

Water Quality Management Plan
for 2006 & 2007 Water Years



2008 Water Quality Implementation Report

*Provo River, Deer Creek Reservoir
and Jordanelle Reservoir*

Prepared For:

The Wasatch County Council

and

The Provo River Watershed Council

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TABLE OF CONTENTS

RIVER & STREAM WATER QUALITY

UPPER PROVO RIVER ABOVE JORDANELLE.....	1
PROVO RIVER THROUGH HEBER VALLEY	2
DEER CREEK TRIBUTARIES.....	3
PROVO RIVER AND TRIBUTARIES BELOW DEER CREEK	4

RESERVOIR WATER QUALITY

DEER CREEK RESERVOIR LOADINGS.....	5
DEER CREEK RESERVOIR TROPHIC STATE & PROFILES.....	6
JORDANELLE RESERVOIR TROPHIC STATE & PROFILES	7
DEER CREEK & JORDANELLE RESERVOIRS ALGAL ANALYSIS	8

OTHER WATER QUALITY ISSUES

GROUND WATER MONITORING.....	9
JORDANELLE BASIN METALS	9

SUMMARY & CONCLUSIONS

PROBLEM SUMMARY	10
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Upper Provo River

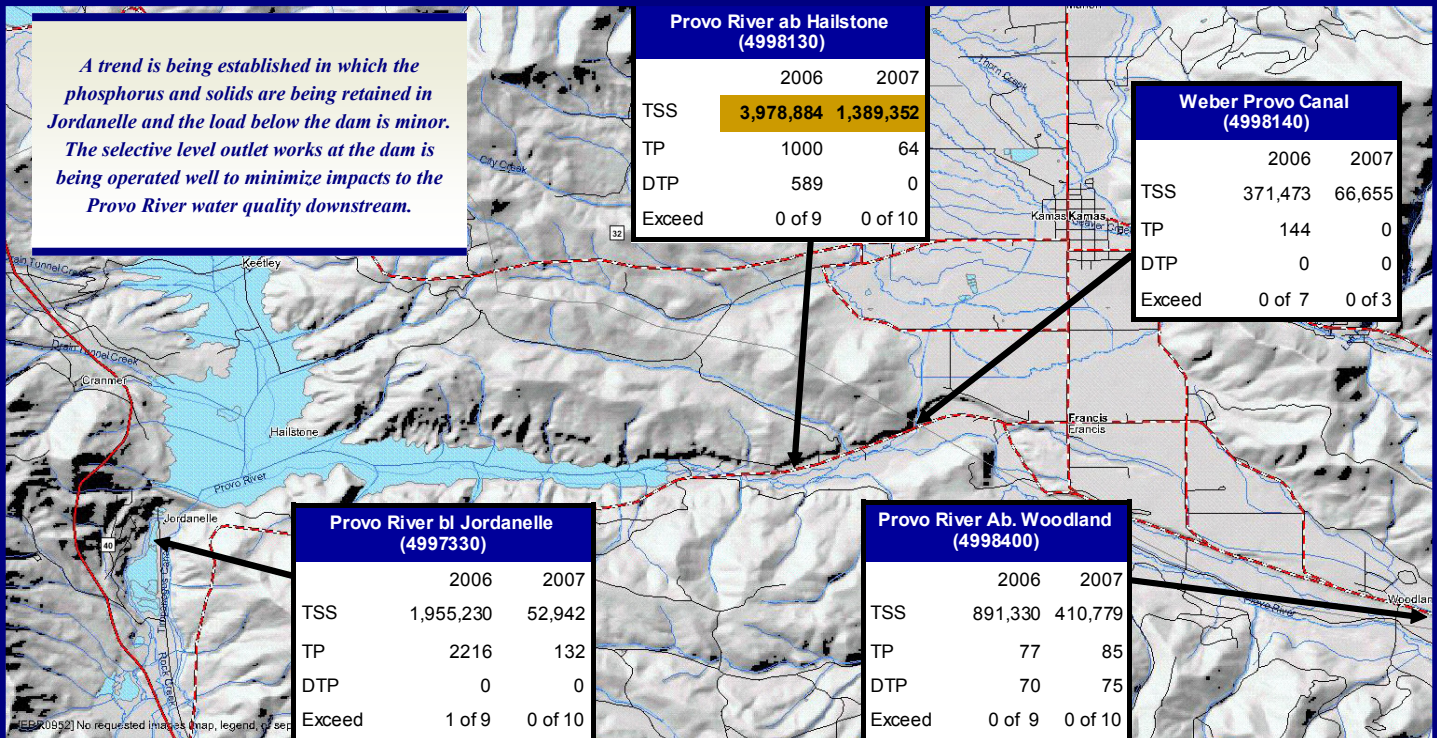
	2004	2005	2006	2007
Provo River at Woodland, STORET 4998400				
Weighted Average Flow (cfs)	123	226	239	153
TP Weighted Average (mg/l)	0	0	0	0
TP Annual Load (kg/yr)	0	44	77	85
DTP Weighted Average (mg/l)	0	0	0	0
DTP Annual Load (kg/yr)	0	0	70	77
TSS Weighted Average (mg/l)	0.99	3.4	3	2.2
TSS Annual Load (kg/yr)	108,736	936,676	891,330	410,779
Weber Provo Canal, STORET 4998140				
Weighted Average Flow (cfs)	-	133	74	80
TP Weighted Average (mg/l)	-	0.01	0.00	0.00
TP Annual Load (kg/yr)	-	1,271	144	0
DTP Weighted Average (mg/l)	-	0	0.00	0.00
DTP Annual Load (kg/yr)	-	0	0	0
TSS Weighted Average (mg/l)	-	8.2	5	2
TSS Annual Load (kg/yr)	-	1,088,494	371,473	66,655
Provo River at Hailstone, STORET 4998130				
Weighted Average Flow (cfs)	271	394	320	178
TP Weighted Average (mg/l)	0	0	0.01	0.00
TP Annual Load (kg/yr)	153	1,198	1,000	64
DTP Weighted Average (mg/l)	0	0	0.00	0.00
DTP Annual Load (kg/yr)	0	0	589	0
TSS Weighted Average (mg/l)	1.36	5.8	7	6
TSS Annual Load (kg/yr)	328,212	4,174,295	3,978,884	1,389,352
Provo River below Jordanelle, STORET 4997330				
Weighted Average Flow (cfs)	278	285	425	305
TP Weighted Average (mg/l)	0	0	0.01	0.00
TP Annual Load (kg/yr)	0	86	2,216	132
DTP Weighted Average (mg/l)	0	0	0.00	0.00
DTP Annual Load (kg/yr)	0	0	0	0
TSS Weighted Average (mg/l)	18	0	7	0
TSS Annual Load (kg/yr)	45,705	0	1,955,230	52,942

TMDL Target Loads

Site	Target Load (kg/yr)	2006 Loads	2007 Loads
Provo Rv Woodland	7,681	77	85
Kamas Fish Hatch	173	81	97
Provo Rv Hailstone	9,837	1,000	64

Problems & Concerns

1. The Provo River exhibited high TSS at Hailstone in 2005 through 2007 as compared to 2002 through 2004. This may be related to construction activities. Additional monitoring of construction, especially after storm events, should be implemented.
2. The Jordanelle Dam is retaining phosphorus and solids. This is good for downstream and for Deer Creek Reservoir. The selective level outlet works is being operated efficiently.



