



“Straight Pipe” Septic Monitoring Project

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Straight Pipe Septic Monitoring



April/May of 2006 a straight pipe septic system was monitored for e.coli bacteria. Stream/pipe monitoring continued after a mound system was installed in May 2006.



Date	Time	Upstream	Downstream	Septic
4/12/2006	2:00 PM	1	14	870
4/19/2006	2:00 PM	5	9	933
4/20/2006	9:00 AM	2	0	1,300
4/21/2006	11:30 AM	2	3	58
4/24/2006	1:45 PM	2	8	43
4/25/2006	3:15 PM	2	1	23
4/26/2006	11:50 AM	8	10	54
4/27/2006	8:00 AM	8	26	>2420
4/28/2006	1:05 PM	20	13	52
5/1/2006	11:30 AM	32	46	1,236
5/2/2006	11:45 AM	13	12	28
5/3/2006	12:25 PM	9	19	579
5/4/2006	8:07 AM	29	160	>2420
5/5/2006	1:00 PM	12	28	1,396
5/8/2006	5:45 PM	24	21	2,282
5/10/2006	6:40 PM	20	31	298
5/11/2006	10:10 AM	26	75	4,884
5/16/2006	7:40 AM	37	25	20
5/17/2006	7:35 AM	19	12	201
5/17/2006	6:10 PM	8	15	816
5/18/2006	7:33 AM	23	26	131
5/22/2006	7:32 AM	23	41	173
5/23/2006	7:31 AM	20	17	219
5/23/2006	4:55 PM	16	20	389
5/24/2006	11:30 AM	30	62	6,867
5/29/2006	6:15 PM	109	68	10
5/30/2006	7:35 AM	196	308	1
5/31/2006	7:28 AM	291	276	10
6/1/2006	7:31 AM	308	291	10
6/5/2006	3:15 PM	345	435	10
6/6/2006	7:28 AM	435	435	10
6/6/2006	11:00 AM	285	326	1
6/7/2006	7:27 AM	291	1,986	1
6/8/2006	7:30 AM	261	387	5
6/19/2006	1:10 PM	200	179	73
6/20/2006	5:15 PM	116	147	19
6/21/2006	7:36 AM	91	101	24
6/22/2006	7:33 AM	84	236	14
6/26/2006	7:35 AM	435	411	27
6/27/2006	6:05 PM	816	579	40
6/28/2006	7:34 AM	276	325	2
6/29/2006	7:29 AM	201	202	6
7/5/2006	7:30 AM	222	238	<1
GM Conc. Pre-Mound		11	15	350
GM. Conc. Post-Mound		235	288	7

A total of 43 sample sets were collected from April 12th through July 5th, 2006.



The water quality standard for E. coli is 126 cfu/100 ml.

Pre-Mound		Post-Mound	
Date	Conc.	Date	Conc.
4/12/2006	870	5/29/2006	10
4/19/2006	933	5/30/2006	1
4/20/2006	1,300	5/31/2006	10
4/21/2006	58	6/1/2006	10
4/24/2006	43	6/5/2006	10
4/25/2006	23	6/6/2006	10
4/26/2006	54	6/6/2006	1
4/27/2006	2,420	6/7/2006	1
4/28/2006	52	6/8/2006	5
5/1/2006	1,236	6/19/2006	73
5/2/2006	28	6/20/2006	19
5/3/2006	579	6/21/2006	24
5/4/2006	2,420	6/22/2006	14
5/5/2006	1,396	6/26/2006	27
5/8/2006	2,282	6/27/2006	40
5/10/2006	298	6/28/2006	2
5/11/2006	4,884	6/29/2006	6
5/16/2006	20	7/5/2006	1
5/17/2006	201		
5/17/2006	816		
5/18/2006	131		
5/22/2006	173		
5/23/2006	219		
5/23/2006	389		
5/24/2006	6,867		
GM Conc.	350		7

