Total Maximum Daily Load Synopsis

State: Kentucky
Major River Basin: Big Sandy
USGS HUC8: 05070203
Counties: Floyd and Knott
Impaired Use(s): Primary and Secondary Contact Recreation
Pollutants of Concern: Fecal Coliform, <u>E. coli</u>

The Beaver Creek Watershed is located in the Big Sandy River Basin in Floyd and Knott Counties and encompasses the cities of Wheelwright and Pippa Passes in its headwaters, Wayland in its midst, and Martin and Allen near its confluence with Levisa Fork. A map depicting the location of the Beaver Creek Watershed is in Figure S.1.

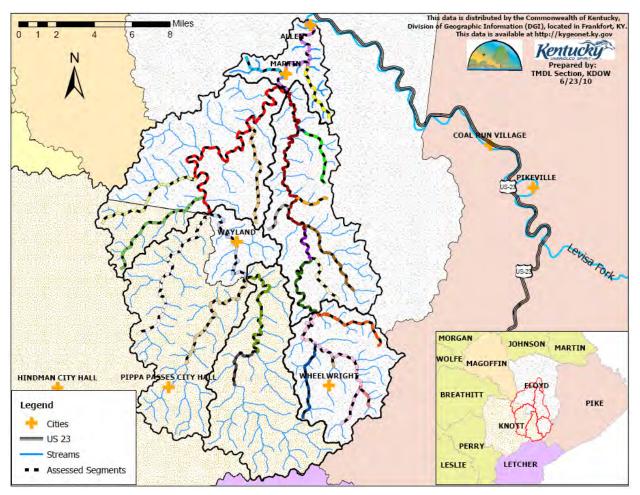


Figure S.1 Location of Beaver Creek Watershed in Floyd and Knott Counties of Eastern KY

The Kentucky Division of Water (KDOW) contracted with Eastern Kentucky University (EKU) to monitor for <u>Escherichia coli</u> (a pathogen indicator) in the Beaver Creek watershed, including the Right Fork and Left Fork of Beaver Creek and their major tributaries. This sampling was performed by the students and staff of the Eastern Kentucky Environmental Research Institute at EKU under the direction of Dr. Alice Jones and Environmental Specialist Reagan Butcher. This

document contains the monitoring results and describes TMDL development for pathogen indicators in the Beaver Creek watershed as required under Section 303(d) of the Clean Water Act. Table S.1 indicates the pathogen indicator impaired segments for which TMDLs are developed in this document.

Watarhady					0 0 0 0 0		
Waterbody	Total	Watanhadar ID	Country	Assessment	Llac	Immoinneat	Supported Second (a)
& Segment	Size	Waterbody ID	County	Category	Use	Impairment	Suspected Source(s)
							On-Site Treatment
Arkansas							Systems (Septic
Creek 0.0 to	3.6					Escherichia	Systems and Similar
3.6	miles	KY486027_01	Floyd	5-NS	PCR	<u>coli</u>	Decentralized Systems)
							Municipal (Urbanized
							High Density Area),
							On-Site Treatment
							Systems (Septic
							Systems and Similar
							Decentralized
							Systems), Package
							Plant or Other
							Permitted Small Flows
Beaver							Discharges,
Creek 0.0 to	7.1					Escherichia	Unspecified Domestic
7.1	miles	KY486610_01	Floyd	5-NS	PCR	coli	Waste
							On-Site Treatment
							Systems (Septic
Buck Branch	2.8					Escherichia	Systems and Similar
0.0 to 2.8	miles	KY488192_01	Floyd	5-NS	PCR	coli	Decentralized Systems)
			j				On-Site Treatment
							Systems (Septic
Caleb Fork	1.2					Escherichia	Systems and Similar
0.0 to 1.2	miles	KY488598_01	Floyd	5-NS	PCR	coli	Decentralized Systems)
							Package Plant or Other
Caney Fork	7.5					Escherichia	Permitted Small Flows
0.0 to 7.5	miles	KY488862_01	Knott	5-NS	PCR	coli	Discharges
							On-Site Treatment
							Systems (Septic
Clear Creek	4.9					Escherichia	Systems and Similar
0.0 to 4.9	miles	KY489611_01	Floyd	5-NS	PCR	coli	Decentralized Systems)
					_		On-Site Treatment
							Systems (Septic
							Systems and Similar
							Decentralized
							Systems), Package
Frasure							Plant or Other
Creek 0.0 to	5.2					Escherichia	Permitted Small Flows
5.2	miles	KY492468 01	Floyd	5-NS	PCR	coli	Discharges
5.2		11172700_01	11090	5 110	ien		On-Site Treatment
							Systems (Septic
Jacks Creek	4.4					Escherichia	Systems and Similar
0.0 to 4.4	4.4 miles	KY495089_01	Floyd	5-NS	PCR	<u>coli</u>	Decentralized Systems)
0.0104.4	miles	K 147J007_01	Tioyu	5-110	TUN	<u>0011</u>	Decentralized Systems)

