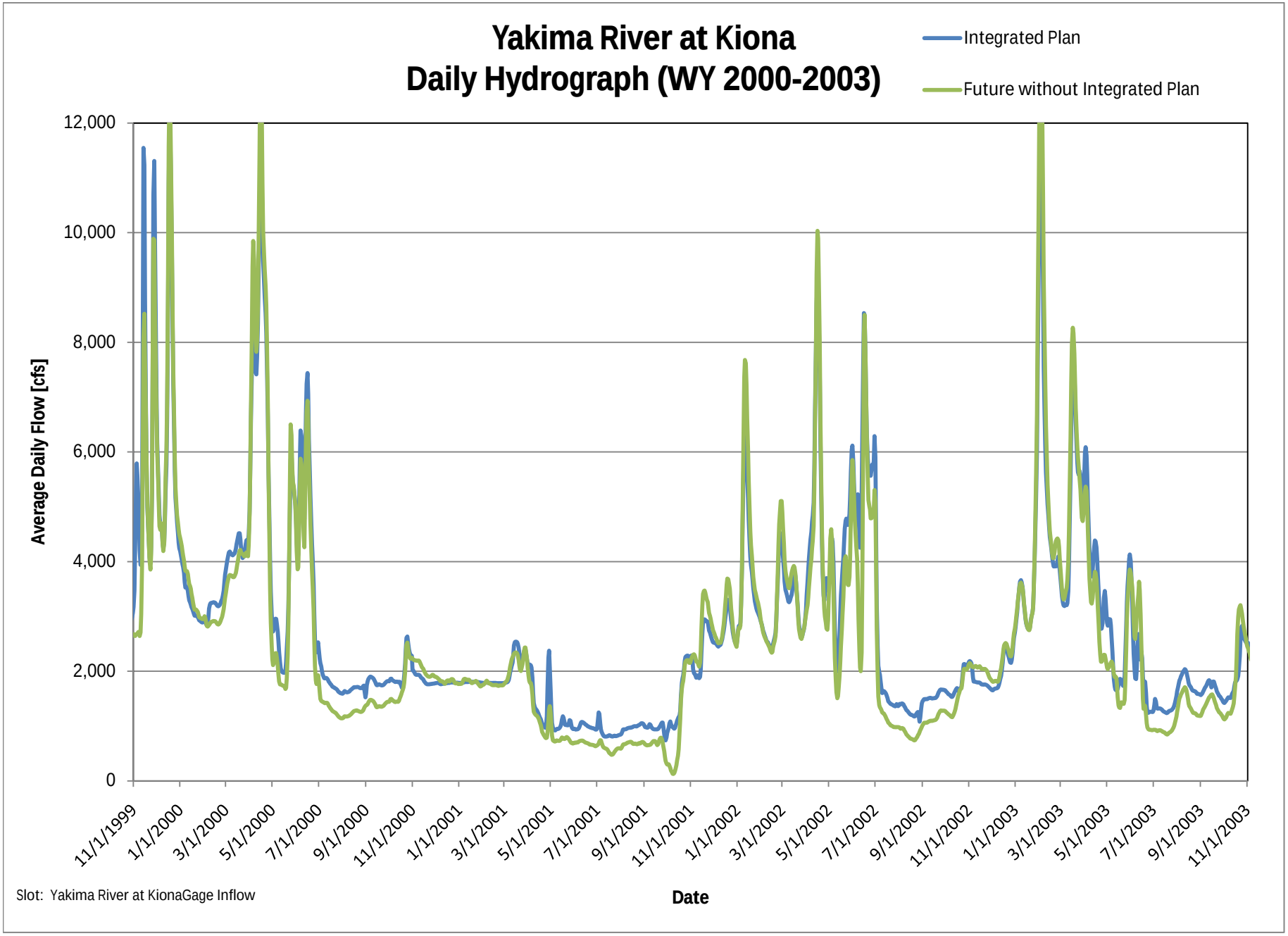

Yakima River - Easton Reach
Daily Hydrograph (WY 2000-2003)
Integrated Plan
Future without Integrated Plan
Average Daily Flow [cfs]
2,500
2,000
1,500
1,000
500
0
11/1/1999
1/1/2000
3/1/2000
5/1/2000
7/1/2000
9/1/2000
11/1/2000
1/1/2001
3/1/2001
5/1/2001
7/1/2001
9/1/2001
11/1/2001
1/1/2002
3/1/2002
5/1/2002
7/1/2002
9/1/2002
11/1/2002
1/1/2003
3/1/2003
5/1/2003
7/1/2003
9/1/2003
11/1/2003
Date
Slot: Yakima 202_0 at Easton EASWGage Outflow

