

Cane Run Watershed Council Meeting

Monday, November 28, 2011

Northside Public Library, Lexington, KY

Ben Krebs
Lindell Ormsbee
Ben Albritton
Sarah Wightman
Beth Finzer
Amanda Gumbert
Russ Turpin
Charlie Denham
Susan Byars
Stephanie Jenkins
Ernest Collins
Sarah Gracey
Angie Wingfield
Tom Blues
Jennifer Myatt
Cindy King

Update of UK Project (Amanda Gumbert)

- The watershed-based plan has been conditionally accepted and will be returned to DOW with changes in a few days, which means implementation can begin next year.
- BMP implementation is planned at the Kentucky Horse Park for the next year.
 - UK BAE senior design students are studying areas with erosion and nutrient-transfer problems for possible implementation.
- Education and outreach efforts will continue next year.
 - Watershed festivals?
 - Other watersheds are doing small ice cream social-type events
 - Amanda is in favor of these events, but it is unknown right now how the council will proceed with those.
- November 5th tree-planting at Lexmark as part of a CSX program

Legacy Trail Adopt-A-Plot (Susan/group discussion)

- The group did not come to total agreement, and we have exchanged information with Keith.
- Amanda did not want to commit herself and the whole group without agreement.
- Right now, the council has expressed interest, but has never confirmed participation.
- Discussion
 - Maintenance expectations
 - A couple times of year in terms of maintenance

- Weed and mulch beds, report vandalism, remove debris, etc. – Russ
- Keith made it sound low input
- How do we get mulch in? – Susan
- How much work is it really?
- Doodle poll to figure out when the best times for people to gather to care for the plot – Sarah G.
- Plot size/location
 - How big are the plots?
 - Near Spindletop, get the neighborhood involved - Susan
- Benefits to the group/watershed
 - Good way to get publicity for the council
 - Lexmark had also expressed interest in adopting a plot near their property
 - Is pulling weeds an appropriate thing for the council? – Charlie
 - Maybe our function is best served elsewhere, but our name could get out there on the Legacy Trail
 - Tie adopting a plot to a watershed festival - Stephanie
 - Tie service piece to a festival
 - Work with Master Gardeners in the watershed – Stephanie
 - Maybe not adopt a bed, but get together and remove bush honeysuckle - Russ
- Going forward
 - Susan will ask others in the Spindletop neighborhood and see if there's interest
 - The council could try it for a year, and not renew if it didn't work out - Amanda
 - Keith has our name, but we have not been assigned a plot yet - Ben

Pathogen TMDL Update (Lindell Ormsbee)

- See attached PowerPoint for information

Pathogen TMDL Development Cane Run Watershed

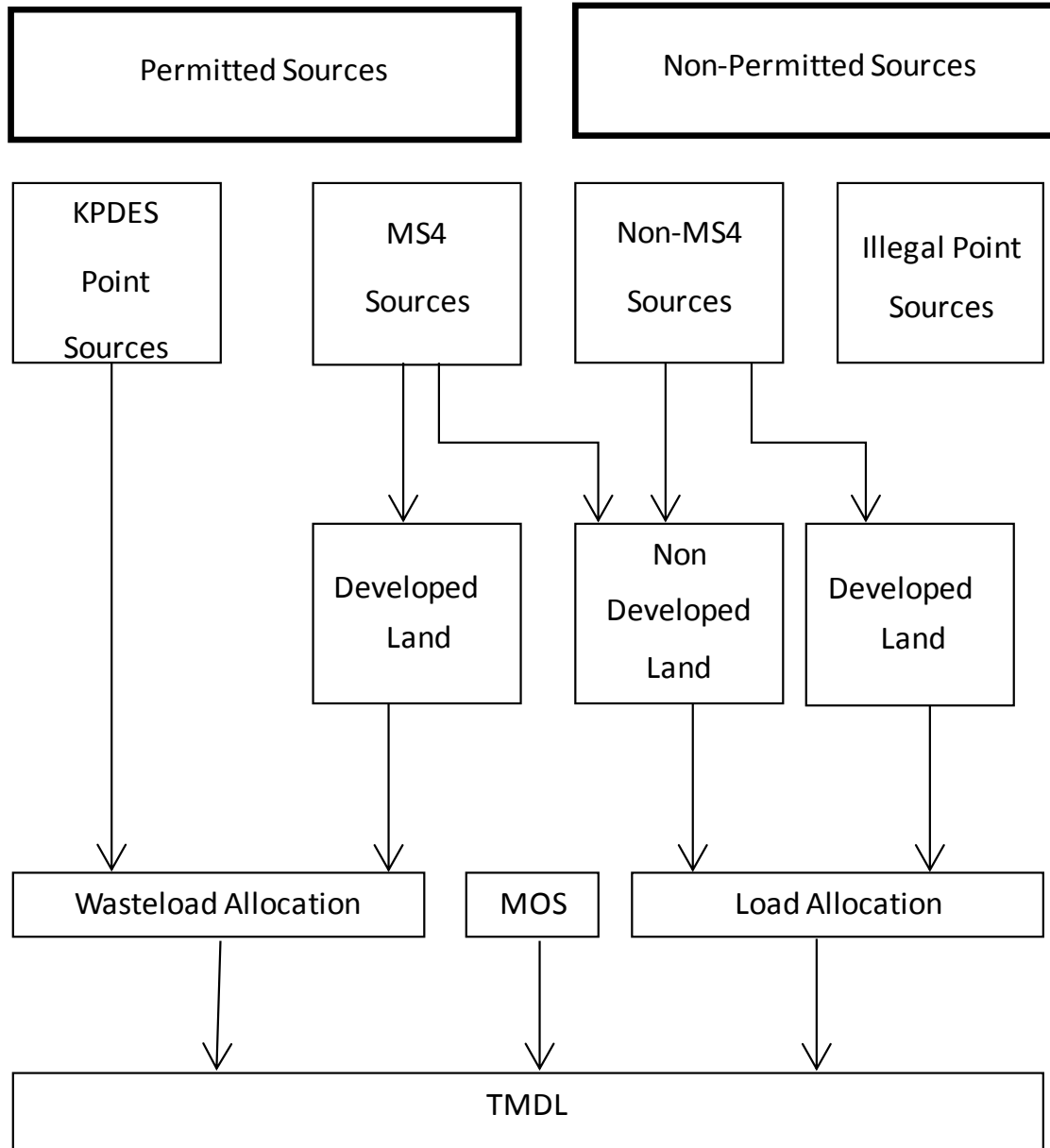
Lindell Ormsbee,
P.E., P.H., Ph.D., D.WRE, F.ASCE
Ben Albritton



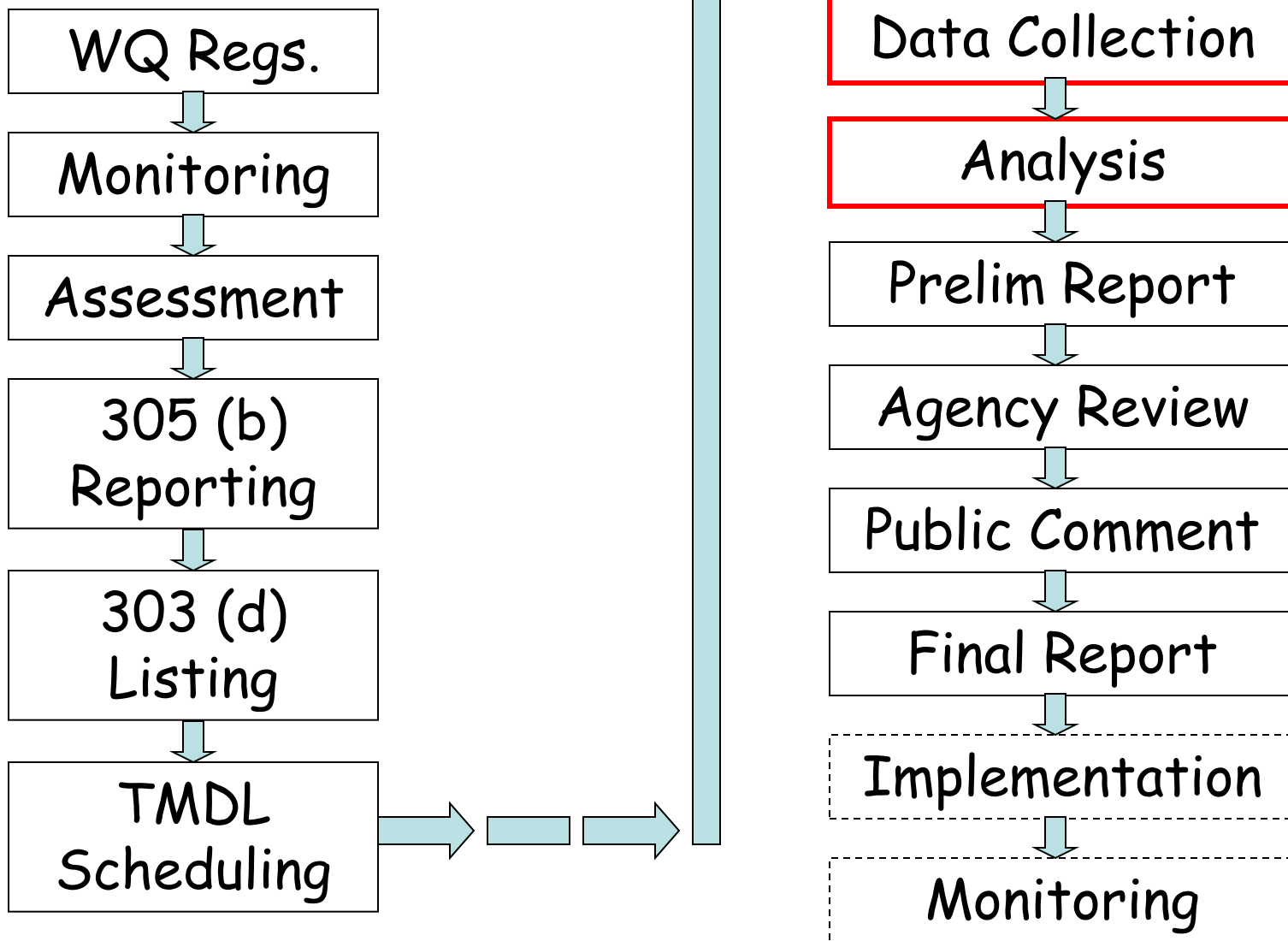
What is a TMDL?

- **Number**
 - T. - Total
 - M. - Maximum
 - D. - Daily
 - L. - Load
- **Analysis** to determine the TMDL.
- **Document** that contains a description of the problem, data, and calculations used to determine the TMDL, existing loads, load allocations, load reductions, and Imp. Plans.
- **Process** for restoring polluted waters by determining loads reductions for various point and non-point sources that if implemented should restore the stream to its designated use.

TMDL Components



TMDL Process



Designated Uses

- Every stream in Kentucky is assigned multiple designated uses:
 - Warm Water Aquatic Life
 - Primary Contact Recreation
 - Secondary Contact Recreation
 - *Drinking Water Supply*
 - *Cold Water Aquatic Life*
 - *Fish Consumption*

Primary Contact Standards

- (a) Fecal coliform content or *Escherichia coli* 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 *Escherichia coli*. These limits shall be applicable during the recreation season of May 1 through October 31. Fecal coliform criteria listed in subsection (2)(a) of this section shall apply during the remainder of the year.

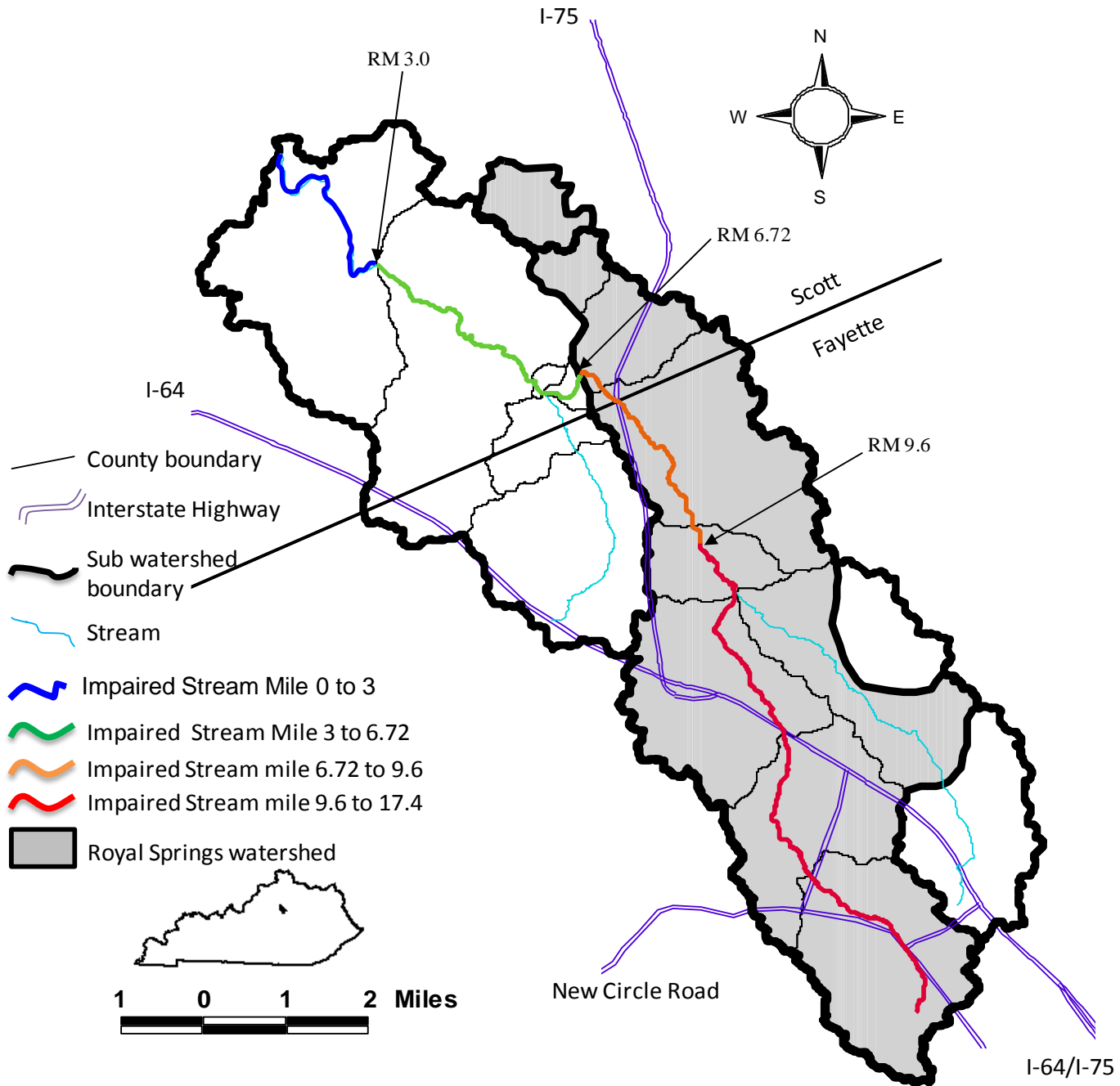
Secondary Contact Standards

- (a) Fecal coliform content shall not exceed 1,000 colonies per 100 ml as a thirty (30) day geometric mean based on not less than five (5) samples; nor exceed 2,000 colonies per 100 ml in twenty (20) percent or more of all samples taken during a thirty (30) day period.
- Geometric Mean:

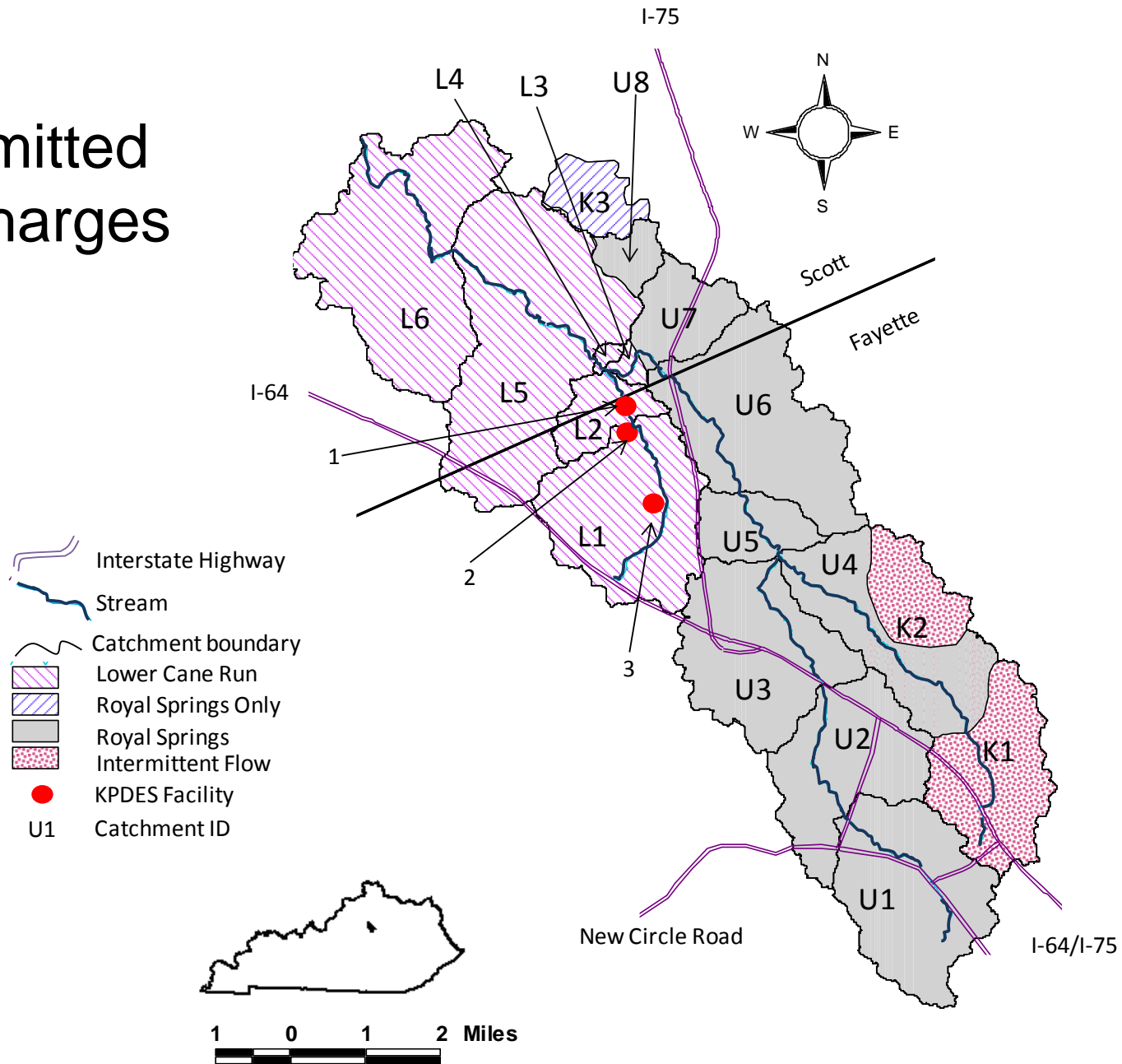
$$GM = \sqrt[n]{X_1 * X_2 * \dots * X_n}$$

2010 303(d) List of Cane Run Creek Impaired Segments

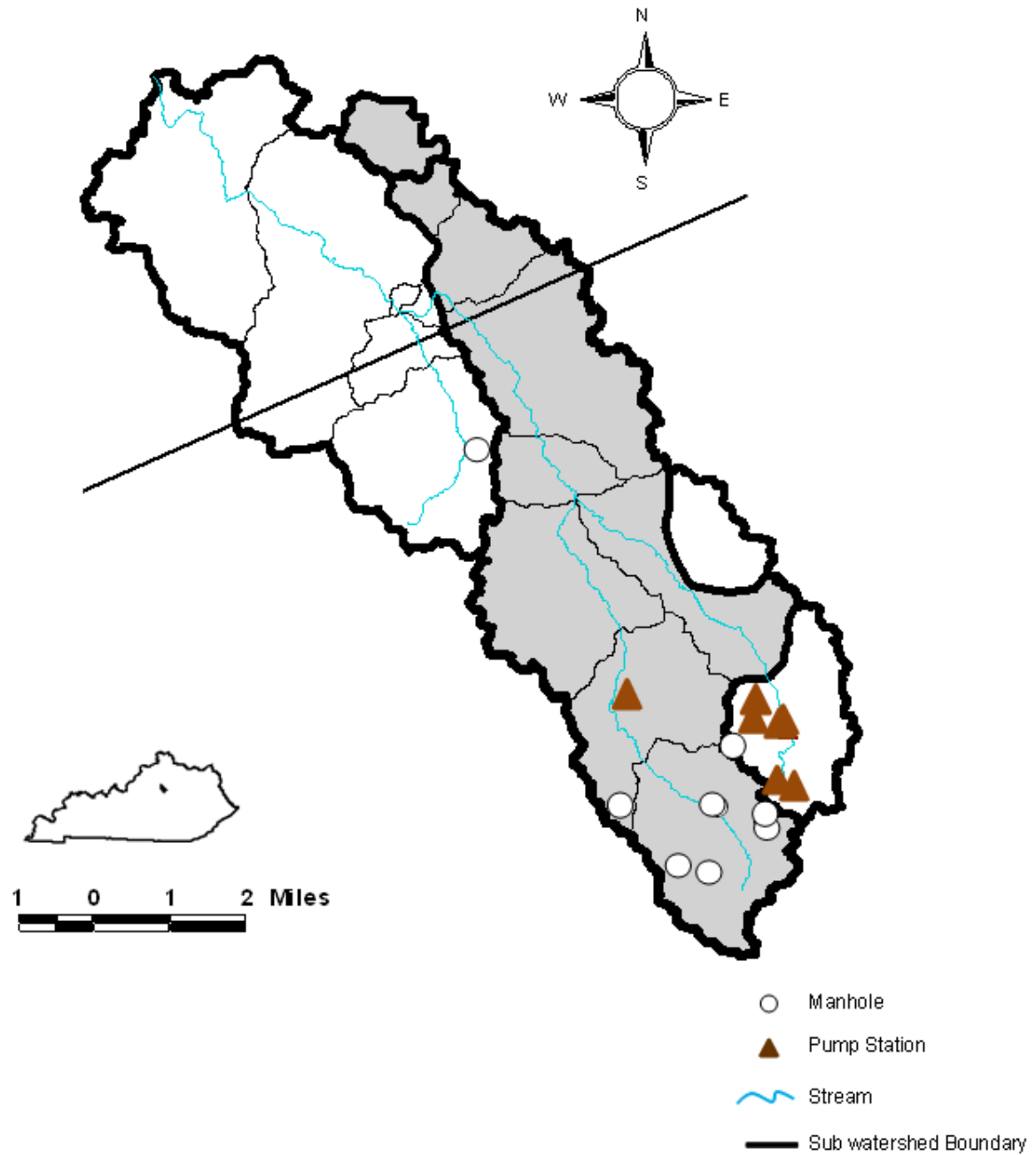
Stream	Impaired Segment	County	Impairment	Pollutant	Potential Sources
Cane Run of North Elkhorn Creek	0.0 - 3.0	Scott	Aquatic Life (NS), Primary Contact Recreation (NS)	Fecal Coliform	Nonpoint Source Pollution
Cane Run of North Elkhorn Creek	3.0 - 9.6	Scott	Aquatic Life (NS), Primary Contact Recreation (NS)	Fecal Coliform	Point Source Pollution, Nonpoint Source Pollution
Cane Run of North Elkhorn Creek	9.6 - 17.4	Fayette	Aquatic Life (NS), Primary Contact Recreation (NS) & Secondary Contact Recreation (NS)	Fecal Coliform	SSOs, Urban Stormwater