Table S.1 Impaired Waterbodies Addressed in this TMDL I	Document
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				<u> </u>			
Waterbody	Total		~	Assessment			a
& Segment	Size	Waterbody ID	County	Category	Use	Impairment	Suspected Source(s)
							On-Site Treatment
							Systems (Septic
Jones Fork	9.9					Escherichia	Systems and Similar
0.0 to 9.9	miles	KY495499_01	Knott	5-NS	PCR	<u>coli</u>	Decentralized Systems)
							On-Site Treatment
							Systems (Septic
							Systems and Similar
							Decentralized
Left Fork							Systems), Package
Beaver							Plant or Other
Creek 0.0 to	11.4					Escherichia	Permitted Small Flows
11.4	miles	KY496194_01	Floyd	5-NS	PCR	<u>coli</u>	Discharges
							On-Site Treatment
							Systems (Septic
							Systems and Similar
							Decentralized
Left Fork							Systems), Package
Beaver	0.15						Plant or Other
Creek 11.4	2.15	WW406104 00	T 1	5.310	DCD	Escherichia	Permitted Small Flows
to 13.55	miles	KY496194_02	Floyd	5-NS	PCR	<u>coli</u>	Discharges
Left Fork							On-Site Treatment
Beaver	5.2					F 1 · 1 ·	Systems (Septic
Creek 18.7	5.3		T 1	5.310	DCD	Escherichia	Systems and Similar
to 28.6	miles	KY496194_04	Floyd	5-NS	PCR	<u>coli</u>	Decentralized Systems)
	0.5					E. I. d. L.	Package Plant or Other
Otter Creek	0.5	VV500021_01	Florid	5 NG	DCD	Escherichia	Permitted Small Flows
0.0 to 0.5	miles	KY500021_01	Floyd	5-NS	PCR	<u>coli</u>	Discharges
Right Fork Beaver						Ecohorishia	
Creek 0.0 to	17.4				PCR,	Escherichia coli, Fecal	Inonpropriate Weste
17.4	17.4 miles	VV501962 01	Floyd	5 NG 5 NG	SCR	coliform	Inappropriate Waste Disposal
17.4	miles	KY501863_01	Floyd	5-NS, 5-NS	SCK	comorni	On-Site Treatment
							Systems (Septic Systems and Similar
							Decentralized
Right Fork							Systems), Package
Beaver							Plant or Other
Creek 17.4	5.9					Escherichia	Permitted Small Flows
to 23.3	miles	KY501863_02	Floyd	5-NS	PCR	coli	Discharges
10 23.3	miles	<u>K1501005_02</u>	Tioyu	5-110		<u>con</u>	On-Site Treatment
							Systems (Septic
							Systems and Similar
							Decentralized
Right Fork							Systems), Package
Beaver							Plant or Other
Creek 30.3	2.9					Escherichia	Permitted Small Flows
to 33.4	miles	KY501863 04	Knott	5-NS	PCR	coli	Discharges
							On-Site Treatment
Salt Lick							Systems (Septic
Creek 0.0 to	6.8					Escherichia	Systems and Similar
6.8	miles	KY502845_01	Floyd	5-NS	PCR	coli	Decentralized Systems)
		01	110 / 4	~ ~ ~ ~			

Waterbody	Total			Assessment			
& Segment	Size	Waterbody ID	County	Category	Use	Impairment	Suspected Source(s)
							On-Site Treatment
Simpson							Systems (Septic
Branch 0.0	1.8					Escherichia	Systems and Similar
to 1.8	miles	KY503532_01	Floyd	5-NS	PCR	coli	Decentralized Systems)
							On-Site Treatment
Sizemore							Systems (Septic
Branch 0.0	2					Escherichia	Systems and Similar
to 2.0	miles	KY503590_01	Floyd	5-NS	PCR	coli	Decentralized Systems)
Spewing							On-Site Treatment
Camp							Systems (Septic
Branch 0.0	3.1					Escherichia	Systems and Similar
to 3.1	miles	KY504061_01	Floyd	5-PS	PCR	coli	Decentralized Systems)
							On-Site Treatment
Spurlock							Systems (Septic
Creek 0.0 to	0.6					Escherichia	Systems and Similar
0.6	miles	KY504191_01	Floyd	5-NS	PCR	coli	Decentralized Systems)
							On-Site Treatment
Turkey							Systems (Septic
Creek 0.0 to	5.9					Escherichia	Systems and Similar
5.9	miles	KY505598_01	Floyd	5-NS	PCR	<u>coli</u>	Decentralized Systems)

Kentucky Water Quality Criteria (WQC):

According to 401 KAR 10:031,

"The following criteria shall apply to waters designated as primary contact recreation use during the primary contact recreation season of May 1 through October 31: Fecal coliform content or <u>Escherichia coli</u> content shall not exceed 200 colonies per 100 ml or 130 colonies per 100 ml respectively as a geometric mean based on not less than five (5) samples taken during a thirty (30) day period. Content also shall not exceed 400 colonies per 100 ml in twenty (20) percent or more of all samples taken during a thirty (30) day period for fecal coliform or 240 colonies per 100 ml for <u>Escherichia coli</u>."

Additionally,

"The following criteria shall apply to waters designated for secondary contact recreation use during the entire year: Fecal coliform content shall not exceed 1000 colonies per 100 ml as a thirty (30) day geometric mean based on not less than five (5) samples; nor exceed 2000 colonies per 100 ml in twenty (20) percent or more of all samples taken during a thirty (30) day period."

