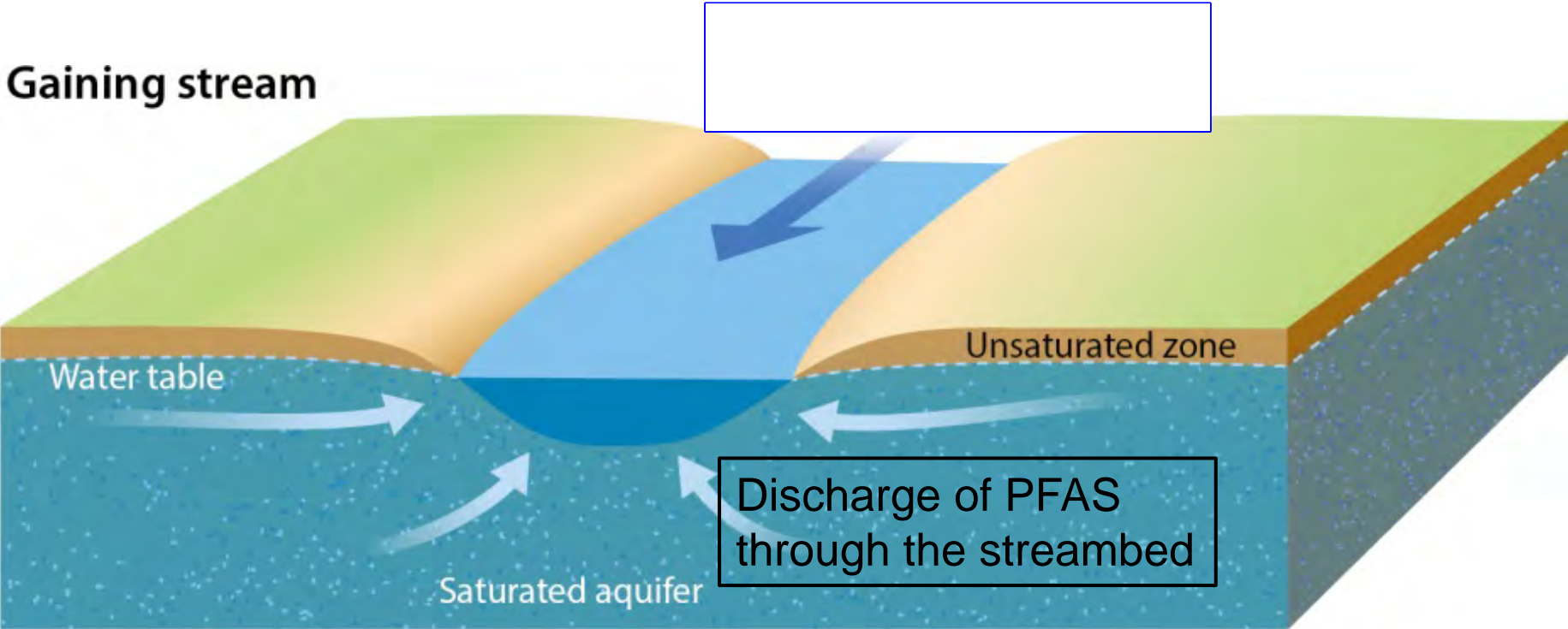




**Discharge of PFAS from groundwater
to surface water near the Fayetteville
Works, North Carolina**

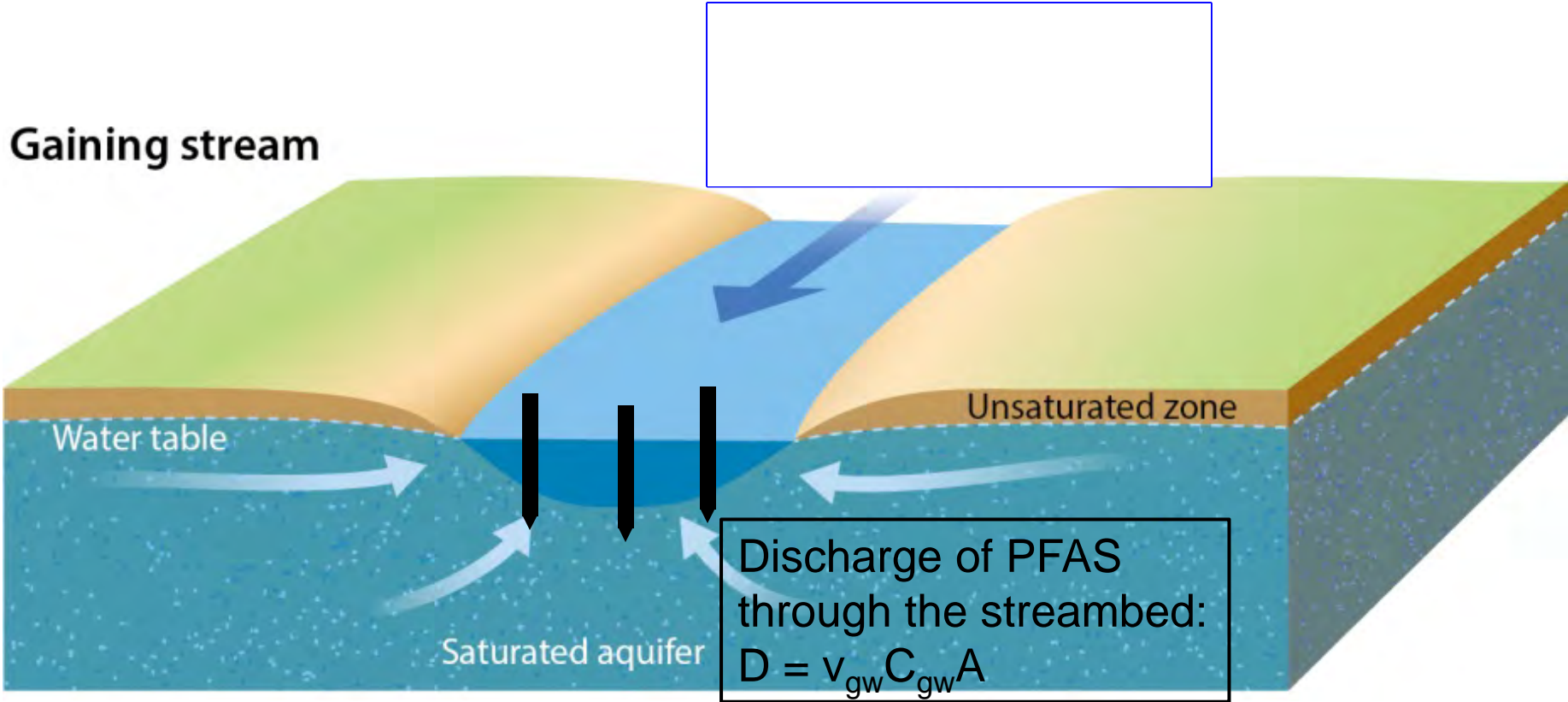
**David P. Genereux, Lydia Koropecj-Cox, Sandrine
Duboscq, Marie-Amélie Pétré, and Detlef R. U. Knappe
NC State University**

Discharge of PFAS from groundwater to a stream \implies stream export of PFAS from the watershed



(image: calag.ucanr.edu/Archive/?article=ca.2018a0008)

Estimating the rate of PFAS discharge from contaminated groundwater: $D = E$?