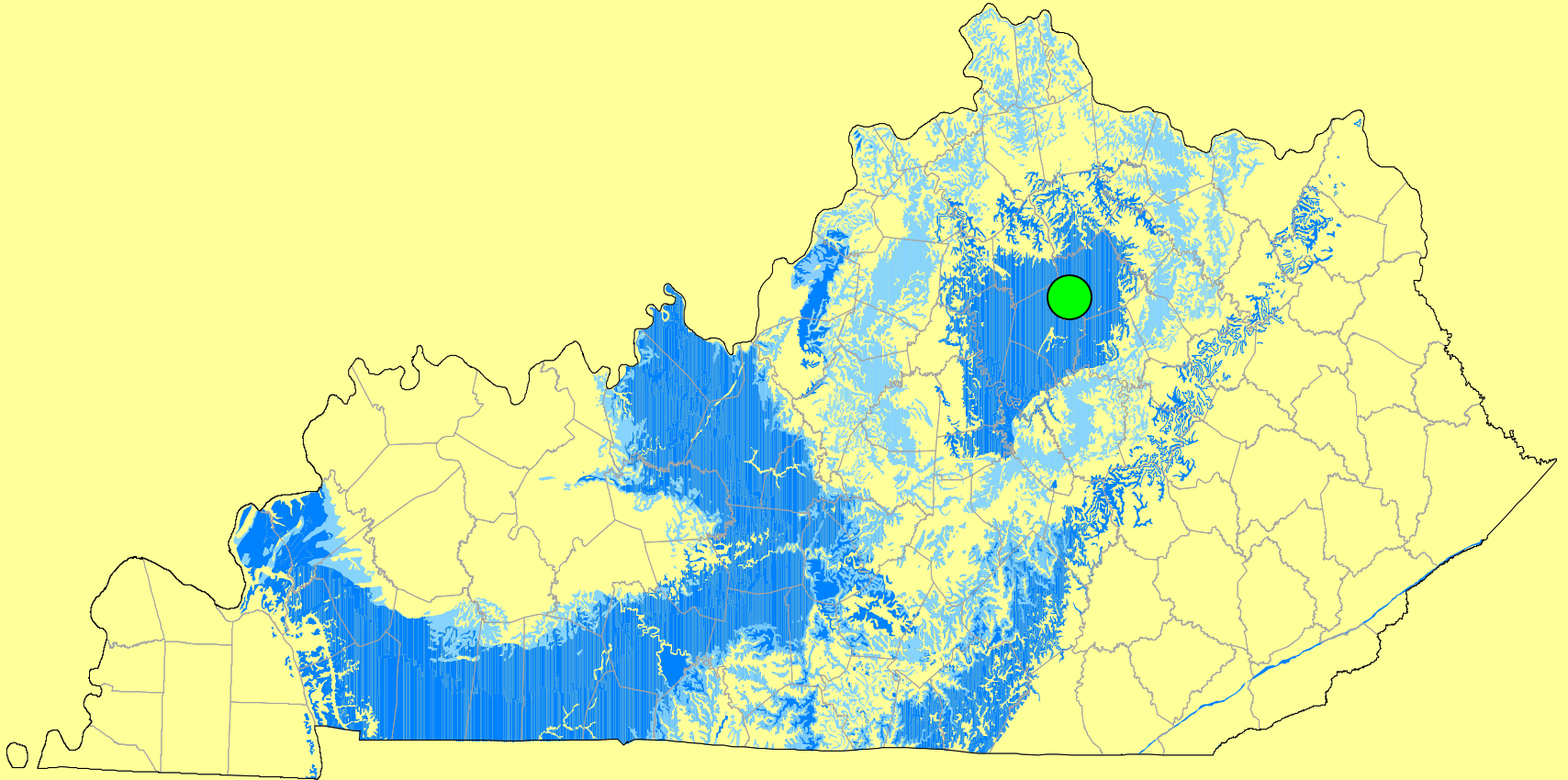
Permitted Discharges



Illicit Discharges in 2007



Karst in Kentucky: 55 percent of the state has potential for karst





Georgetown Kentucky

Georgetown Road

Franklin Road

Cane Run Watershed
45 Square Miles

Russell Cave Road

West New Circle Road

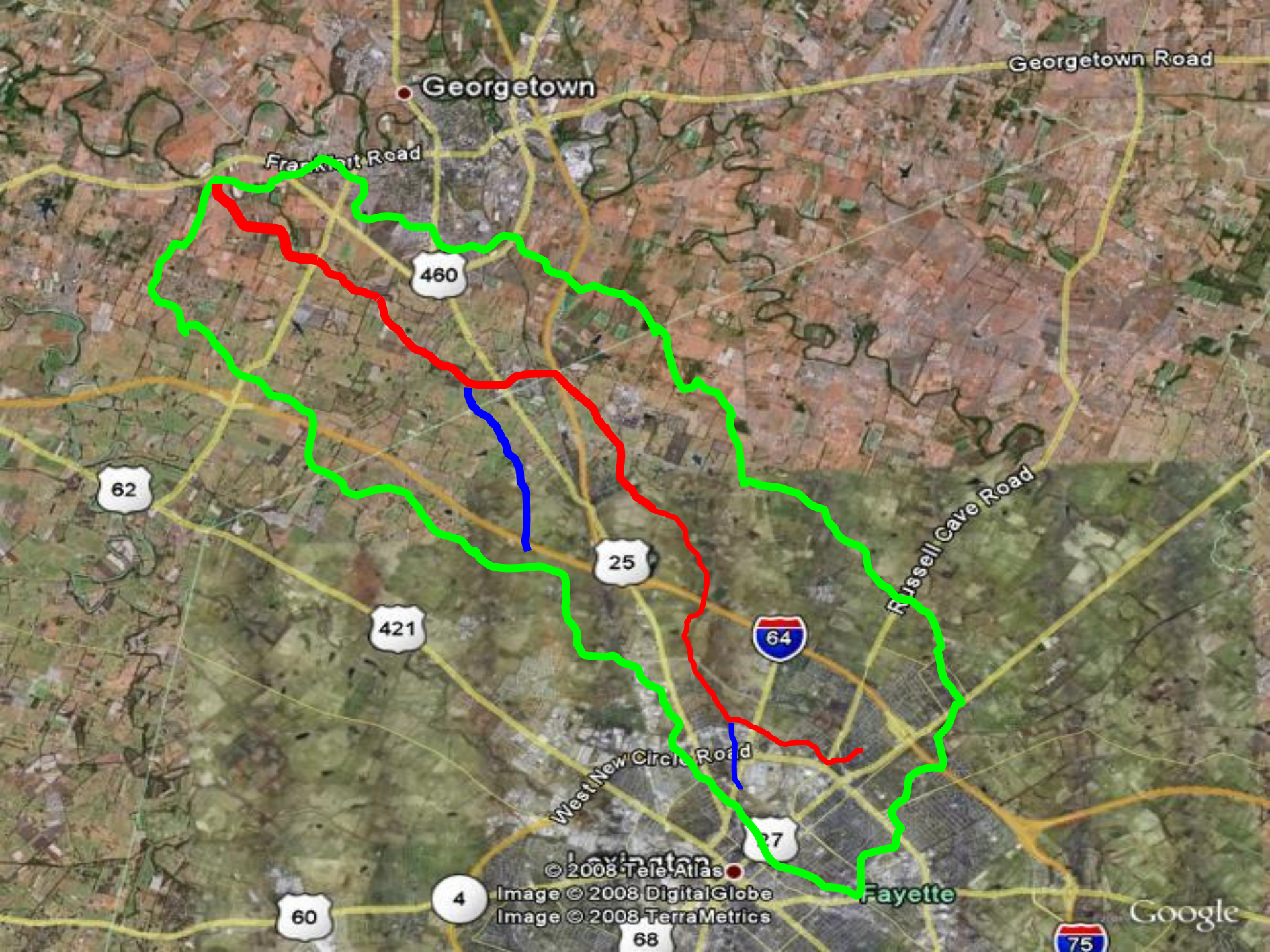
Lexington Kentucky

Fayette

Image © 2008 DigitalGlobe
Image © 2008 TerraMetrics

Google





Georgetown

Georgetown Road

Frankfort Road

460

62

421

25

64

Russell Cave Road

West New Circle Road

27

Lexington

Fayette

60

4

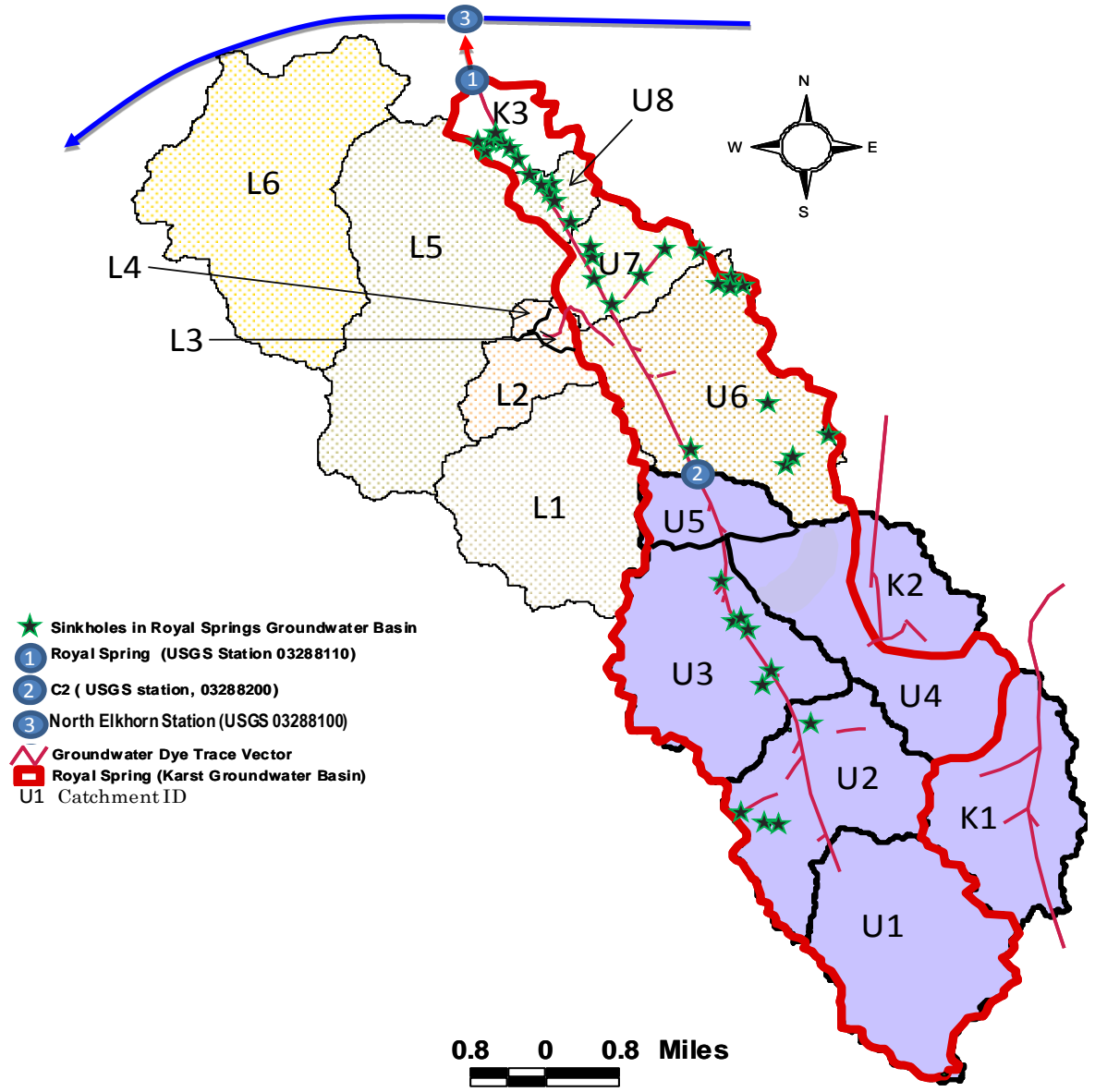
© 2008 Tele Atlas
Image © 2008 DigitalGlobe
Image © 2008 TerraMetrics