Provo River Through Heber Valley

	2004	2005	2006	2007
Provo River at River Road Crossing STORET 4997300				
Weighted Average Flow (cfs)	138	238	367	244
TP Weighted Average (mg/l)	0	0.01	0	0
TP Annual Load (kg/yr)	0	1,922	526	0
DTP Weighted Average (mg/l)	0	0.00	0	0
DTP Annual Load (kg/yr)	0	0	0	0
TSS Weighted Average (mg/l)	0.53	1.07	2	3.6
TSS Annual Load (kg/yr)	65,813	288,228	38,649,064	879,820
Provo River at Heber - Midway Road Crossing blw Berkenshaw Pond, STORET 5910250				
Weighted Average Flow (cfs)	136	249	380	246
TP Weighted Average (mg/l)	0	0.06	0.01	0
TP Annual Load (kg/yr)	430	23,771	1,091	0
DTP Weighted Average (mg/l)	0	0.00	0	0
DTP Annual Load (kg/yr)	0	0	187	0
TSS Weighted Average (mg/l)	2.73	0.93	4	6.5
TSS Annual Load (kg/yr)	332,750	158,563	2,070,313	1,466,839
Spring Creek at Provo River, STORET 4997250				
Weighted Average Flow (cfs)	25	38	30	26
TP Weighted Average (mg/l)	0.11	0.13	0.09	0.08
TP Annual Load (kg/yr)	2,390	4,478	2,770	1,518
DTP Weighted Average (mg/l)	0.05	0.07	0.05	0.04
DTP Annual Load (kg/yr)	1,060	2,257	1,217	741
TSS Weighted Average (mg/l)	42.03	46.22	35	28.6
TSS Annual Load (kg/yr)	938,354	1,563,909	1,383,817	658,234
Provo River above Deer Creek, STORET 5913630				
Weighted Average Flow (cfs)	247	304	406	257
TP Weighted Average (mg/l)	0.041	0.03	0.02	0.01
TP Annual Load (kg/yr)	7,767	7,382	5,300	2,121
DTP Weighted Average (mg/l)	0	0.01	0.01	0
DTP Annual Load (kg/yr)	0	2,042	1,460	0
TSS Weighted Average (mg/l)	19.85	33.82	15	10.6
TSS Annual Load (kg/yr)	4,373,323	8,536,044	5,715,132	2,421,951
Provo River TP Increase Ratio		86.30	2.39	16.07

TMDL Target Loads

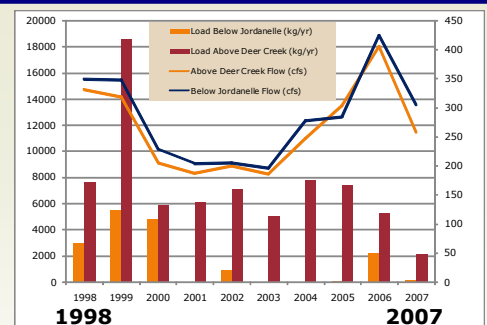
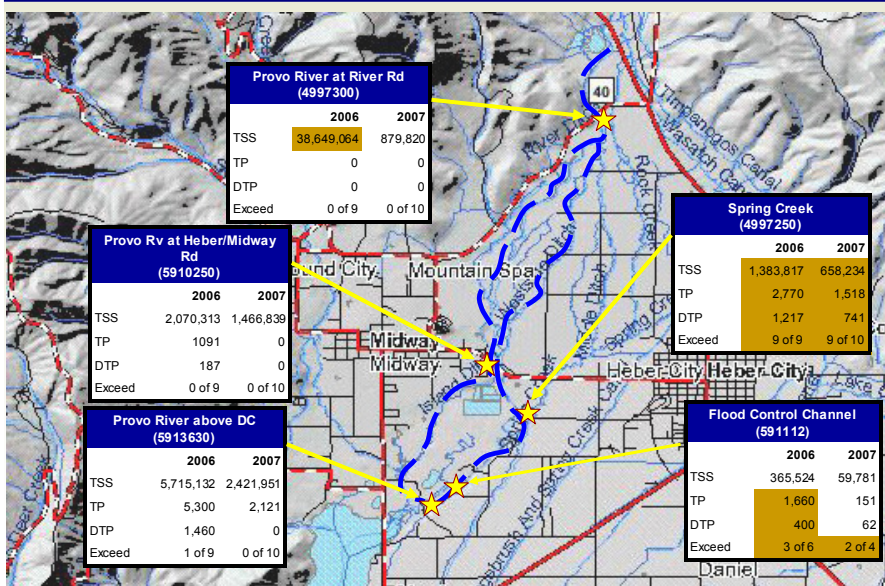
Site on Provo River	Target Load (kg/yr)	2006 Loads	2007 Loads
Below Jordanelle	8,685	2,216	132
Above Deer Creek	8,428	5,300	2,121

Problems & Concerns

1. Flows from Spring Creek continue to be the major contributor of Phosphorus and Solids to the Provo River System. Spring Creek contributes from 50% to 70% of the TP Load and over 80% of the DTP Load to the River.

Spring Creek		
	2006	2007
TSS	1,383,817	658,234
TP	2,770	1,518
DTP	1,217	741
Exceed	9 of 9	9 of 10

2. The County Flood Control Channel is also a major contributor of Phosphorus to the Provo River System. Phosphorus concentrations are high though the flow is sporadic.



Jordanelle Reservoir has effectively reduced phosphorus concentrations in the Provo River below the dam since 1993.

Prior to 1997 there was strong correlation between TP and TSS. Since that time there has not been a direct relationship between these two constituents.