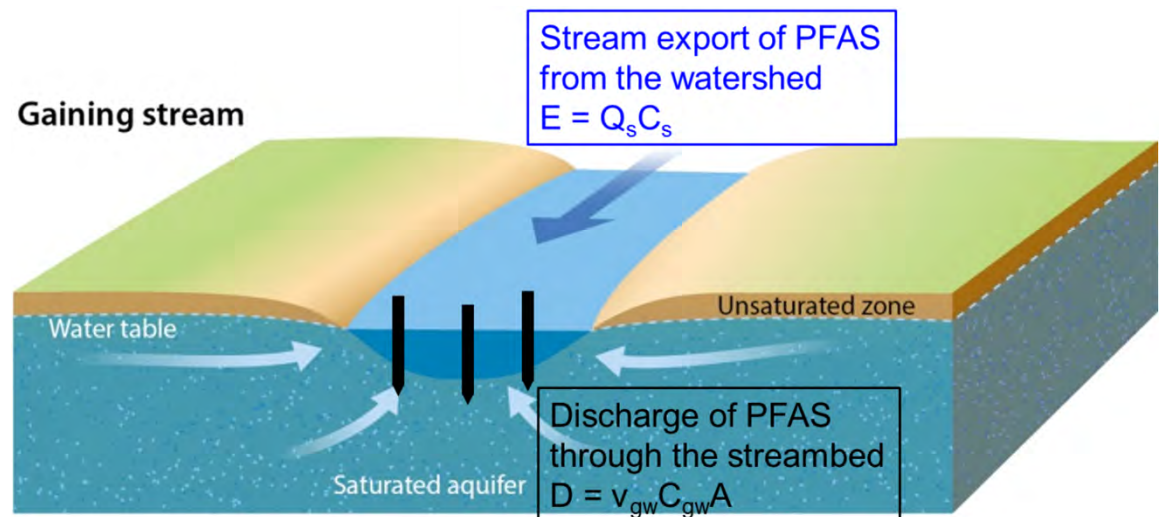


(image: calag.ucanr.edu/Archive/?article=ca.2018a0008)

