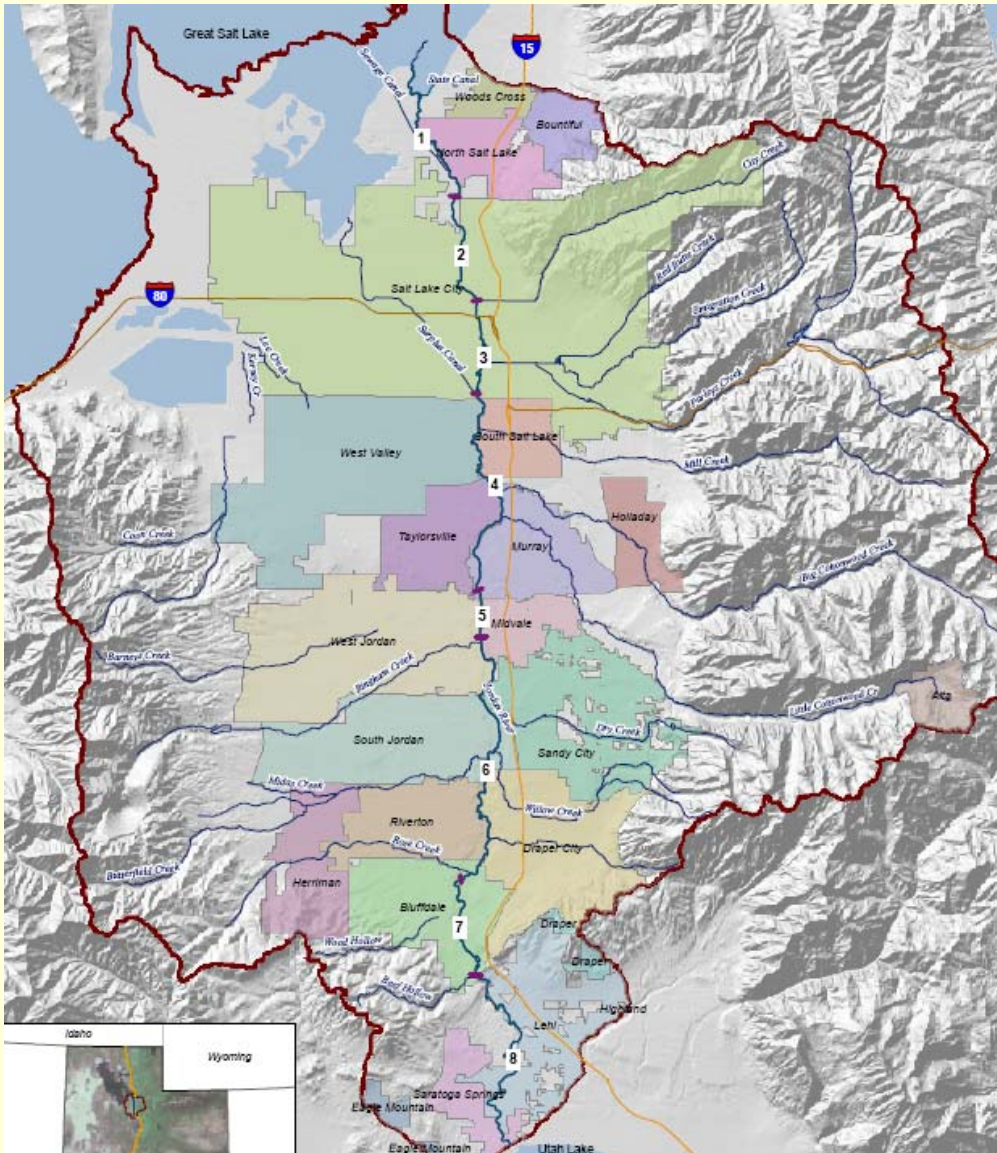


Jordan River TMDL - Work Element 1



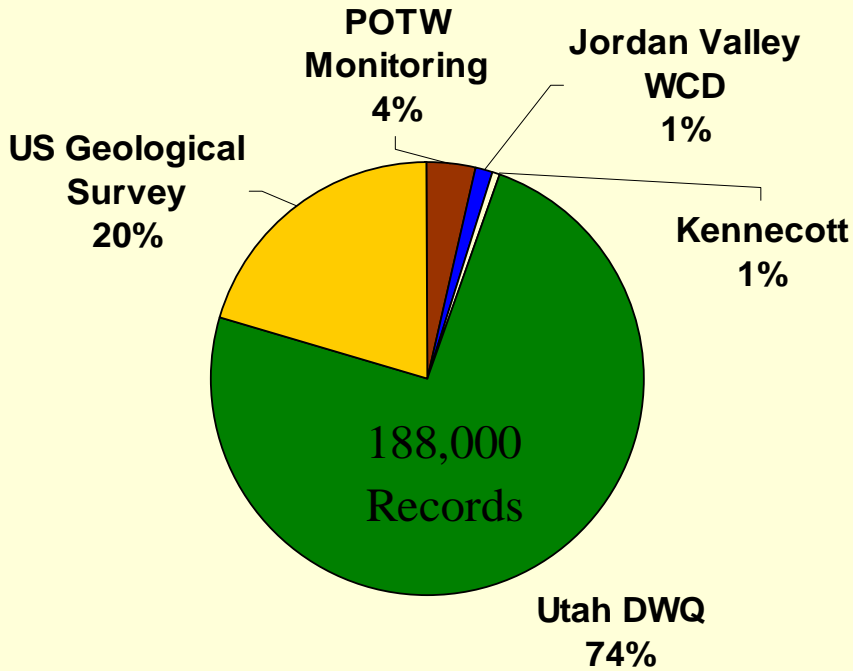
December 14, 2006

Jordan River Segments



Pollutants of Concern	Impaired Segments
Dissolved Oxygen	1, 2
Temperature	5, 6, 7
Total Dissolved Solids	1, 5, 6, 7, 8
E. coli	2, 3, 5

