Technical Management Team
2004 Year End Review

Water Quality

Fixed Monitoring Stations

- Corps operated a total of 29 FMS's
  - ⇨Portland District: 8 Stations
  - ⇨Walla Walla District: 16 Stations
  - ⇨Seattle District: 5 Stations
- Bureau of Reclamation Operated 4 FMS's
- Mid-C PUD's Operated 10 FMS's
- 2 New Stations in 2004
  - ⇨Albani Falls Forebay
  - ⇨Cascade Island
- Data can be obtained at "Dataquery"
  - ⇨ http://www.nwd-wc.usace.army.mil/perl/dataquery.pl

Total Dissolved Gas

Project	Start Spill	End Spill	Days of Spill
Dworshak	Various Dates		45 days
Lower Granite	4 April	22 April	19 Days
Little Goose	8 April	22 April	15 Days
Lower Monumental	25 April	13 May	19 days
Ice Harbor	15 April	31 August	139 days
McNary	15 April	24 June	71 days
John Day	15 April	31 August	139 days
The Dalles	15 April	31 August	139 days
Bonneville	15 April	31 August	139 days
Chief Joseph	No Spill		

Total Dissolved Gas

Comparison of Exceedences with Previous Years TDG Exceedences from High 12-hr Average in 24 hours				
Year	Days in Spill Season	Number of Days Exceeded	Percent Exceeding TDG Standard (%)	Percent Consistent with TDG Standard (%)
2004	3020	71	2.4	97.6
2003	3020	243	8.0	92.0
2002	3020	490	16.2	83.8
2001	3020	13	0.4	99.6
2000	3020	252	8.3	91.7
1999	3020	411	13.6	86.4
Ave.	**3020**	**247**	**8.17**	**91.8**

Total Dissolved Gas

TYPES OF EXCEEDANCES FOR 2003 AND 2004 SPILL SEASON			
2004	**2003**	**TYPE**	**DEFINITION**
4	68	1	Exceedance due to high runoff flows and flood control efforts.
0	0	2	Exceedance due to Intertie line outages.
0	0	3	Exceedance due to unit outages during repair or maintenance.
0	0	4	Exceedance due to BPA inability to handle load so water was spilled.
0	1	5	Exceedance due to a break down in communication. Teletype went out, but no change occurred or Project operator interpreted teletype differently than what was intended.
16	106	6	Exceedance due to uncertainties when using best professional judgement to apply the spill guidance criteria (travel time; degassing; water temperature effects; spill patterns).
0	18	7	Exceedance due to high TDG levels coming from the Mid-Columbia River (see Pasco FMS).
3	0	8	Exceedance due to high TDG levels coming from the Snake River. (see Ice Harbor tailwater FMS).
0	0	9	Exceedance due to a load rejection. The powerhouse was not working and the river was spilled.
6	7	10	Exceedance due to lack of Information (FMS gage malfunction therefore no data.
0	9	11	Exceedance due to mechanical problems (gate stuck open, passing debris, etc.)
25	20	12	Exceedance due to sharp rise in water temperature (3-5 ºC change in a day).
7	33	13	Exceedance due to bulk spill pattern being used which generated more TDG than expected.
10	0	12/7	Exceedance due to combination of exceedance type 12 and 7.
71	**262**	**--**	**TOTALS**