68

75

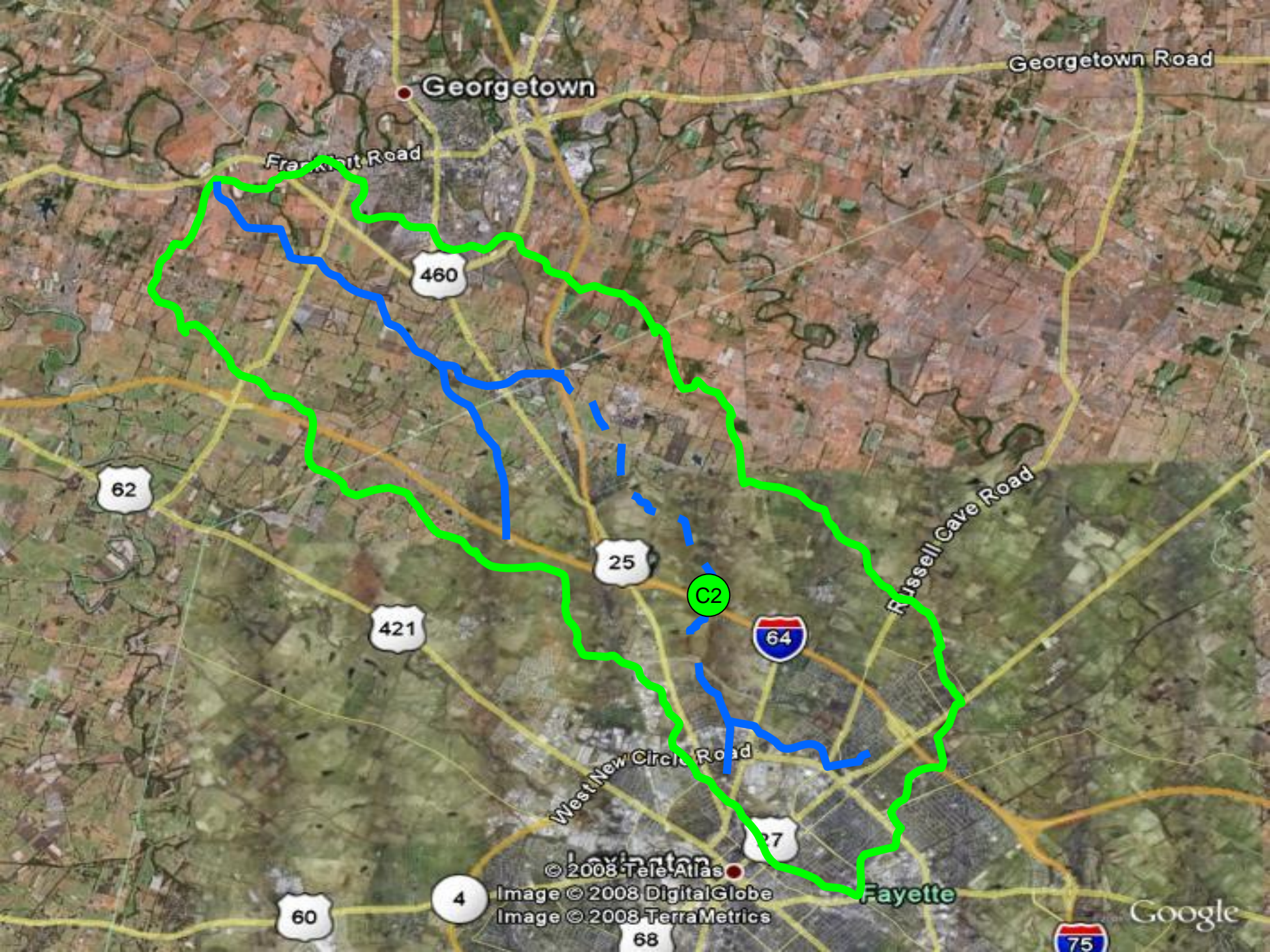
Google

Karst Features









Georgetown

Georgetown Road

Frankfort Road

460

62

25

C2

421

64

Russell Cave Road

West New Circle Road

60

4

© 2008 Tele Atlas
Image © 2008 DigitalGlobe
Image © 2008 TerraMetrics

68

27

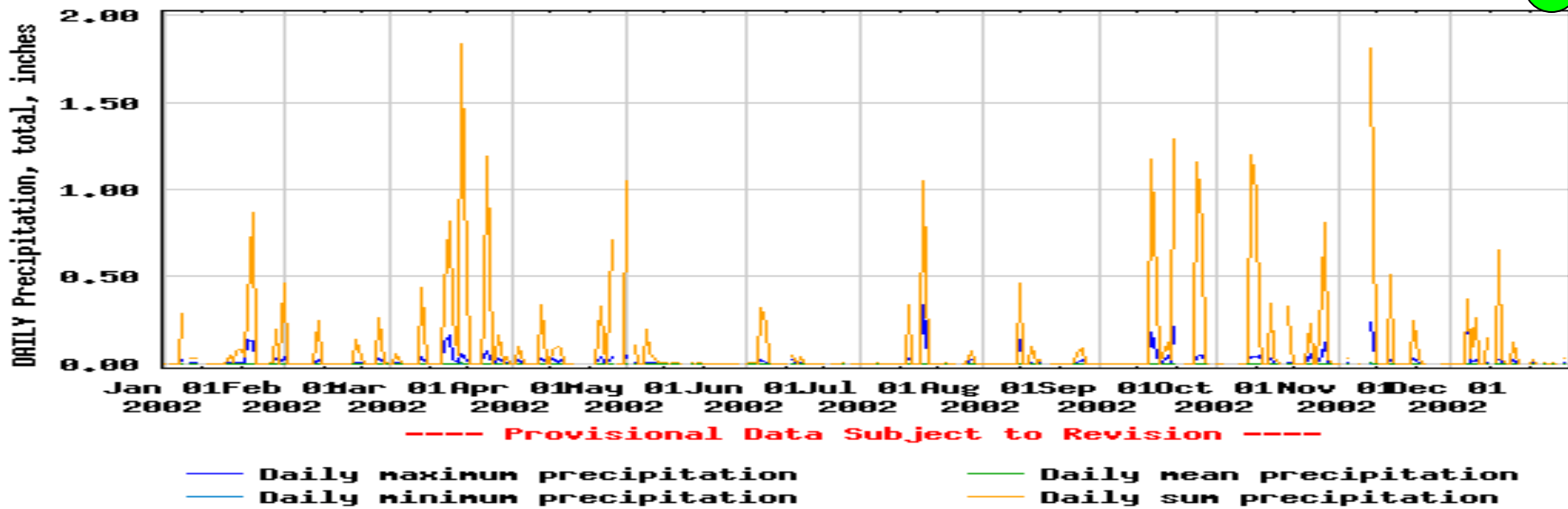
Fayette

75

Google

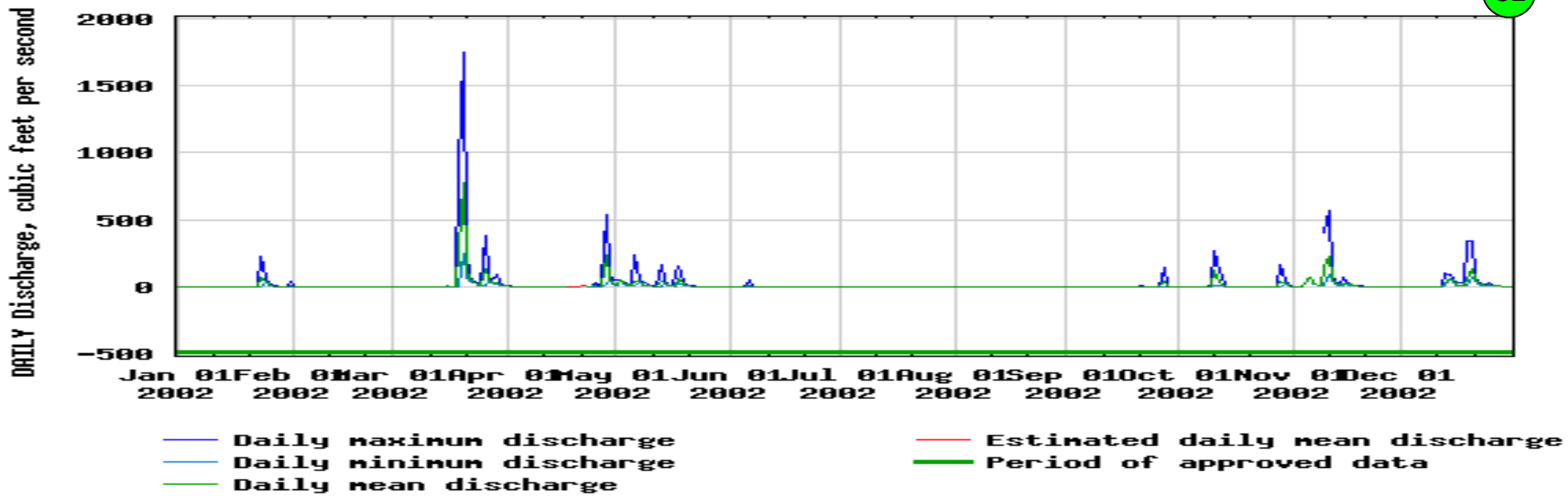
USGS 03288200 CANE RUN AT BEREA ROAD NEAR DONERAIL, KY

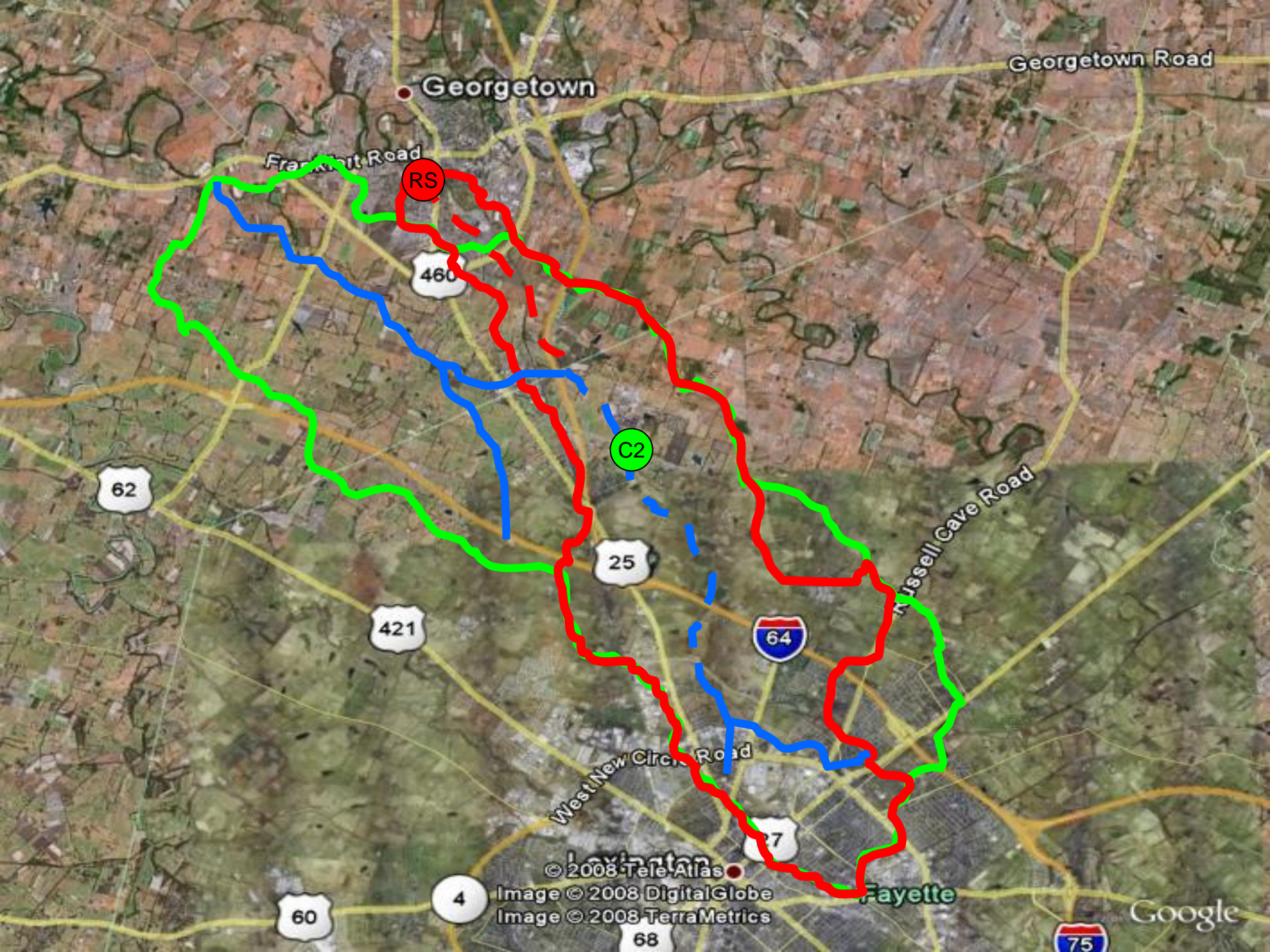
C2



USGS 03288200 CANE RUN AT BEREA ROAD NEAR DONERAIL, KY

C2





Georgetown

Georgetown Road

Frankfort Road

RS

460

C2

62

25

421

64

Russell Cave Road

West New Circle Road

7

Lexington

Fayette

60

4

© 2008 Tele Atlas
Image © 2008 DigitalGlobe
Image © 2008 TerraMetrics

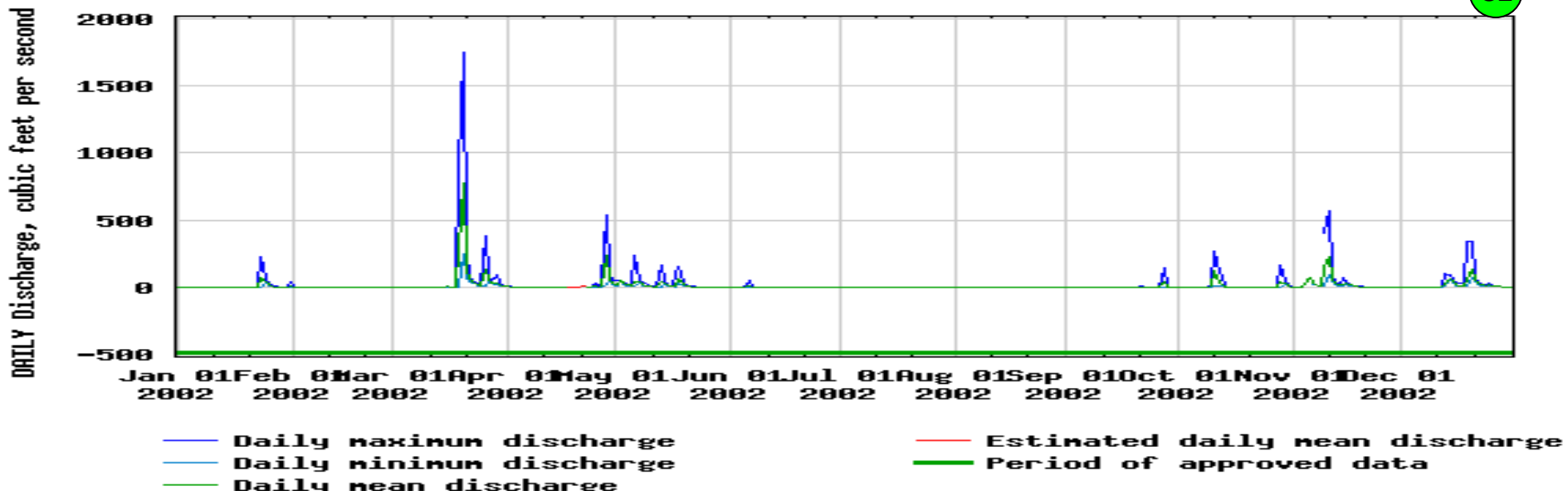
68

75

Google

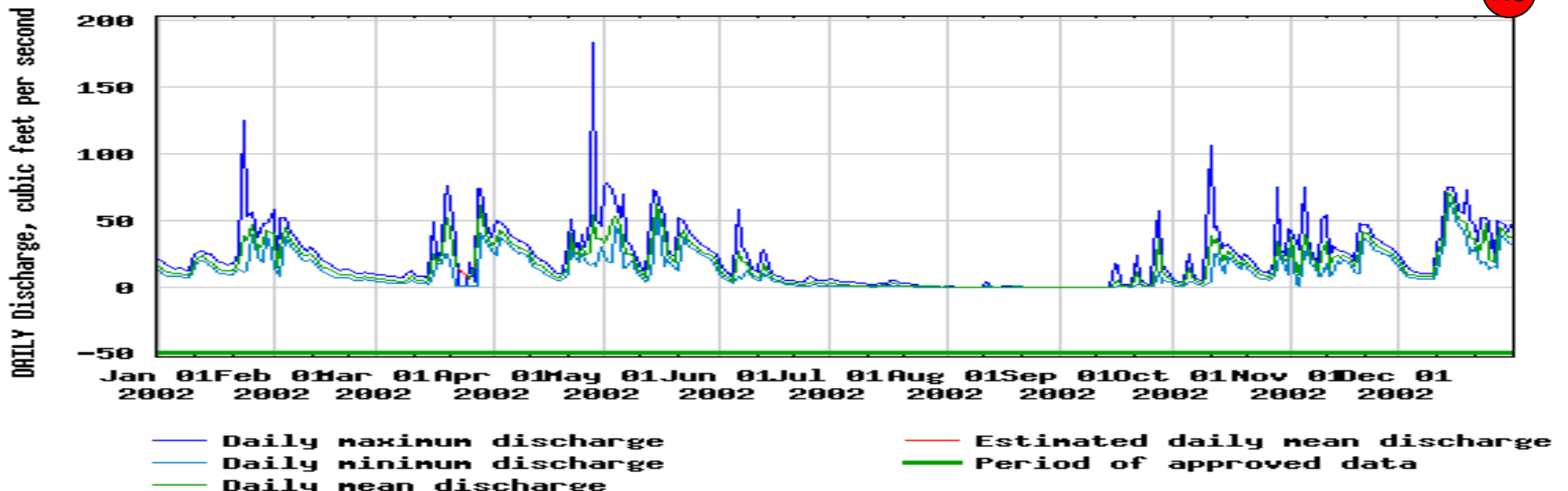
USGS 03288200 CANE RUN AT BEREA ROAD NEAR DONERAIL, KY

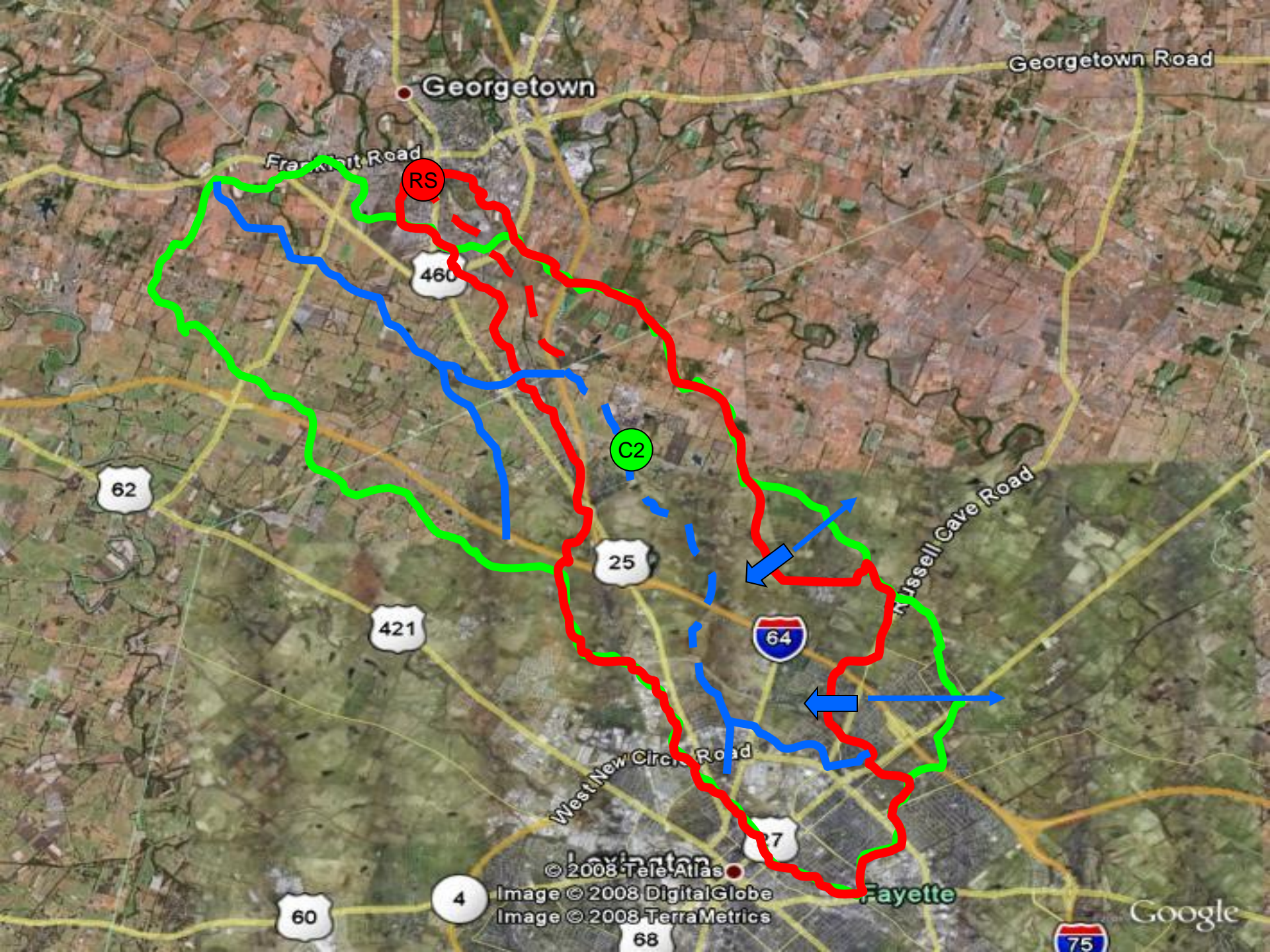
C2



USGS 03288110 ROYAL SPRINGS AT GEORGETOWN, KY

RS





Georgetown

Georgetown Road

Frankfort Road

RS

460

C2

25

Russell Cave Road

62

421

64

West New Circle Road

←

→

Lexington

Fayette

60

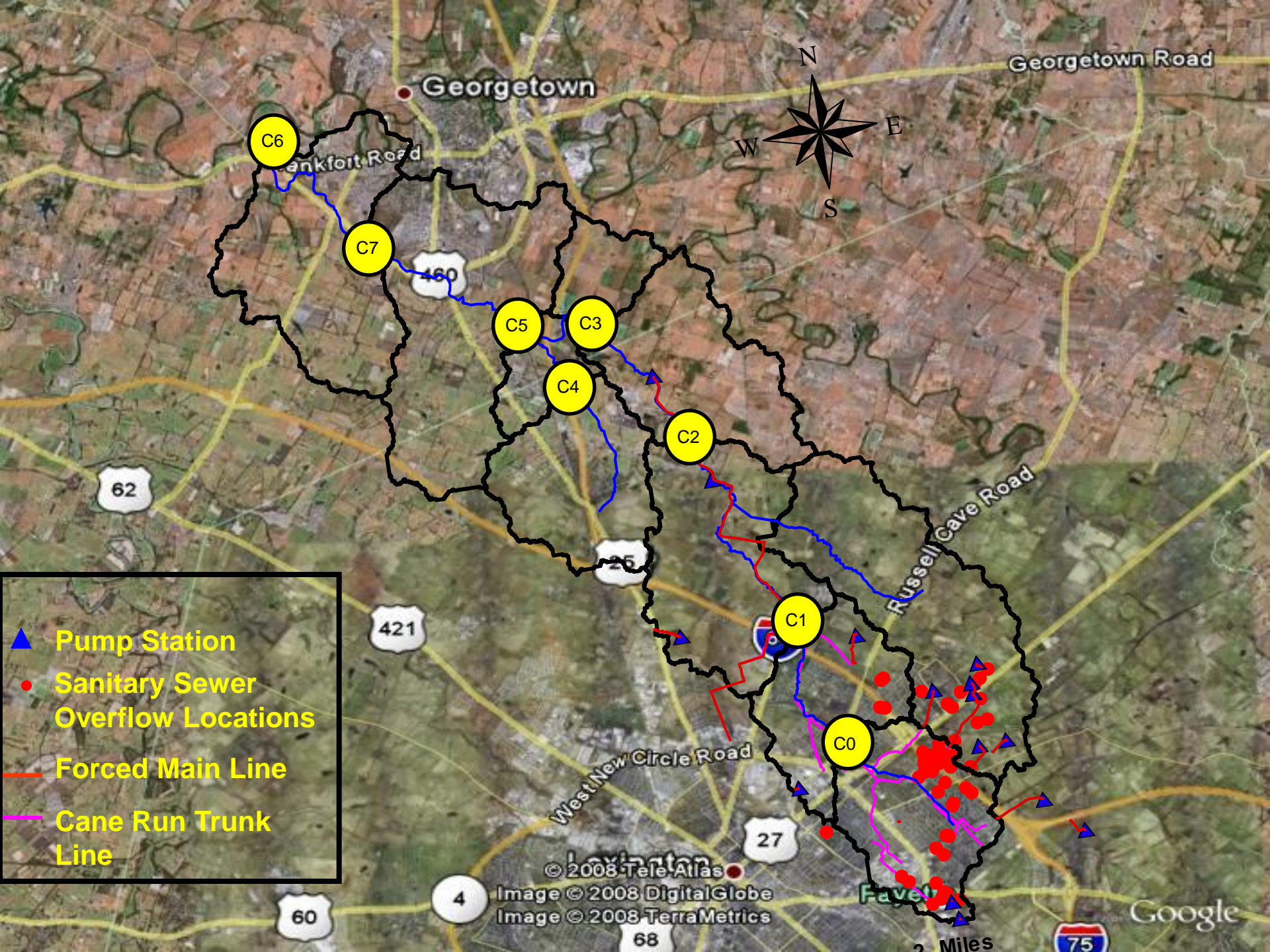
4

© 2008 Tele Atlas
Image © 2008 DigitalGlobe
Image © 2008 TerraMetrics

68

75

Google



Georgetown

Georgetown Road

C6

C7

460

C5

C3

C4

C2

62

421

Russell Cave Road

C1

C0

West New Circle Road

27

4

© 2008 Tele Atlas
Image © 2008 DigitalGlobe
Image © 2008 TerraMetrics

Fayetteville

60

68

2 Miles

75

Google

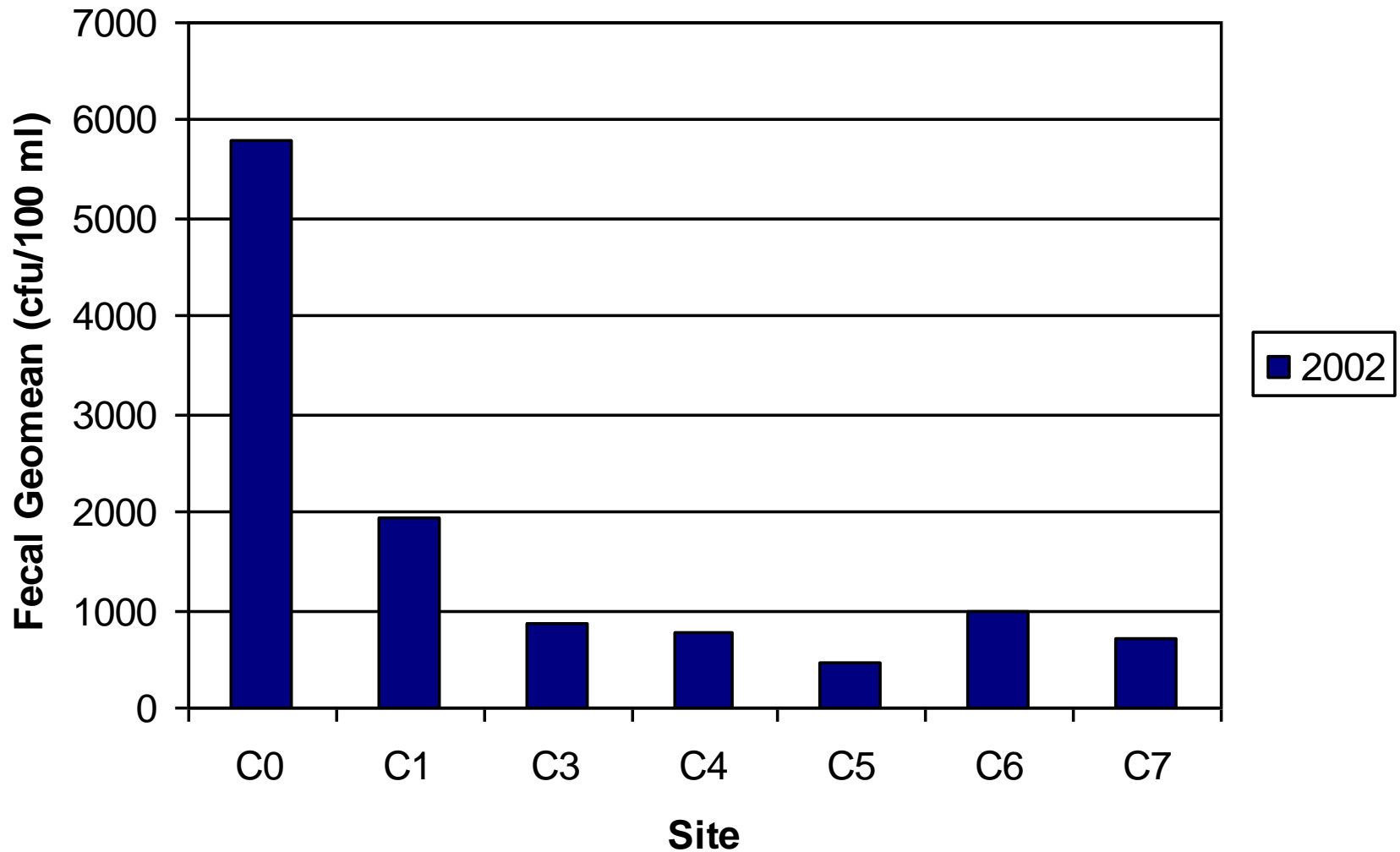
- ▲ Pump Station
- Sanitary Sewer Overflow Locations
- Forced Main Line
- Cane Run Trunk Line