TMDL Components and Target:

A TMDL calculation is performed as follows:

$$TMDL = WLA + LA + MOS$$

Where:

TMDL = the Water Quality Criterion. This is defined as an instantaneous <u>E</u>. <u>coli</u> concentration of 240 colonies/100 ml.

WLA = the Waste Load Allocation. For this TMDL document, there are two types of WLAs: WLAs for KPDES-permitted sources and a Future Growth WLA. The KPDES-permitted WLAs are allowable loadings of pollutants into the stream from KPDES-permitted sources such as sewage treatment plants, package plants, and home units. The Future Growth WLA is a portion of the loading reserved for expanding and new KPDES-permitted sources.

LA = the Load Allocation, which is the allowable loading of pollutants into the stream from sources not permitted by KPDES and from natural background.

MOS = the Margin of Safety, which can be an implicit or explicit additional reduction applied to sources of pollutants that accounts for uncertainties in the data or TMDL calculations. For this TMDL an explicit MOS of 10% was applied and an implicit MOS was incorporated by calculating WLAs for KPDES-sources at their maximum design capacity.

TMDL Target = the TMDL minus the MOS (or 240 colonies/100 ml - 10% = 216 colonies/100 ml).

Seasonality

In Kentucky regulations, the PCR use is defined to apply to the period beginning May 1 and ending October 31. For this TMDL, seasonality is considered because samples were collected twice a month to provide data over the entire PCR season.

Critical Condition

The critical condition for nonpoint source \underline{E} . <u>coli</u> (or fecal coliform) loadings is typically an extended dry period followed by a rainfall runoff event. Conversely, the critical condition for point source loading typically occurs during periods of low stream flow when dilution is minimized. Sampling was performed during both types of conditions (during or following rain events and during extended dry periods). The Beaver Creek watershed contains both types of sources; therefore the critical condition for each impaired segment is defined by the sample showing the greatest concentration, which was generally collected during rainfall events.

TMDL Methodology:

<u>Mean Annual Flows (MAFs)</u>: MAFs were used to convert concentrations of <u>E</u>. <u>coli</u> into loads of <u>E</u>. <u>coli</u>. The MAF for each site was adjusted by either adding or subtracting flow based on any KPDES-permitted dischargers of pathogen indicators or KDOW permitted stream water withdrawals in the watershed upstream of a sample site (yielding the Adjusted MAF for that site).

<u>Existing Loads</u>: For each sample site, the sample with the greatest concentration of \underline{E} . <u>coli</u> was used as the existing concentration for the site. Existing loads were calculated as:

Greatest		Adjusted		Conversion Factor		
Concentration	×	MAF	×		=	Existing Load (billion colonies/day)
(colonies/100ml)		(cfs)		.0244657584		colonics/day)

where the conversion factor converts cfs to ml/day and colonies to billion colonies.

<u>Total TMDL</u>: Total TMDLs were calculated for each site using the <u>E</u>. <u>coli</u> criterion of 240 colonies/100 ml:

240		Adjusted		Conversion Factor		
240	×	MAF	×	Conversion Factor	=	Total TMDL (billion
(colonies/100ml)		1,11	~	.0244657584		colonies/day)
		(cfs)				

<u>MOS</u>: A 10% explicit MOS (i.e., 10% of the WQC, or 24 colonies/100ml,) was set. Additionally, an implicit MOS was incorporated in loading calculations for KPDES-permitted sources by setting their flow at the maximum design capacity. The explicit MOS load for each site was calculated as:

24		Adjusted		Communican Easter		
24	×	MAF	×	Conversion Factor	=	MOS (billion
(colonies/100ml)		(cfs)		.0244657584		colonies/day)

<u>Target Load</u>: The Target Load was calculated for each site by subtracting the explicit MOS from the Total TMDL (Target Load = Total TMDL – MOS).

<u>Percent Reduction</u>: Percent Reduction (%) = [(Existing Load – Target Load) / Existing Load] * 100

<u>Calculation of WLAs for Each KPDES-permitted Source</u>: The WLAs are calculated based on the permitted concentration limits expressed in terms of <u>E</u>. <u>coli</u> limits and facility design flow (in units of cfs) using the following equation:

240	×	Design Flow	~	Conversion Factor	_	KPDES WLA (billion
(colonies/100ml)	~	(cfs)	~	.0244657584	_	colonies/day)

- .

The design capacity in MGD was converted to cfs by multiplying by 1.54723 to convert days to seconds and million gallons to cubic feet.

<u>Calculation of Remainder</u>: The Remainder is not part of the TMDL; however, it is used in the TMDL calculations. It is determined as the Target Load minus the sum of all WLAs for KPDES-permitted sources.

Final Beaver Creek Watershed E. coli TMDL

<u>Calculation of Future Growth WLA:</u> Future growth is represented by a portion of the TMDL Target that is set aside (i.e., is not part of the LA nor is it part of the WLA for current/known sources). The Future Growth WLA was calculated as the Remainder multiplied by the appropriate percentage from Table S.2 (Future Growth WLA = Remainder * Future Growth WLA percentage).