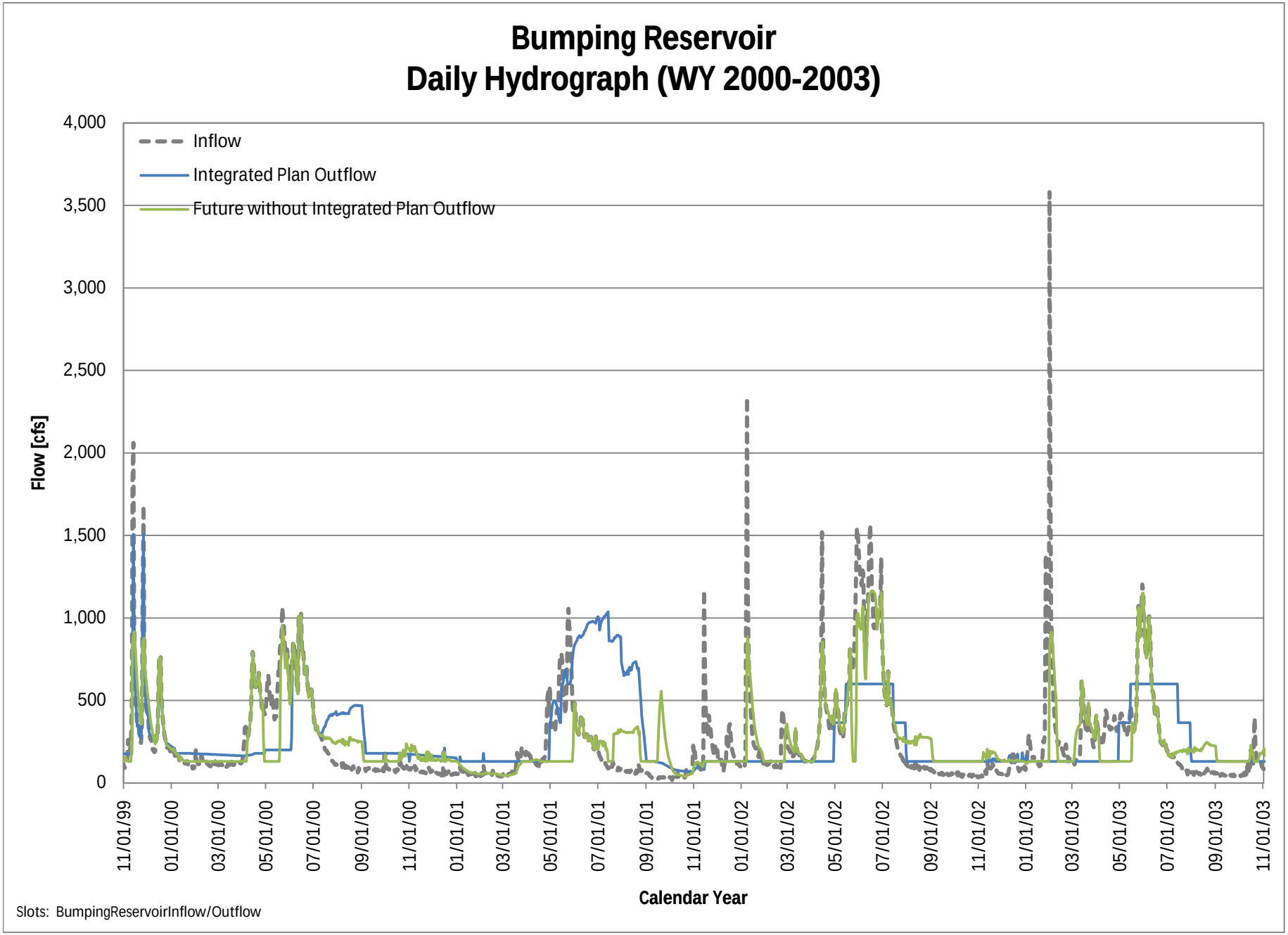

Cle Elum River
Daily Hydrograph (WY 2000-2003)
Integrated Plan
Future without Integrated Plan
Average Daily Flow [cfs]
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
11/1/1999
1/1/2000
3/1/2000
5/1/2000
7/1/2000
9/1/2000
11/1/2000
1/1/2001
3/1/2001
5/1/2001
7/1/2001
9/1/2001
11/1/2001
1/1/2002
3/1/2002
5/1/2002
7/1/2002
9/1/2002
11/1/2002
1/1/2003
3/1/2003
5/1/2003
7/1/2003
9/1/2003
11/1/2003
Date
Slot: Cle Elum River below Cle Elum DamGage Outflow


Yakima River - Ellensburg Reach
Daily Hydrograph (WY 2000-2003)
Integrated Plan
Future without Integrated Plan
Average Daily Flow [cfs]
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
11/1/1999
1/1/2000
3/1/2000
5/1/2000
7/1/2000
9/1/2000
11/1/2000
1/1/2001
3/1/2001
5/1/2001
7/1/2001
9/1/2001
11/1/2001
1/1/2002
3/1/2002
5/1/2002
7/1/2002
9/1/2002
11/1/2002
1/1/2003
3/1/2003
5/1/2003
7/1/2003
9/1/2003
11/1/2003
Date
Slot: Yakima 139_8 at Umtanum UMTWGage Outflow

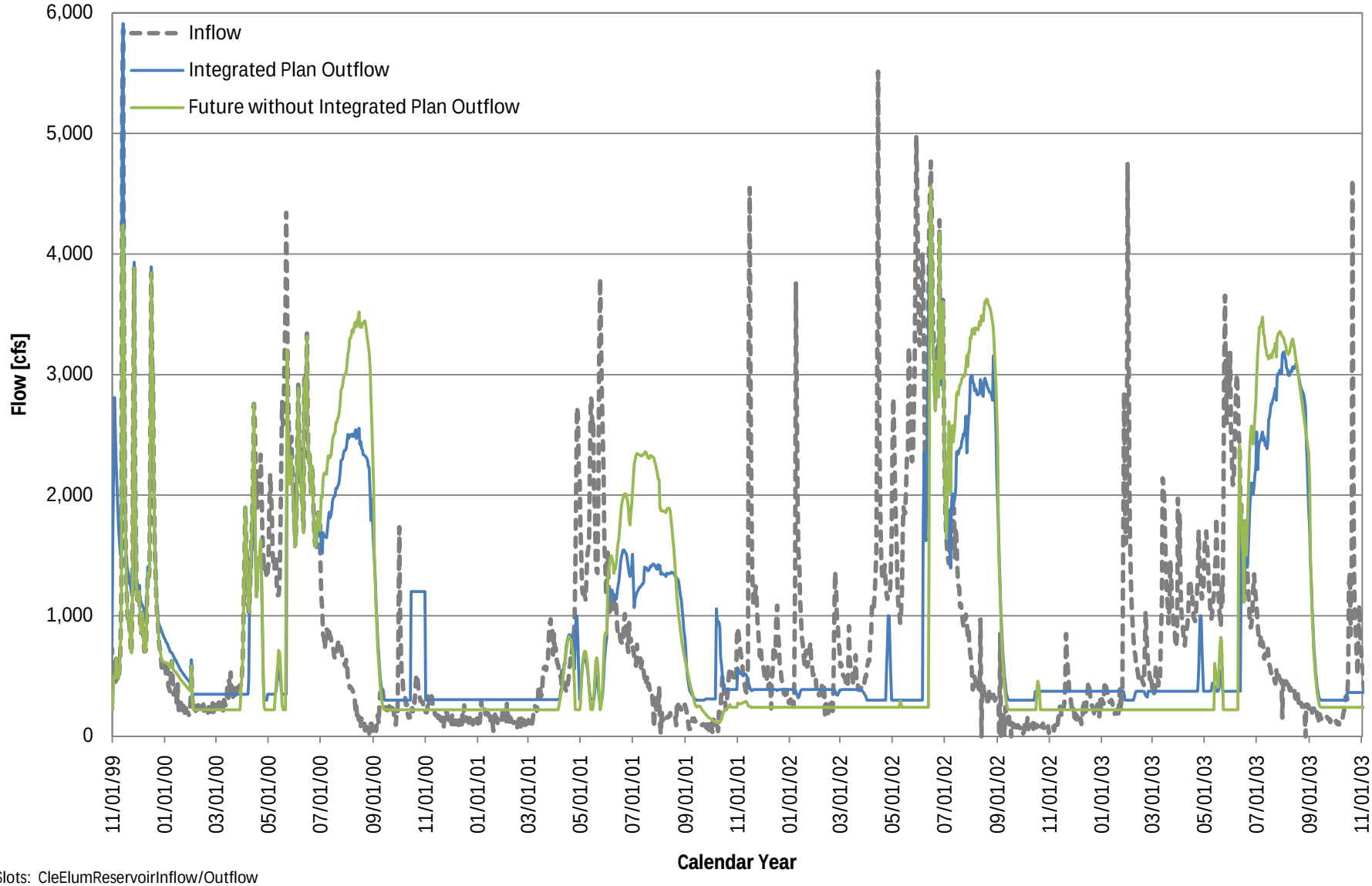

Yakima River - Selah Reach
Daily Hydrograph (WY 2000-2003)
Integrated Plan
Future without Integrated Plan
Average Daily Flow [cfs]
6,000
5,000
4,000
3,000
2,000
1,000
0
11/1/1999
1/1/2000
3/1/2000
5/1/2000
7/1/2000
9/1/2000
11/1/2000
1/1/2001
3/1/2001
5/1/2001
7/1/2001
9/1/2001
11/1/2001
1/1/2002
3/1/2002
5/1/2002
7/1/2002
9/1/2002
11/1/2002
1/1/2003
3/1/2003
5/1/2003
7/1/2003
9/1/2003
11/1/2003
Date
Slot: Yakima 127_98 at Roza Dam RBDWGage Outflow


Yakima River at Parker
Daily Hydrograph (WY 2000-2003)
Integrated Plan
Future without Integrated Plan
Average Daily Flow [cfs]
12,000
10,000
8,000
6,000
4,000
2,000
0
11/1/1999
1/1/2000
3/1/2000
5/1/2000
7/1/2000
9/1/2000
11/1/2000
1/1/2001
3/1/2001
5/1/2001
7/1/2001
9/1/2001
11/1/2001
1/1/2002
3/1/2002
5/1/2002
7/1/2002
9/1/2002
11/1/2002
1/1/2003
3/1/2003
5/1/2003
7/1/2003
9/1/2003
11/1/2003
Date
Slot: Yakima River at Parker PARWGage Outflow