Deer Creek Tributaries

2004 2005 2006 2007

Main Creek abv Deer Creek STORET 5913460

Weighted Average Flow (cfs)	8	17	23	9
TP Weighted Average (mg/l)	0.04	0.054	0.07	0.05
TP Annual Load (kg/yr)	194	765	2339	439
DTP Weighted Average (mg/l)	0.03	0.022	0.03	0.03
DTP Annual Load (kg/yr)	141	332	562	131
TSS Weighted Average (mg/l)	21.4	27	47	24.6
TSS Annual Load (kg/yr)	111,289	598,638	2,234,868	290,895

Snake Creek above Deer Creek STORET 5910160

Weighted Average Flow (cfs)	34	52	54	37
TP Weighted Average (mg/l)	0.01	0.021	0.02	0.01
TP Annual Load (kg/yr)	155	795	958	252
DTP Weighted Average (mg/l)	0	0	0	0
DTP Annual Load (kg/yr)	0	100	77	41
TSS Weighted Average (mg/l)	6.46	13.2	12	11.9
TSS Annual Load (kg/yr)	198,515	549,453	742,117	303,457

Provo River abv Deer Creek STORET 5913630

Weighted Average Flow (cfs)	247	304	406	257
TP Weighted Average (mg/l)	0.041	0.035	0.02	0.01
TP Annual Load (kg/yr)	7,767	7382	5300	2121
DTP Weighted Average (mg/l)	0	0.006	0.01	0
DTP Annual Load (kg/yr)	0	2,042	1460	0
TSS Weighted Average (mg/l)	19.85	33.8	15	10.6
TSS Annual Load (kg/yr)	4,373,323	8,536,044	5,715,132	2,421,951

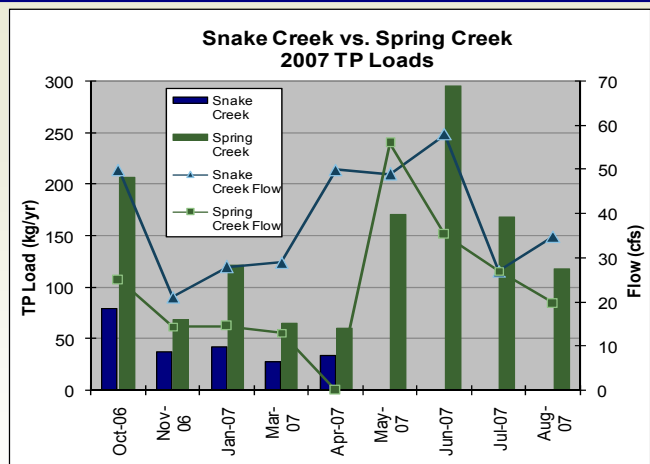
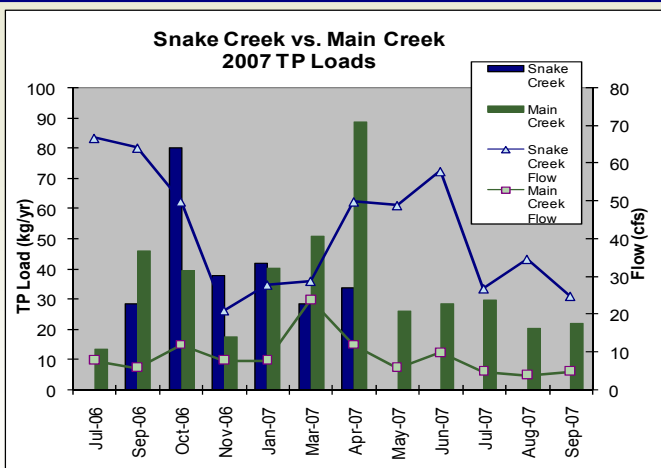
TMDL Target Loads

Tributary	Target Load (kg/yr)	2006 Loads	2007 Loads
Provo River	11,136	5,300	2,121
Snake Creek	2,308	958	252
Daniels Creek	645	398	24
Main Creek	1,210	2,339	439

Problems & Concerns

1. Main Creek continues to exhibit high total phosphorus concentrations.
2. 30% of the phosphorus in Main Creek is in dissolved form. Dissolved phosphorus plays a central role in algal community biomass and production.
3. Main Creek only contributes 15% of the Total Phosphorus Load to Deer Creek, but over 70% of the Dissolved Phosphorus Load.

Tributary	TP Load	% TP load	DTP Load	% dissolved	% DTP Load
Provo	2,121	75%	0	0%	0%
Snake	252	9%	41	16%	22%
Daniels	24	1%	12	50%	7%
Main	439	15%	131	30%	71%
Total	2,836	100%	184		100%

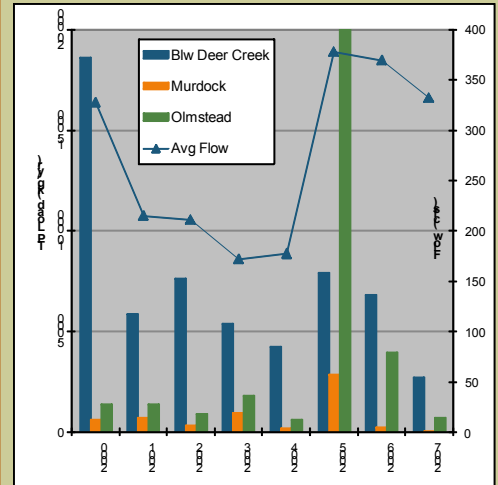


During the 1970s and 1980s Snake Creek was a major contributor of phosphorus to the Deer Creek Reservoir System. However, during the 1990s a change occurred which has now become a long term trend. Main Creek and Spring Creek exceed Snake Creek contributions as seen in the graphs. Specific mitigation plans to address Main and Spring Creeks individually need to be prepared.