Percent Developed Area	% of Remainder Set Aside for Future Growth WLA
≥25%	5%
≥20% - <25%	4%
$\geq 15\% - <20\%$	3%
$\geq 10\% - <15\%$	2%
$\geq 5\% - < 10\%$	1%
<5%	0.5%

Table S.2 Future Growth WLA Formula

<u>Calculation of LA:</u> Load Allocations are calculated as LA= Remainder – Future Growth WLA. The available sampling data were insufficient to apportion the existing loading among the various LA sources; therefore, it is lumped to all LA sources.

TMDLs for Impaired Segments:

TMDLs and loading allocations are summarized for each segment in Table S.3. All loads are expressed in units of billion <u>E</u>. <u>coli</u> colonies per day while percent reduction is expressed as a percentage.

Translation of WLAs into Permit Limits:

All WLAs will be translated into KPDES permit limits as an <u>E</u>. <u>coli</u> effluent gross limit of 130 colonies/100 ml as a monthly average and 240 colonies/100 ml as a maximum weekly average or as a Fecal coliform effluent gross limit of 200 colonies/100 ml as a monthly average and 400 colonies/100 ml as a maximum weekly average.

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Table S.3 TMDLs for Impaired Segments

	<u>3 TMDLs f</u>	or Impair	ed Segme	ents																				
Loads are															Right									
in units of	Demonst						Left Feed		C :		C:	Spewing	Left Fork	L - A E - d-	Fork			Dista Esula			Dist Essle		Decel	
billion <u>E</u> .	Percent Reduction is		Caleb	Clear Creek	Jacks	Otter	Left Fork Beaver	Frasure	Simpson Branch	Spurlock	Sizemore Branch	Camp Branch	Beaver Creek RM	Left Fork Beaver	Beaver Creek RM	Caney	Jones	Right Fork Beaver	Salt Lick	Turkey	Right Fork Beaver	Arkansas	Buck Branch	Beaver
<u>coli</u> <u>colonies</u> /	expressed as		Fork RM	RM 0.0 to	Creek RM	Creek RM	Creek RM	Creek RM	RM 0.0 to	Creek RM	RM 0.0 to	RM 0.0 to	11.4 to	Creek RM	30.3 to	Fork RM	Fork RM	Creek RM	Creek RM	Creek RM	Creek RM	Creek RM	RM 0.0 to	Creek 0.0 to
day	a percentage		0.0 to 1.2	4.9	0.0 to 4.4	0.0 to 0.5	18.7 to 28.6	0.0 to 5.2	1.8	0.0 to 0.6	2.0	3.1	13.55	0.0 to 11.4	33.4	0.0 to 7.5	0.0 to 9.9	17.4 to 23.3	0.0 to 6.8	0.0 to 5.9	0.0 to 17.4	0.0 to 3.6	2.8	7.1
any	u percentage	Existing	010 10 112	,			1017 to 2010	0.0 10 0.2	110		2.0	011	10.00	010 10 1111	0011		010 10 717	171110 2010		010 10 215	010 10 1711			
		Load	5284.6038	13901.0933	1783.7241	9686.2876	69257.5721	27154.7145	3436.0145	6117.7027	3704.6737	4327.5145	90650.1145	126755.5507	1994.2419	549.4722	3243.4191	10391.2139	27133.8788	10107.7083	65184.6057	8035.3679	5798.3369	147268.9800
		Total																						
		TMDL	15.8538	41.7033	47.5660	29.0589	207.7727	91.7906	15.2712	29.9643	12.3489	19.9731	315.3047	573.9874	251.9042	191.1208	181.0280	608.2662	98.6687	41.1161	1203.4081	24.1061	21.7438	1860.2397
		MOS	1.5854	4.1703	4.7566	2.9059	20.7773	9.1791	1.5271	2.9964	1.2349	1.9973	31.5305	57.3987	25.1904	19.1121	18.1028	60.8266	9.8669	4.1116	120.3408	2.4106	2.1744	186.0240
		TMDL	14.0 (04	27.5220	12 000 1	26.1520	106.0054	02 (115	10 7441	0.000	11 11 40	17.0750	202 77 12	516 5005	226 7120	152 0005	1 62 0252	547 400 6	00.0010	27.0045	1002.0772	21 6055	10.5004	1674 0150
		Target	14.2684	37.5330	42.8094	26.1530	186.9954	82.6115	13.7441	26.9678	11.1140	17.9758	283.7743	516.5887	226.7138	172.0087	162.9252	547.4396	88.8018	37.0045	1083.0673	21.6955	19.5694	1674.2158
AI #	KPDES #	percent reduction	99.73	99.73	97.60	99.73	99.73	99.70	99.60	99.56	99.70	99.58	99.69	99.59	88.63	68.70	94.98	94.73	99.67	99.63	98.34	99.73	99.66	98.86
Δ1 π	KI DLS #	KPDES	<i>99.13</i>	33.13	97.00	33.13	33.13	33.10	99.00	99.50	99.10	99.30	99.09	33.33	88.05	08.70	94.90	94.75	99.07	99.05	90.34	99.15	99.00	90.00
1133	KYG400642	WLA																			0.0045		()	0.0045
		KPDES																			010010			
1134	KY0085791	WLA												0.1817									()	0.1817
		KPDES																						
1143	KYG400479	WLA												0.0045										0.0045
		KPDES																					()	
1158	KYG400787	WLA																					0.0045	0.0045
		KPDES								0.0045													()	
1161	KYG400692	WLA								0.0045				0.0045)	0.0045
1162	KYG400678	KPDES WLA								0.0045				0.0045									()	0.0045
1102	KIG400078	KPDES					-			0.0045				0.0045	-									0.0045
1168	KYG400854	WLA									0.0045			0.0045									()	0.0045
1100	RIG100051	KPDES									0.0042			0.0042										0.0042
1168	KYG401516	WLA									0.0045			0.0045									()	0.0045
		KPDES																						
1173	KYG400790	WLA		0.0045									0.0045	0.0045										0.0045
		KPDES																						
1180	KYG400520	WLA																					0.0045	0.0045
		KPDES																					()	
1182	KYG400614	WLA						0.0045						0.0045									'	0.0045
1100	KNC 400500	KPDES																			0.0045		()	0.0045
1196	KYG400590	WLA																			0.0045			0.0045
1100	KYG400603	KPDES WLA																	0.0045		0.0045		()	0.0045
1199	K10400003	KPDES																	0.0045		0.0045			0.0045
1202	KYG400969	WLA						0.0045	· · · · · · · · · · · · · · · · · · ·					0.0045				· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·			()	0.0045
		KPDES																						
1218	KYG400567	WLA									0.0045			0.0045									()	0.0045
		KPDES																						
1222	KYG400730																				0.0045			0.0045
		KPDES																					()	
1232	KYG400806																						0.0045	0.0045
1007	KYG400753	KPDES		0.0045									0.0045	0.0045										0.0045
1237		WLA KPDES		0.0045									0.0045	0.0045										0.0045
1243	KYG400915						· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·					· · · · · · · · · · · · · · · · · · ·		0.0045			0.0045		()	0.0045
1243		KPDES																0.0045			0.0045			0.0045
1248	KYG400593	WLA																				0.0045		0.0045
12.0		KPDES																						
1255	KY0096342	WLA												0.1635										0.1635
		KPDES																						
1262	KY0026921																							1.0902
		KPDES																						
1263	KY0103136	WLA												0.0045									ليستعم	0.0045
10.07		KPDES																						0.0045
1265	KYG400612																							0.0045
1266	KYG400970	KPDES WLA		0.0045									0.0045	0.0045										0.0045
1200		KPDES		0.0045									0.0045	0.0045										0.0045
1269	KYG400478							0.0045						0.0045										0.0045
1207	110100470	· · •						010040						0.0040										010010