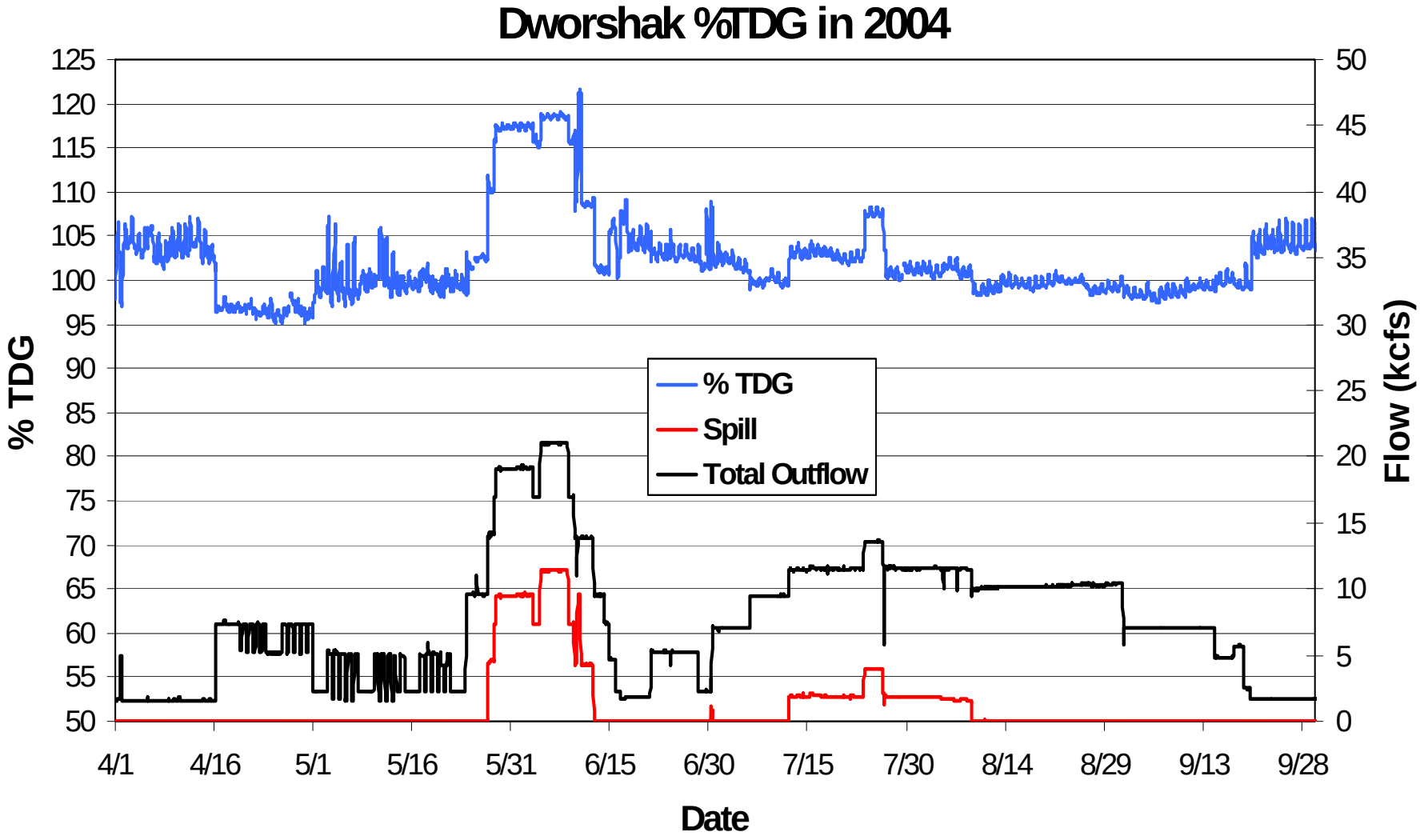
Total Dissolved Gas

EXCEEDANCES AT FMS FROM 1999 - 2004							
	2004	2003	2002	2001	2000	1999	Totals
Water Quality Gages	**Quantity**	**Quantity**	**Quantity**	**Quantity**	**Quantity**	**Quantity**	**Quantity**
Lower Granite Forebay	0	0	0	5	2	0	7
Lower Granite Tailwater	0	15	17	0	4	15	51
Little Goose Forebay	3	10	17	0	2	39	71
Little Goose Tailwater	0	6	6	0	9	6	27
Lower Monumental Forebay	1	19	49	0	28	44	**141**
Lower Monumental Tailwater	1	10	6	0	12	26	55
Ice Harbor Forebay	4	35	24	0	34	44	**141**
Ice Harbor Tailwater	2	4	6	0	4	12	28
McNary Forebay - Wa.	10	24	43	1	14	22	114
McNary Forebay - Or.	23	32	45	5	22	19	**146**
McNary Tailwater	7	12	31	0	17	50	117
John Day Forebay	0	10	11	0	1	8	30
John Day Tailwater	0	0	29	0	12	43	84
The Dalles Forebay	5	11	18	0	5	1	40
The Dalles Tailwater	0	4	11	0	5	5	25
Bonneville Forebay	1	17	30	0	14	19	81
Cascade Island	0	---	---	---	---	---	0
Warrendale	0	1	19	0	6	2	28
Camas/Washougal	14	33	65	2	58	51	**223**
Chief Joseph Forebay	0	0	53	0	3	4	60
Chief Joseph Tailwater	0	0	11	0	0	1	12
Total Number of Exceedances	**71**	**243**	**491**	**13**	**252**	**411**	**1481**

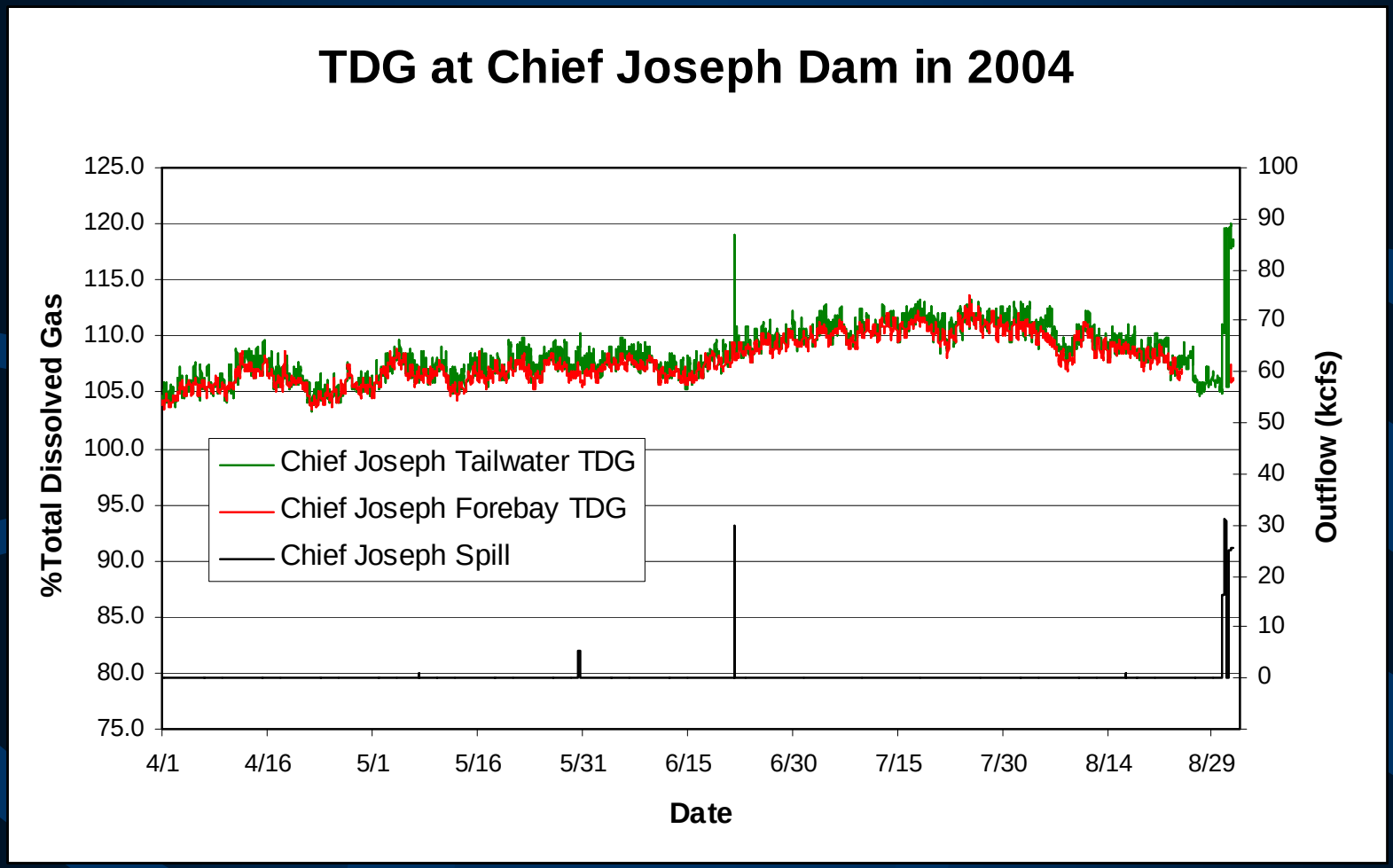
Total Dissolved Gas

TDG Exceedances at Dworshak Dam in 2004				
Date	# of Hours	TDG Levels (%)	Type of Exceedance	Cause
27 May-6 June	338	110.1 – 119.0	1	Exceedance due to high runoff flows and flood control efforts.
10 June	13	113.9 – 121.5	1	Exceedance due to high runoff flows and flood control efforts.
TOTALS	351	--	--	--