Provo River and Tributaries Below Deer Creek

	2004	2005	2006	2007
Provo River below Deer STORET 5913210				
Weighted Average Flow (cfs)	177	378	369	332
TP Weighted Average (mg/l)	0.03	0.03	0.02	0.01
TP Annual Load (kg/yr)	4,274	7,904	6813	2749
DTP Weighted Average (mg/l)	0.01	0.02	0.02	0.01
DTP Annual Load (kg/yr)	2,369	4820	5332	1679
TSS Weighted Average (mg/l)	0.99	0	3	4.6
TSS Annual Load (kg/yr)	157,184	74,100	734,680	949,652
Little Deer Creek Above Provo River STORET 4996870				
Weighted Average Flow (cfs)	14	27	25	21
TP Weighted Average (mg/l)	0.01	0.02	0.02	0
TP Annual Load (kg/yr)	71	469	429	40
DTP Weighted Average (mg/l)	0	0.01	0.01	0
DTP Annual Load (kg/yr)	25	206	197	0
TSS Weighted Average (mg/l)	4.6	14	18	7.2
TSS Annual Load (kg/yr)	58,044	482,686	499,871	147,684
Provo River at Utah Co. Line STORET 4996890				
Weighted Average Flow (cfs)				332
TP Weighted Average (mg/l)				0.01
TP Annual Load (kg/yr)				2794
DTP Weighted Average (mg/l)				0.01
DTP Annual Load (kg/yr)				1685
TSS Weighted Average (mg/l)				4.5
TSS Annual Load (kg/yr)				965,630
Lower North Fork of Provo River at Wildwood STORET 4996850				
Weighted Average Flow (cfs)	14	23	28	16
TP Weighted Average (mg/l)	0	0.01	0.01	0
TP Annual Load (kg/yr)	0	106	265	0
DTP Weighted Average (mg/l)	0	0	0	0
DTP Annual Load (kg/yr)	0	0	0	0
TSS Weighted Average (mg/l)	0.65	17	9	3.3
TSS Annual Load (kg/yr)	7,945	386,249	259,701	52,317
Lower South Fork Provo River at Vivian Park STORET 4996830				
Weighted Average Flow (cfs)	10	20	24	14
TP Weighted Average (mg/l)	0	0.11	0	0
TP Annual Load (kg/yr)	0	1,821	0	0
DTP Weighted Average (mg/l)	0	0	0	0
DTP Annual Load (kg/yr)	0	0	0	0
TSS Weighted Average (mg/l)	2.03	5	5	2.6
TSS Annual Load (kg/yr)	18,863	93,578	113,090	32,493
Provo River at Murdock Diversion STORET 4996780				
Weighted Average Flow (cfs)	64	195	80	25
TP Weighted Average (mg/l)	0	0.02	0.02	0.01
TP Annual Load (kg/yr)	176	2,844	263	60
DTP Weighted Average (mg/l)	0	0	0.01	0
DTP Annual Load (kg/yr)	27	58	84	31
TSS Weighted Average (mg/l)	2.4	4	3	6.5
TSS Annual Load (kg/yr)	136,360	836,393	220,894	250,917
Provo River at Olmsted Diversion STORET 4996810				
Weighted Average Flow (cfs)	75	230	184	146
TP Weighted Average (mg/l)	0.01	0.12	0.03	0.01
TP Annual Load (kg/yr)	624	64,246	3977	727
DTP Weighted Average (mg/l)	0	0	0.01	0
DTP Annual Load (kg/yr)	313	327	1578	414
TSS Weighted Average (mg/l)	0.56	1	18	3
TSS Annual Load (kg/yr)	37,893	394,019	944,843	287,773

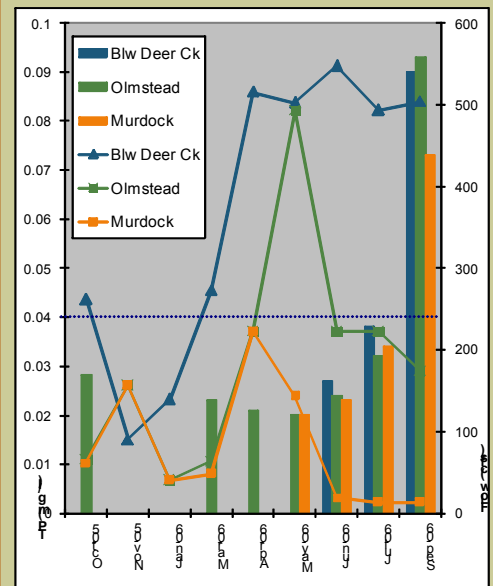
Historical Loadings Below Deer Creek (2000—2007)



Problems & Concerns

- The lower Provo River generally has good water quality. However, water released below Deer Creek Dam is high in dissolved phosphorus during the late summer and early spring as is seen in the figure below.

Provo River TP Conc. (2006)



Deer Creek Reservoir - Midlake

Date	Data	Chlorophyll a	Secchi Disk Depth	Dissolved oxygen (DO)	Phosphorus	Temperature		
10/19/2005	Average	10.6	2.1	6.5	0.01	13.4		
	Max				7.3		0.03	13.8
	Min				5.8		0.00	13.0
11/22/2005	Average	3.1	2.7	7.6	0.01	8.7		
	Max				7.8	0.02	9.1	
	Min				7.4	0.00	8.2	
5/2/2006	Average	30.2	1.3	10.9	0.00	9.6		
	Max				12.5	0.00	12.8	
	Min				8.8	0.00	6.0	
6/14/2006	Average	5.4	2.6	7.6	0.00	13.5		
	Max				8.6	0.03	16.5	
	Min				6.1	0.00	9.9	
7/12/2006	Average	4.1	1.9	6.0	0.01	17.0		
	Max				7.9	0.03	22.3	
	Min				3.2	0.00	10.4	
8/30/2006	Average	5.6	3.3	4.1	0.02	19.2		
	Max				6.8	0.07	20.9	
	Min				0.1	0.00	16.0	
Total Average		9.8	2.3	7.3	0.01	13.8		
Total Max		30.2	3.3	12.5	0.07	22.3		
Total Min		3.1	1.3	0.1	0.00	6.0		
10/4/2006	Average	12.3	2.6	7.7	0.00	15.2		
	Max				8.3	0.02	15.7	
	Min				6.8	0.00	14.3	
11/15/2006	Average	3.4	2.4	8.6	0.00	9.1		
	Max				9.1	0.00	9.5	
	Min				8.1	0.00	8.8	
4/5/2007	Average	10.2	3.6	9.6	0.00	6.2		
	Max				10.6	0.00	7.8	
	Min				7.8	0.00	4.6	
5/16/2007	Average	3.0	3.8	8.5	0.00	10.8		
	Max				9.5	0.00	15.8	
	Min				7.4	0.00	6.7	
6/21/2007	Average	2.9	4.4	6.8	0.00	16.5		
	Max				8.0	0.00	20.3	
	Min				4.8	0.00	12.4	
7/18/2007	Average	5.4	2.2	5.0	0.00	20.8		
	Max				7.1	0.02	23.0	
	Min				0.9	0.00	16.8	
8/9/2007	Average	8.2	2.0	3.8	0.02	21.0		
	Max				7.1	0.06	22.5	
	Min				0.4	0.00	19.5	
Total Average		6.5	3.0	7.3	0.00	14.1		
Total Max		12.3	4.4	10.6	0.06	23.0		
Total Min		2.9	2.0	0.4	0.00	4.6		