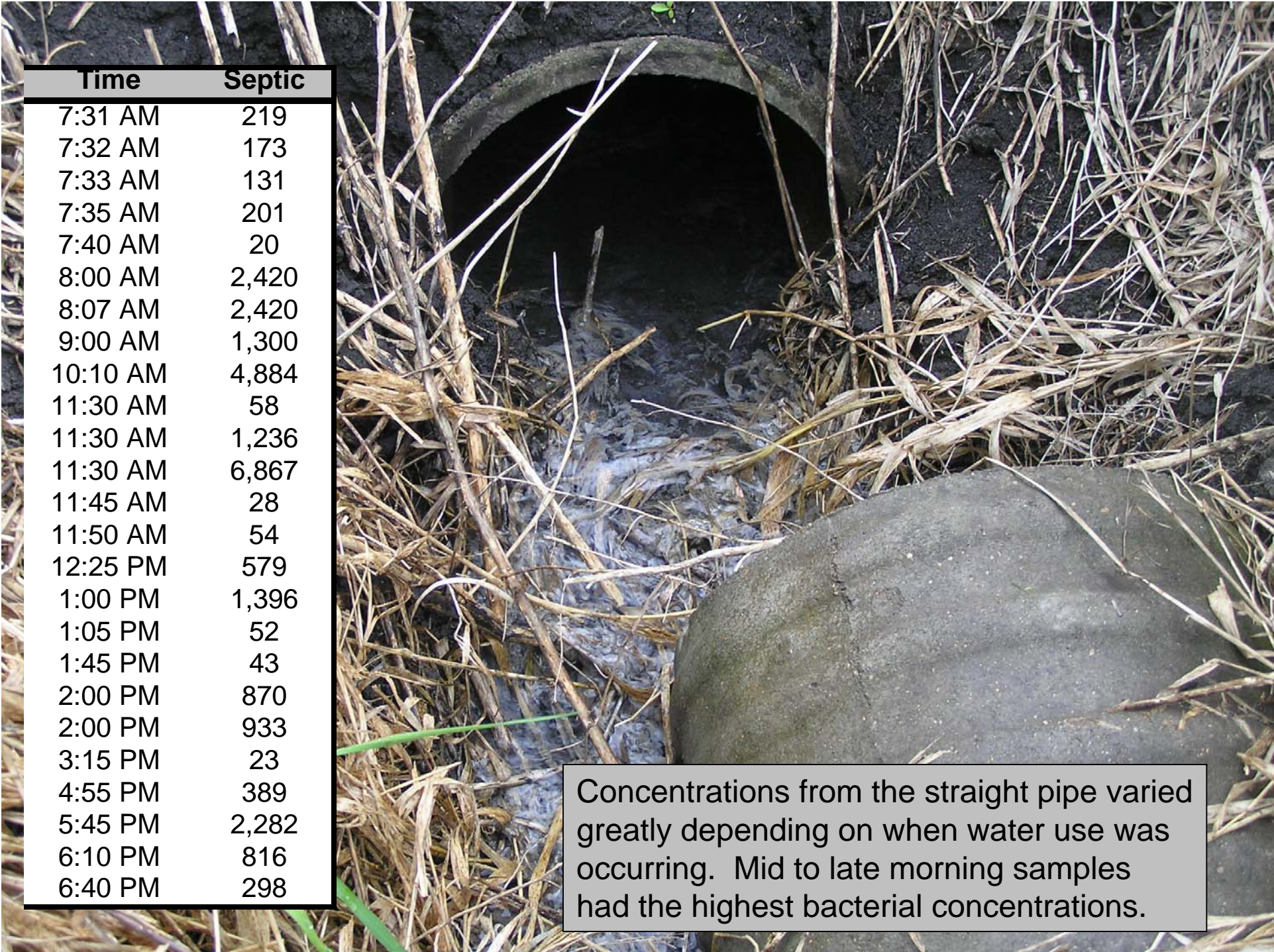
Geometric mean e.coli concentration from the outlet pipe dropped from 350 to 7 cfu/100 ml after the mound system was installed.

Before mound installation 72% of samples exceeded 126 cfu/100 ml.



After mound installation 0% of samples exceeded 126 cfu/100 ml.





Time	Septic
7:31 AM	219
7:32 AM	173
7:33 AM	131
7:35 AM	201
7:40 AM	20
8:00 AM	2,420
8:07 AM	2,420
9:00 AM	1,300
10:10 AM	4,884
11:30 AM	58
11:30 AM	1,236
11:30 AM	6,867
11:45 AM	28
11:50 AM	54
12:25 PM	579
1:00 PM	1,396
1:05 PM	52
1:45 PM	43
2:00 PM	870
2:00 PM	933
3:15 PM	23
4:55 PM	389
5:45 PM	2,282
6:10 PM	816
6:40 PM	298


Concentrations from the straight pipe varied greatly depending on when water use was occurring. Mid to late morning samples had the highest bacterial concentrations.

Straight Pipe Septic Monitoring Upstream vs Downstream Sample Concentrations Prior to Mound Installation

Wilcoxon Signed Ranks Test $S=0.009$
Statistically Significant Difference Upstream to Downstream

The GM of samples collected
downstream were 15 cfu/100 ml.