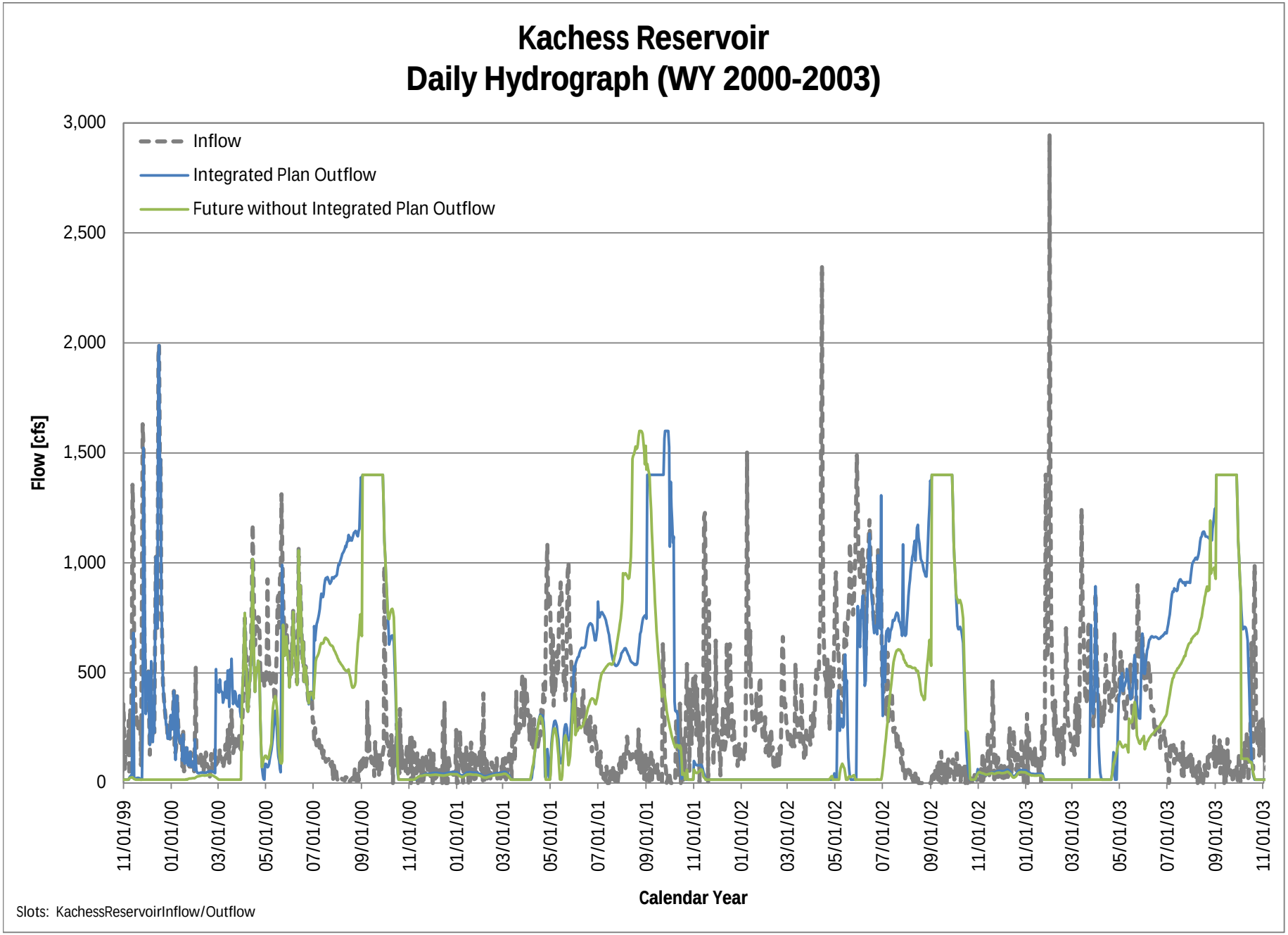

Yakima River at Kiona
Daily Hydrograph (WY 2000-2003)
Integrated Plan
Future without Integrated Plan
Average Daily Flow [cfs]
12,000
10,000
8,000
6,000
4,000
2,000
0
11/1/1999
1/1/2000
3/1/2000
5/1/2000
7/1/2000
9/1/2000
11/1/2000
1/1/2001
3/1/2001
5/1/2001
7/1/2001
9/1/2001
11/1/2001
1/1/2002
3/1/2002
5/1/2002
7/1/2002
9/1/2002
11/1/2002
1/1/2003
3/1/2003
5/1/2003
7/1/2003
9/1/2003
11/1/2003
Date
Slot: Yakima River at KionaGage Inflow

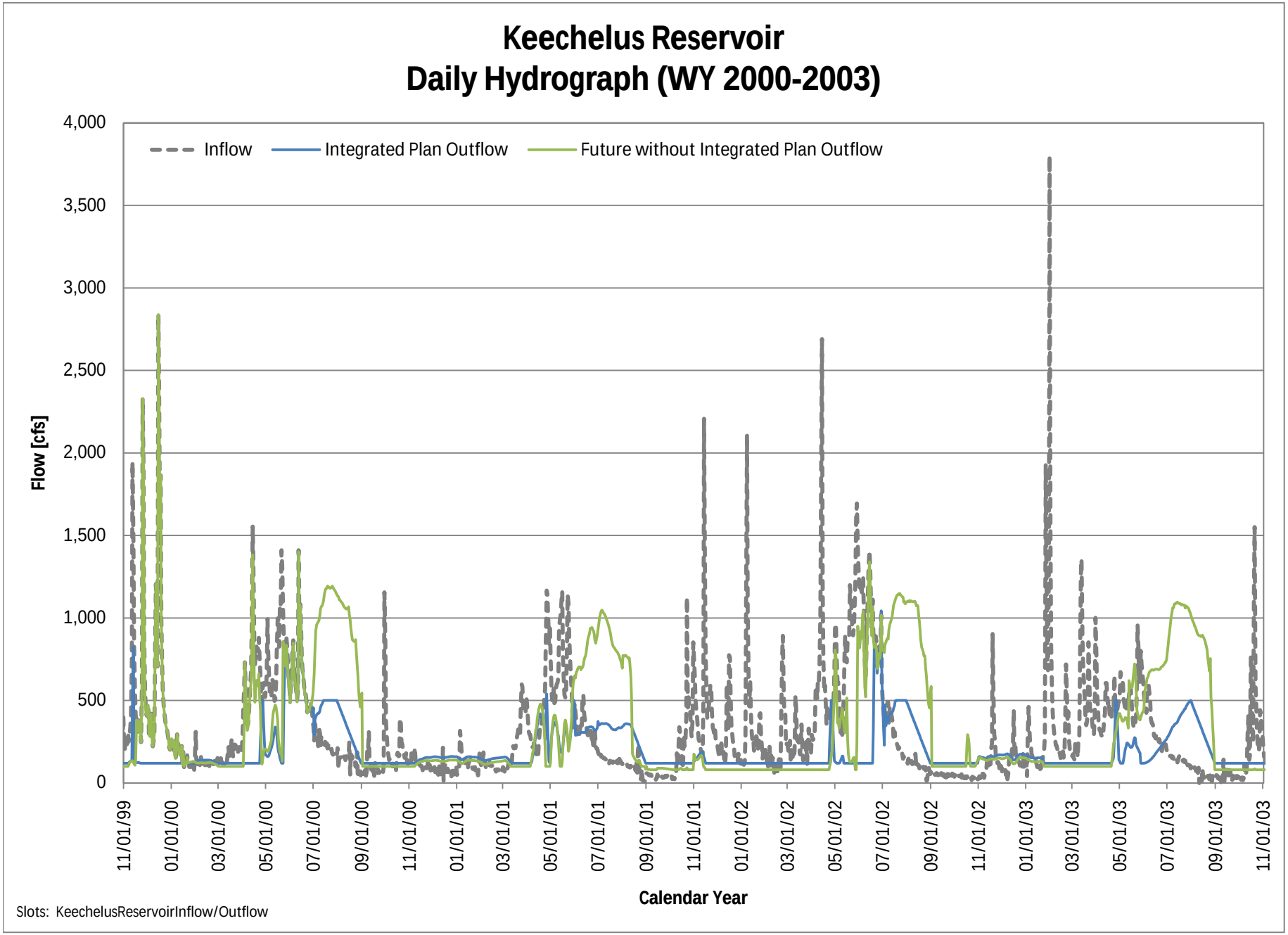

Bumping Reservoir
Daily Hydrograph (WY 2000-2003)
Inflow
Integrated Plan Outflow
Future without Integrated Plan Outflow
Flow [cfs]
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
11/01/99
01/01/00
03/01/00
05/01/00
07/01/00
09/01/00
11/01/00
01/01/01
03/01/01
05/01/01
07/01/01
09/01/01
11/01/01
01/01/02
03/01/02
05/01/02
07/01/02
09/01/02
11/01/02
01/01/03
03/01/03
05/01/03
07/01/03
09/01/03
11/01/03
Calendar Year
Slots: BumpingReservoirInflow/Outflow