TMDL Targets

Phosphorus Loads to Lake	2006 Meeting Targets	2007 Meeting Targets
15,300 Kg/YR Total Phosphorus	YES	YES
9,700 Kg/YR Dissolved Total Phosphorus	YES	YES
560 Kg/Month Total Phosphorus August–October	NO	NO
350 Kg/Month Dissolved Total Phosphorus August–October	NO	YES

Monthly Phosphorus Loads to Deer Creek

Date	Total TP Load per Month	Total DTP Load per Month
Jul-06	588	342
Aug-06	588	488
Sep-06	597	524
Oct-06	837	337
Jun-07	576	281
Jul-07	467	284
Aug-07	580	276
Sep-07	717	274

Problems and Concerns

Tributary	TP Load	% TP load	DTP Load	% DTP	% DTP Load
Provo	2,121	36%	0	0%	0%
Snake	252	4%	41	16%	1%
Daniels	24	0%	12	50%	0%
Main	439	7%	131	30%	4%
Groundwater	2,725	46%	2,725	100%	82%
Storm	400	7%	400	100%	12%
Total	5,961	100%	3,309	56%	100%

- In the Spring of both 2006 and 2007 there were high levels of chlorophyll-a in Deer Creek. This spring time algae bloom is new for Deer Creek. Typically there are algal blooms in the autumn. See upper table to left.*
- Overall Total Phosphorus and Dissolved Total Phosphorus loads to the reservoir were low for both 2006 and 2007. However, the monthly loads during August through October exceeded the TMDL targets. See table to left and Monthly Phosphorus Table above.*

Deer Creek Trophic State

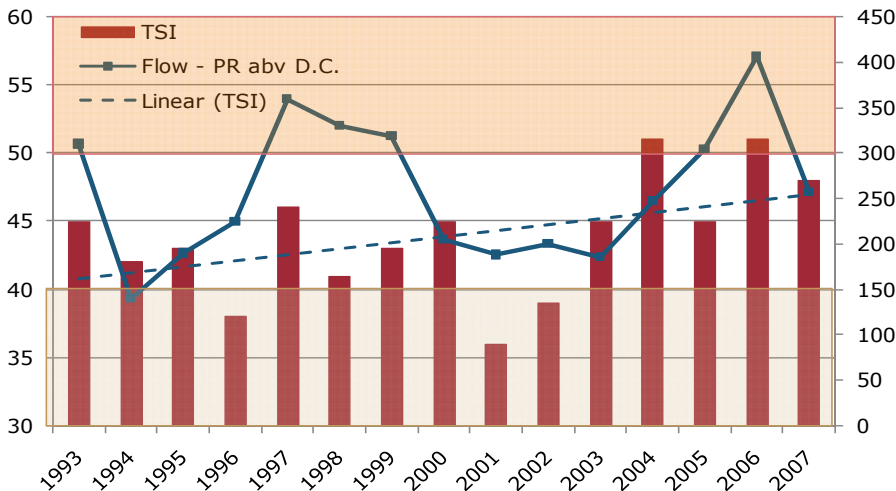
Year	Average TSI	Upper End		Midlake		Above Dam	
		Chlorophyll a	Secchi Disk Depth	Chlorophyll a	Secchi Disk Depth	Chlorophyll a	Secchi Disk Depth
5/16/2007		3.40	3.70	3.00	3.80	4.30	3.00
6/21/2007		9.30	2.20	2.90	4.40	3.15	3.60
7/18/2007		7.20	1.60	5.40	2.20	5.00	2.50
8/9/2007		17.00	0.90	8.20	2.00	9.10	1.80
8/22/2007						7.20	2.00
9/12/2007						6.30	3.30
2007	47.9	9.2	2.1	4.9	3.1	5.8	2.7
		51.6	48.0	48.9	44.2	48.9	45.6
5/2/2006		30.70	1.30	30.20	1.30	23.15	1.40
6/14/2006		5.80	2.00	5.40	2.60	4.75	2.90
7/12/2006		4.30	2.30	4.10	1.90	2.50	2.30
8/30/2006		12.70	0.90	5.60	3.30	7.35	2.60
2006	51.3	13.4	1.6	11.3	2.3	9.4	2.3
		56.6	51.4	53.0	47.9	50.3	48.5

TMDL Targets/Endpoints

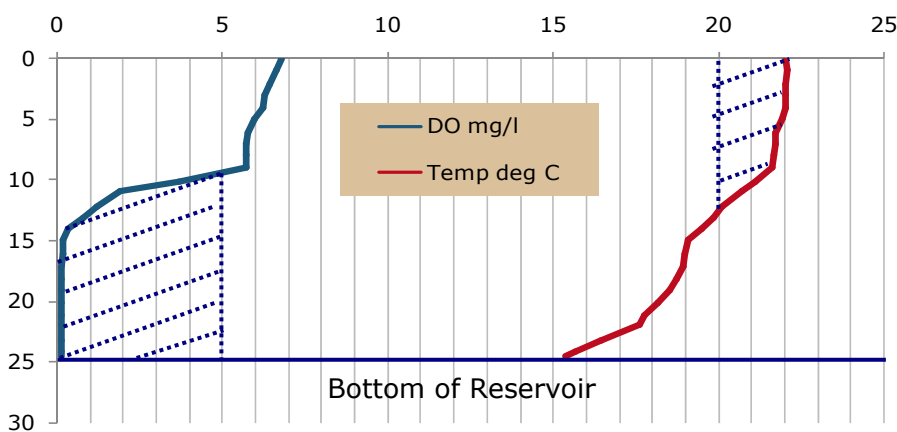
Parameter	Meeting TMDL Yes or No
Dissolved Oxygen >50% Water Column with D.O. <4.0 mg/l Abv Dam (Aug & Sept) Midlake (Aug)	NO
Fish Habitat No Fish Kills	YES
In-lake Phosphorus Concentration 0.025 mg/l TP (All Depths)	YES
Average TSI 40-45	NO
Algae Biomass 5.1 µg/l Chlorophyll a	NO

Problems & Concerns

1. The Trophic State Index, an indicator of biological productivity, in Deer Creek has indicated eutrophic conditions two (2) out of the last four (4) years. This may be a product of the recent draining of Deer Creek for construction. See figure to upper left.
2. The trend in TSI over the last 15 years shows increasing TSI. See figure to upper left. The recent years of drought may have contributed to this trend. However, if this trend continues then a mitigation and restoration plan should be considered for the reservoir. Since nutrient loading to the reservoir has been relatively low the mitigation plan should take into account dilution and flushing with Jordanelle Reservoir water.
3. High Temperatures (nearly 23 degrees C in summer) in a significant portion of the water column (down to 46-feet) combined with Low Dissolved Oxygen Concentrations have been a consistent reoccurring problem. This situation may lead to fish kills in the future since much of the water column is not favorable fish habitat. See table