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200001								<u>-p::::::;</u>																
Loads are															Right									
in units of												Spewing	Left Fork		Fork							1 /	(1	
billion <u>E</u> .	Percent						Left Fork		Simpson		Sizemore	Camp	Beaver	Left Fork	Beaver			Right Fork			Right Fork	//	Buck	
<u>coli</u>	Reduction is		Caleb	Clear Creek		Otter	Beaver	Frasure	Branch	Spurlock	Branch	Branch	Creek RM	Beaver	Creek RM	Caney	Jones	Beaver	Salt Lick	Turkey	Beaver	Arkansas	Branch	Beaver
colonies/			Fork RM	RM 0.0 to	Creek RM		Creek RM	Creek RM	RM 0.0 to	Creek RM	RM 0.0 to	RM 0.0 to	11.4 to	Creek RM	30.3 to	Fork RM	Fork RM	Creek RM	Creek RM	Creek RM	Creek RM	Creek RM	RM 0.0 to	Creek 0.0 to
day	a percentage		0.0 to 1.2	4.9	0.0 to 4.4	0.0 to 0.5	18.7 to 28.6	0.0 to 5.2	1.8	0.0 to 0.6	2.0	3.1	13.55	0.0 to 11.4	33.4	0.0 to 7.5	0.0 to 9.9	17.4 to 23.3	0.0 to 6.8	0.0 to 5.9	0.0 to 17.4	0.0 to 3.6	2.8	7.1
		KPDES																				1 /	(1	
1270	KYG400666																				0.0045	ļ'		0.0045
		KPDES																				(/	(/	
1274	KYG400714	WLA											0.0045	0.0045								ļ'	I	0.0045
		KPDES																				1 /	(1	
1276	KYG400975	WLA																		0.0045	0.0045	└──── ′	()	0.0045
1202	WWG 400000 C	KPDES																0.0045			0.0045	1 /	(1	0.0045
1293	KYG400836	WLA																0.0045			0.0045	└──── ′	ļļ	0.0045
1204	KNC 400220	KPDES																				0.0045	(1	0.0045
1304	KYG400339	WLA																				0.0045		0.0045
1205	KY0103233	KPDES WLA												0.0899								1 /	(1	0.0899
1303	K10103233	KPDES			-									0.0099								├ ────′		0.0099
1314	KYG400844	WI A												· · · · · · · · · · · · · · · · · · ·		·			0.0045		0.0045	1 /	(——	0.0045
1514	K10400044	KPDES																	0.0045		0.0045		 	0.0045
1315	KYG400677	WLA								0.0045				0.0045								1 /	(1	0.0045
1515	K10400077	KPDES								0.0045				0.0045									/	0.0045
1327	KYG400601	WLA						0.0045						0.0045								1 /	(1	0.0045
1527	INTO 100001	KPDES			1			010012						010012										0.0012
1328	KYG400936	WLA																				0.0045	(1	0.0045
1020	1110100000	KPDES																					t	0.0012
1343	KYG400778	WLA																			0.0045	1 /	(1	0.0045
		KPDES																					(
1352	KY0072974	WLA																· · · · · · · · · · · · · · · · · · ·			0.2271		()	0.2271
		KPDES																					(
1367	KYG400579	WLA												0.0045								1 /	(1	0.0045
		KPDES																						
1369	KYG400724	WLA									0.0045			0.0045								1 /	(1	0.0045
		KPDES																						
2514	KY0094510	WLA															0.0273				0.0273		(0.0273
		KPDES																						
2517	KY0083089	WLA															0.0908				0.0908		(0.0908
		KPDES																						
2527	KY0042854	WLA														0.9085		0.9085			0.9085			0.9085
		KPDES																				1 /	(1	
4250	KYG400659													0.0045								ļ'		0.0045
		KPDES																				1 /	(1	
4327	KYG401073	WLA																			0.0045	ļ'		0.0045
		KPDES																				/ /	(1	
4331	KYG401143	WLA																				0.0045	I	0.0045
1000	WWW (CALL)	KPDES												0.004										0.0017
4332	KYG401142													0.0045										0.0045
4222	KNC 401140	KPDES WL A											0.0045	0.0045										0.0047
4533	KYG401140	WLA KPDES											0.0045	0.0045								′		0.0045
1220	KYG401125																	0.0045			0.0045			0.0045
4336	K10401125	WLA KPDES																0.0045			0.0045	<u> </u>		0.0045
1312	KYG401126	WIA																				0.0045		0.0045
4342	K10401120	KPDES																				0.0045		0.0045
1311	KYG401121	WLA																		0.0045	0.0045			0.0045
4344	110401121	KPDES																		0.0045	0.0045			0.0043
4349	KYG401133	WLA			0.0045		0.0045						0.0045	0.0045										0.0045
4349	110401155	KPDES			0.0045		0.00-15						0.00-15	0.00-15										0.0043
4350	KYG401113	WLA																	0.0045		0.0045			0.0045
+550	113401113	KPDES																	0.0045		0.00-10			0.0043
4356	KYG401040							0.0045						0.0045										0.0045
+550	110 101040	KPDES						0.0042						0,0040										010040
4405	KYG401197	WLA										0.0045	0.0045	0.0045										0.0045
1105		KPDES																						
12253	KYG401218																				0.0045			0.0045
		KPDES																						
15635	KYG401271	WLA												0.0045										0.0045