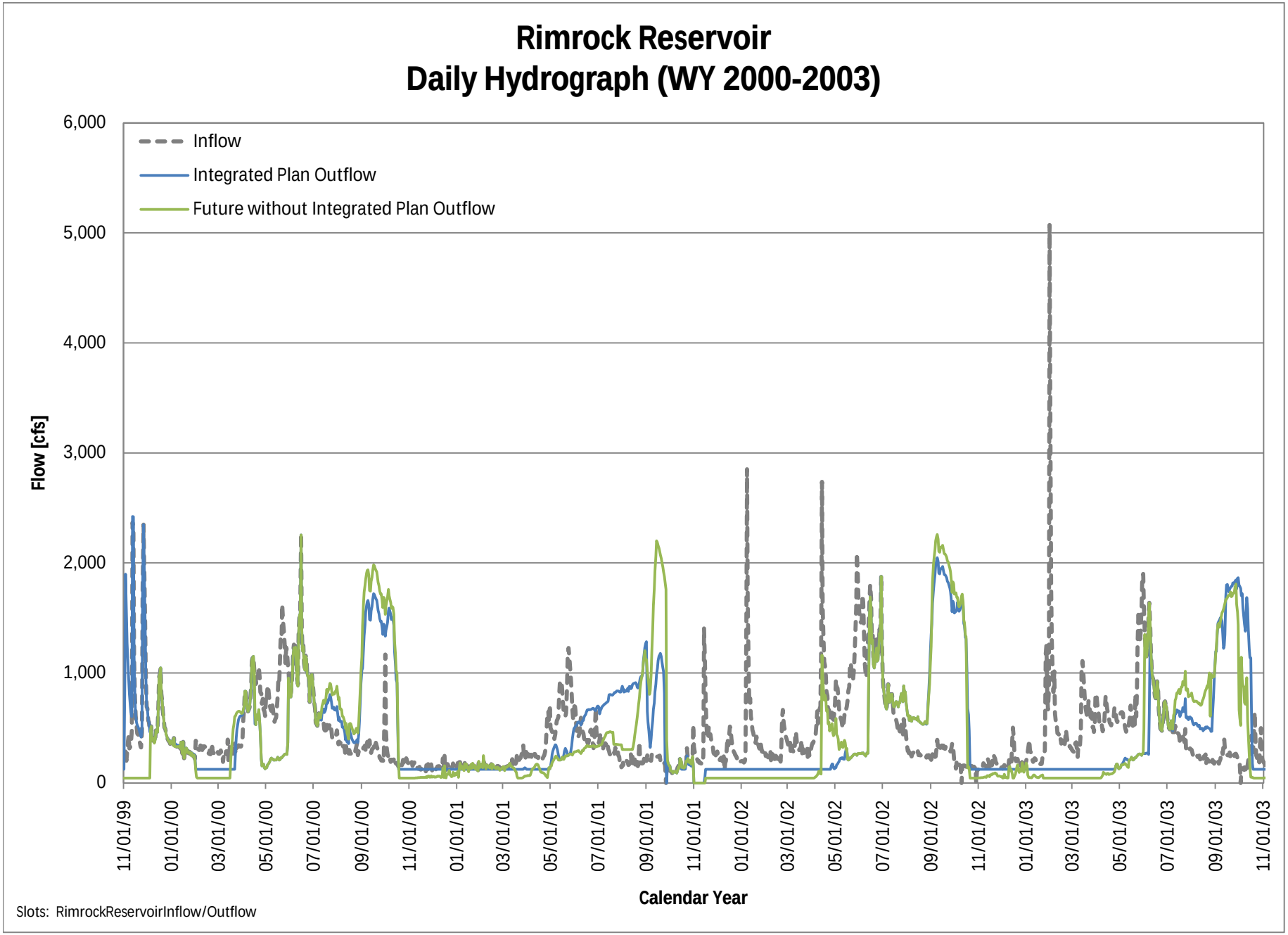
Cle Elum Reservoir
Daily Hydrograph (WY 2000-2003)