Total Dissolved Gas



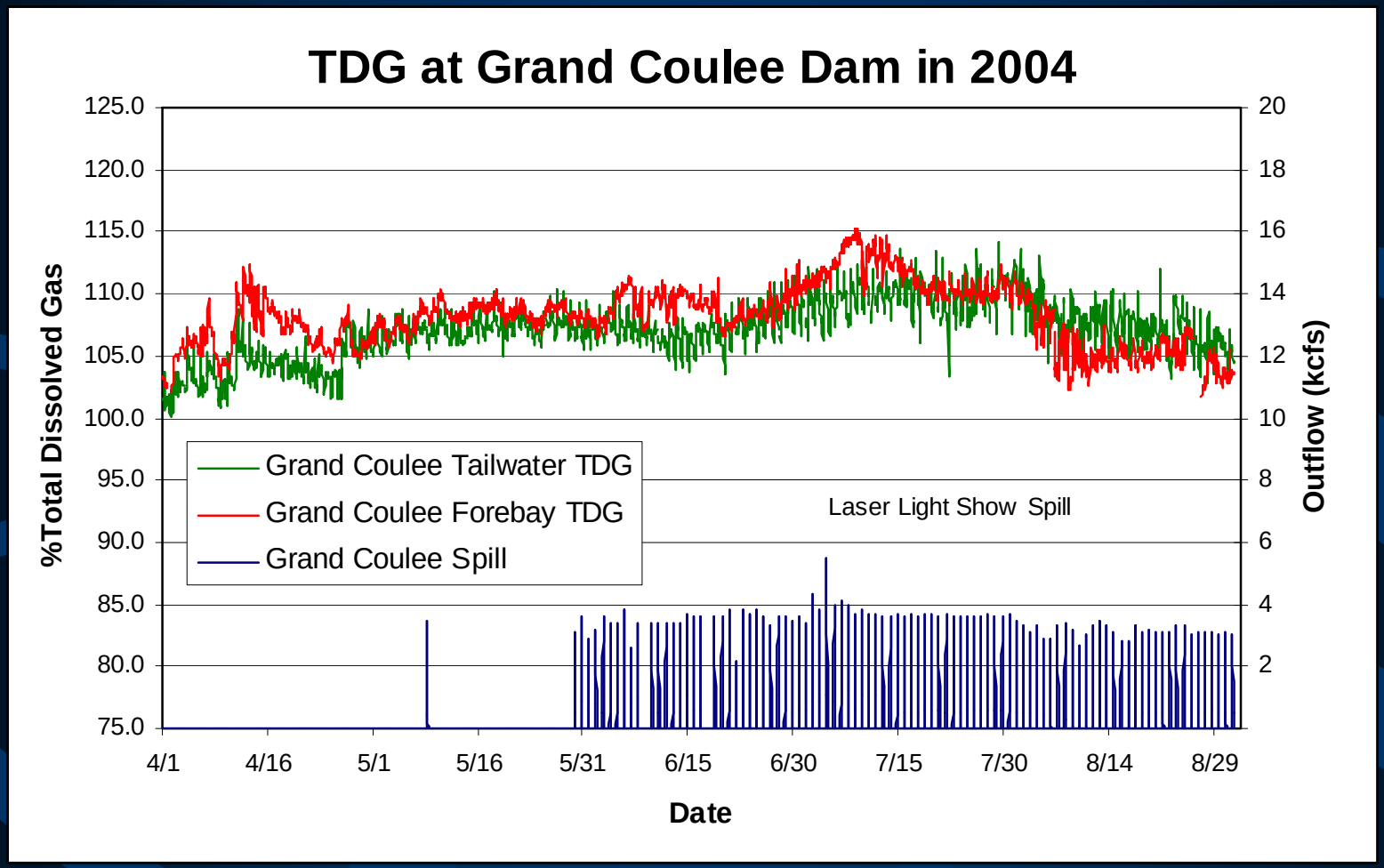
Total Dissolved Gas



Number of Hours of Forebay TDG Exceedance = 712
Number of Hours of Tailwater TDG Exceedance = 927

Hours of Spill = 43

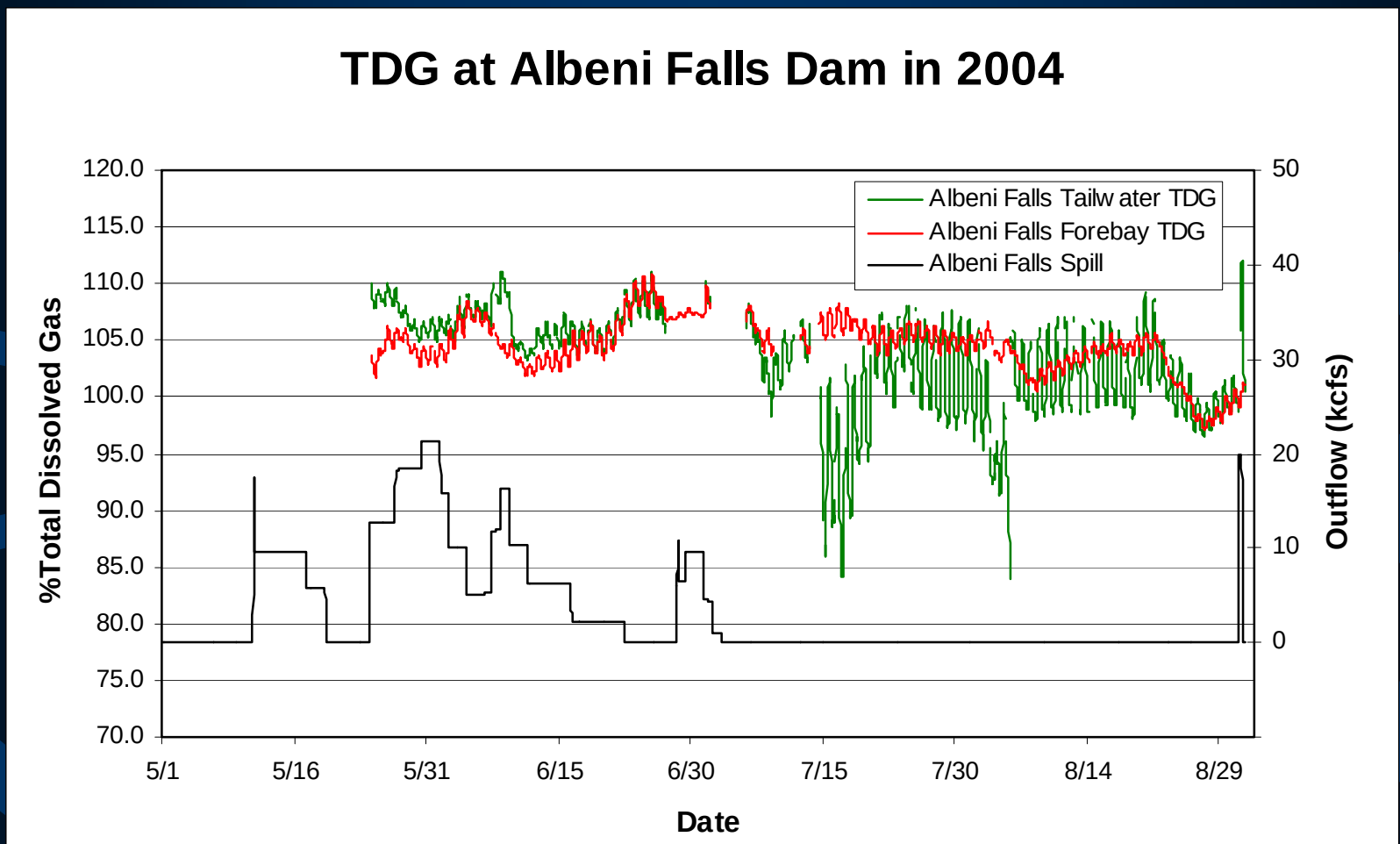
Total Dissolved Gas



Number of Hours of Forebay TDG Exceedance = 832
Number of Hours of Tailwater TDG Exceedance = 388