Water Quality Data

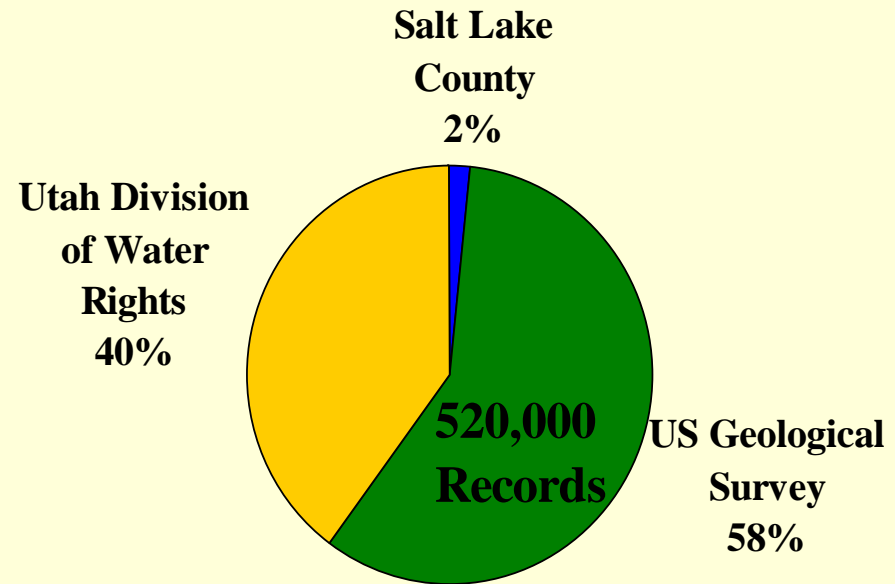


- All WQ and flow data organized in MS-Access database and assessed with MapWindow analysis tools (EPA-BASINS software).
- Biological data obtained from literature review, Utah DWQ, and NAWQA including fish, macroinvertebrate and periphyton measurements.
- Original GIS data sets obtained from archives (EPA, USGS, AGRC), Salt Lake County, and DWQ.