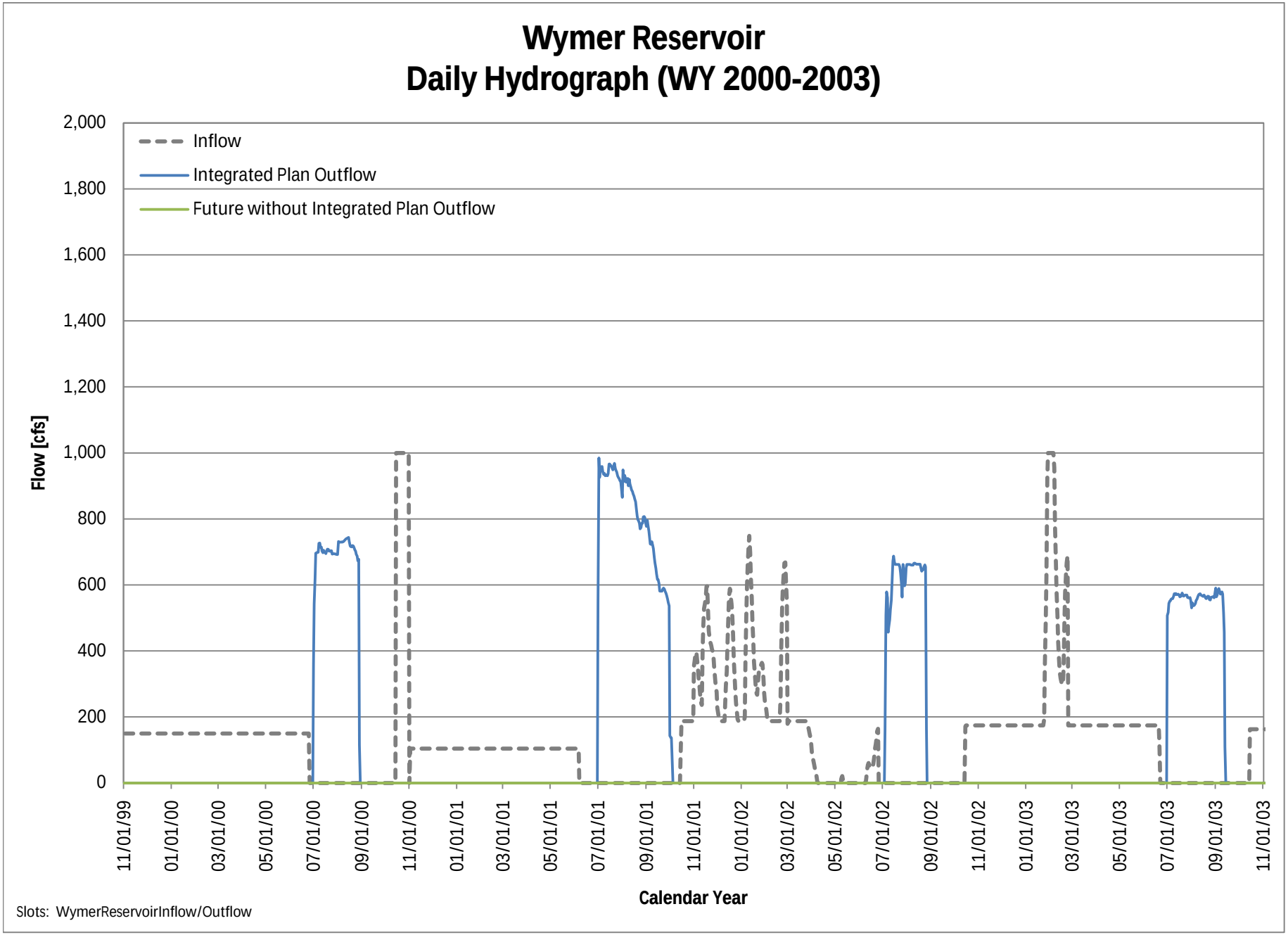


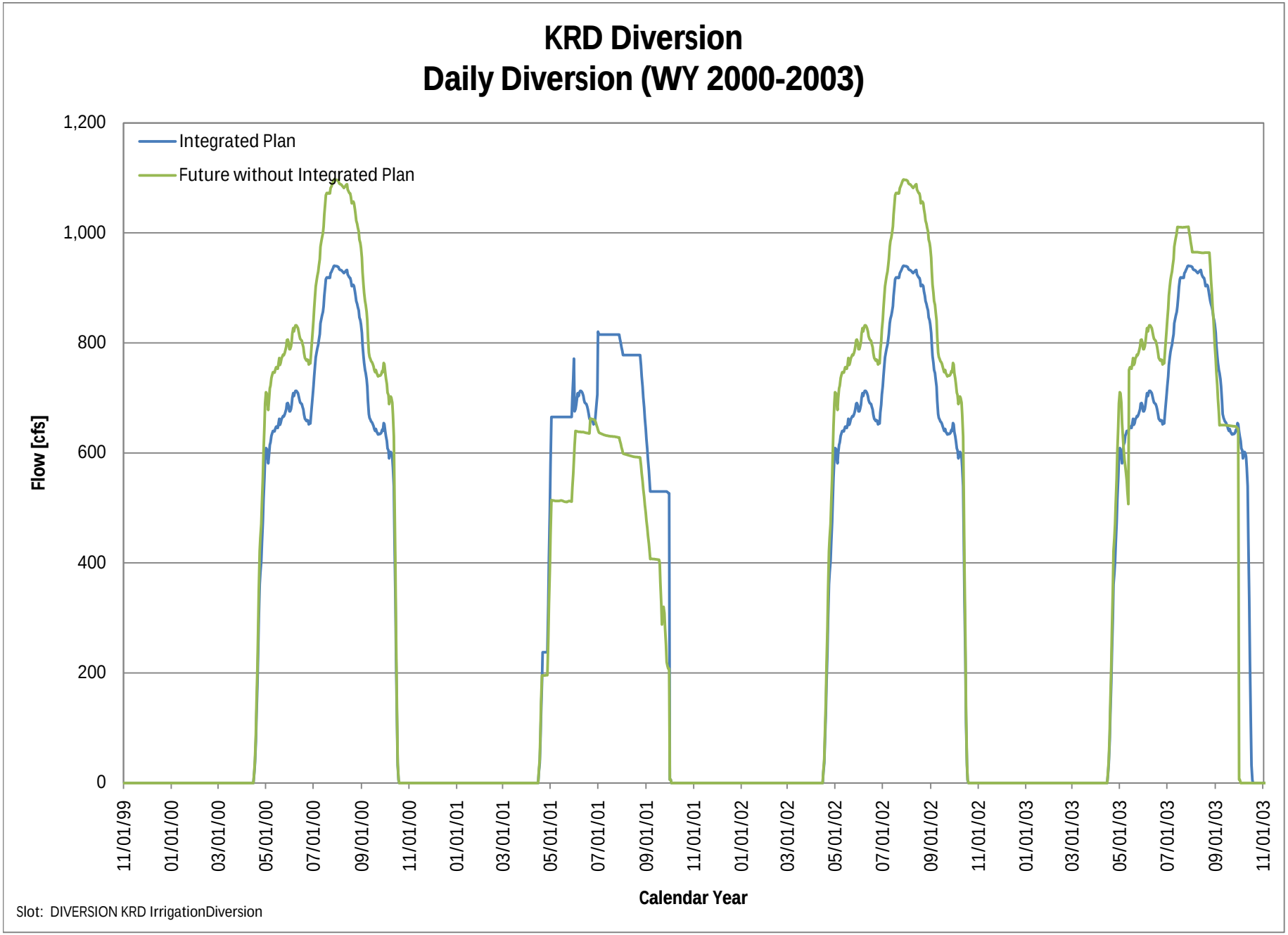
Slots: CleElumReservoirInflow/Outflow

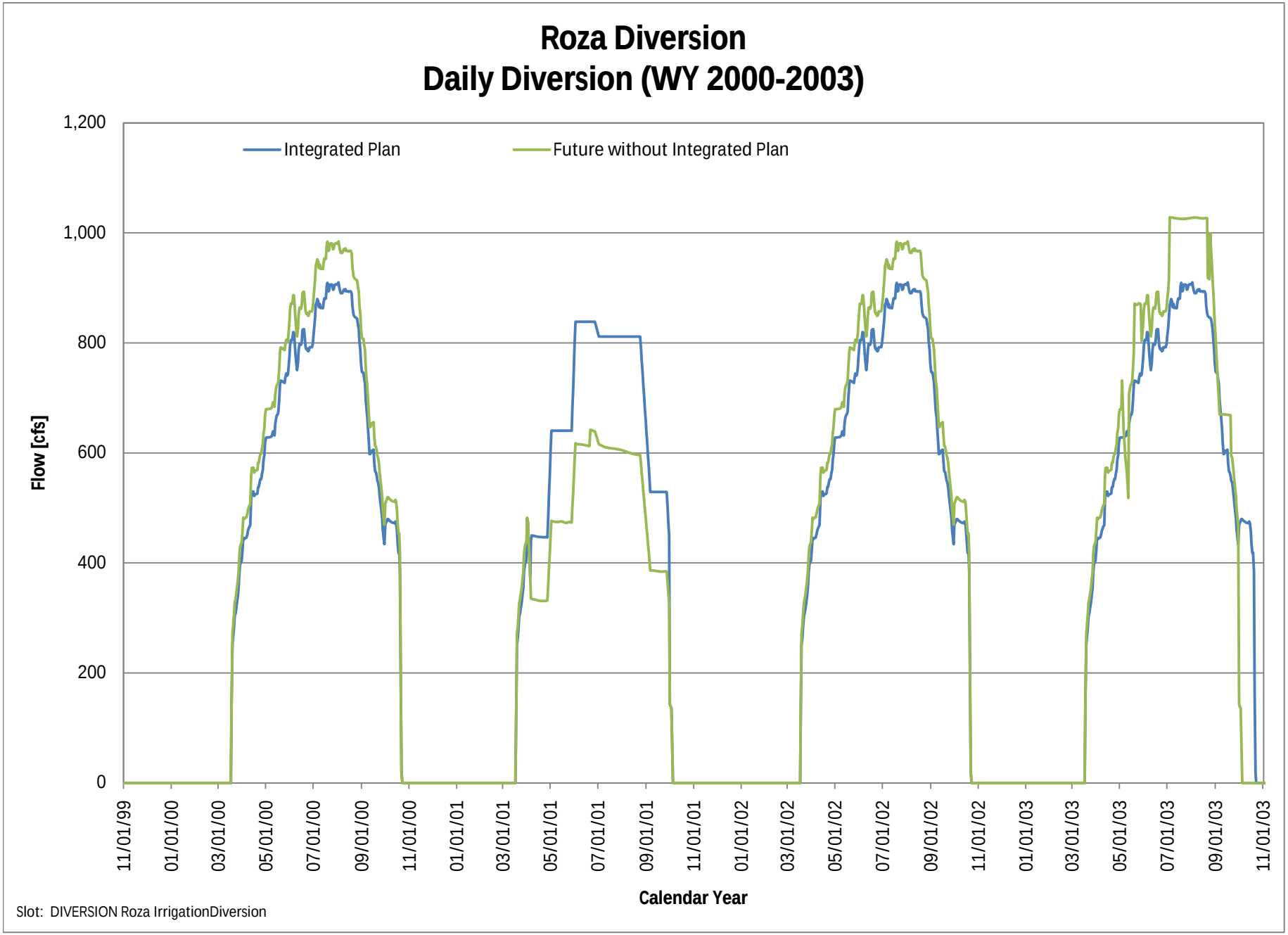

Kachess Reservoir
Daily Hydrograph (WY 2000-2003)
Inflow
Integrated Plan Outflow
Future without Integrated Plan Outflow
Flow [cfs]
3,000
2,500
2,000
1,500
1,000
500
0
11/01/99
01/01/00
03/01/00
05/01/00
07/01/00
09/01/00
11/01/00
01/01/01
03/01/01
05/01/01
07/01/01
09/01/01
11/01/01
01/01/02
03/01/02
05/01/02
07/01/02
09/01/02
11/01/02
01/01/03
03/01/03
05/01/03
07/01/03
09/01/03
11/01/03