September, 2010

200001								<u>-pre-me er,</u>																
Loads are															Right									
in units of billion <u>E</u> .	Percent						Left Fork		Simpson		Sizemore	Spewing Camp	Left Fork Beaver	Left Fork	Fork Beaver			Right Fork			Right Fork		Buck	
<u>coli</u>	Reduction is		Caleb	Clear Creek	Jacks	Otter	Beaver	Frasure	Branch	Spurlock	Branch	Branch	Creek RM	Beaver	Creek RM	Caney	Jones	Beaver	Salt Lick	Turkey	Beaver	Arkansas	Branch	Beaver
colonies/	expressed as		Fork RM	RM 0.0 to	Creek RM	Creek RM	Creek RM	Creek RM	RM 0.0 to	Creek RM	RM 0.0 to	RM 0.0 to	11.4 to	Creek RM	30.3 to	Fork RM	Fork RM	Creek RM	Creek RM	Creek RM	Creek RM	Creek RM	RM 0.0 to	Creek 0.0 to
day	a percentage		0.0 to 1.2	4.9	0.0 to 4.4	0.0 to 0.5	18.7 to 28.6	0.0 to 5.2	1.8	0.0 to 0.6	2.0	3.1	13.55	0.0 to 11.4	33.4	0.0 to 7.5	0.0 to 9.9	17.4 to 23.3	0.0 to 6.8	0.0 to 5.9	0.0 to 17.4	0.0 to 3.6	2.8	7.1
15655	KYG401296																				0.0045			0.0045
15807	KYG401352	KPDES WLA	·		·	· · · · · · · · · · · · · · · · · · ·			· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	·	· · · · · · · · · · · · · · · · · · ·		· ·	·			·			0.0045			0.0045
33378	KYG401353	KPDES WLA																			0.0045			0.0045
33945	KY0077542														0.0636			0.0636						0.0636
35251	KY0089435	KPDES WLA					0.0618						0.0618	0.0618										0.0618
35252	KY0079421	KPDES WLA						0.1363						0.1363										0.1363
35254	KY0079430	KPDES WLA																			0.0999			0.0999
35258	KY0093017	KPDES WLA																			0.0727			0.0727
		KPDES WLA					0.1363						0.1363	0.1363										0.1363
		KPDES WLA																			0.2271			0.2271
35359	KY0087076	KPDES															0.0545				0.0545			0.0545
35761	KY0105228	KPDES WLA																0.9085			0.9085			0.9085
	KYG401533	KPDES						0.0045						0.0045										0.0045
	KYG401529	KPDES																						0.0045
		KPDES WLA																						0.0045
		KPDES WLA				2.0441	2.0441						2.0441	2.0441										2.0441
	KYG401540	KPDES									·										0.0045			0.0045
	KYG401548	KPDES																			0.0045			0.0045
44695		KPDES				0.0045	0.0045						0.0045	0.0045										0.0045
	KYG401590	KPDES												0.0045										0.0045
	KYG401582	KPDES												0.0045										0.0045
		KPDES WLA												0.0045										0.0045
	KYG401601	KPDES								0.0045				0.0045										0.0045
	KYG401603	KPDES															0.0045				0.0045			0.0045
	KYG401638	KPDES																			0.0045			0.0045
		KPDES WLA												0.0045										0.0045
	KYG401646	KPDES					0.0045						0.0045	0.0045										0.0045
	KYG401654	KPDES					0.0042					0.0045	0.0045	0.0045										0.0045
	KYG401692	KPDES						0.0045				0.0040	0.0042	0.0045										0.0045
	KYG401699	KPDES												0.0010										0.0045
	KYG401721	KPDES																		0.0045	0.0045			0.0045
50027	A10401/21																			0.0045	0.0040			0.0040