2002 Sample Results

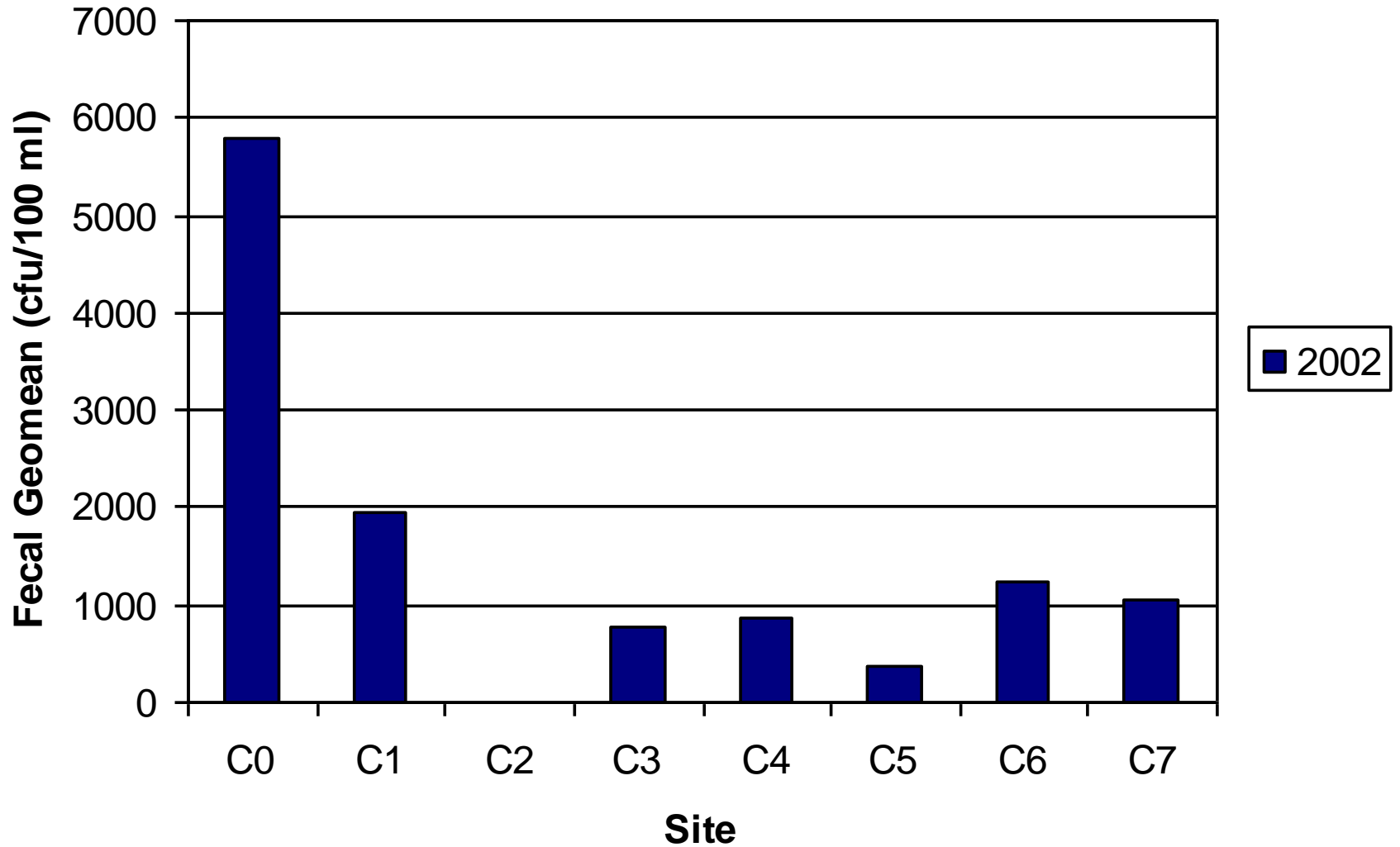
Fecal Coliforms (col/100 ml)

SERIAL NO	Date of observation	C0 (Reach 10)	C1 (Reach 9)	C2 (Reach 8)	C3 (Reach 7)	C4 (Reach 5)	C5 (Reach 4)	C6 (Reach 1)	C7 (Reach 3)
1	6/11/2002	9,215	2,289	DRY	334	832	387	1,497	4,697
2	6/14/2002	6,482	4,469	DRY	250	723	373	1,294	698
3	7/2/2002	7,058	DRY	DRY	391	3,972	840	4,176	1,930
4	7/9/2002	DRY	DRY	DRY	204	7,470	612	290	495
5	7/15/2002	DRY	DRY	DRY	1,055	34,605	704	5,385	552
6	7/22/2002	DRY	DRY	DRY	1,030	18,624	672	1,144	519
7	7/29/2002	DRY	DRY	DRY	5,239	441	425	572	2,116
8	9/9/2002	DRY	DRY	DRY	6,088	362	1,270	137	199
9	9/23/2002	7,361	DRY	DRY	986	414	221	789	201
10	9/30/2002	2,121	721	DRY	1,179	909	282	997	519

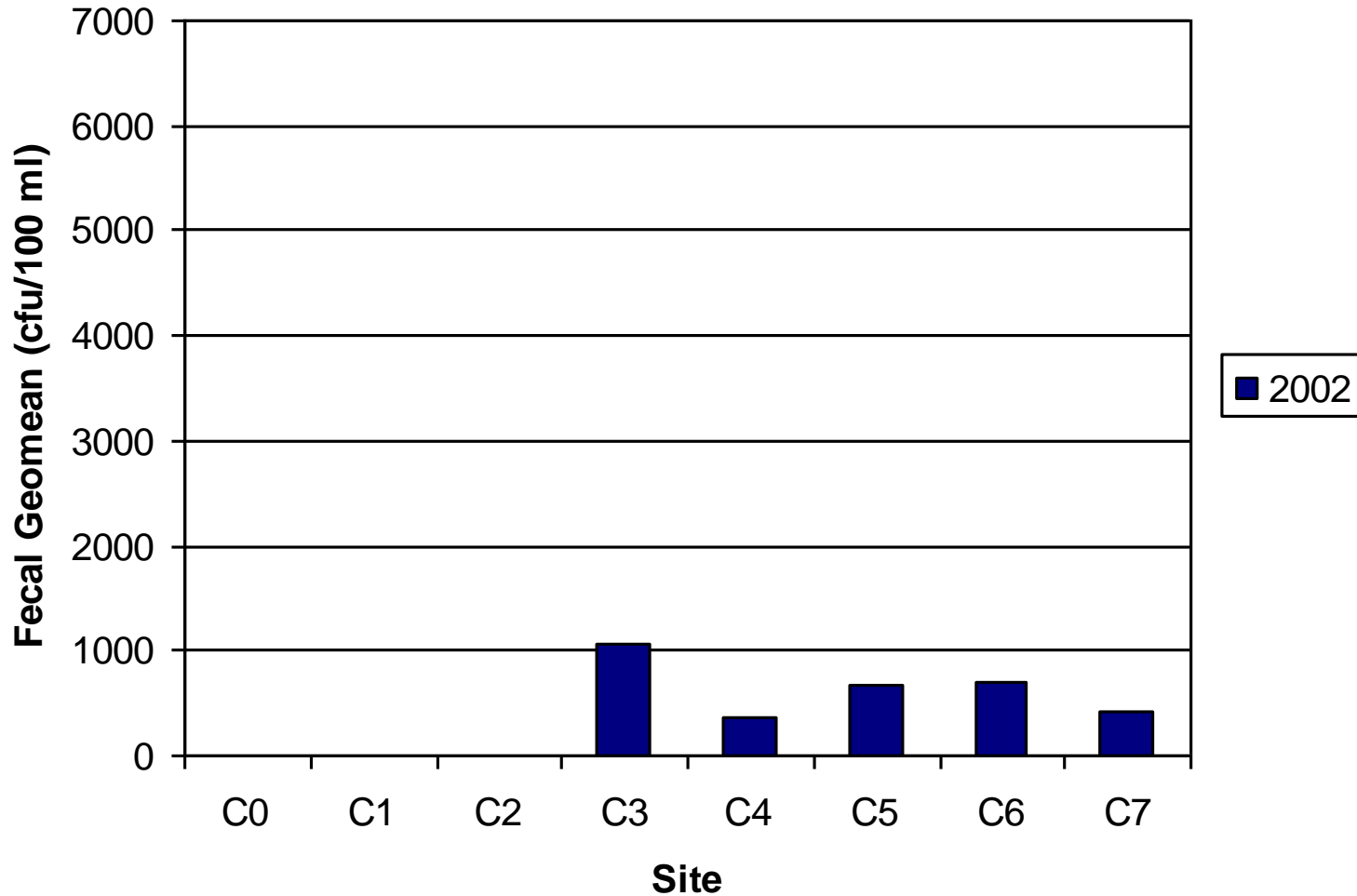
FC Geomeans



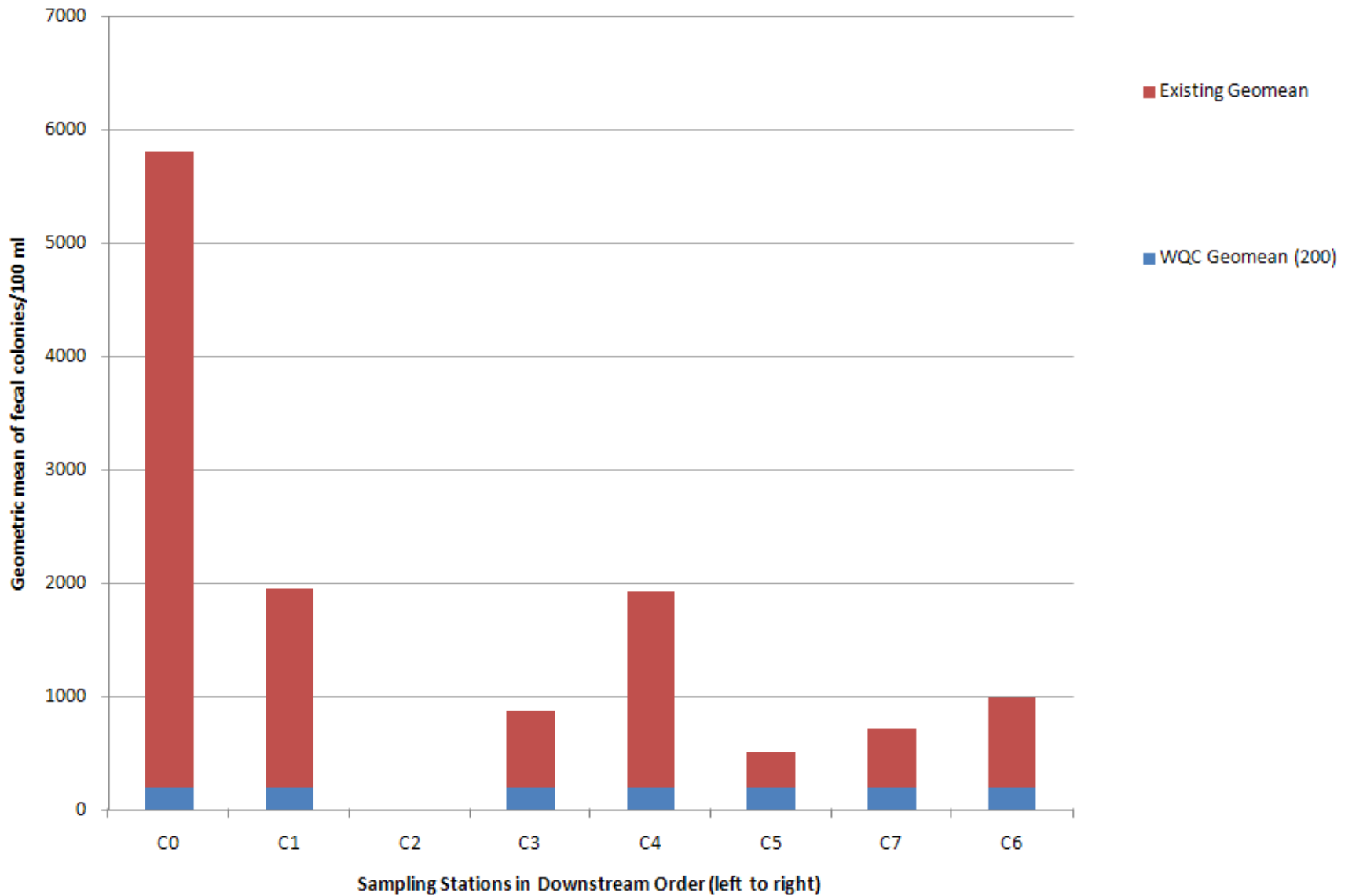
FC Geomeans (Wet Days)



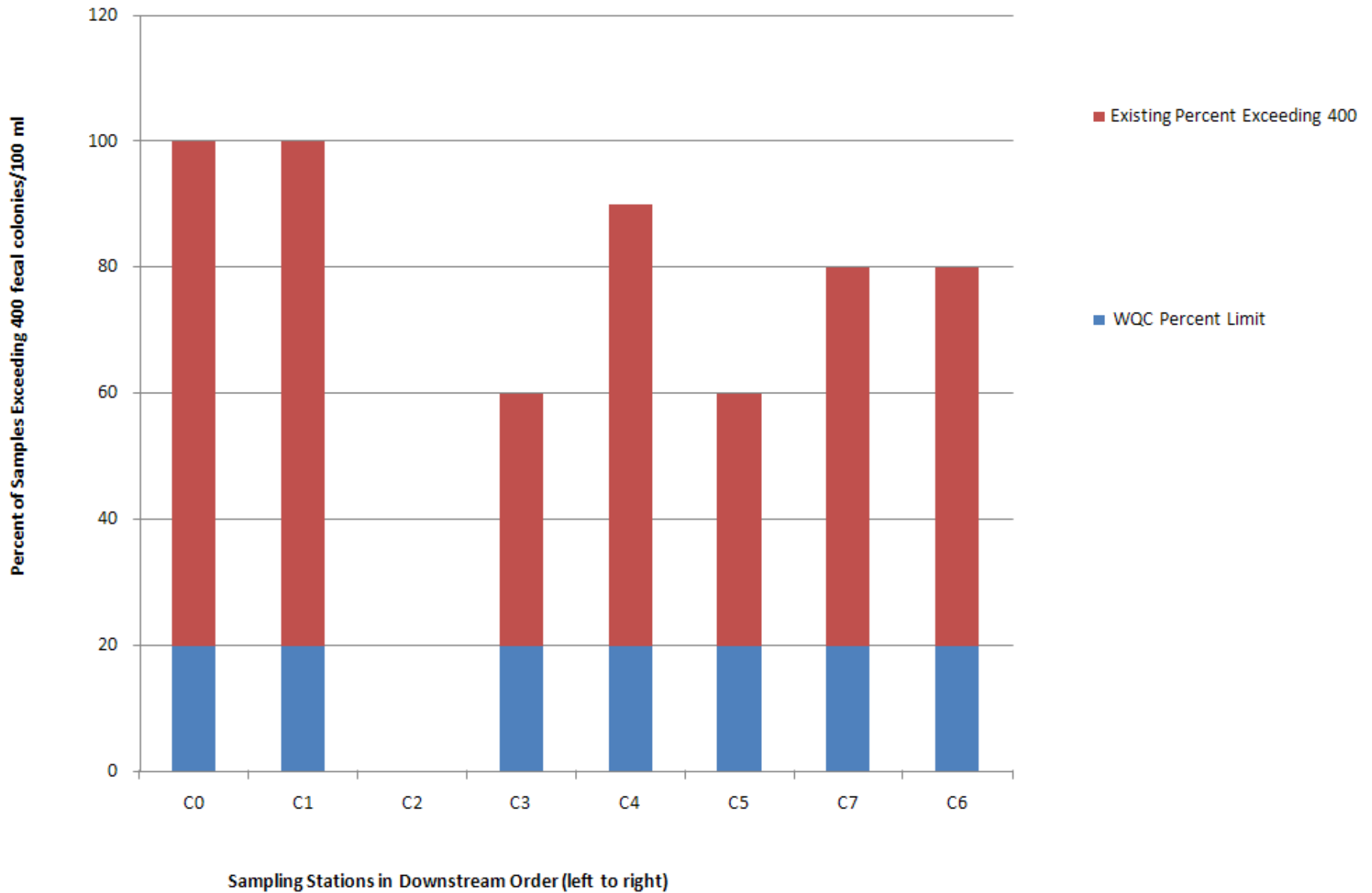
FC Geomeans (Dry Days)