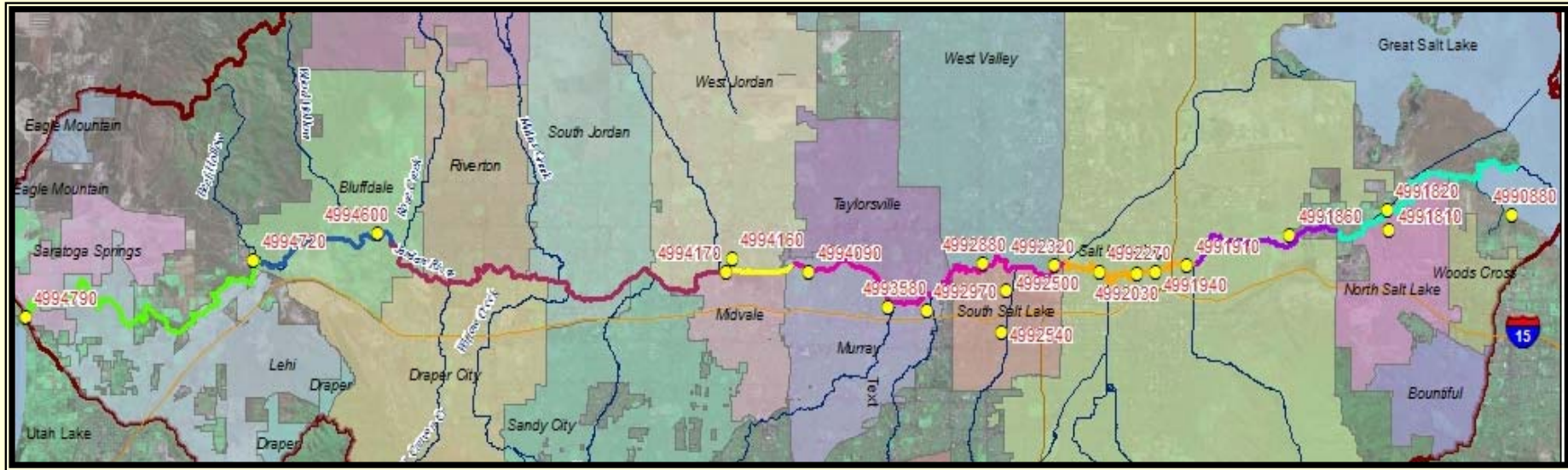
Data Sources

Water Quality, Flow, Biology, GIS

Flow Data



DWQ Intensive Monitoring Sites 1999-2000 and 2004-2005



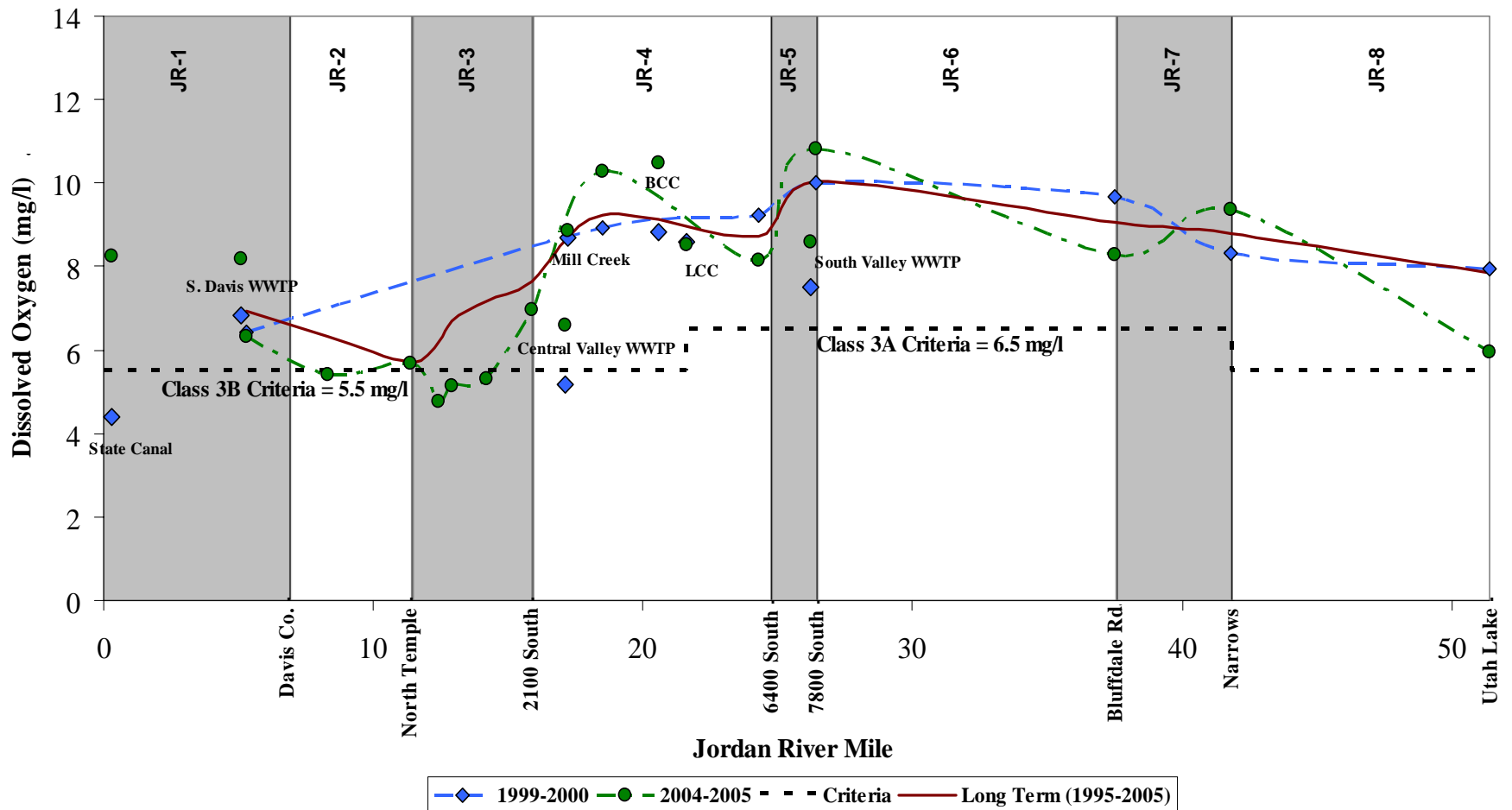
Station ID	Name	Segment
4994160	South Valley	5
4994170	7800 South	5
4994600	Bluffdale Road	7
4994720	Narrows	8
4994790	Utah Lake Outlet	8

Station ID	Name	Segment
4992320	2100 South	4
4992500	Central Valley	4
4992540	Mill Creek	4
4992880	3300 South	4
4992970	BCC	4
4993580	LCC	4
4994090	5400 South	4

Station ID	Name	Segment
4990880	State Canal	NA
4991810	South Davis	1
4991820	Cudahy Lane	1
<i>4991860</i>	<i>Redwood Road</i>	2
<i>4991910</i>	<i>North Temple</i>	3
<i>4991940</i>	<i>400 South</i>	3
<i>4992030</i>	<i>700 South</i>	3
<i>4992270</i>	<i>1300 South</i>	3