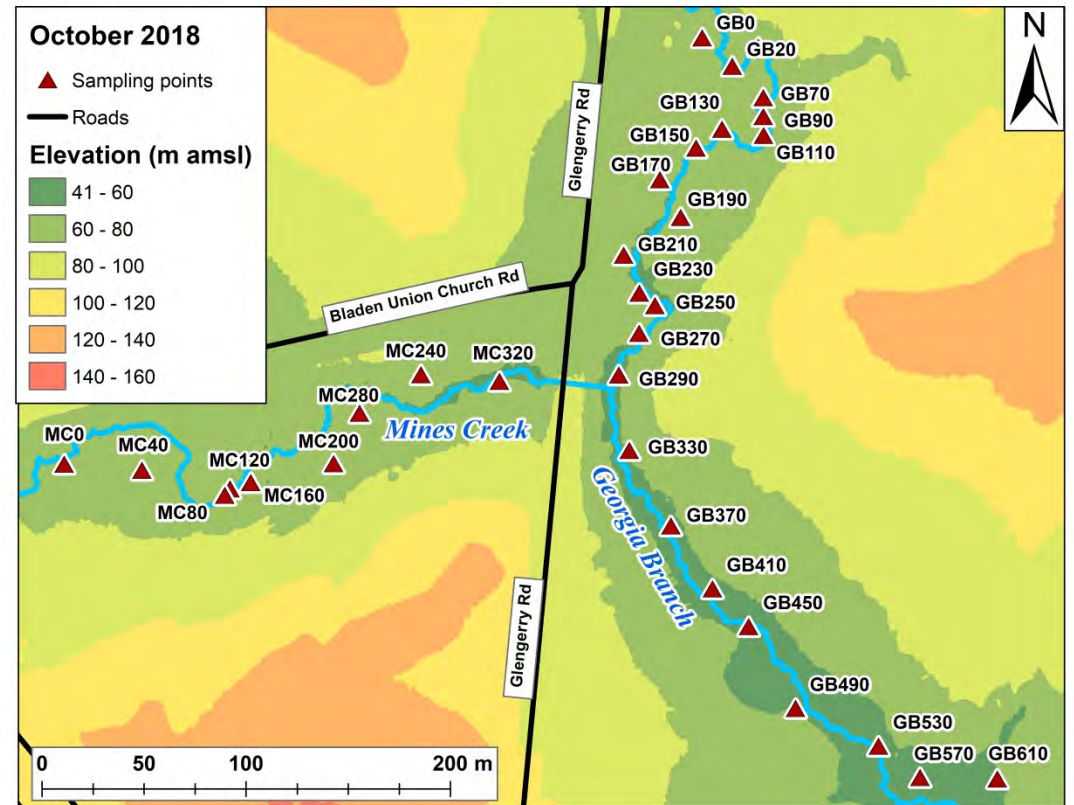
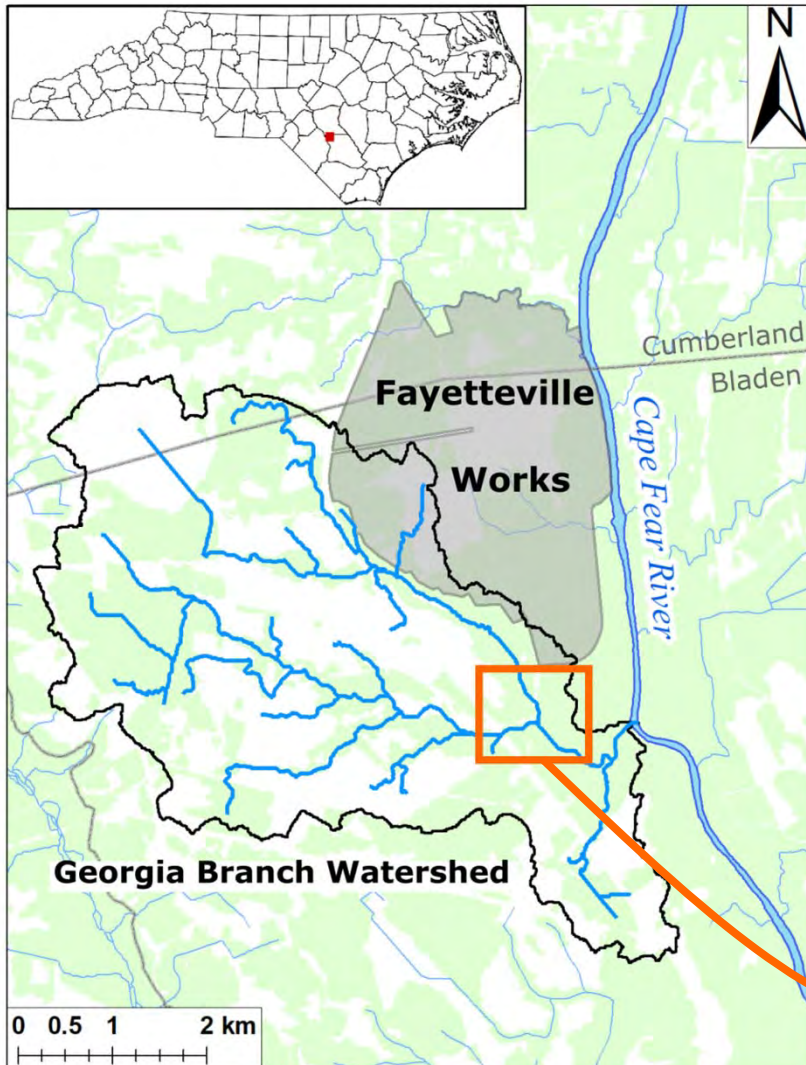
Estimating the rate of PFAS discharge from contaminated groundwater: $D = E$?

Yes, if:

- PFAS is conservative in stream water
- Groundwater is the dominant source of PFAS to the stream
- There are enough streambed measurement points for a meaningful extrapolation