Calendar Year
Slots: KachessReservoirInflow/Outflow

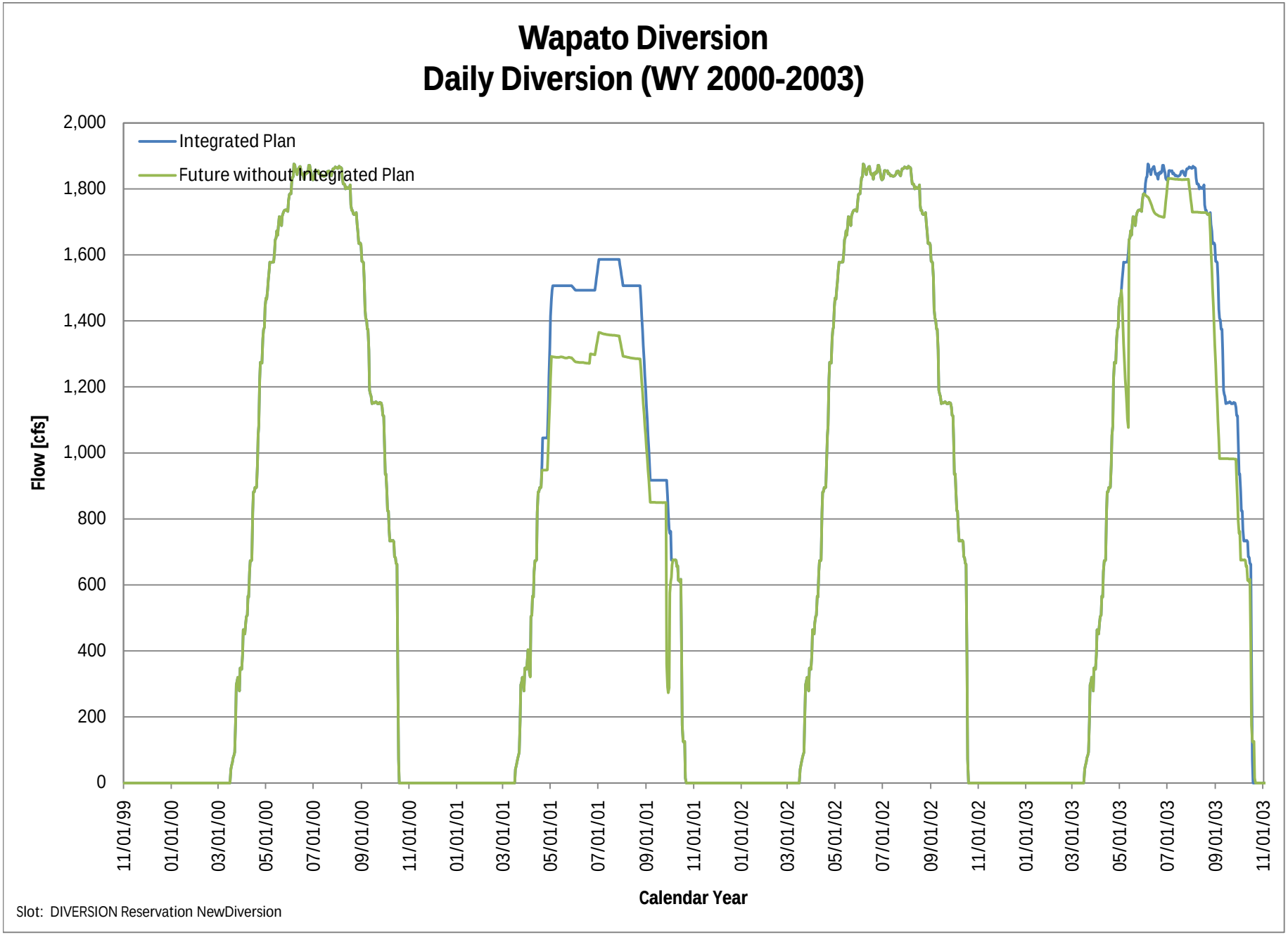

Keechelus Reservoir
Daily Hydrograph (WY 2000-2003)
Inflow
Integrated Plan Outflow
Future without Integrated Plan Outflow
Flow [cfs]
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
11/01/99
01/01/00
03/01/00
05/01/00
07/01/00
09/01/00
11/01/00
01/01/01
03/01/01
05/01/01
07/01/01
09/01/01
11/01/01
01/01/02
03/01/02
05/01/02
07/01/02
09/01/02
11/01/02
01/01/03
03/01/03
05/01/03
07/01/03
09/01/03
11/01/03
Calendar Year
Slots: KeechelusReservoirInflow/Outflow