Hours of Spill = 170

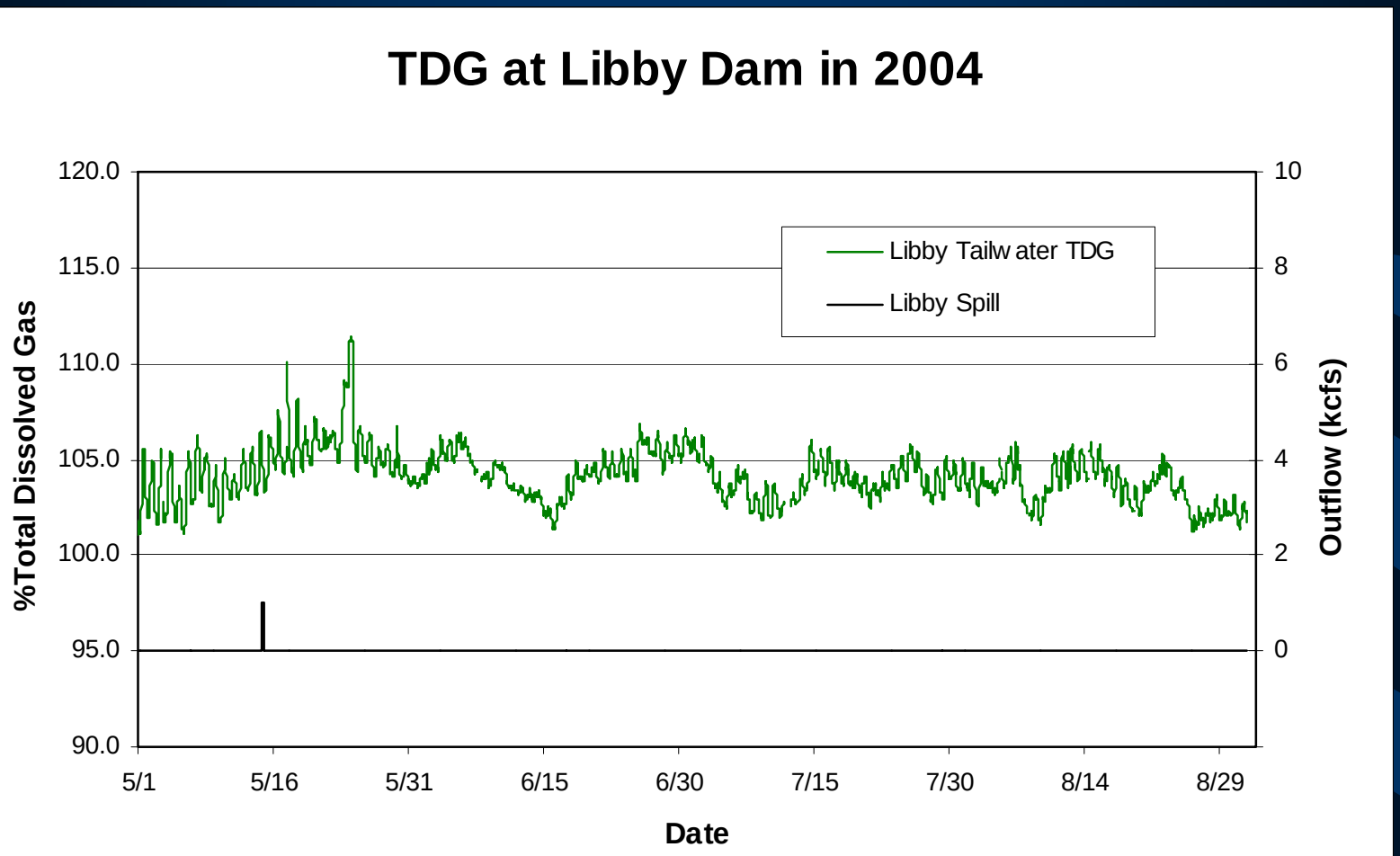
Total Dissolved Gas



Number of Hours of Forebay TDG Exceedance = 18
Number of Hours of Tailwater TDG Exceedance = 31