Study area, and groundwater sampling points

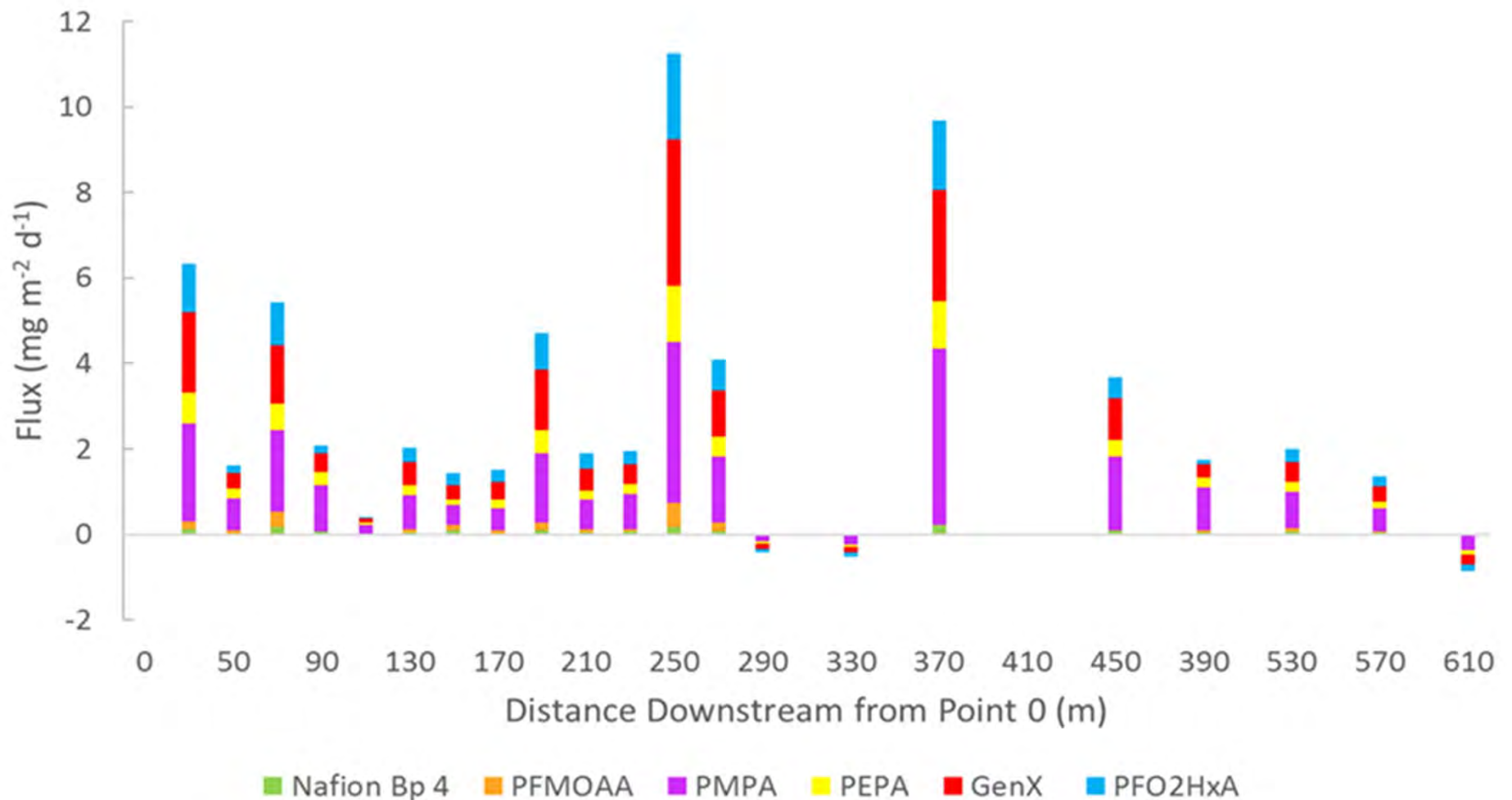


PFAS in groundwater beneath Georgia Branch, October 2018

- PMPA: 792 ng/L
 - GenX: 548 ng/L
 - PFO2HxA: 334 ng/L
 - PEPA: 236 ng/L
 - PFMOAA: 69 ng/L
 - Nafion Byp 4: 44 ng/L
 - Nafion Byp 2: 19 ng/L
 - PFO30A: 17 ng/L
 - **SUM: 2059 ng/L (98.8% of measured PFAS)**
- (all averages, n= 22)