Straight pipe discharge,
GM conc. 350 cfu/ml



The GM of samples collected
upstream were 11 cfu/100 ml.

72% of the data sets showed
an increase in bacterial concentration
from upstream to downstream.


Straight Pipe Septic Monitoring Upstream vs Downstream Sample Concentrations After Mound Installation

Wilcoxon Signed Ranks Test $S=0.163$

Not a Statistically Significant Difference Upstream to Downstream

The GM of samples collected
downstream were 288 cfu/100 ml.

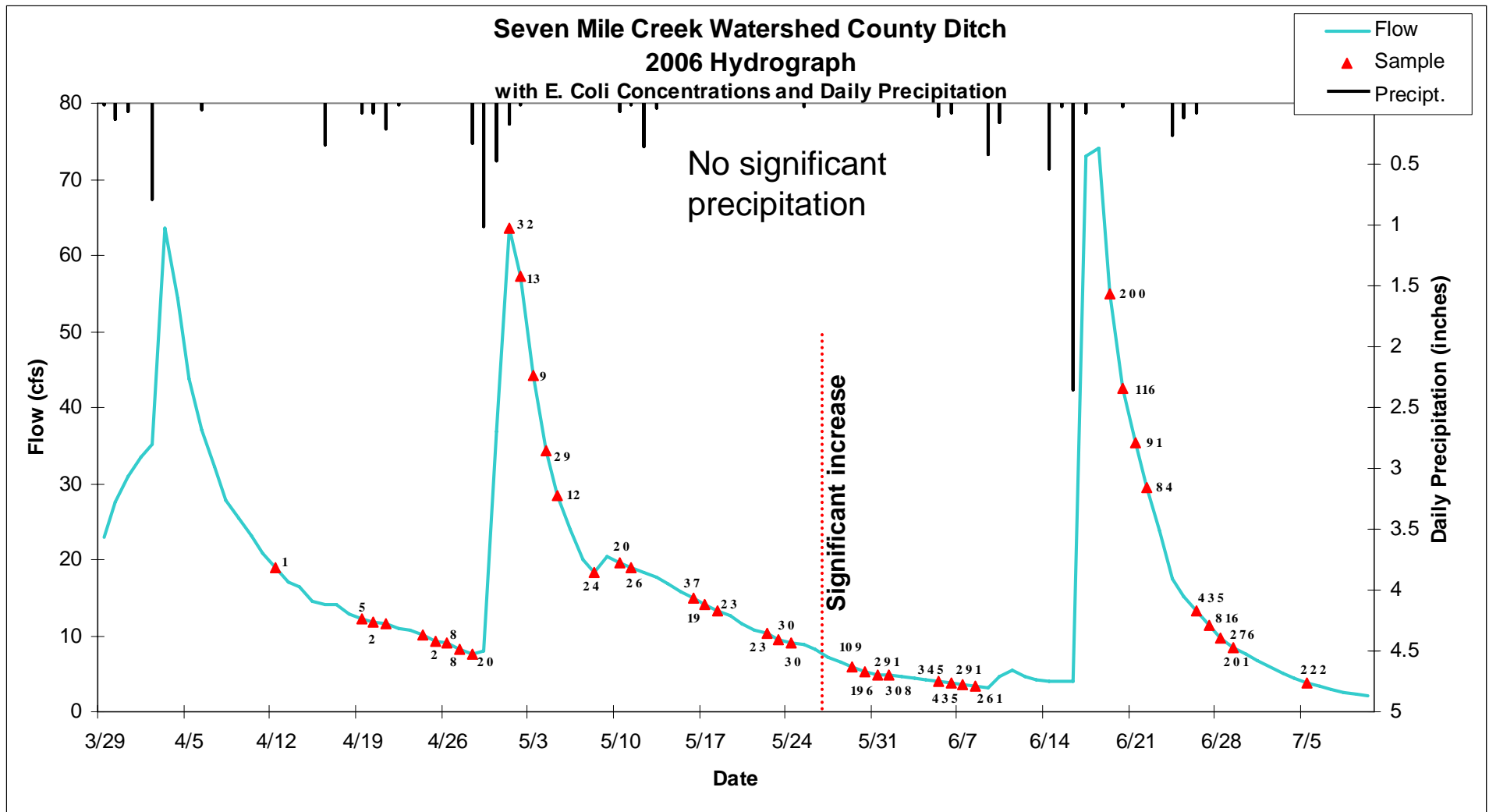
Straight pipe discharge,
GM conc. 7 cfu/ml