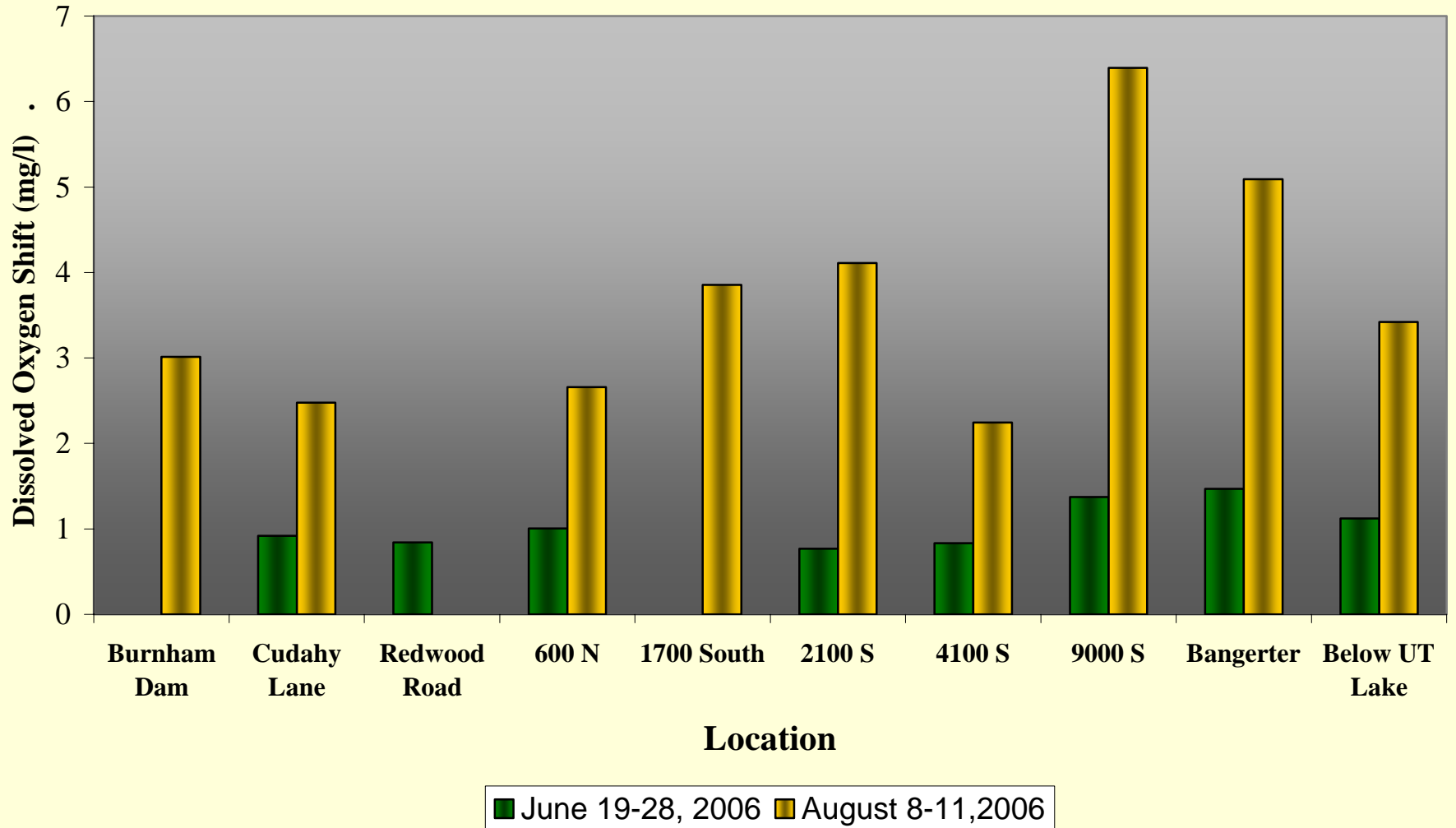
Italics = Sampled in 2004-2005 only

Dissolved Oxygen



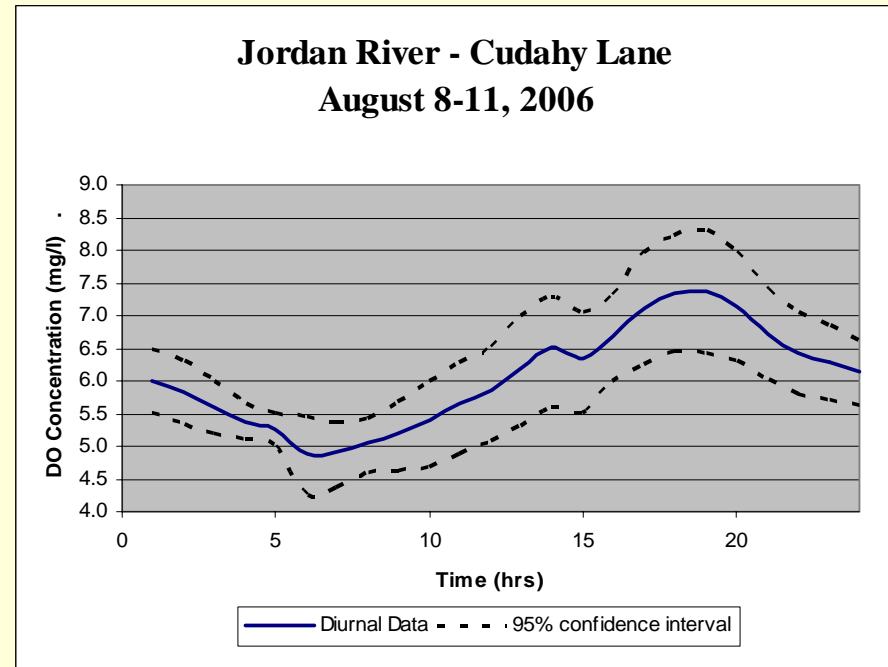
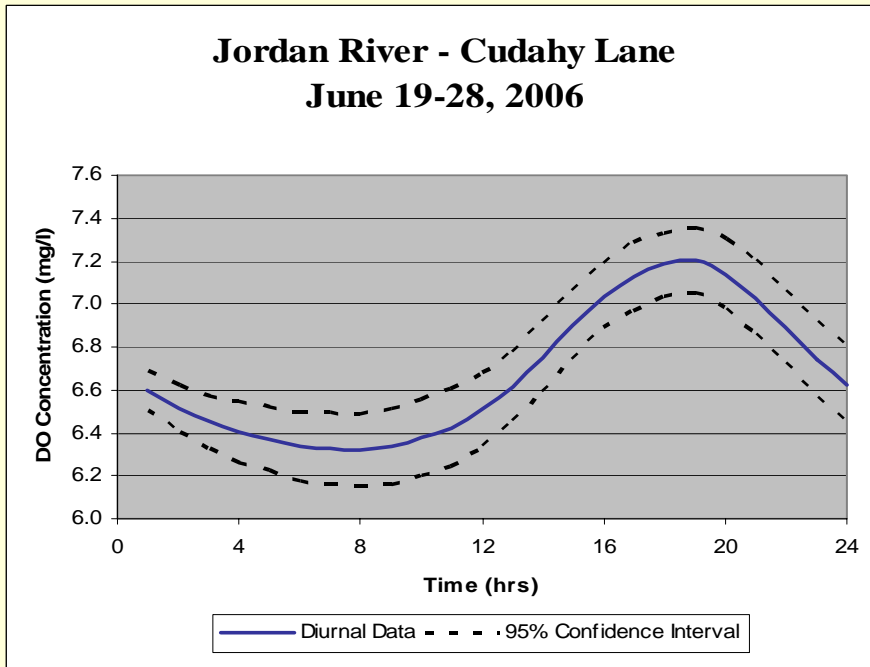
Jordan River Dissolved Oxygen										
		1999-2000			2004-2005			Long Term (1995-2005)		
	Criteria	Mean	n	% Exceed	Mean	n	% Exceed	Mean	n	% Exceed
Cudahy Lane	5.5	6.4	18	27.8	6.3	28	39.3	6.9	99	19.2
Redwood Road	5.5	na	na	na	5.4	15	33.3	na	0	na
North Temple	5.5	na	na	na	5.7	21	61.9	5.7	24	54.2