Final Beaver Creek Watershed E. coli TMDL

September, 2010

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Loads are															Right					((I	
in units of												Spewing	Left Fork		Fork					(/	4	/ /	(V	
	D (L C F 1		G.		G.			I C F 1				D'I/E I		(D' L F 1			
billion <u>E</u> .	Percent						Left Fork		Simpson		Sizemore	Camp	Beaver	Left Fork	Beaver			Right Fork		(/	Right Fork		Buck	
<u>coli</u>	Reduction is		Caleb	Clear Creek	Jacks	Otter	Beaver	Frasure	Branch	Spurlock	Branch	Branch	Creek RM	Beaver	Creek RM	Caney	Jones	Beaver	Salt Lick	Turkey	Beaver	Arkansas	Branch	Beaver
	expressed as	1	Fork RM	RM 0.0 to	Creek RM	Creek RM	Creek RM	Creek RM	RM 0.0 to	Creek RM	RM 0.0 to	RM 0.0 to	11.4 to	Creek RM	30.3 to	Fork RM	Fork RM	Creek RM	Creek RM	Creek RM		Creek RM	RM 0.0 to	Creek 0.0 to
colonies/																								
day	a percentage		0.0 to 1.2	4.9	0.0 to 4.4	0.0 to 0.5	18.7 to 28.6	0.0 to 5.2	1.8	0.0 to 0.6	2.0	3.1	13.55	0.0 to 11.4	33.4	0.0 to 7.5	0.0 to 9.9	17.4 to 23.3	0.0 to 6.8	0.0 to 5.9	0.0 to 17.4	0.0 to 3.6	2.8	7.1
, i i i i i i i i i i i i i i i i i i i	1 0	KPDES																			1	t		
																				(/		/ /	(V	
50950	KYG401730	WLA																	0.0045	(/	0.0045	/ /	(V	0.0045
		KPDES																			1	t		
		KI DES																		(/	/ /	/ I	(V	
53921	KYG401764	WLA																		(/	1	0.0045	(V	0.0045
		KPDES																						
																				(4	/ /	(V	
54879	KYG401772	WLA																		(/	0.0045	/ /	(V	0.0045
		KPDES																			1	t		
																				(4	/ /	(V	
71436	KYG401809	WLA						0.0045						0.0045						(/	1	/ /	(V	0.0045
		KPDES																			1	t		
		KI DES																		(/	1	/ /	(V	
74022	KYG401406	WLA							0.0045					0.0045						(4	/ /	(V	0.0045
		KPDES																						
																				(/	1	/ /	(V	
74025	KYG401409	WLA												0.0045						(/	1	/ /	(V	0.0045
		KPDES																			1	t		
																				(/	/ /	/ I	(V	
74062	KYG401442	WLA											0.0045	0.0045						(/	1	/ /	(V	0.0045
		KPDES																						
							0.00.1-						0.00.1-	0.00.1-										0.00.1-
74181	KYG401470	WLA					0.0045						0.0045	0.0045										0.0045
		KPDES																						
		KI DES																	0.00.17		0.001-			0.00.1-
74185	KYG401475	WLA																	0.0045	(/	0.0045	/ /	(V	0.0045
		KPDES																				i		
= 10.10																				(/	1	/ /	(V	
74243	KYG401821	WLA						0.0045						0.0045						(/	1	/ /	(V	0.0045
		KPDES																						
		KI DES												0.004						(/	1	/ /	(V	0.004
75141	KYG401851	WLA												0.0045						(4	/ /	(V	0.0045
		KPDES																				i		
		KI DES																		(/	/ /	/ I	(———— V	
75556	KYG401857	WLA																		(/	0.0045	/ /	(V	0.0045
		KPDES																				i		
																				(/	1	/ /	(V	
75746	KYG401868	WLA																		(/	1	/ /	0.0045	0.0045
		KPDES																					()	
																				(/		/ /	(V	
76078	KYG401876	WLA																		(0.0045	/ /	(V	0.0045
		KPDES																						
																				(/		/ /	(V	
76185	KYG401883	WLA																		(/		0.0045	(V	0.0045
											1												(†	
		KPDES																		(4	/ /	(V	
79525	KYG401931	WLA						0.0045						0.0045						(/		/ /	(V	0.0045
								0.00.12						0.00.12							├────			010010
		KPDES																		(/	4		(V	
79842	KYG401936	WLA																		(4	/ /	(V	0.0045