Hours of Spill = 1,029

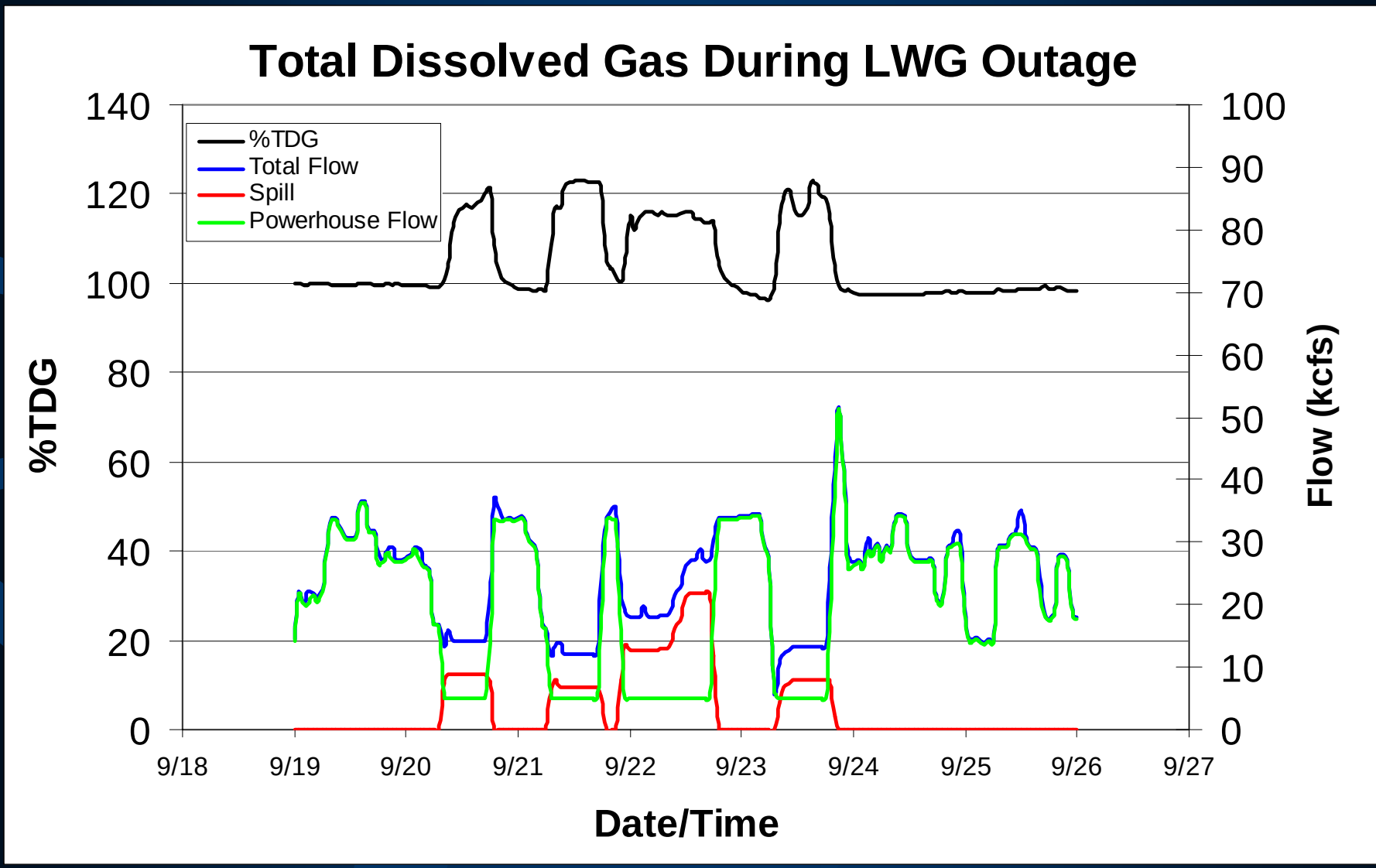
Total Dissolved Gas



Number of Hours of Tailwater TDG Exceedance = 11

Hours of Spill = 5

Total Dissolved Gas

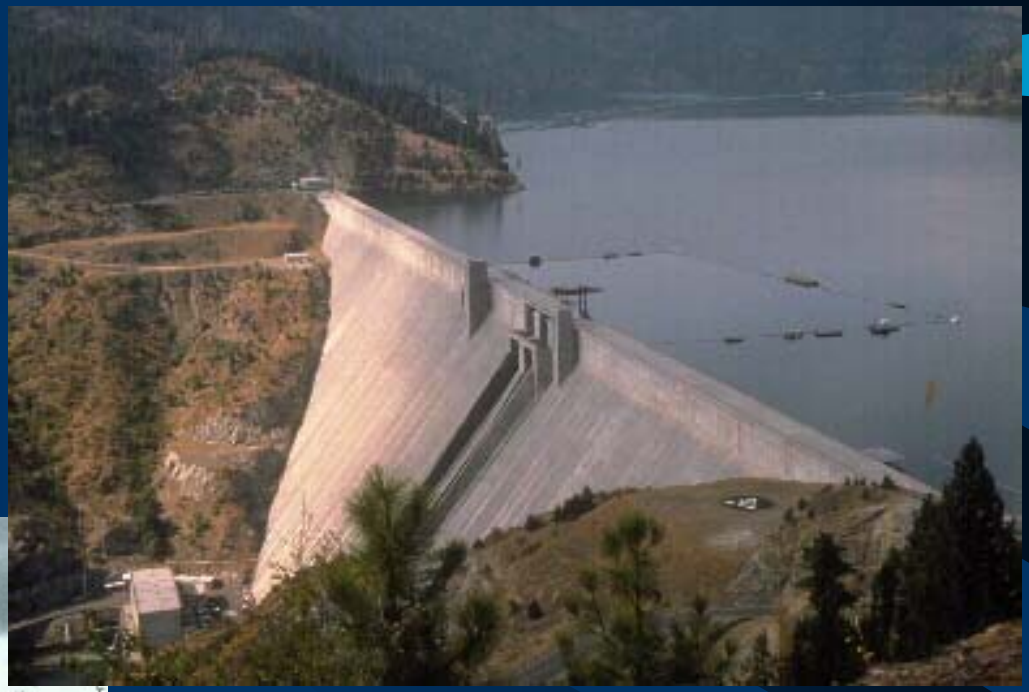


Total Dissolved Gas Exchange in the Columbia River Basin: Decision Support SYSTDG

In Season Spill Management of TDG

- How did we arrive at current conditions?
  - Hindcast using current conditions
- Are adjustments needed to current spill caps?
  - Reduction in spill volume (125/120/115 TDG criteria)
  - Increase spill volume to meet FP objectives
- Where are we headed tomorrow?
  - Forecasting operations and environmental properties
  - Optimization of spill levels