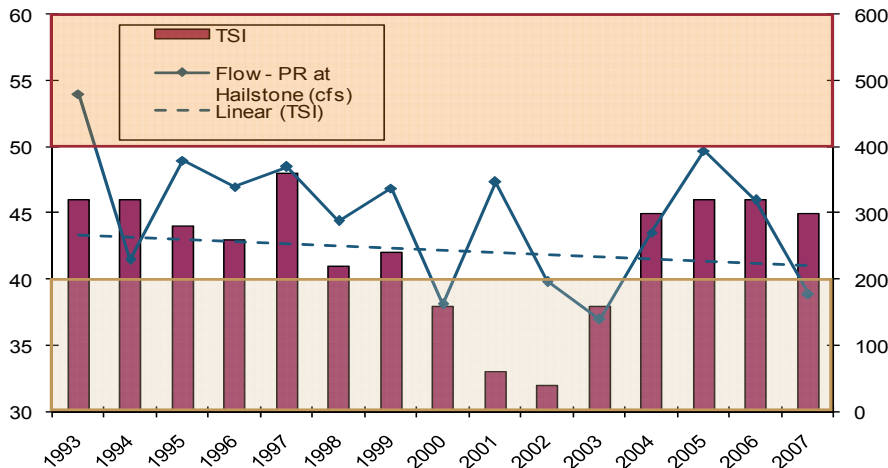
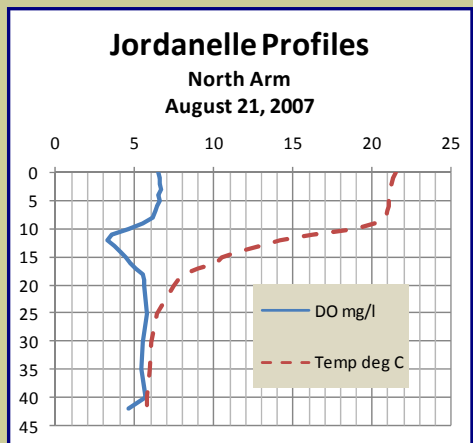
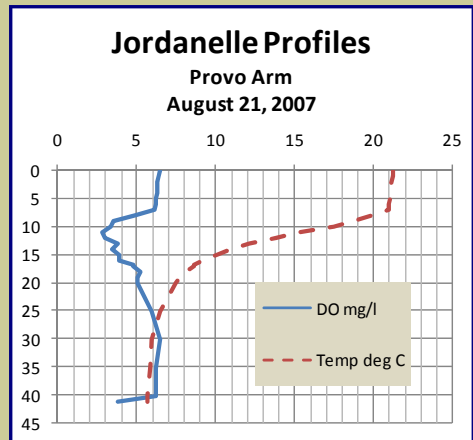
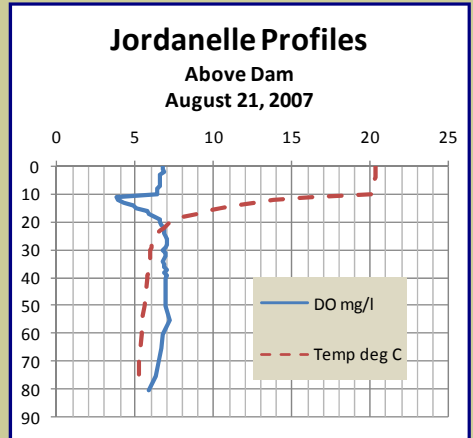
Deer Creek Profiles August 9, 2007



Jordanelle Trophic State

Year	Average TSI	North End		Provo Arm		Above Dam	
		Chlorophyll a	Secchi Disk Depth	Chlorophyll a	Secchi Disk Depth	Chlorophyll a	Secchi Disk Depth
10/3/2006		3.60	2.80	4.80	3.30	4.65	3.80
11/7/2006		18.80	2.40	11.00	3.30	10.85	3.40
4/4/2007		2.40	2.90	2.50	2.00	1.80	3.70
5/15/2007		0.90	2.30	3.40	1.10	3.90	1.90
6/19/2007		4.30	2.50	4.30	2.70	3.35	3.80
7/17/2007		2.40	3.00	3.40	3.30	2.70	3.00
8/21/2007		2.20	2.90	2.50	3.30	2.40	3.30
9/13/2007		3.40	1.60	3.80	3.50	2.20	4.60
2007	44.9	4.8	2.6	4.5	2.8	4.0	3.4
		45.9	46.5	45.3	45.1	44.2	42.2
10/18/2005		7.40	2.70	4.00	3.00	4.55	3.40
11/21/2005		2.00	3.60	2.10	4.40	1.90	3.40
5/3/2006		6.30	2.30	9.70	1.30	5.20	2.50
6/15/2006				7.90	2.20	3.90	2.70
7/13/2006						4.10	2.70
8/29/2006		3.20	2.00	3.80	2.40	2.45	3.90
2006	45.4	4.7	2.7	5.5	2.7	3.7	3.1
		45.8	46.0	47.3	45.9	43.4	43.7

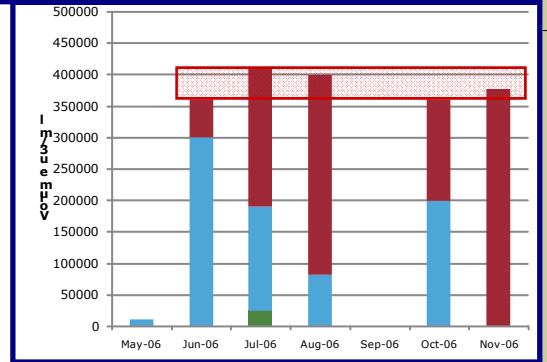
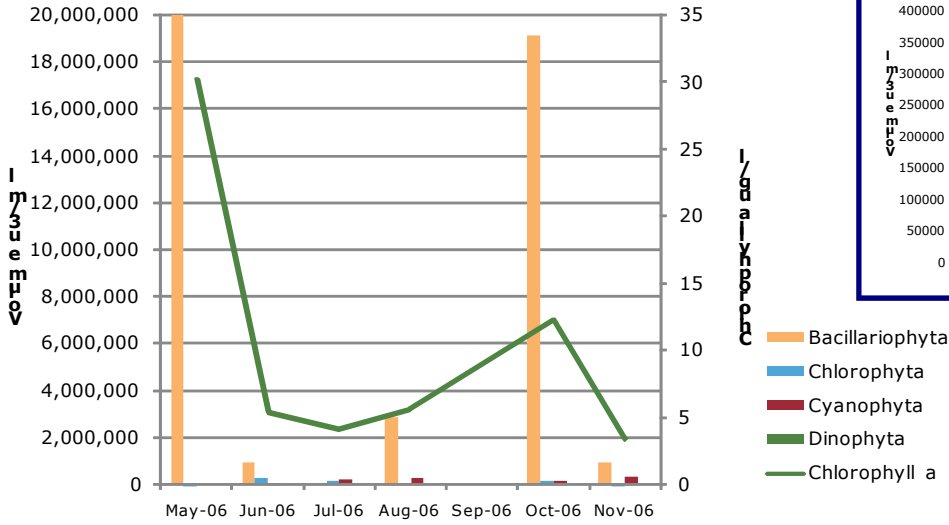
Jordanelle Reservoir Profiles