Jordan River Diurnal DO Shift Summer/Fall 2006



Jordan TMDL

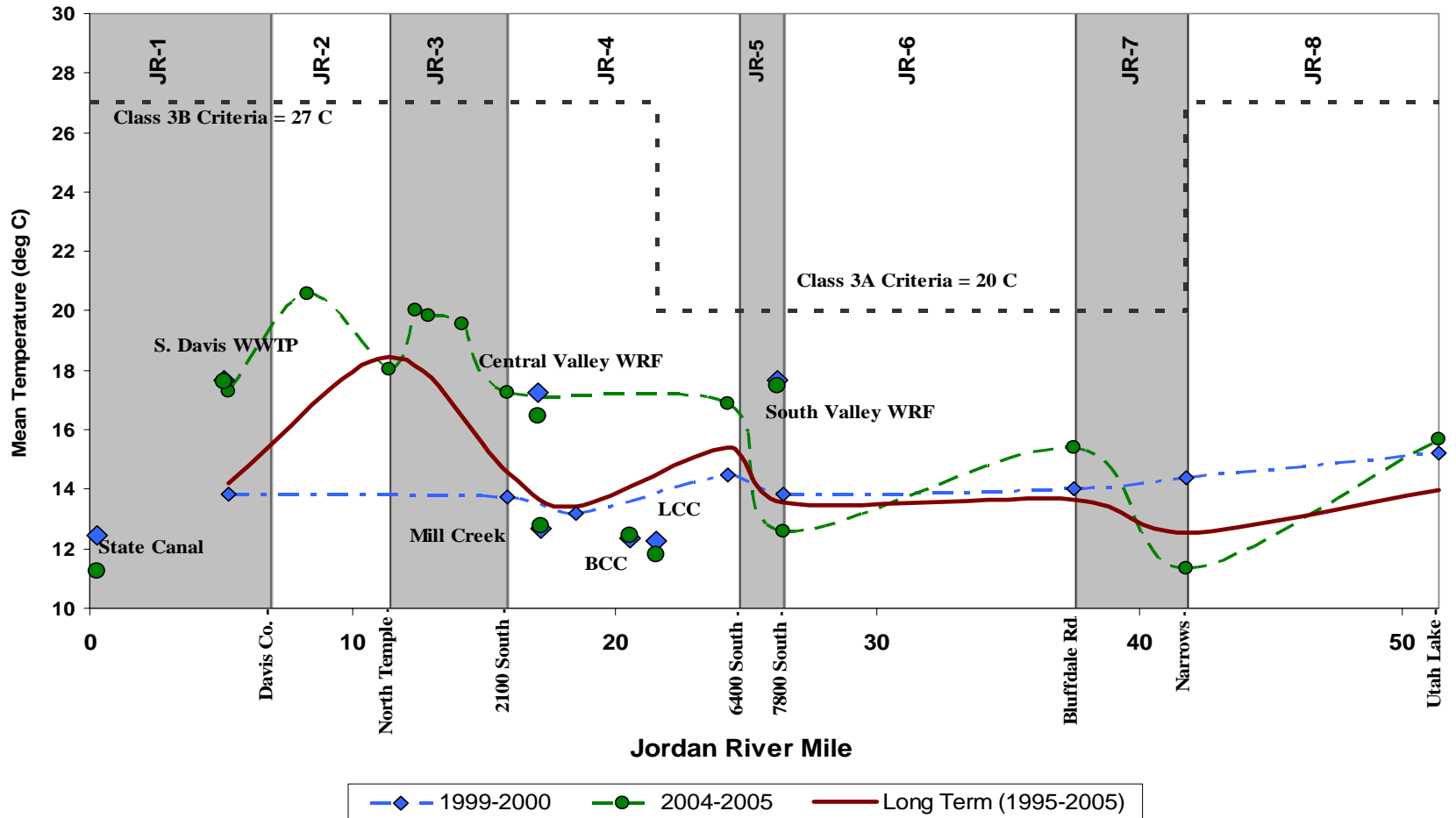
Diurnal DO – Cudahy Lane



Jordan River Average Diurnal DO Characteristics

	June 20-28, 2006			August 8-11, 2006		
Segment	1	2	2	1	1	2
Station	Cudahy Lane	Redwood Road	600 N	Burnham Dam	Cudahy Lane	500 N
Min. Concentration (mg/l)	6.22	7.16	6.85	4.82	4.87	4.80
Max Concentration (mg/l)	7.13	8.00	7.86	7.83	7.35	7.46
Hours < 5.5 mg/l	0	0	0	7.5	6.8	7.0

Temperature

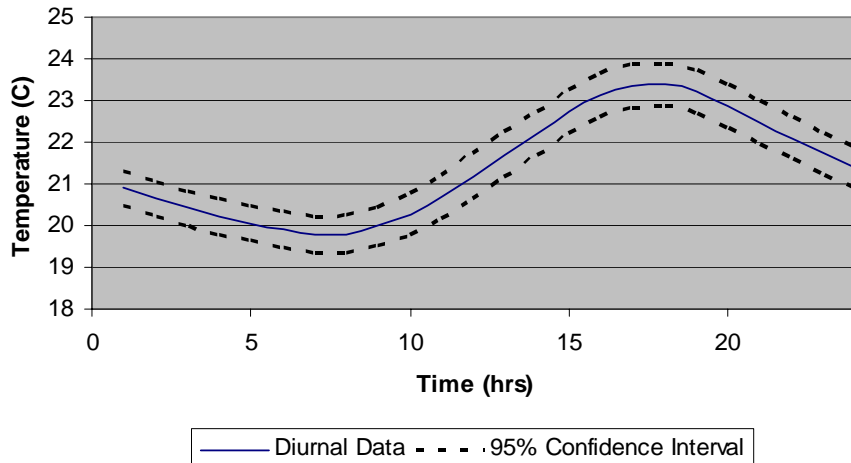


Jordan River Temperature										
		1999-2000			2004-2005			Long Term (1995-2005)		
Station	Criteria	Mean	n	% Exceed	Mean	n	% Exceed	Mean	n	% Exceed
7800 S	20	13.84	15	0	12.60	9	0	13.57	55	10.9
Bluffdale Road	20	14.03	17	0	15.40	26	0	13.67	97	16.5
Narrows	27	14.37	10	0	11.35	7	0	12.55	27	18.5
Utah Lake	27	15.23	15	0	15.68	11	0	13.97	50	0