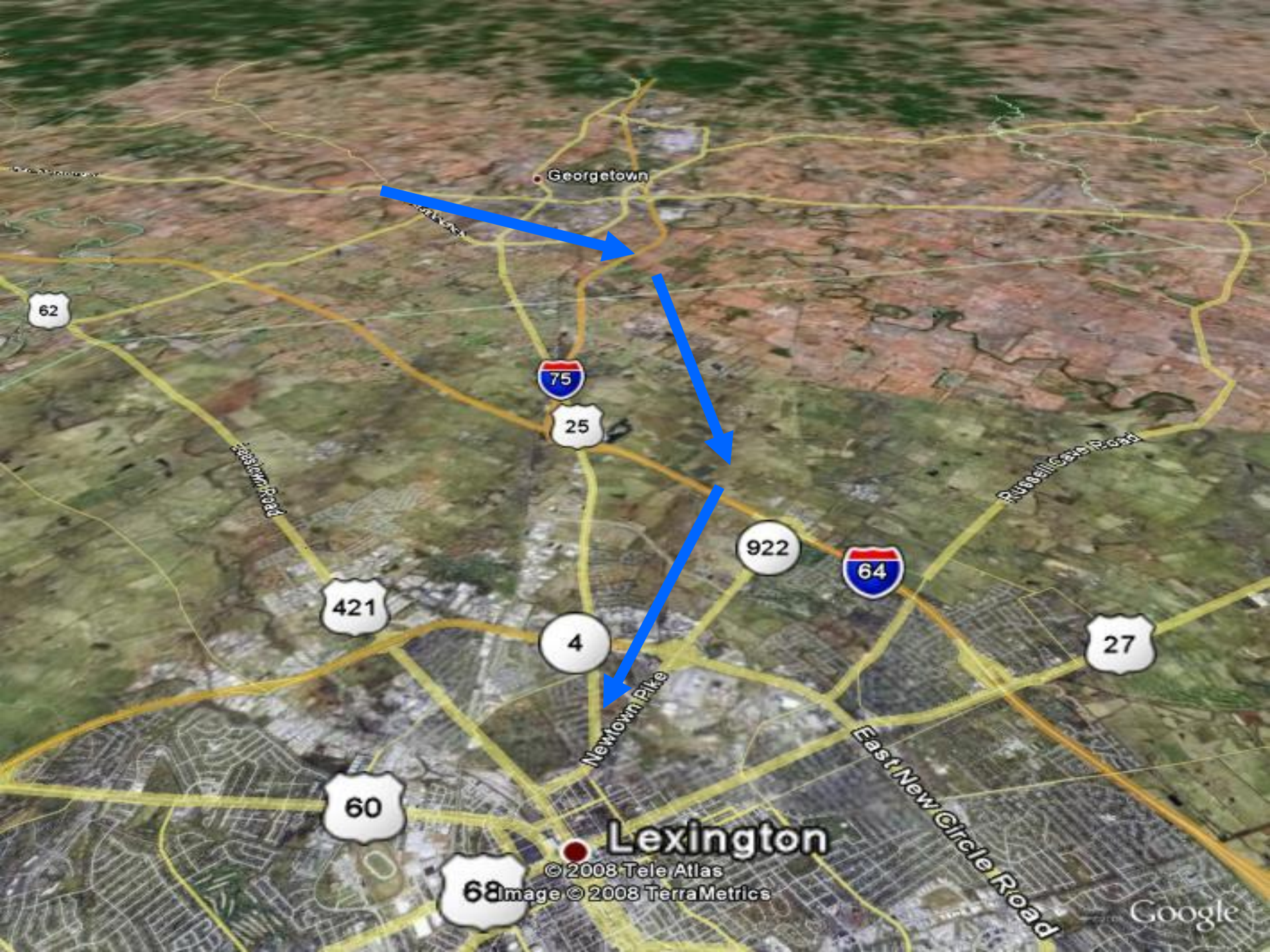


Chronic Criteria



Acute Criteria





Georgetown

62

75

25

East New Circle Road

421

922

64

4

27

Russell Gess Park

60

Newtown Pike

East New Circle Road

Lexington

68

© 2008 Tele Atlas
Image © 2008 TerraMetrics

Google

North Elcorn Creek

C7

724

763

RS

Georgetown

C6

988

Urbanized Area

C5

509

25

Trailer Park



C2 DRY

C1 1,946 (3)

C0 5,803 (5)

IBM/LEXMARK

© 2008 Tele Atlas

Image © 2008 TerraMetrics

Google

LFUCG Water Quality Monitoring Stations

Station ID	Station Description	Sampling Dates	Fecal Geometric Mean Cfu/100 ml
CR-L1	Nandino Blvd	Dec-01 to Apr 02	8,900
CR-L2	Silver Lane	Nov-01 to Dec-01	2,711
CR-S1	Lexmark	May-96 to Jun-02	5,755
CR-S2	Cold Stream Farm	May-96 to Oct-96	36,037
CR-S3	US-25	May-98 to Nov-03	1,350



DRY

C2

C1

36,037

S2

8,900

L1

1,350

S3

5,755

S1

C0

2,711

L2

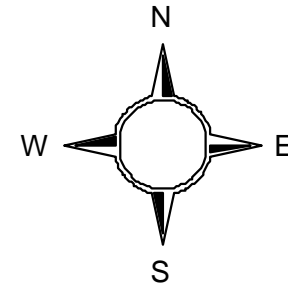
IBM/LEXMARK

© 2008 Tele Atlas

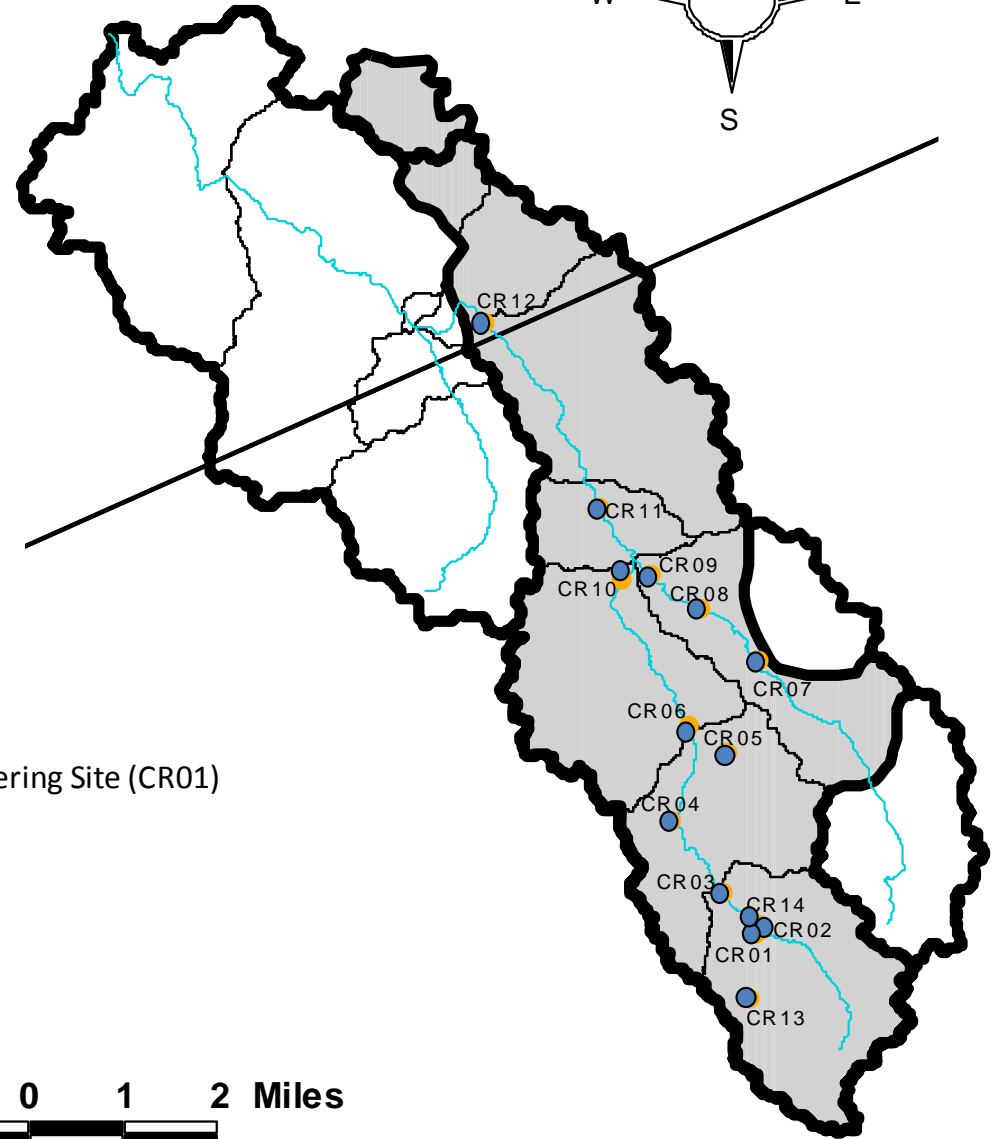
Image © 2008 TerraMetrics

Google

UK Agricultural Engineering Sites 2008-2009



- County boundary
- Sub watershed boundary
- Stream
- Catchment boundary
- UK Agricultural Engineering Site (CR01)



EC to FC Relationship

$$EC = 1.44 * FC^{0.8093}$$

$$FC = (EC/1.44)^{(1/0.8093)}$$



Station ID	Station Description	E. Coli Geometric Mean cfu/100 ml)	Approximate Fecal Coliform Equivalence (cfu/100 ml)
CR01	Lexmark Park West	2970	12456
CR02	Lexmark Park East	5223	25022
CR03	Newtown Pike	3076	13008
CR04	Highlands	7003	35949
CR05	Coldstream Park	887	2798
CR06	UK Farm South I-75	3708	16386
CR07	UK Farm below Fasig-Tipton	1769	6566
CR08	UK Farm	1075	3548
CR09	UK Farm below Lake	716	2148
CR10	UK Farm above Confluence	630	1834
CR11	Berea Road	431	1147
CR12	Lisle Road	410	1078
CR13	Loudon Avenue	10760	61119
CR14	Lexmark below Subdivision	1199	4061



410

CR12

C5

C4

C3

KY Horse Park

431

CR11

C2

630

CR10

CR09

716

CR08

1,075

25

Greendale

UK Research Farm

3,708

CR06

C1

CR07

1,769

© 2008 Tele Atlas

Image © 2008 TerraMetrics

922

Google



3708

CR06

C1

887

CR05

7,003

CR04

3,076

CR03

C0

IBM/LEXMARK

© 2008 Tele Atlas

Image © 2008 TerraMetrics

Google



IBM/LEXMARK

7,003

3,076

1,199

5,223

2,970

10,760

Calculating the TMDL

- In order to determine the TMDL for a given stream, we typically use a computer model of a watershed.
- A watershed computer model is very similar to a check book register. Instead keeping track dollars and cents it keeps track of the balance of flows and pollutant loads for each day.

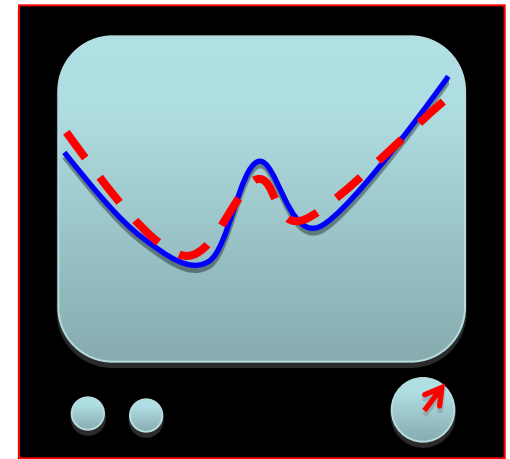
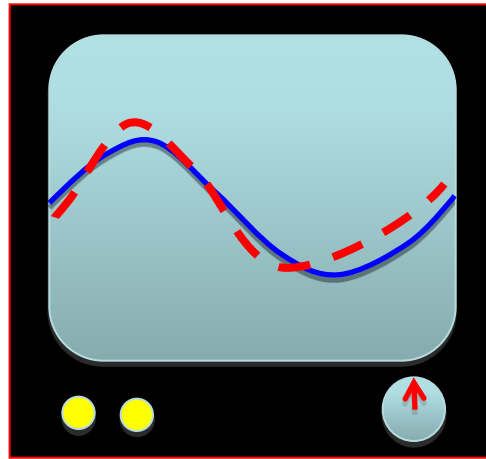
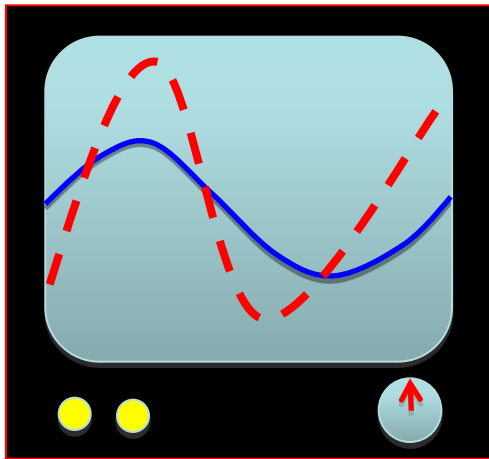
Computer Watershed Model

				Balance
Date	Transaction Item	Deposit/Credit	Payment/Debit	\$1,000.00
July 1	Check 101 for phone bill		\$100.00	\$900.00
	Travel reimbursement	\$50.00		\$950.00
July 2	Check 102 for groceries		\$75.00	\$875.00
July 3	Auto insurance bank draft		\$100.00	\$775.00
	Birthday check	\$25.00		\$800.00
				Water storage (acre*ft)
Date	Event	Rainfall (ac.ft/day)	Stream Flow (ac.ft/day)	1000.00
July 1	Flow exits watershed		100.00	900.00
	Rainfall on watershed	50.00		950.00
July 2	Flow exits watershed		75.00	875.00
July 3	Flow exits watershed		100.00	775.00
	Rainfall on watershed	25.00		800.00

Computer Watershed Model

				Pollutant storage on land (g)
Date	Event	Mass IN (grams)	Mass OUT (grams)	2000.00
July 1	Mass leaving land by washoff		300.00	1700.00
	Mass entering land by deposition	50.00		1750.00
July 2	Mass entering land by deposition	50.00		1800.00
July 3	Mass leaving land by washoff		200.00	1600.00
	Mass entering land by deposition	50.00		1650.00
				Pollutant storage in reach (g)
Date	Event	Mass IN (grams)	Mass OUT (grams)	500.00
July 1	Mass leaving reach by flow		250.00	250.00
	Mass entering reach by washoff	300.00		550.00
July 2	Mass leaving reach by flow		350.00	200.00
July 3	Mass leaving reach by flow		50.00	150.00
	Mass entering reach by washoff	200.00		350.00