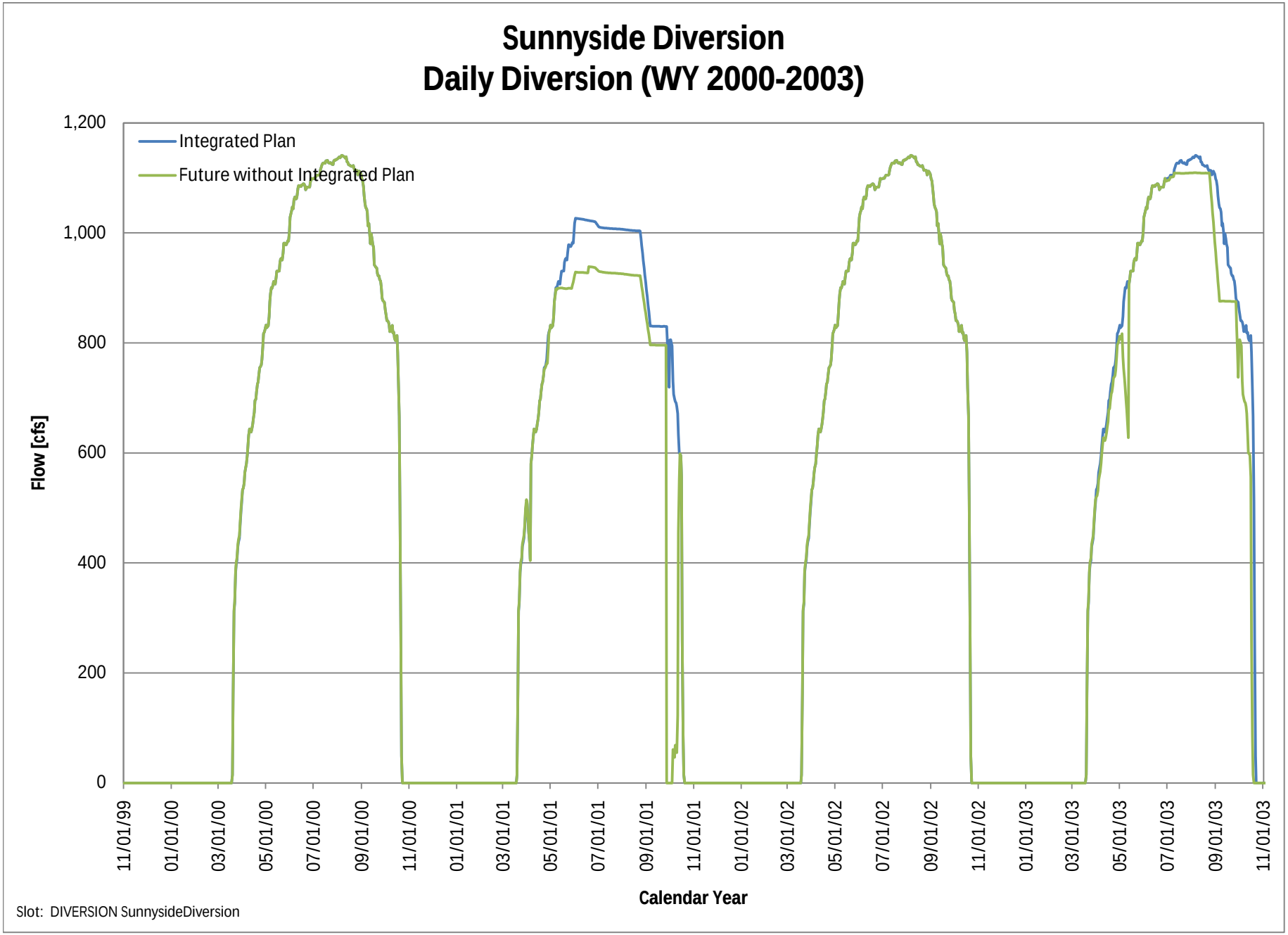

Rimrock Reservoir
Daily Hydrograph (WY 2000-2003)
Inflow
Integrated Plan Outflow
Future without Integrated Plan Outflow
Flow [cfs]
6,000
5,000
4,000
3,000
2,000
1,000
0
11/01/99
01/01/00
03/01/00
05/01/00
07/01/00
09/01/00
11/01/00
01/01/01
03/01/01
05/01/01
07/01/01
09/01/01
11/01/01
01/01/02
03/01/02
05/01/02
07/01/02
09/01/02
11/01/02
01/01/03
03/01/03
05/01/03
07/01/03
09/01/03
11/01/03
Calendar Year
Slots: RimrockReservoirInflow/Outflow

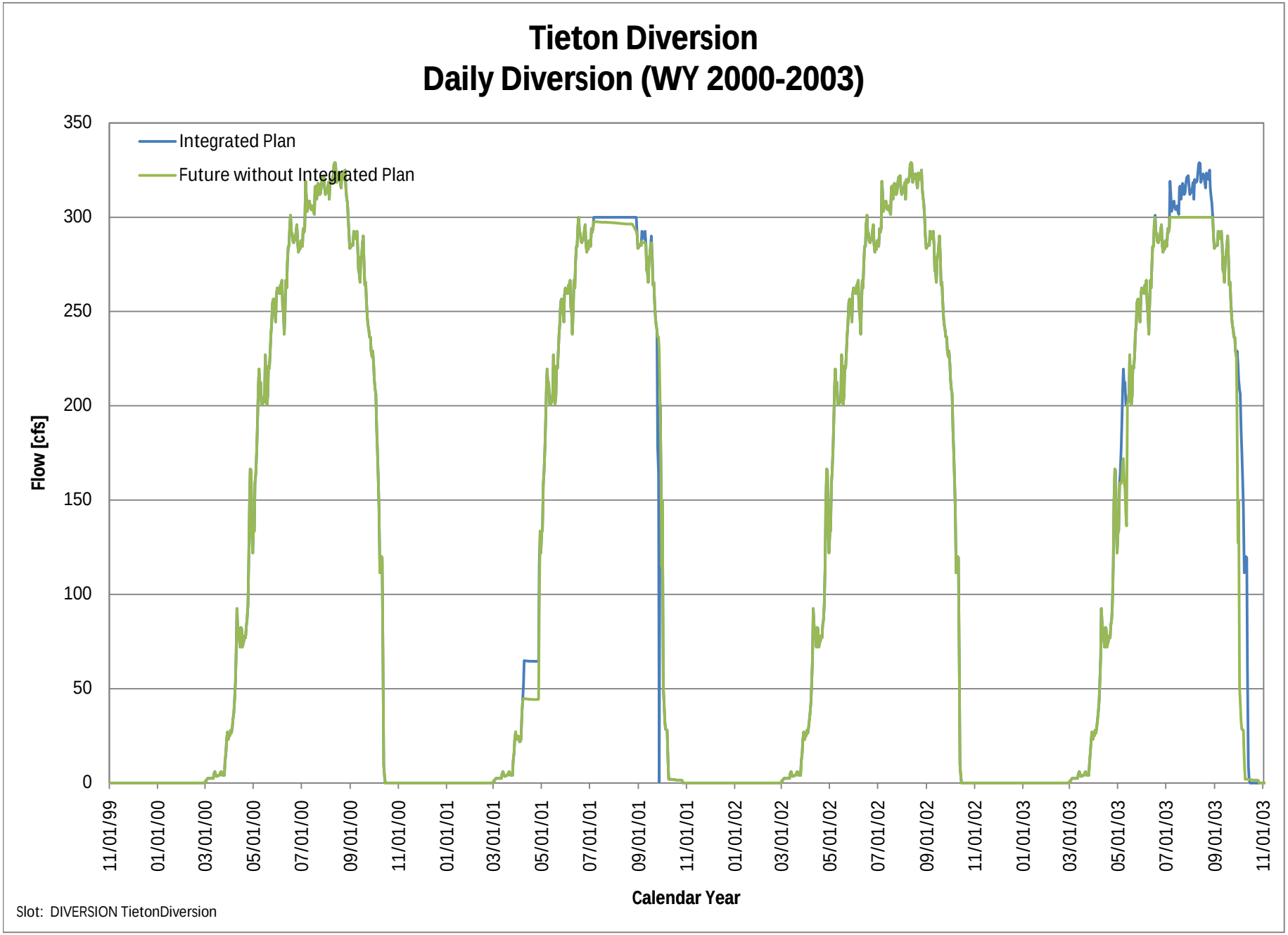

Wymer Reservoir
Daily Hydrograph (WY 2000-2003)
Inflow
Integrated Plan Outflow
Future without Integrated Plan Outflow
Flow [cfs]
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
11/01/99
01/01/00
03/01/00
05/01/00
07/01/00
09/01/00
11/01/00
01/01/01
03/01/01
05/01/01
07/01/01
09/01/01
11/01/01
01/01/02
03/01/02
05/01/02
07/01/02
09/01/02
11/01/02
01/01/03
03/01/03
05/01/03
07/01/03
09/01/03
11/01/03
Calendar Year
Slots: WymerReservoirInflow/Outflow