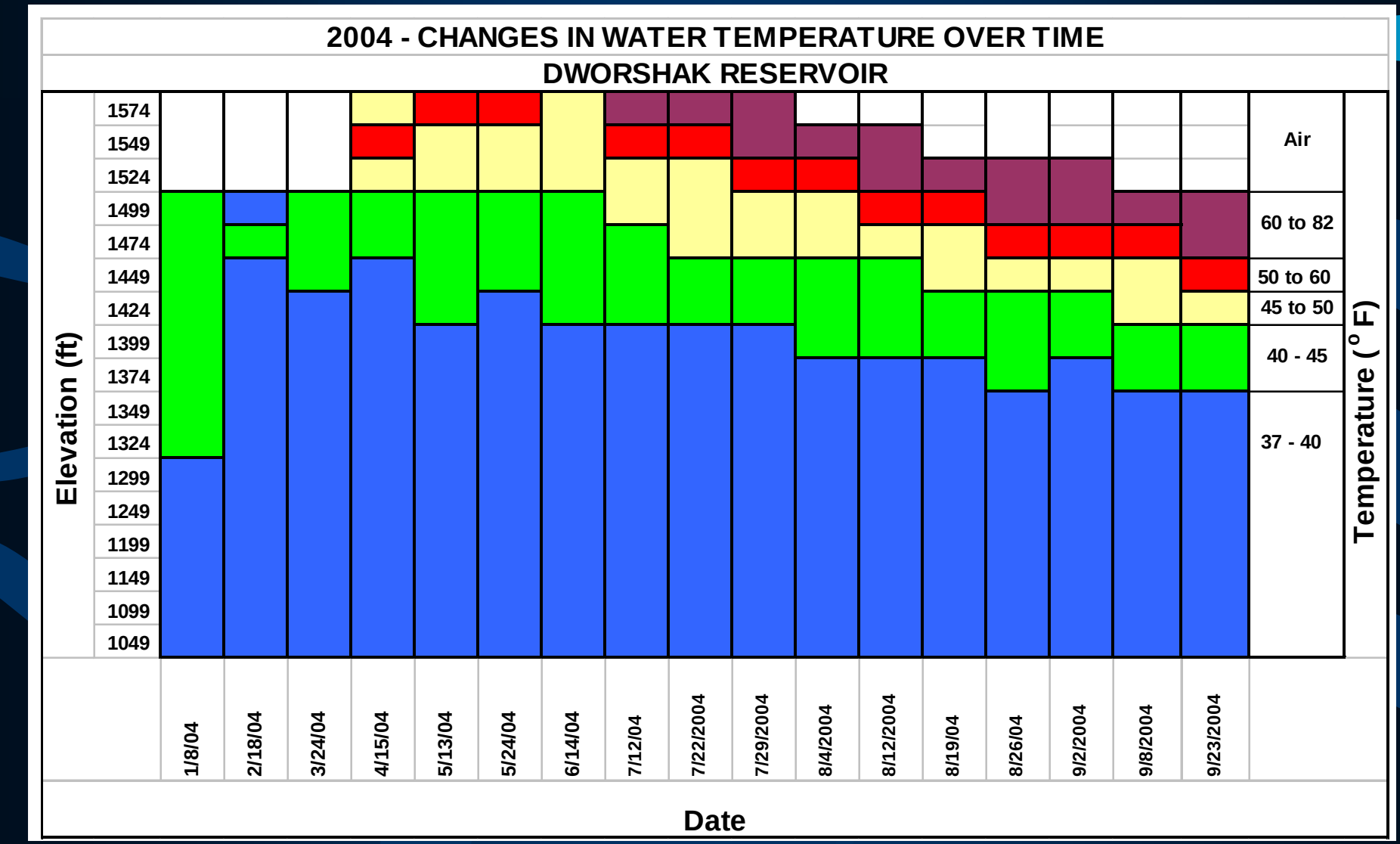
Dworshak Summer Operations



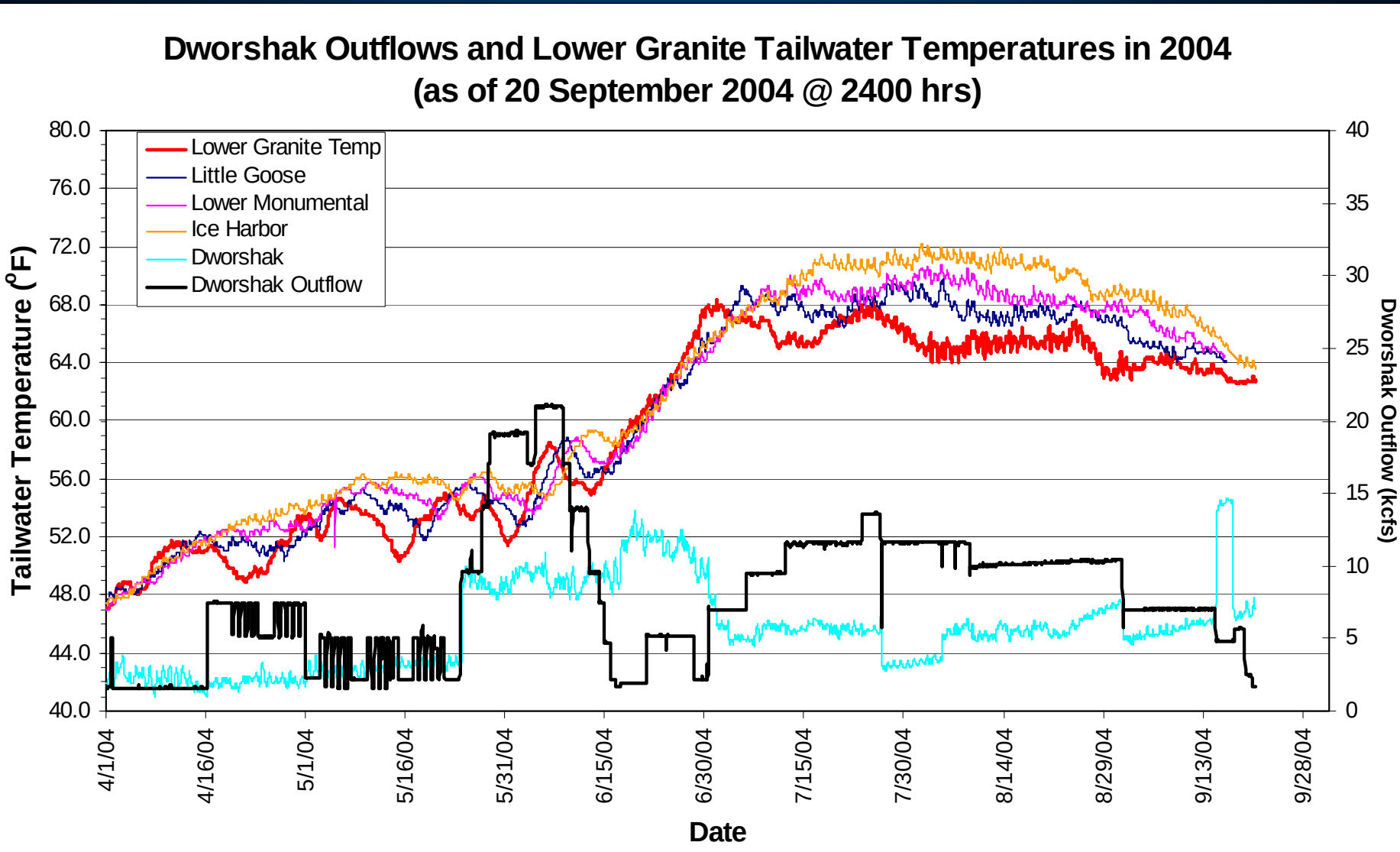
Dworshak Dam

Lower Granite Dam Tailwater

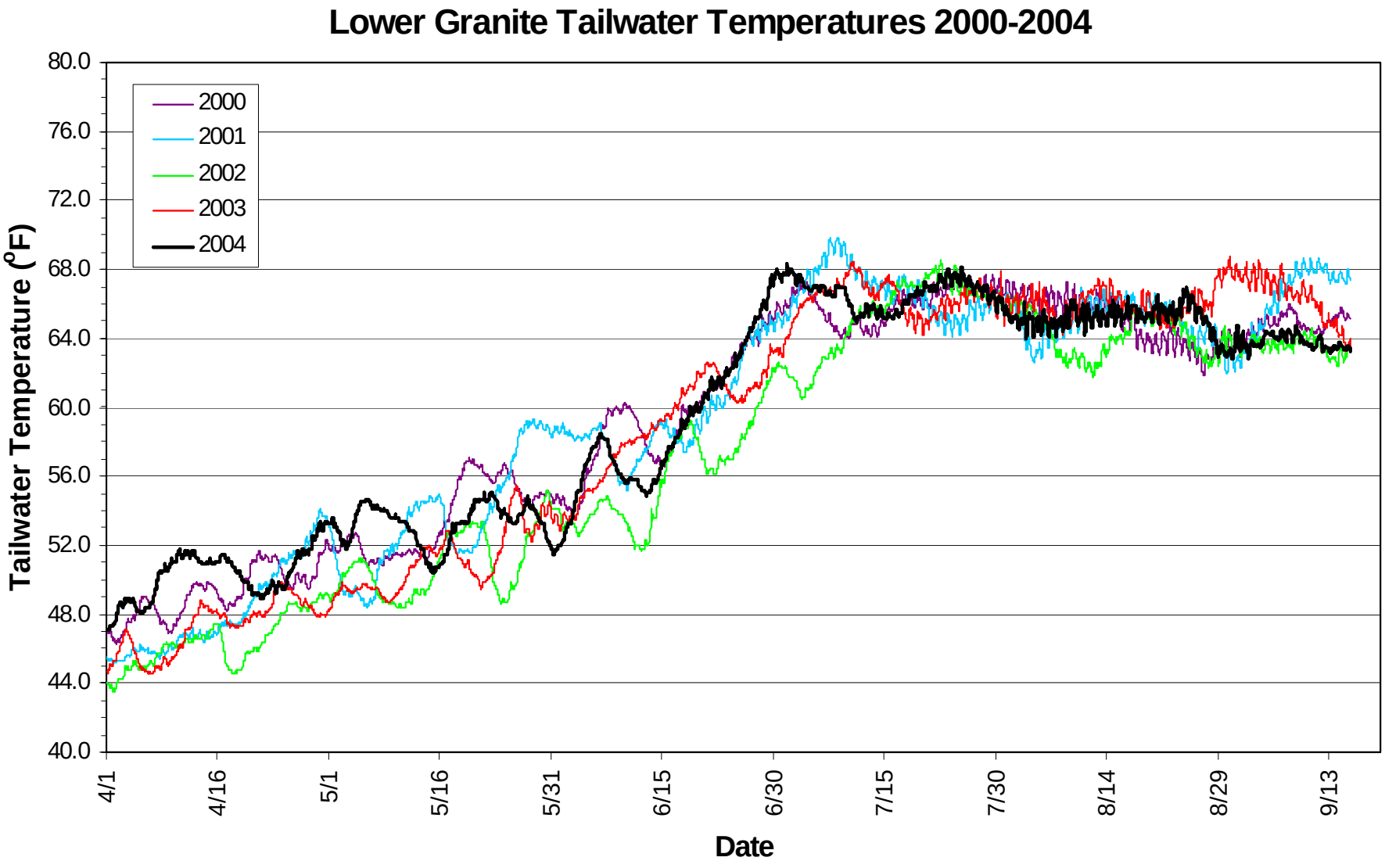
Dworshak Summer Operations



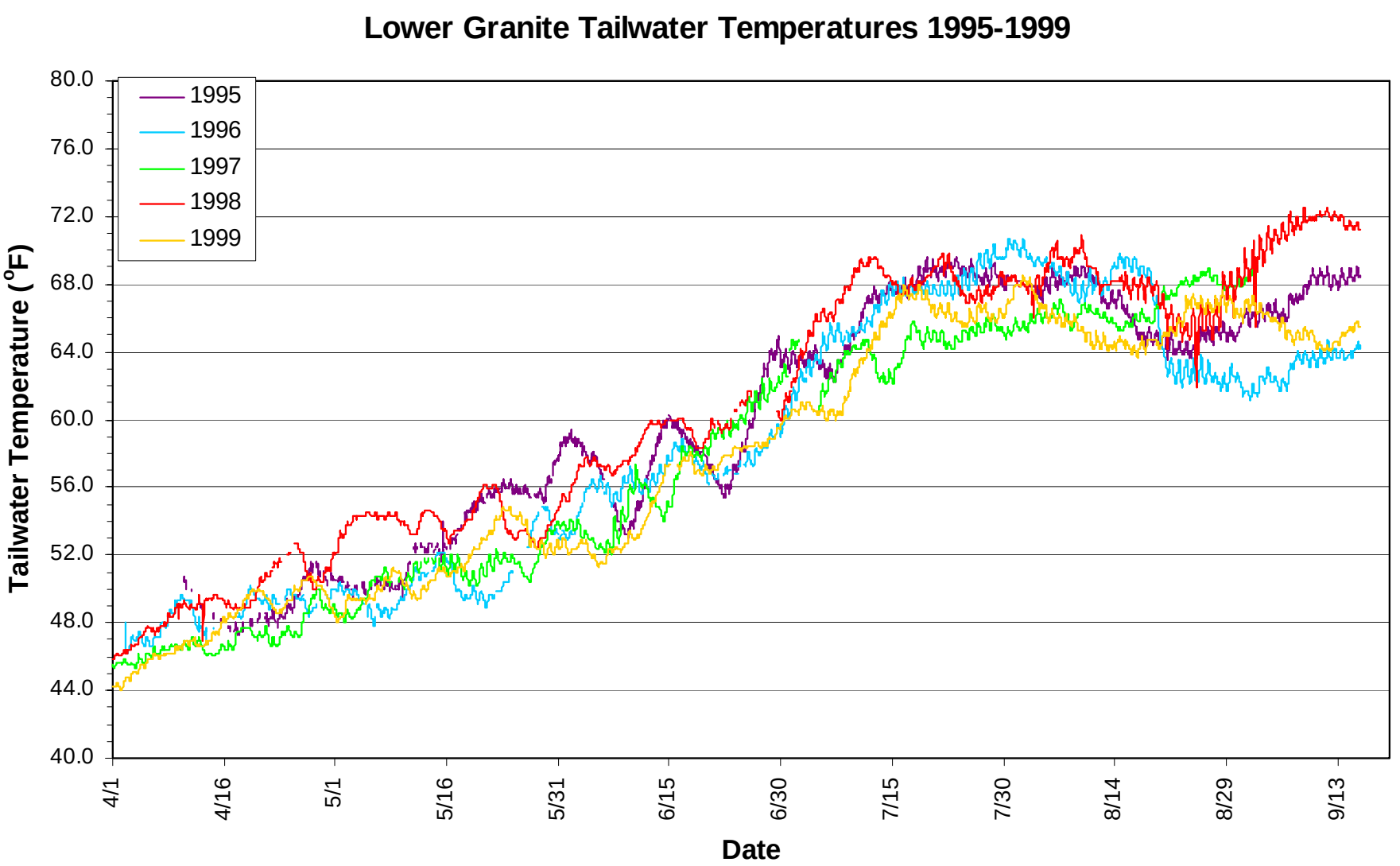
Dworshak Summer Operations



Dworshak Summer Operations



Dworshak Summer Operations



Dworshak Summer Operations