Watershed Model Calibration/Validation

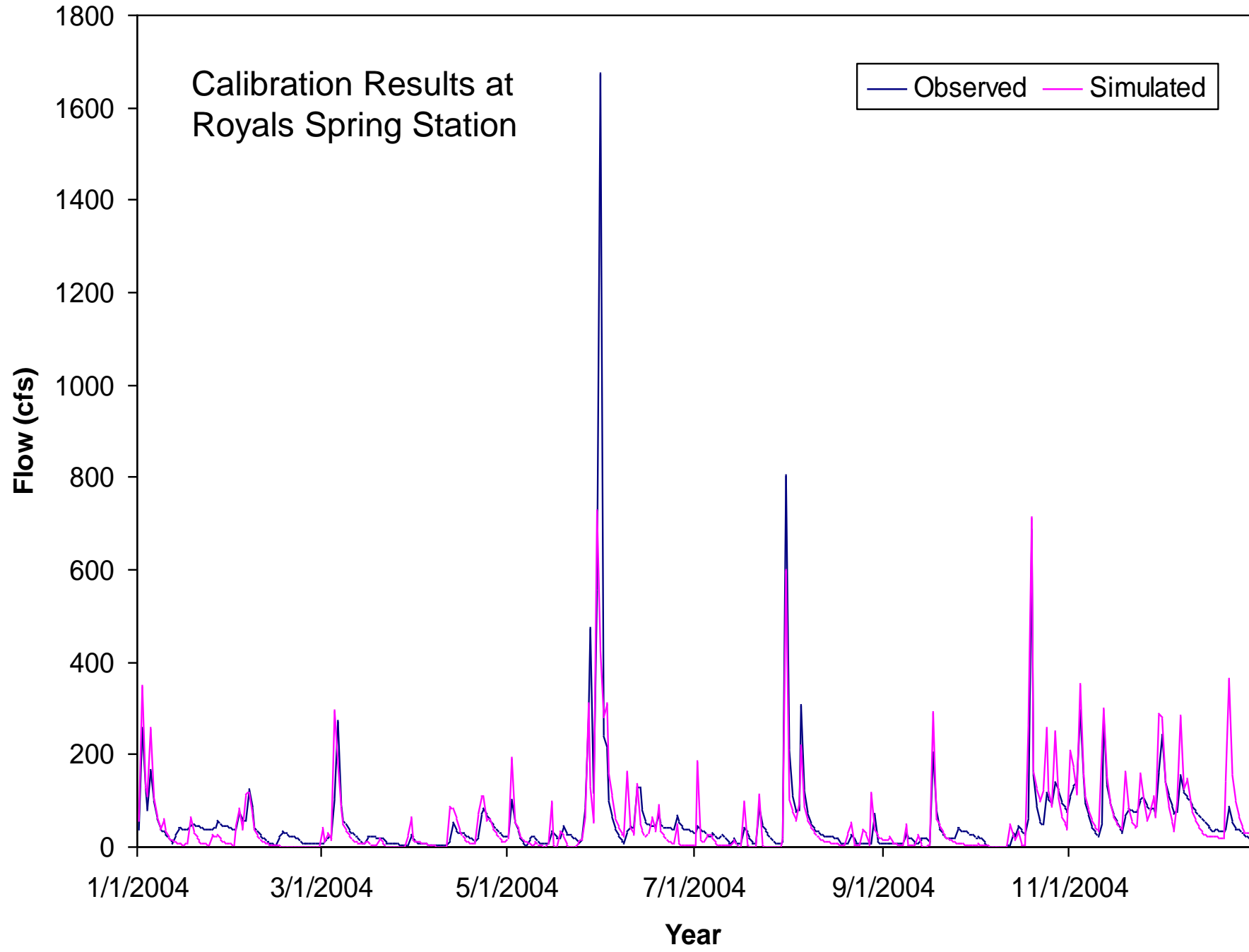


Model Calibration

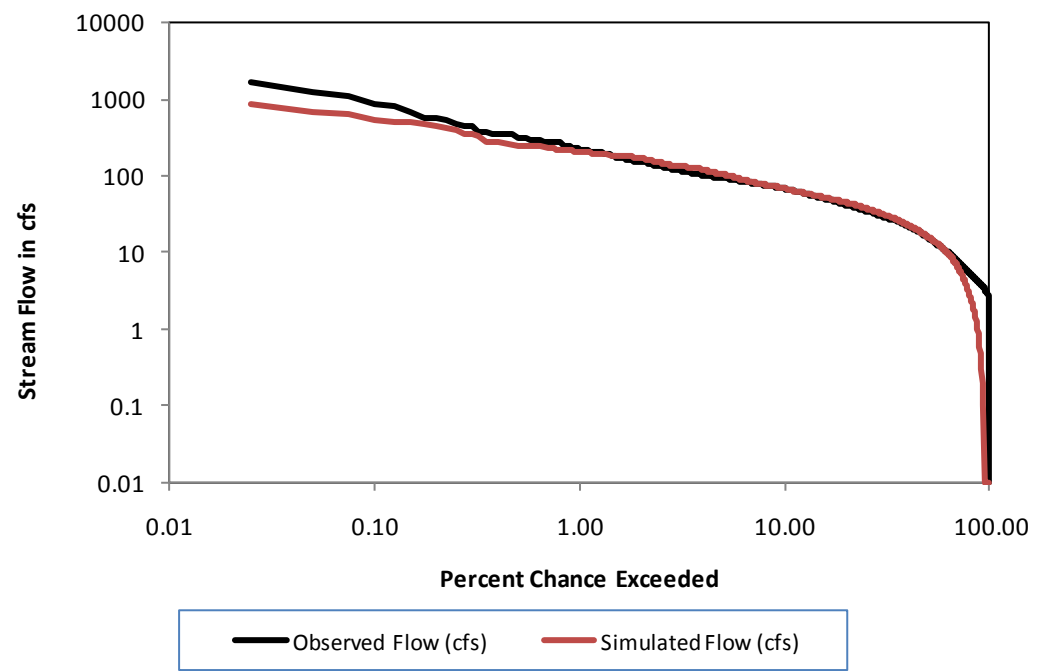
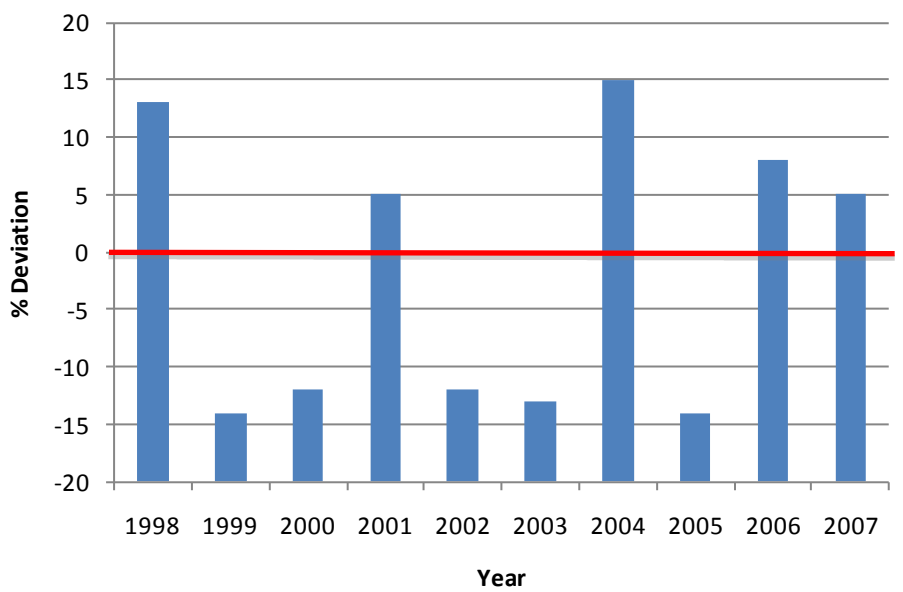
Model Validation

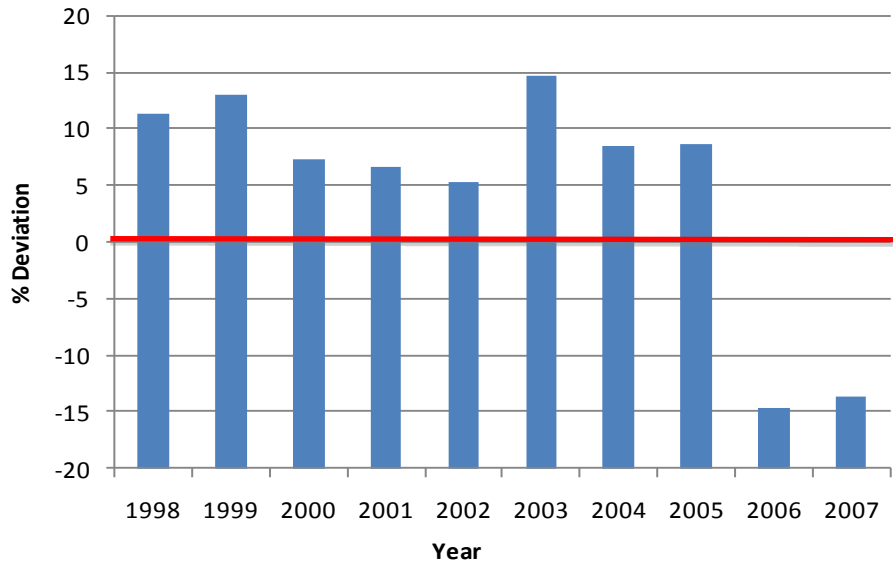
Calibration Results at Royals Spring Station

— Observed — Simulated

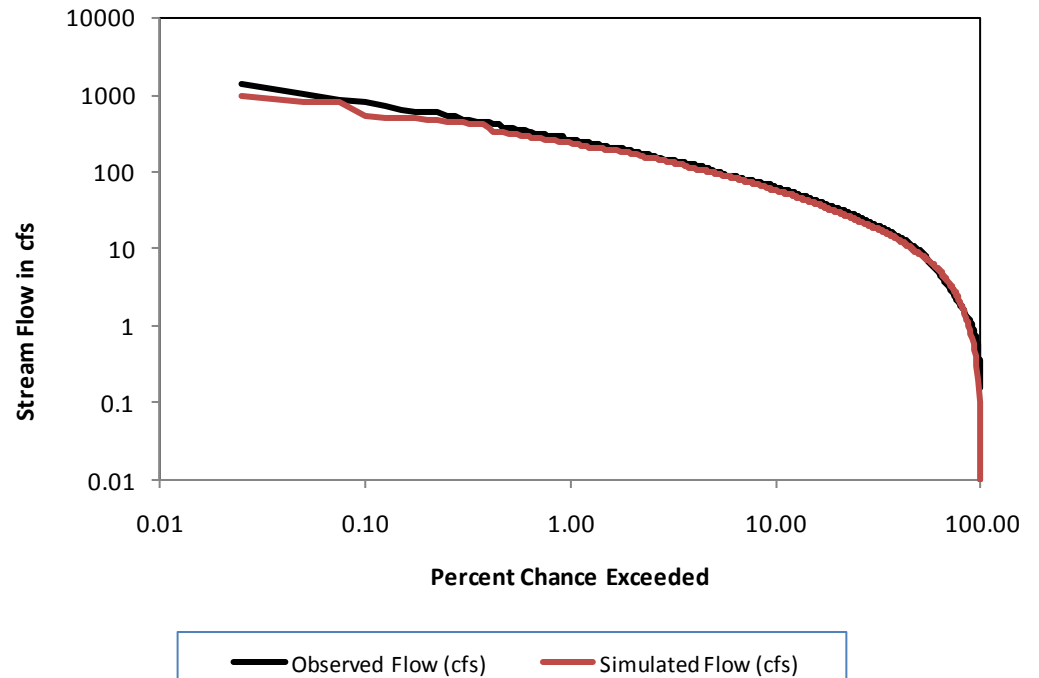


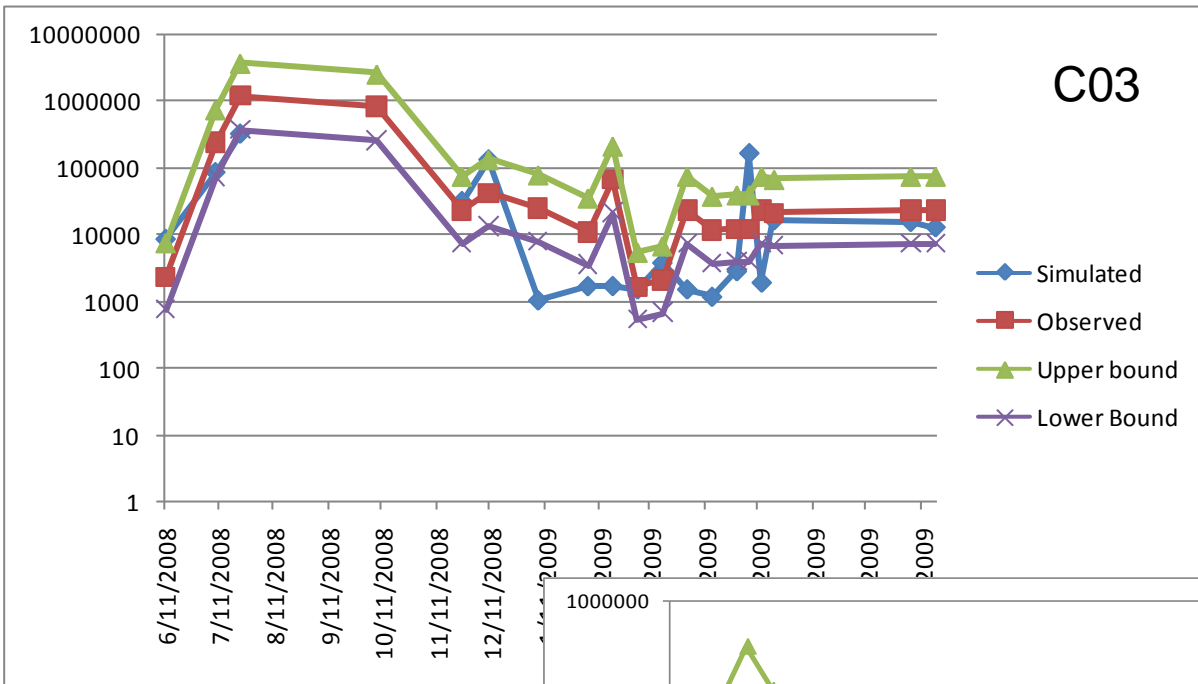
Flow Calibration Results at Royals Spring Station



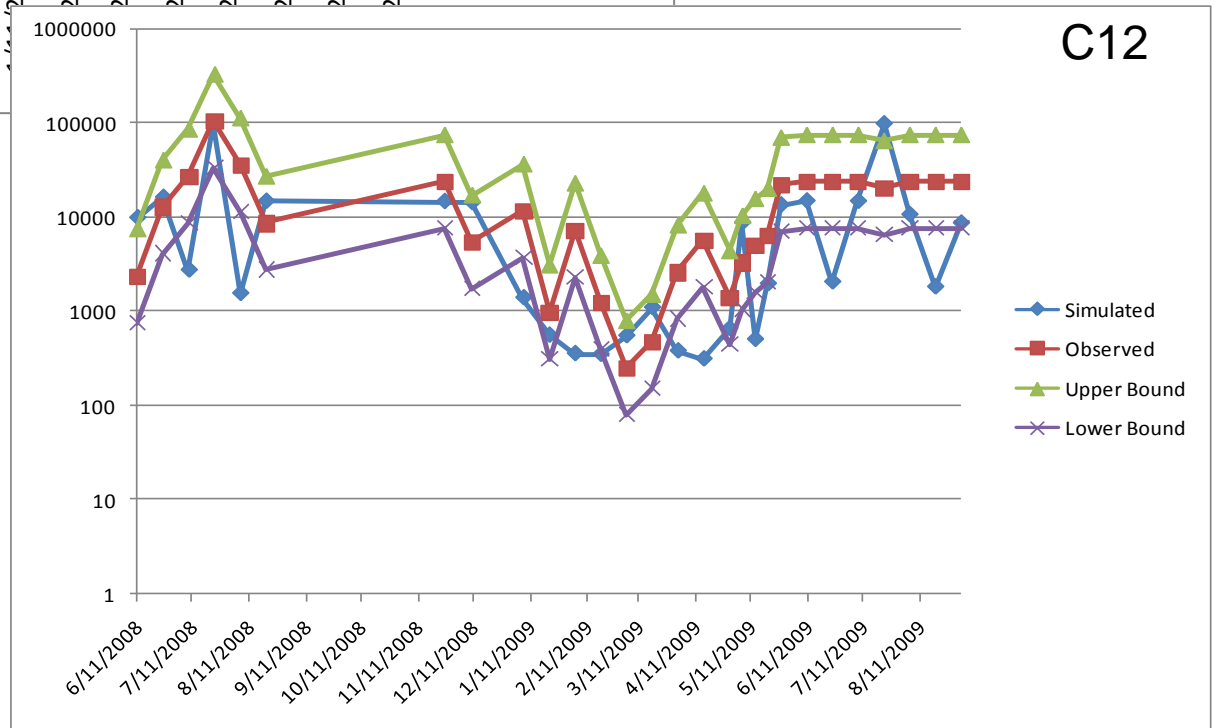


Flow Calibration Results at Outlet of Cane Run

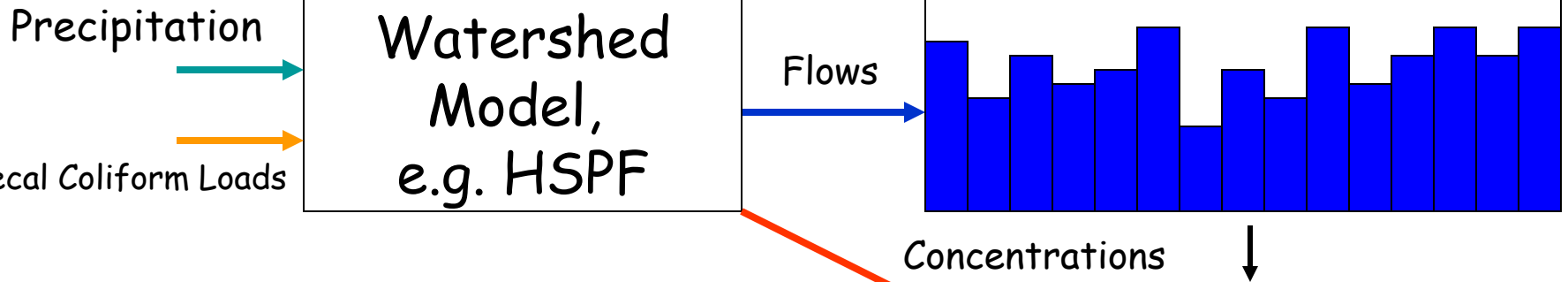




Fecal Coliform Validation Results UK Ag Stations



Watershed Model

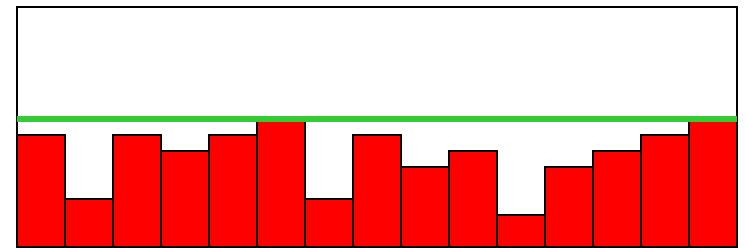
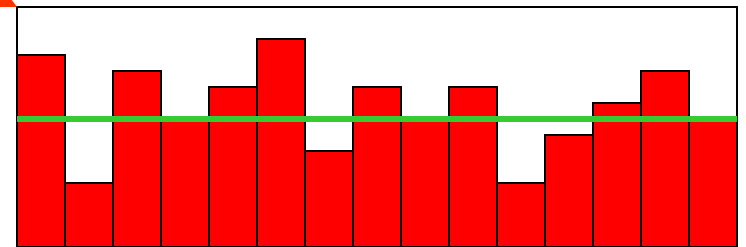