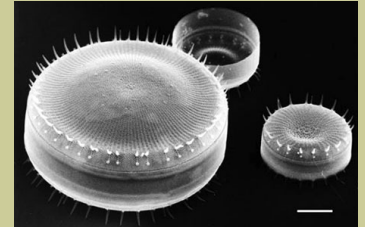
Problems and Concerns

1. *Jordanelle is a rather healthy lake. Its' Trophic State Index has be consistently around 45 (in the middle of the mesotrophic zone) for the past four years. This, even though the flows into the reservoir have been quite different over that time. Also, the overall 15-year trend in TSI is downward which is a good sign. See Figure above.*
2. *Even though the Jordanelle Reservoir is healthy we still see algae blooms occurring in the late fall as indicated in the Trophic State Table above.*
3. *The profiles within the reservoir exhibit a strange phenomenon as show in the figures to the left. In the area of the thermanline there is also an area where the dissolved oxygen is reduced. However, the D.O. rises in the lower portions of the water column.*

Deer Creek Reservoir Algae Biomass



Tabellaria fenestrata

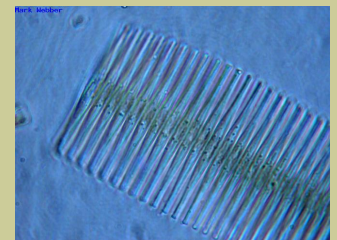
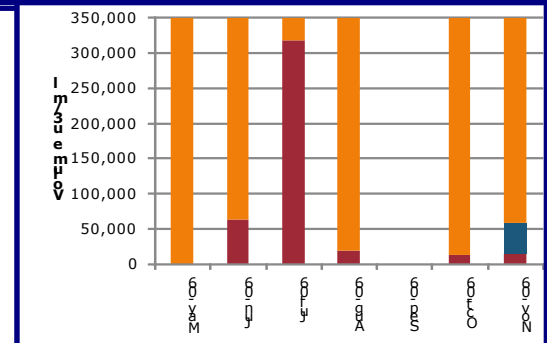
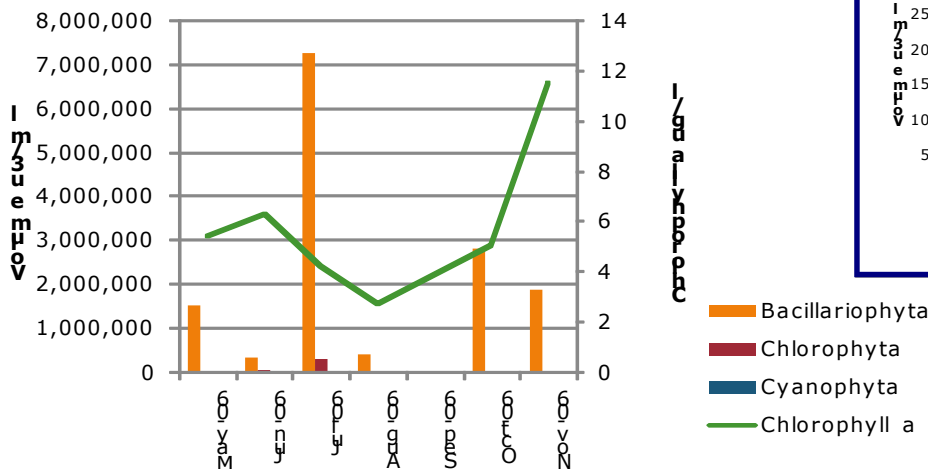


Stephanodiscus niagarae

Deer Creek Reservoir has experienced two (2) algae blooms annually for the past couple of years. Both of these blooms have primarily consisted of Bacillariophyta diatoms. However, the majority of the spring time bloom is *Tabellaria fenestrata* while the fall bloom consists of *Stephanodiscus niagarae*. From the image to the right and the ring of spines surrounding each cell, it is clear how this diatom got its name: translated from the Greek, *Stephanodiscus* means "crown-disc".

The Summer and Fall months exhibit a consistent volume of other algae besides Bacillariophyta. This total mass of Chlorophyta and Cyanophyta as seen in the chart in the upper right is between 360,000 and 410,000 μ^3 /ml.

Jordanelle Algae Biomass



Fragilaria crotonensis

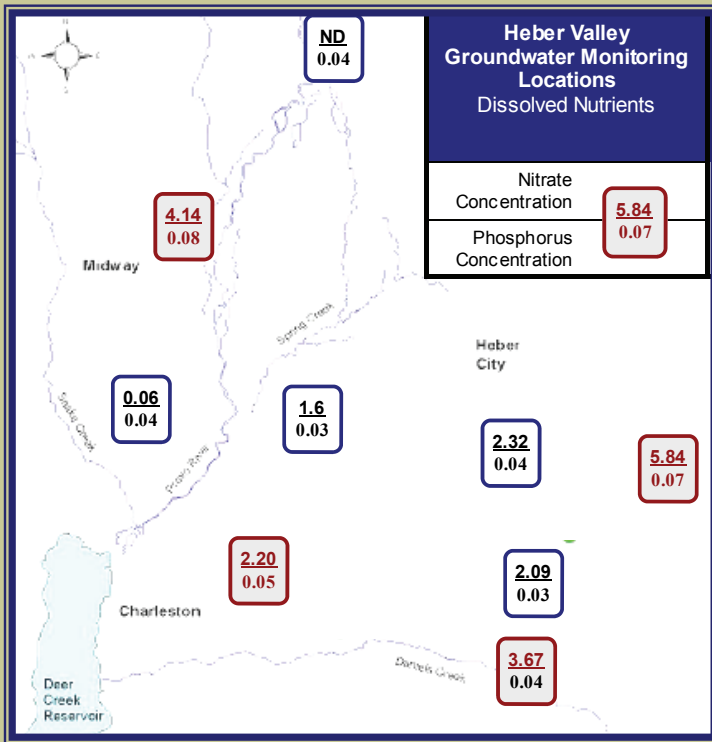
Jordanelle does not experience an extreme bloom as Deer Creek. The primary diatom in the bloom during July is *Fragilaria crotonensis* which is common to eutrophic lakes, especially during the spring bloom.