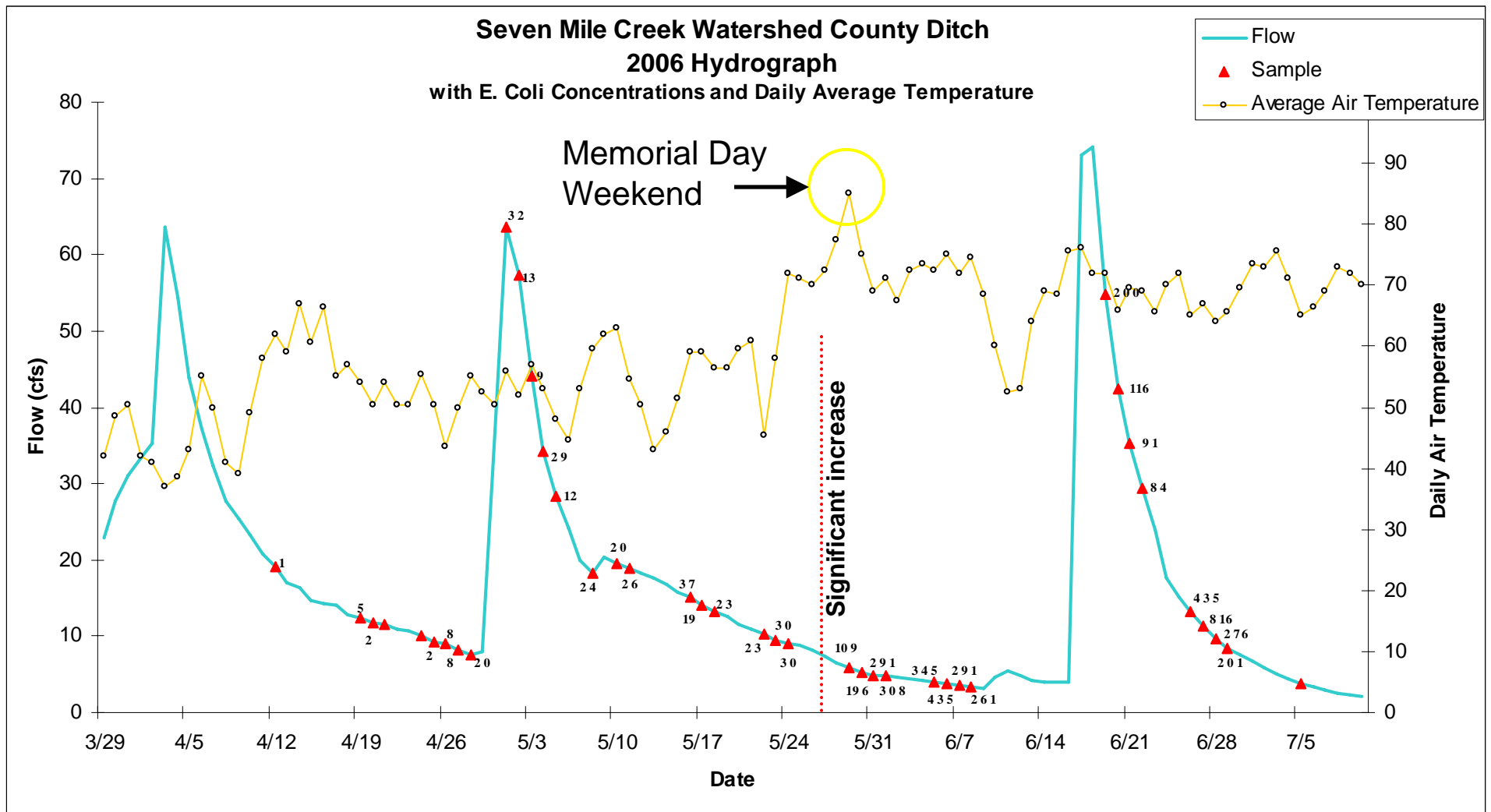
The GM of samples collected
upstream were 235 cfu/100 ml.

65% of the data sets showed
an increase in bacterial concentration
from upstream to downstream.

The ditch monitoring site has demonstrated the effect of temperature of bacterial concentrations.



The ditch monitoring site has demonstrated the effect of temperature and bacterial concentrations.



Lessons Learned

Bacterial concentrations from straight pipes are highest when water usage is occurring. Monitoring to show the effect of the pipe on stream water quality is “hit or miss”.

Once the mound system was installed, fecal coliform concentrations from the pipe were immediately reduced to near zero.

Post-mound installation, downstream bacterial levels appear to have remained higher than upstream. Could this be due to a contaminated streambed sediments?

Temperature has a significant relationship to bacterial concentrations in stream water.