1. Start model with existing loads: $LOAD_i$

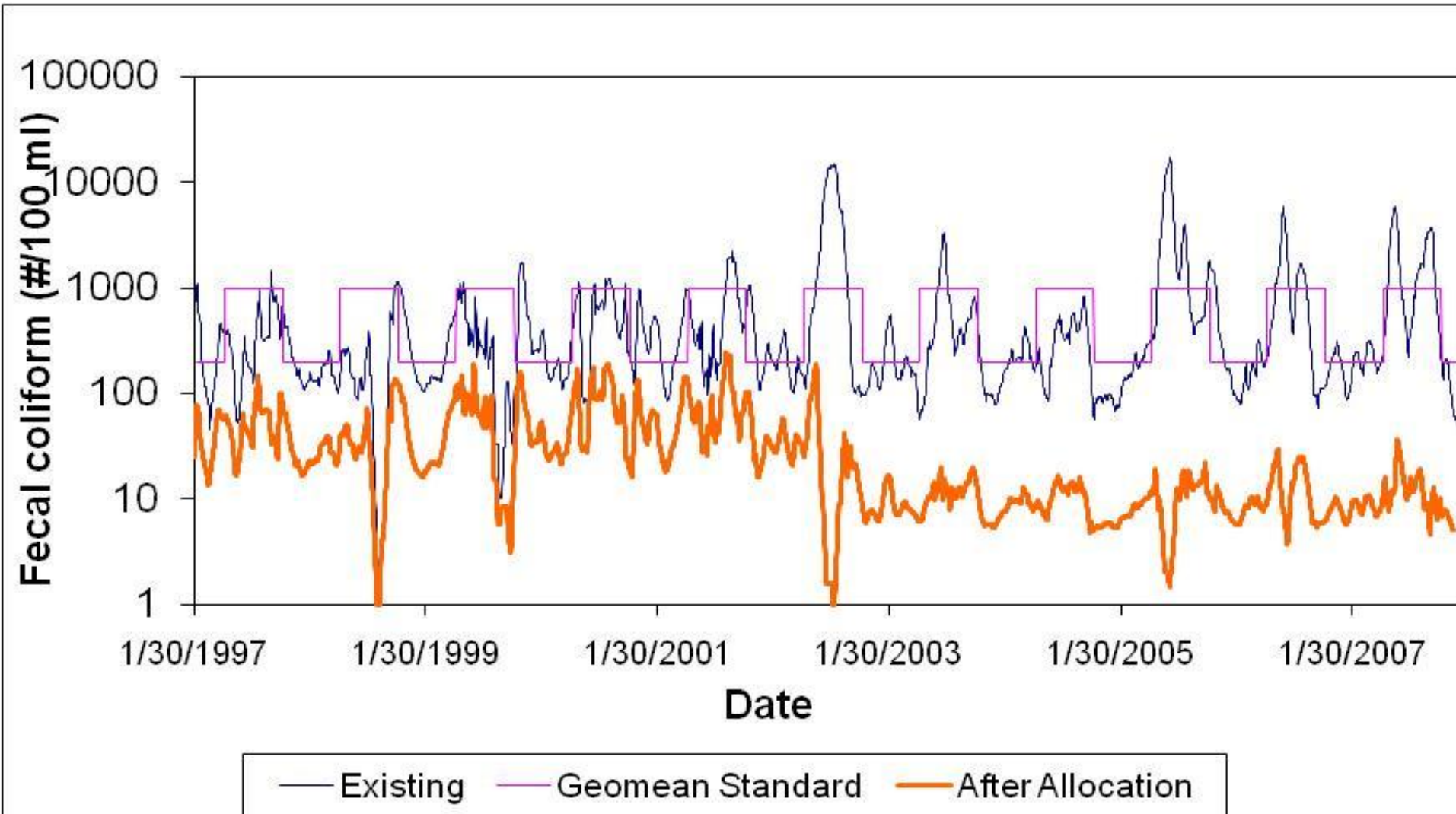
2. Decrease loads until criteria satisfied: $LOAD_f$

3. TMDL = $LOAD_f$

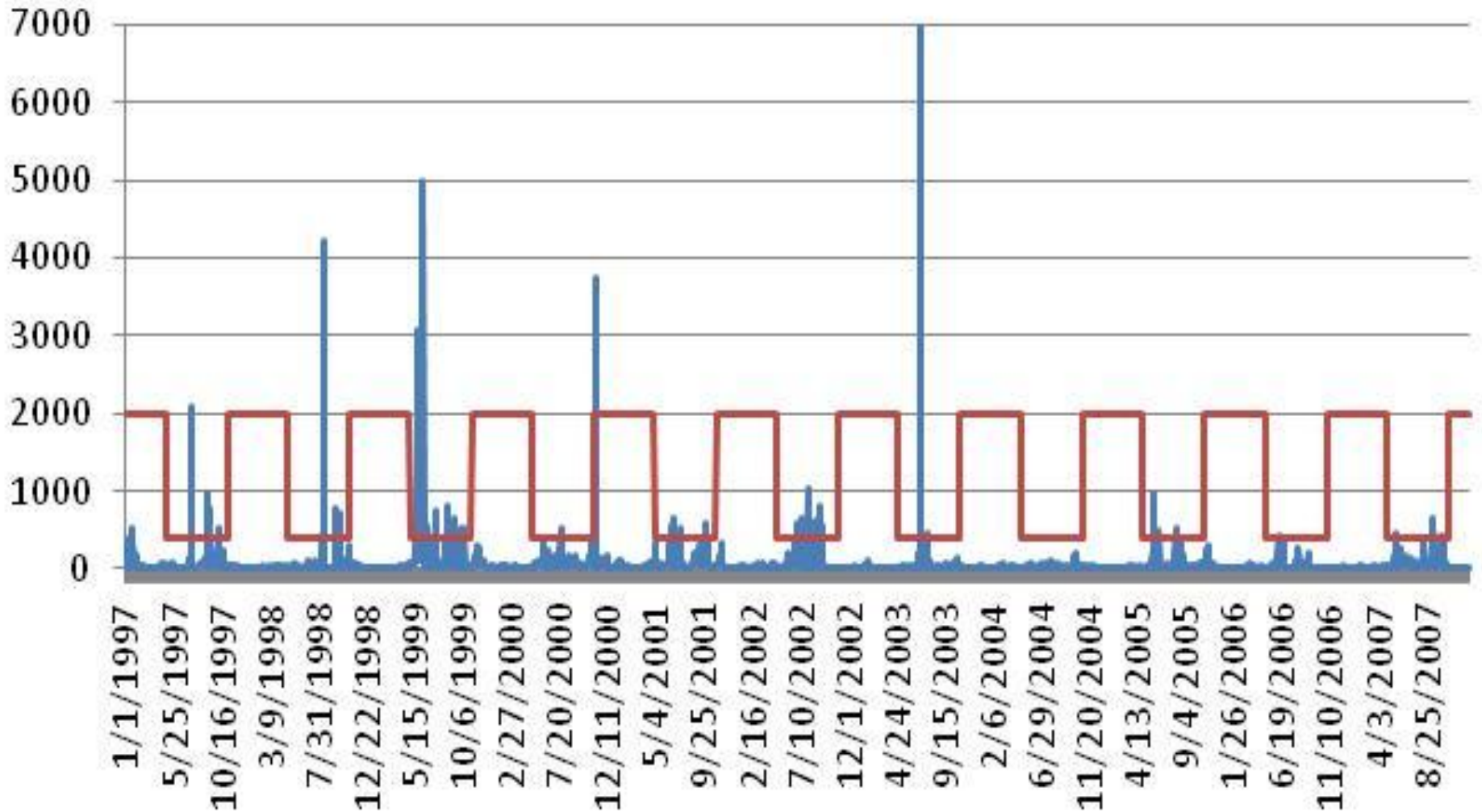
4. LR = $LOAD_i - TMDL$



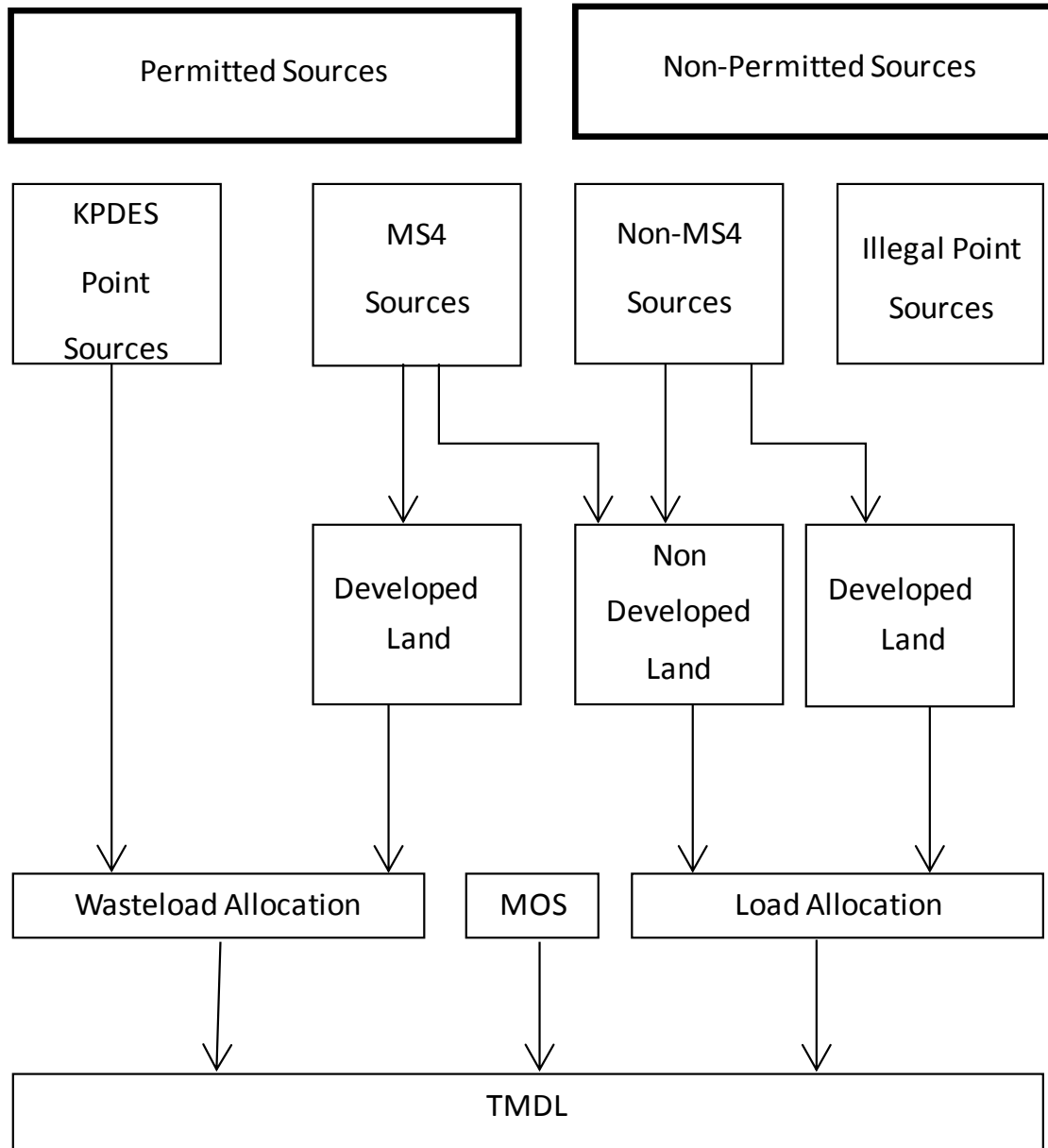
Acute Criteria (Geomean) (200 cfu/100 or 1000 cfu/100)



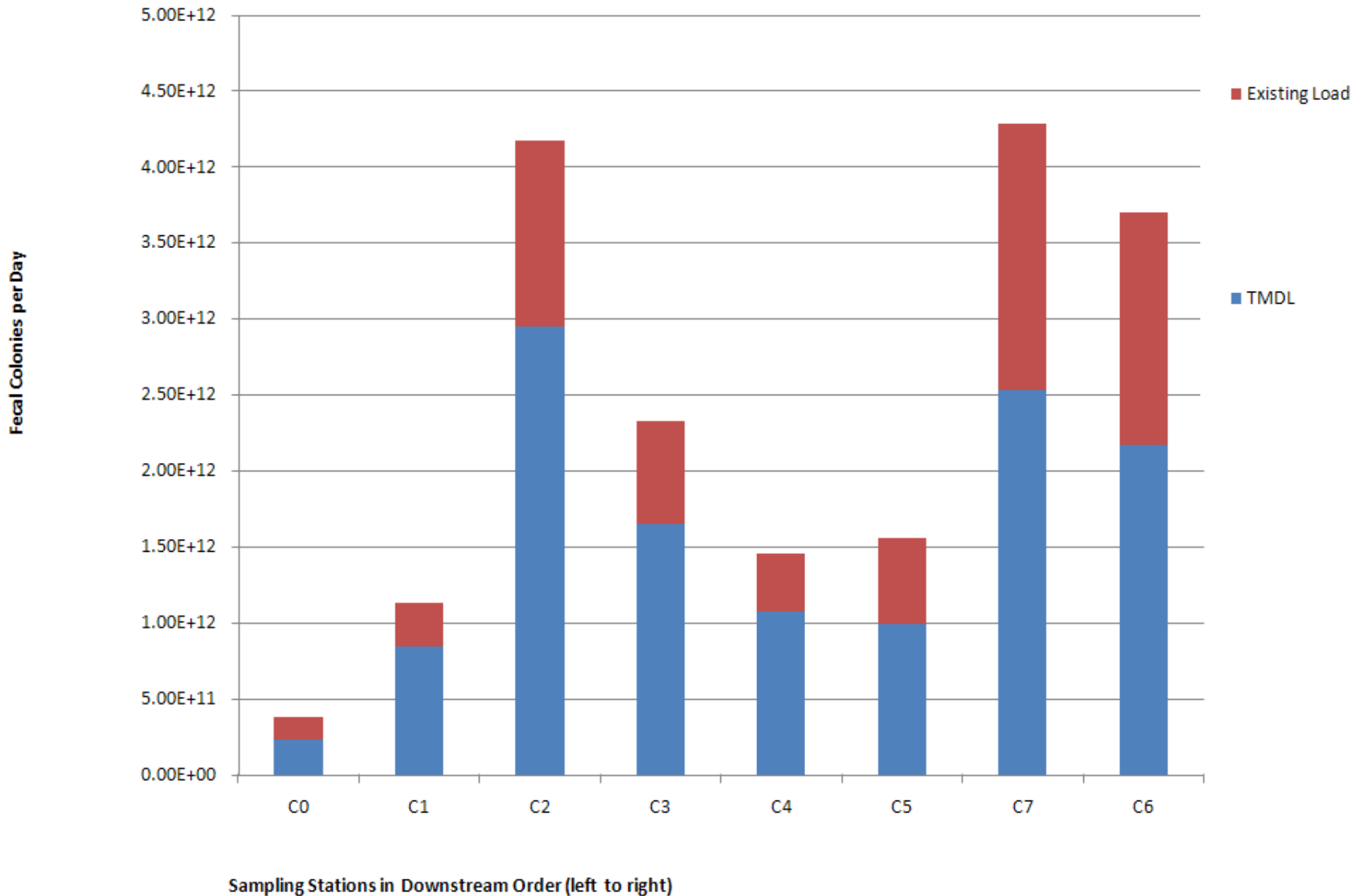
Chronic Criteria (< 20%) (400 cfu/100 or 2000 cfu/100)



TMDL Allocations



Existing and TMDL Loads



TMDL Load Components