USGS GROUNDWATER SAMPLING

USGS Station Number	Dissolved Nitrates (mg/l)							DTP (mg/l)						
	2001	2002	2003	2004	2005	2007	Avg.	2001	2002	2003	2004	2005	2007	Avg.
403146111272701	1.16	1.31	1.48	-	2.32	1.74	1.60	<0.06	<0.06	0.02	-	0.02	<0.04	0.02
402842111263101	1.92	1.74	1.81	1.83	1.85	2.2	1.89	0.06	0.06	0.05	0.04	0.04	0.05	0.05
402937111214901	4.33	4.7	5.58	5.49	7.78	5.84	5.62	0.076	0.08	0.1	0.08	0.1	0.07	0.08
402946111233901	1.97	2.15	2.52	2.76	3.17	4.14	2.79	0.082	0.08	0.09	0.08	0.08	0.08	0.08
403003111255801	2.1	2.33	2.07	2.12	1.62	1.6	1.97	0.03	0.04***	0.05	0.03	0.04	0.03	0.04
403325111254601	-	-	<0.06	<0.06	<0.06	0.05*	<0.06	-	-	<0.04	<0.04	0.04	<0.04	<0.04
402840111232201	2.19	2.34	-	2.12	2.19	2.09	2.19	<0.06	0.04	-	0.03	0.03	0.03*	0.03
402750111232701	0.62	0.64	0.67	0.65	0.84	3.67	1.18	<0.06	<0.06	<0.04	<0.04	0.04	0.02*	<0.04
403004111280301	-	-	0.45	0.41	1.2	0.6	0.67	-	-	<0.04	<0.04	0.04	<0.04	<0.04

Problems & Concerns

- The figure to the left shows the location of the groundwater monitoring wells in the Heber Valley along with the Dissolved Nitrates and Dissolved Total Phosphorus concentrations. In past years higher concentrations of both nitrates and phosphorus were found in the eastern side of the valley. However, this situation has changed. Three wells have DTP concentrations greater than 0.04 mg/l. There are four wells that had high concentrations of Dissolved Nitrates.
- Groundwater loading estimates for Deer Creek Reservoir were developed over 20 years ago. These estimates were based on the limited groundwater sampling available at the time and may be quite inaccurate. The annual loading attributed to groundwater is over 2,700 kg/year. This a significant portion of the overall loading. A new study to better estimate the nutrient loading from groundwater should be considered in the future.
- Cadmium and Zinc in Big Dutch Pete Stream below the Mayflower mine are a concern. 50% of the time the cadmium standard is exceeded. The average concentration is also above the cadmium standard of 2 ug/l. Zinc concentrations exceeded the 3A aquatic wildlife standard of 120 ug/l all of the time. This is drainage from mines in the area and consistently flows three (3) to five (5) cfs throughout the year.



Jordanelle Basin Metals

Station Name Big Dutch Pete Stream bl Mayflower		
Date	Cadmium	Zinc
10/26/2005	1.19	163
6/28/2006	2.58	279
7/27/2006	2.13	251
9/12/2006	1.25	163
10/11/2006	0	151
3/20/2007	9.91	1137
4/25/2007	4.47	456
5/30/2007	2.86	380
6/28/2007	2.6	408
7/26/2007	2.15	381
8/28/2007	1.84	327
9/25/2007	1.13	305
Average	2.68	367

Problem Summary

STORET Number	Location	Problem	Exceedence Rate	Comments
Upper Provo River and Jordanelle Reservoir				
4997675	Big Dutch Pete Hollow below Mayflower in State Park	High Heavy Metals Concentrations	Cadmium – Zinc -	Standards for cadmium and zinc were exceeded 50% and 100% of the time.
Middle Provo River through Heber Valley				
5911120	County Flood Control Channel at Provo River	High Phosphorus Concentrations	TP – 60% DTP – 40%	Total Phosphorus and Dissolved Total phosphorus exceeded the PRWC standards three times in 2006 and two times in 2007.
4997250	Spring Creek at Entrance to Provo River	High Phosphorus Concentrations	TP – 95% DTP – 52%	Average TP equals 0.085 mg/l. Average DTP equals 0.045. Spring Creek is contributing 50% to 60% Total Phosphorus Load and 80% - 90% Dissolved Total Phosphorus Load to the Provo River system.
5910273	Sagebrush-Spring Creek Canal at 1200 N.	High Phosphorus Concentrations	TP – 95% DTP – 90%	Average TP equals 0.135 mg/l Average DTP equals 0.075 mg/l
402937111214901 402946111233901 402750111232701	Groundwater monitoring wells	High Dissolved Nitrates	N/A	Three wells had high concentrations of Dissolved Nitrates.
402937111214901 402946111233901 402842111263101	Groundwater monitoring wells	High Phosphorus Concentrations	N/A	DTP concentrations averaged 0.8 for the first two wells listed and 0.5 for the third well.
Deer Creek Reservoir Basin				
5913460	Main Creek	High Phosphorus Concentrations	TP – 53% DTP – 32%	Average TP equals 0.06 mg/l. Max TP equal 0.25 mg/l. Contributes 15% of TP Load to Deer Creek, but over 70% of DTP load.
5913460	Main Creek	High Temperatures (2006 only)	Temp - 20%	Max Temperature equals 24.7°
	Deer Creek Reservoir	High Phosphorus Loads Aug – Oct	Up to 150% of Target	Summer loadings from all inputs to Deer Creek exceed TMDL
	Deer Creek Reservoir	High Dissolved Phosphorus Loads Aug – Oct	Up to 150% of Target	Summer loadings from all inputs to Deer Creek exceed TMDL
	Deer Creek Reservoir	High Algae Biomass	Up to 193% of Target	Chlorophyll a average equaled 9.83 µg/l for 2006 and 6.49 µg/l for 2007 at midlake.
	Deer Creek Reservoir	High Algae Biomass in Spring	6 Times Target	Chlorophyll a equaled 30.2 µg/l for 2006 and 10.2 µg/l for 2007 at midlake.
5913220 5913230	Deer Creek Reservoir Above Dam & Midlake	Low DO in water column	N/A	July & August 2006 July & August 2007