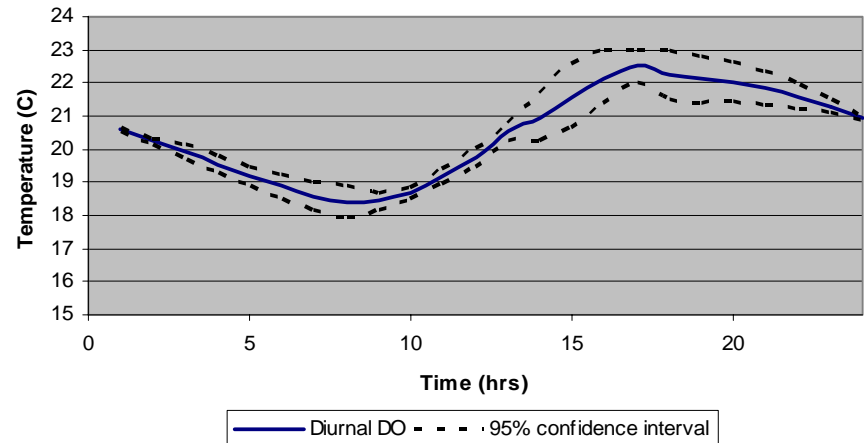
Diurnal Temperature Curve

Jordan River at 9000 South (segment 6)

Jordan River - 9000 South
June 19-28, 2006



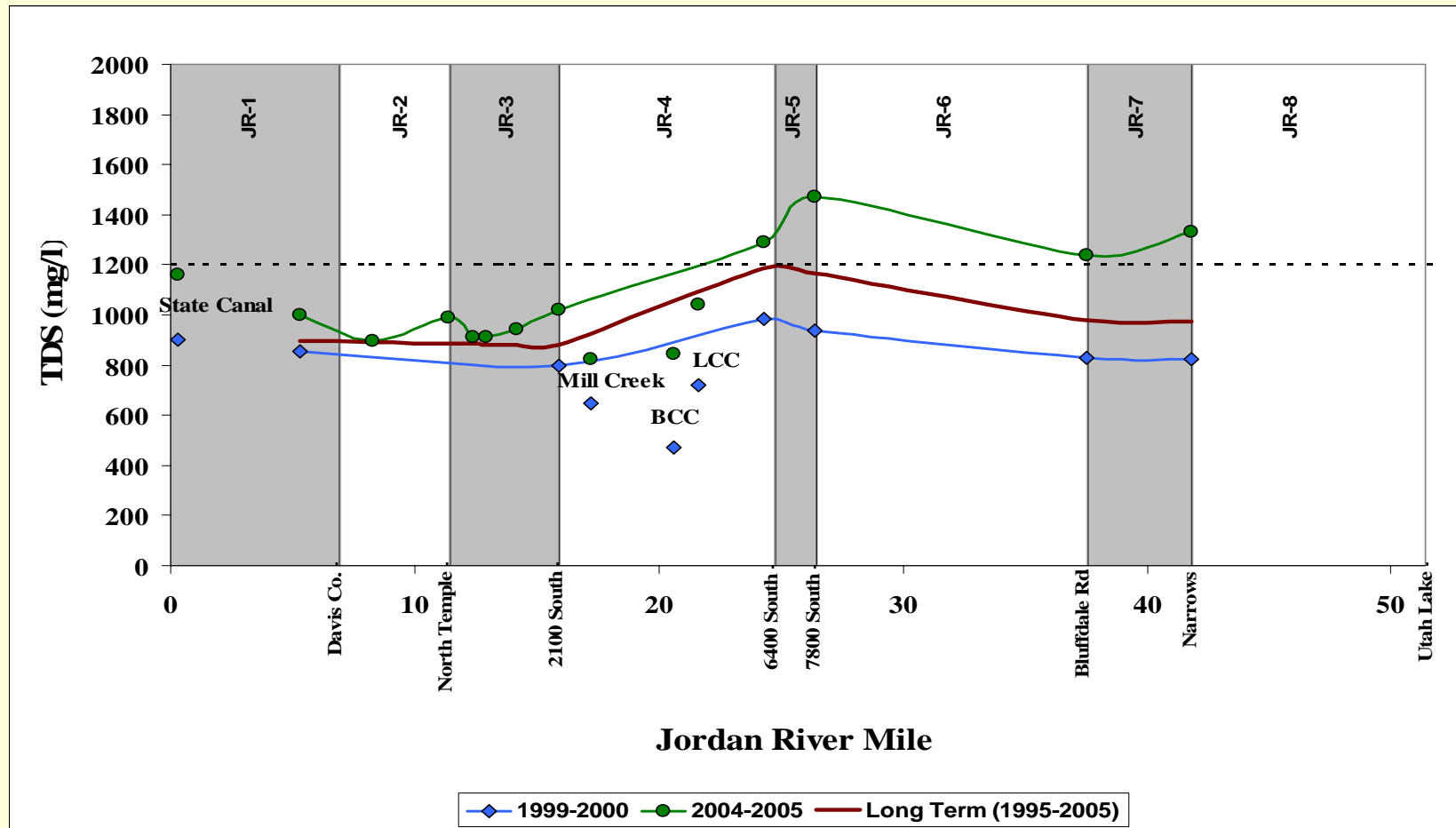
Jordan River - 9000 South
August 8-11, 2006