Lower Granite Tailwater Temperatures 1995-2004

Year	Hours of Exceedance	Index of Exceedance
2004	7	2
2003	63	14
2002	17	4
2001	172	123
2000	0	0
1999	23	6
1998	981	1721
1997	137	56
1996	526	613
1995	593	363

10-Year Statistics

Hours of Exceedance

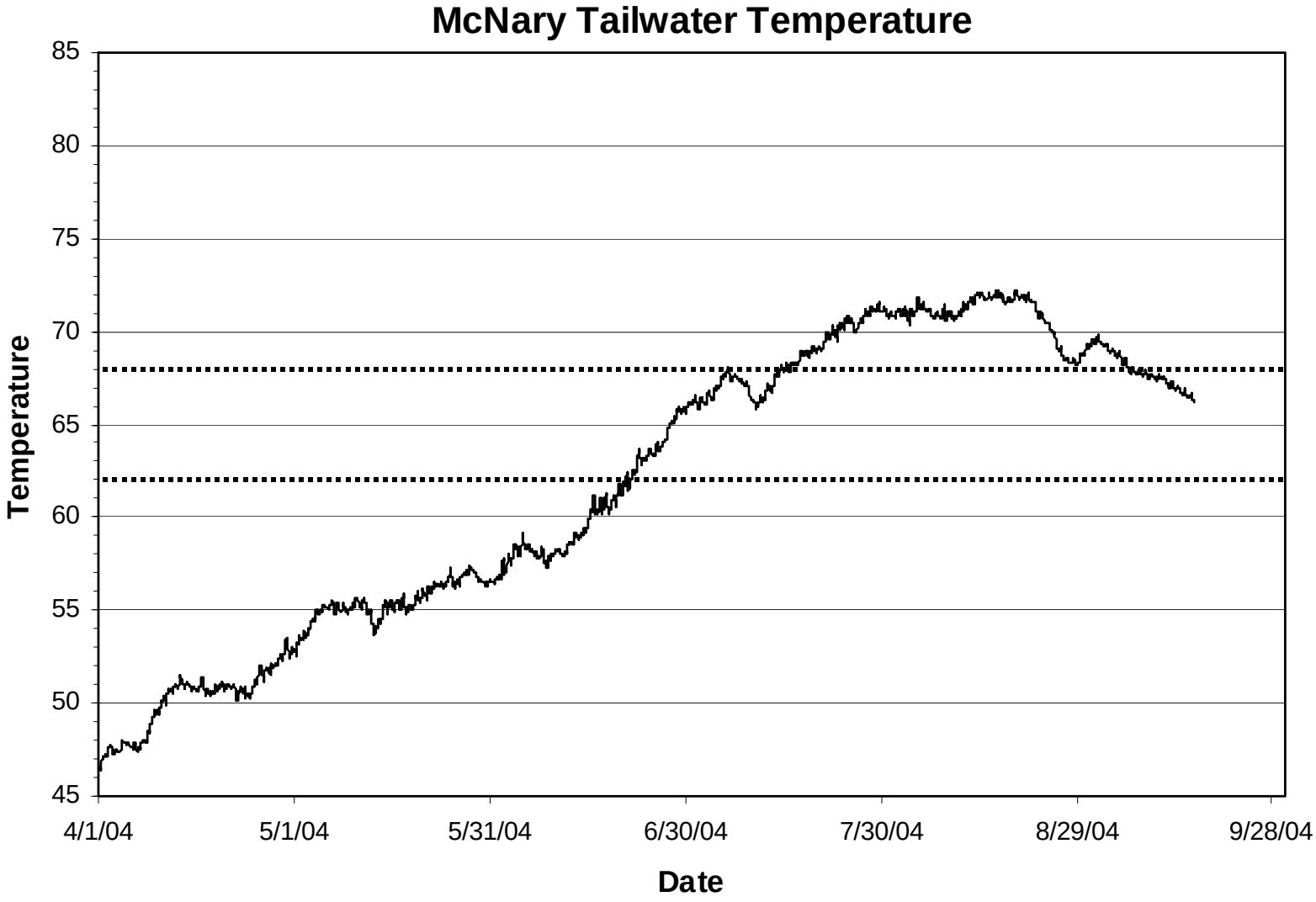
Range: High = 981 hrs (1998)
Low = 0 hrs (2000)
Average 1995-1999: 452 hrs
Average 2000-2004: 52 hrs
10-Year Average: 252 hrs