																							+	010010
		KPDES																		(/		/ /	(V	
81193	KYG401970	WLA						0.0045						0.0045						(/		/ /	(V	0.0045
011/0	111010101010							0.00.0						010010							1		t	010010
		KPDES																		(/		/ /	(V	
81570	KYG401981	WLA																			0.0045			0.0045
01070																								
		KPDES																						
82092	KY0106755	WLA																			0.0545			0.0545
02072																								
		KPDES																						
82471	KYG402002	WLA												0.0045										0.0045
02171	1110102002													0.0010										0.0010
		KPDES																						
84292	KYG402025	WLA																			0.0045			0.0045
0.272																								0.0010
		KPDES																						
97291	KYG402063	WLA																			0.0045			0.0045
71271		VDDEC																						
		KPDES																						
103052	KYG402117	WLA						0.0045						0.0045										0.0045
103032														0.0010										0.0010
		KPDES																						
1297	KY0027413	WLA																						0.0000
1271	1110027413																							0.0000
	1	Total																						
		KPDES																						
			0.011														0.4555	1.05.11	0.000-					
				0.0135	0.0045	2.0486	2.2602	0.1903	0.0045	0.018	0.018	0.009	2.2962	3.0206	0.0636	0.9085	0.1771	1.8941	0.0225	0.0135	2.8104	0.0315	0.018	7.060855
		WLA	0.000	0.0155						26.9497	11.0959	17.9667	281.4776	513.5661	226.6502	171.1002	162.7481	545.5453	88.7791	36.9909	1080.2555	21.6637		1667.1549
		WLA				24 1042	18/ 7251	Q') // 11Y/		/11 94 97	11.0939	17.9007	201.4770	515.5001	220.0302	1/1.1002	102.7401	545.5455	00.//91	30.7707	1 1000 (11)		10 5512	
		WLA remainder	0.000 14.2684	37.5193	42.8048	24.1043	184.7351	82.4207	13.7395	20.7177											1000.2000	21.0037	19.5512	1007.1349
		WLA remainder				24.1043	184.7351	82.4207	13.7395	20.9197											100012000	21.0037	19.5512	1007.1349
		WLA remainder Future				24.1043	184.7351	82.4207	13.7395	20.9197											100012000	21.0037	19.5512	1007.1349
		WLA remainder Future Growth	14.2684	37.5193	42.8048																			
		WLA remainder Future Growth	14.2684	37.5193	42.8048							0.0898		5,1357	2,2665	0.8555	0.8137							
		WLA remainder Future Growth WLA ⁽¹⁾				24.1043 0.2410	184.7351 1.8474	0.824207	0.0687	0.2695	0.1110	0.0898	2.8148	5.1357	2.2665	0.8555	0.8137	5.4555	0.8878	0.1850	10.8026	0.2166	0.1955	16.6715
		WLA remainder Future Growth	14.2684	37.5193	42.8048							0.0898		5.1357	2.2665	0.8555	0.8137							16.6715
		WLA remainder Future Growth WLA ⁽¹⁾ Total	14.2684 0.0713	37.5193 0.3752	42.8048 0.4280	0.2410	1.8474	0.8242	0.0687	0.2695	0.1110		2.8148					5.4555	0.8878	0.1850	10.8026	0.2166	0.1955	16.6715
		WLA remainder Future Growth WLA ⁽¹⁾ Total WLA	14.2684 0.0713 0.07134	37.5193 0.3752 0.3887	42.8048 0.4280 0.4325	0.2410	1.8474 4.1076	0.8242	0.0687	0.2695	0.1110	0.0988	2.8148 5.111	8.1563	2.3301	1.764	0.9908	5.4555 7.3496	0.8878	0.1850 0.1985	10.8026 13.613	0.2166	0.1955	<u>16.6715</u> 23.7324
		WLA remainder Future Growth WLA ⁽¹⁾ Total	14.2684 0.0713	37.5193 0.3752	42.8048 0.4280	0.2410	1.8474	0.8242	0.0687	0.2695	0.1110		2.8148			1.764	0.9908	5.4555 7.3496	0.8878	0.1850	10.8026	0.2166	0.1955	16.6715

Note: (1) Any expanding or future KPDES-permitted point source will receive its WLA from the Future Growth WLA and must meet permit limits based on the Water Quality Standards in 401 KAR 10:031.