Jordan River Average Diurnal Water Temperature Characteristics

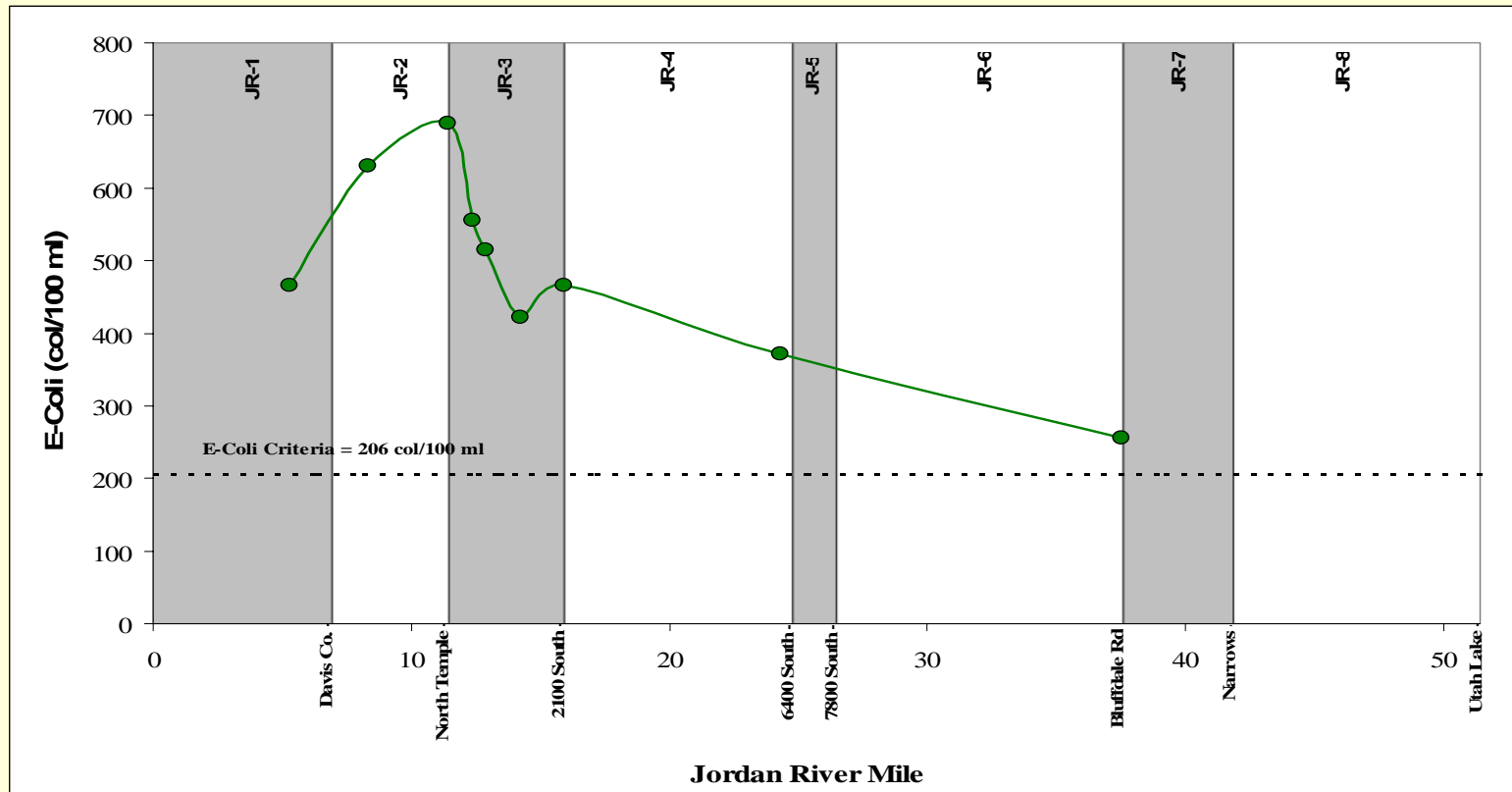
	June 20-28, 2006			August 8-11, 2006		
Segment	6	6	8	6	6	8
Station	9000 South	Bangerter Road	Utah Lake outlet	9000 South	Bangerter Road	Utah Lake outlet
Min. Temperature (°C)	19.8	20.6	20.4	18.4	18.3	20.4
Max Temperature (°C)	23.4	22.8	22.5	22.5	25.8	24.7
Hours > Criteria	19.1	22.7	0.0	13.7	14.0	0.0

Total Dissolved Solids



Jordan River Total Dissolved Solids											
Station	Segment no.	Criteria	1999-2000			2004-2005			Long Term (1995-2005)		
			Mean	n	% Exceed	Mean	n	% Exceed	Mean	n	% Exceed
Cudahy Lane	1	1,200	857	17	5.9	998	18	11.1	897	88	6.8
7800 S	5	1,200	939	11	9.1	1,473	6	100	1,167	27	48.1
Bluffdale Road	7	1,200	830	16	0	1,236	18	72.2	979	87	21.8
Narrows	8	1,200	822	10	0	1,334	6	66.7	976	26	19.2

E. coli (2004)



Jordan River E. coli							
Station	Segment no.	Criteria 1	Criteria 2	n	Average Geo. Mean	% Exceed Criteria 1	% Exceed Criteria 2
Cudahy Lane	1	940	206	9	332.7	22.2	100
Redwood Road	2	940	206	9	13.9	22.2	0
North Temple	3	940	206	9	385.2	11.1	100
400 South	3	940	206	9	231.2	11.1	60
700 South	3	940	206	9	252.2	11.1	60
1300 South	3	940	206	9	321.2	11.1	100
2100 South	4	940	206	9	190.3	11.1	60
5400 South	4	940	206	9	38.3	11.1	0
Bluffdale Rd.	7	940	206	9	22.2	0	0