Index of Exceedance

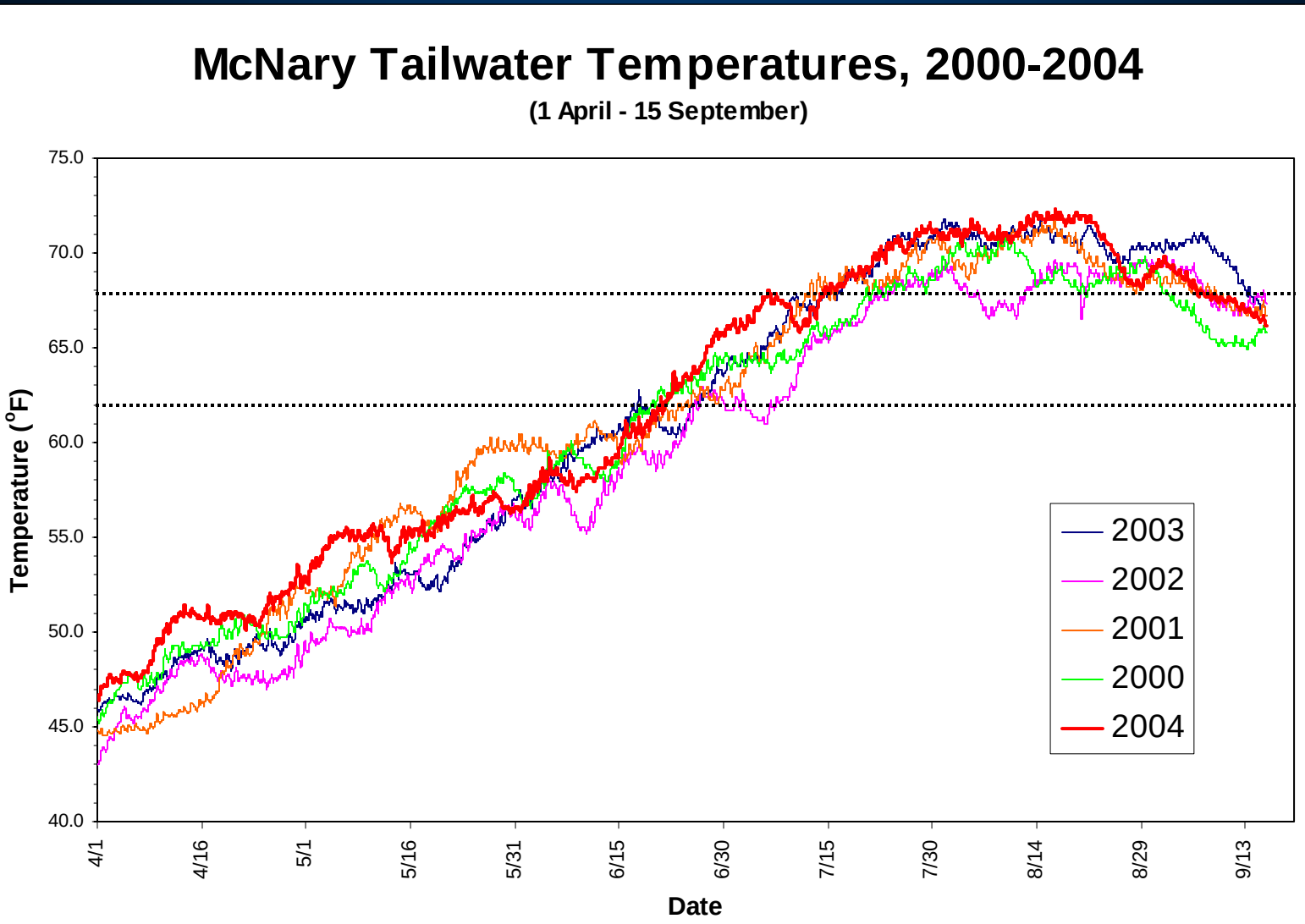
Range: High = 1,721 degree-hrs (1998)
Low = 0 degree-hrs (2000)
Average 1995-1999: 552 degree-hrs
Average 2000-2004: 29 degree-hrs
10-year Average: 290 degree-hrs

Index of Exceedance = (# hours temperature exceeds 68 ºF standard) x (Number of degrees above 68 ºF standard)

McNary Temperatures



McNary Temperatures



McNary Temperatures

McNary Tailwater Temperatures
1995-2004

Year	Hours of Exceedance	Index of Exceedance
2004	1260	2938
2003	1399	3318
2002	817	716
2001	1259	1872
2000	911	1063
1999	454	303
1998	1532	4709
1997	887	757
1996	766	575
1995	1421	2833

10-Year Statistics

Hours of Exceedance

Range: High = 1,532 hrs (1998)
Low = 454 hrs (1999)
Average 1995-1999: 1,012 hrs
Average 2000-2004: 1,129 hrs
10-Year Average: 1,071 hrs

Index of Exceedance

Range: High = 4,709 degree-hrs (1998)
Low = 303 degree-hrs (1999)
Average 1995-1999: 1,835 degree-hrs
Average 2000-2004: 1,981 degree-hrs
10-year Average: 1,908 degree-hrs

Index of Exceedance = (# hours temperature exceeds 68 ^{o}F standard) x (Number of degrees above 68 ^{o}F standard)

Questions?