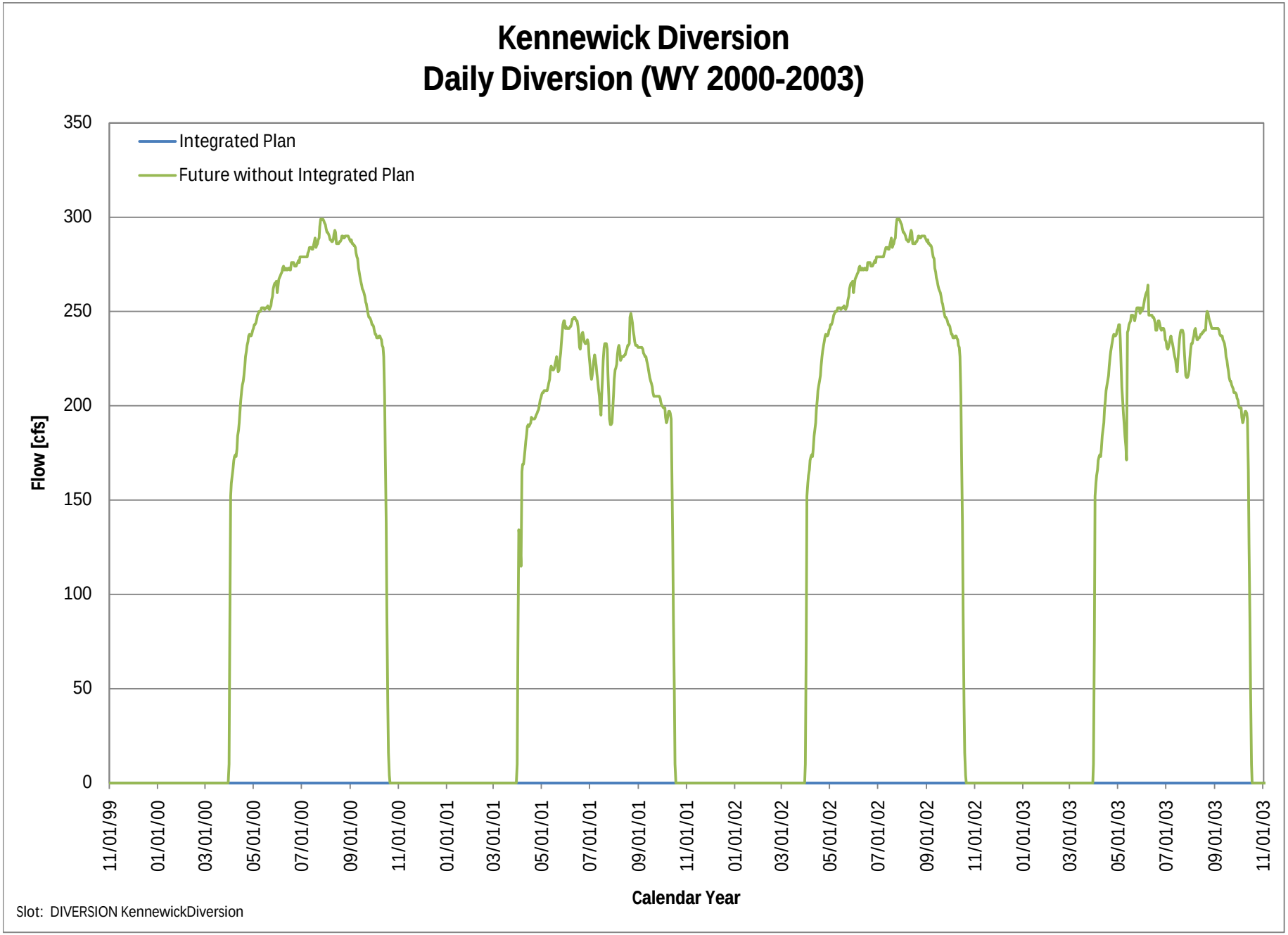

KRD Diversion
Daily Diversion (WY 2000-2003)
Integrated Plan
Future without Integrated Plan
Flow [cfs]
1,200
1,000
800
600
400
200
0
11/01/99
01/01/00
03/01/00
05/01/00
07/01/00
09/01/00
11/01/00
01/01/01
03/01/01
05/01/01
07/01/01
09/01/01
11/01/01
01/01/02
03/01/02
05/01/02
07/01/02
09/01/02
11/01/02
01/01/03
03/01/03
05/01/03
07/01/03
09/01/03
11/01/03
Calendar Year
Slot: DIVERSION KRD IrrigationDiversion


Roza Diversion
Daily Diversion (WY 2000-2003)
Integrated Plan
Future without Integrated Plan
Flow [cfs]
1,200
1,000
800
600
400
200
0
11/01/99
01/01/00
03/01/00
05/01/00
07/01/00
09/01/00
11/01/00
01/01/01
03/01/01
05/01/01
07/01/01
09/01/01
11/01/01
01/01/02
03/01/02
05/01/02
07/01/02
09/01/02
11/01/02
01/01/03
03/01/03
05/01/03
07/01/03
09/01/03
11/01/03
Calendar Year
Slot: DIVERSION Roza IrrigationDiversion


Wapato Diversion
Daily Diversion (WY 2000-2003)
Integrated Plan
Future without Integrated Plan
Flow [cfs]
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
11/01/99
01/01/00
03/01/00
05/01/00
07/01/00
09/01/00
11/01/00
01/01/01
03/01/01
05/01/01
07/01/01
09/01/01
11/01/01
01/01/02
03/01/02
05/01/02
07/01/02
09/01/02
11/01/02
01/01/03
03/01/03
05/01/03
07/01/03
09/01/03
11/01/03
Calendar Year
Slot: DIVERSION Reservation NewDiversion


Sunnyside Diversion
Daily Diversion (WY 2000-2003)
Integrated Plan
Future without Integrated Plan
Flow [cfs]
1,200
1,000
800
600
400
200
0
11/01/99
01/01/00
03/01/00
05/01/00
07/01/00
09/01/00
11/01/00
01/01/01
03/01/01
05/01/01
07/01/01
09/01/01
11/01/01
01/01/02
03/01/02
05/01/02
07/01/02
09/01/02
11/01/02
01/01/03
03/01/03
05/01/03
07/01/03
09/01/03
11/01/03
Calendar Year
Slot: DIVERSION SunnysideDiversion


Tieton Diversion
Daily Diversion (WY 2000-2003)
Integrated Plan
Future without Integrated Plan
Flow [cfs]
350
300
250
200
150
100
50
0
11/01/99
01/01/00
03/01/00
05/01/00
07/01/00
09/01/00
11/01/00
01/01/01
03/01/01
05/01/01
07/01/01
09/01/01
11/01/01
01/01/02
03/01/02
05/01/02
07/01/02
09/01/02
11/01/02
01/01/03
03/01/03
05/01/03
07/01/03
09/01/03
11/01/03
Calendar Year
Slot: DIVERSION TietonDiversion


Kennewick Diversion
Daily Diversion (WY 2000-2003)
Integrated Plan
Future without Integrated Plan
Flow [cfs]
350
300
250
200
150
100
50
0
11/01/99
01/01/00
03/01/00
05/01/00
07/01/00
09/01/00
11/01/00
01/01/01
03/01/01
05/01/01
07/01/01
09/01/01
11/01/01
01/01/02
03/01/02
05/01/02
07/01/02
09/01/02
11/01/02
01/01/03
03/01/03
05/01/03
07/01/03
09/01/03
11/01/03
Calendar Year
Slot: DIVERSION KennewickDiversion