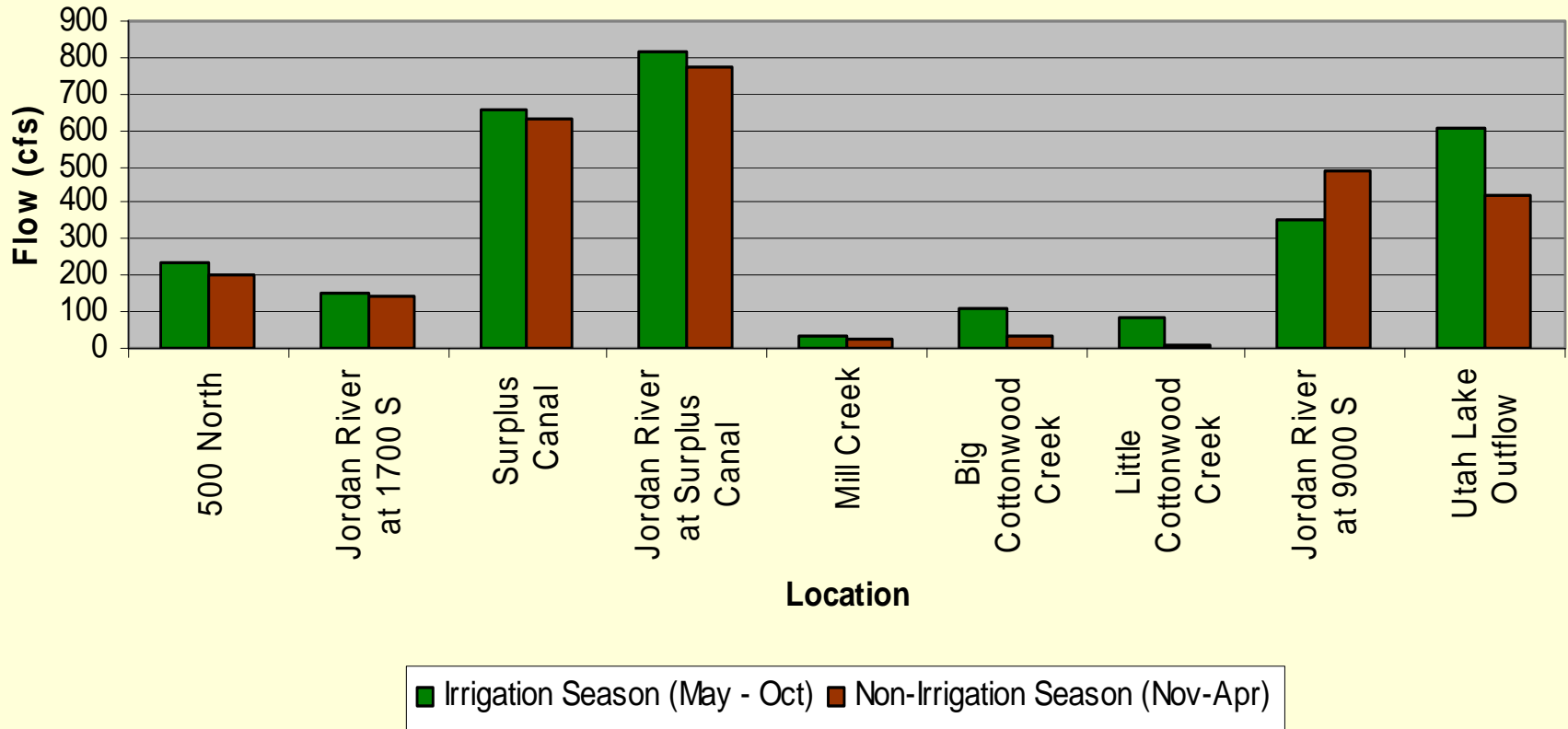
Jordan River WQ Summary

- Monitoring data consistent with 2006 303(d) listing. Degraded water quality evident during low flow years (2004-2005)
- Sufficient data to complete TMDL for Dissolved Oxygen (DO), Temperature, and Total Dissolved Solids (TDS). Limited E. coli data currently available.
- Dissolved Oxygen
 - Intensive monitoring data indicates moderate-high exceedance of criteria in segments 1-3.
 - August diurnal sampling indicates DO sag < 5.0 mg/l.
- Temperature
 - Mean temperature data indicate good conditions in segments 5-7.
 - However, June and August diurnal sampling indicate > 50% of day exceeds criteria in segment 6.
- Total Dissolved Solids
 - Intensive monitoring data indicate TDS in segment 1 is a concern during low flow conditions (2004-2005), good during other periods.
 - Intensive and long-term monitoring of TDS above segment 4 indicates high exceedance of criteria.
- E. coli
 - High exceedance of criteria 1 and criteria 2 observed during 2004.
 - Concentrations increase downstream of segment 5.

Jordan River Flow Data

- Flow data identified for all Jordan River inflows and diversions.
 - Canals (9 stations)
 - Stormwater conduits (8 stations)
 - Treated wastewater (3 stations)
 - Streams (7 stations)
- 11 flow sites on the mainstem Jordan River (5 active sites)
 - 500 North
 - 1700 South
 - Above Surplus Canal
 - 9000 South
 - Utah Lake outlet (calculated)
- Reasonably good data on all tributaries, major conduits, and wastewater discharge after 1980.
- Two recent flow studies completed on Jordan River.
 - Borup (1999): Re-evaluated UPDES permits of POTWs in support of long-term TMDL requirements.
 - CH2MHILL (2005): Evaluate effects of future reuse projects on Jordan River flows downstream of Turner Dam.

Jordan River Seasonal Flow (1980 - Present)



Biology Data

- Biology data are consistent with water quality data.
- Aquatics:
 - 11 Jordan River surveys reviewed to date (1976 – 1991).
 - Majority of fish identified to date are non-game species.
 - Cold water species observed in segments 6-7 (12000 South – Bluffdale) and below confluence of east side tributaries.
- Macroinvertebrate:
 - Limited data available.
 - Jordan River @ 1700 South (segment 3) and State Canal (near segment 1) indicate poor water quality and substantial organic pollution.
- Periphyton:
 - Limited data available.
 - Jordan River @ 1700 South (one site visit). Data currently being assessed.

Pollutant Loading (progress to date)

- Annual loads calculated using post-1980 flow values and long-term (1995-2005) water quality concentrations.
 - Loads also calculated for 1999-2000, and 2004-2005 intensive monitoring periods.
- Load duration curves developed for Jordan River sites with continuous flow.
 - Provides a way to assess loads under all flow conditions rather than a single flow event

Project Schedule

	Task	Completion Date
Phase 1	Evaluate Existing Data	December 2006
	Load Calculations	February 2007
	Assess Beneficial Use	March 2007
Phase 2	Load Allocations/Reductions	May 2007
	Public Draft TMDL Report	November 2007
	Final TMDL Report	February 1, 2008