PFAS flux through Georgia Branch streambed, October 2018

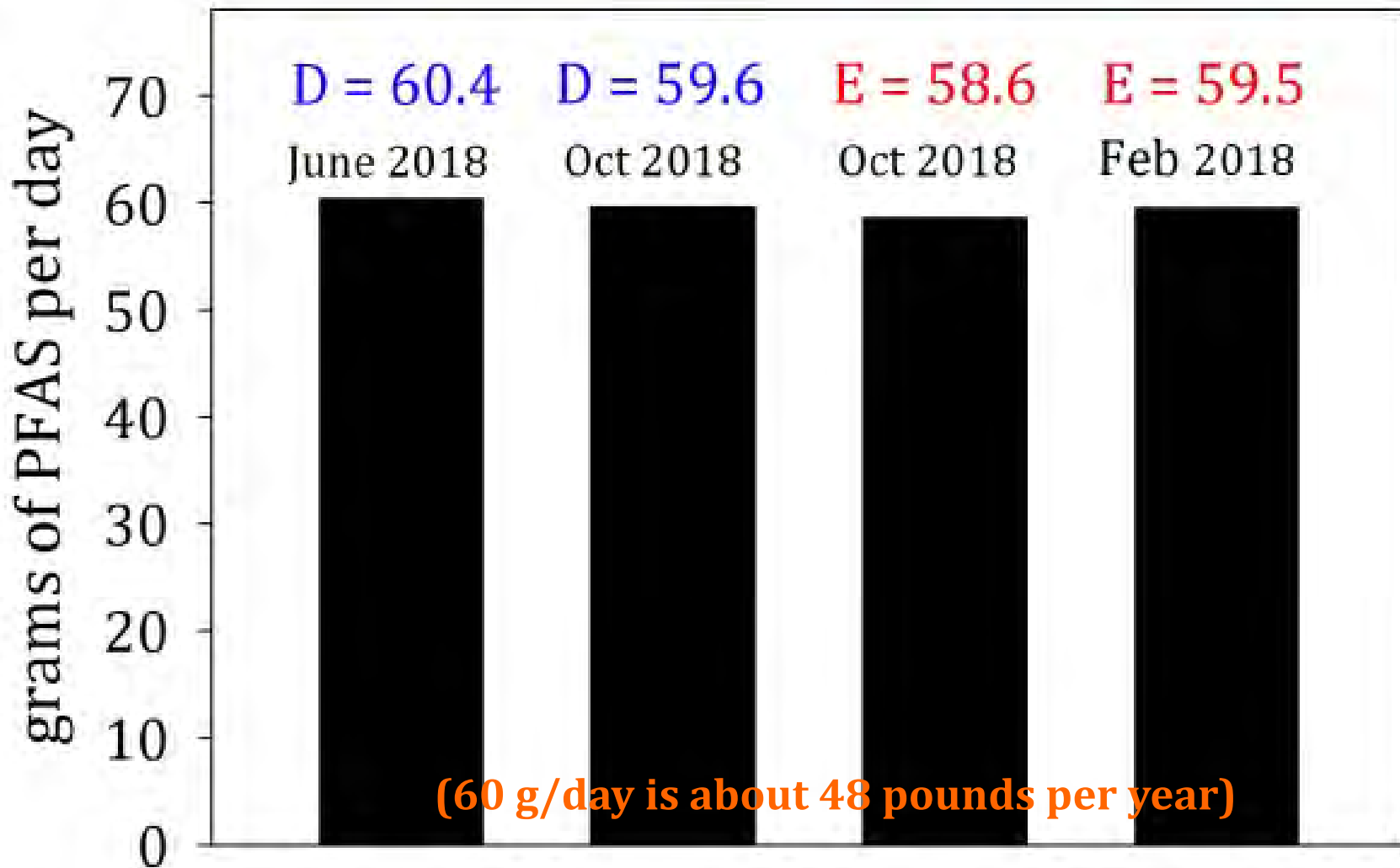


Flow and PFAS in Georgia Branch stream water, October 2018

	October 2018	February 2019
Stream flow, m^3/s	0.274	0.309
GenX, ng/L	662	539
Total PFAS, ng/L	2473	2233

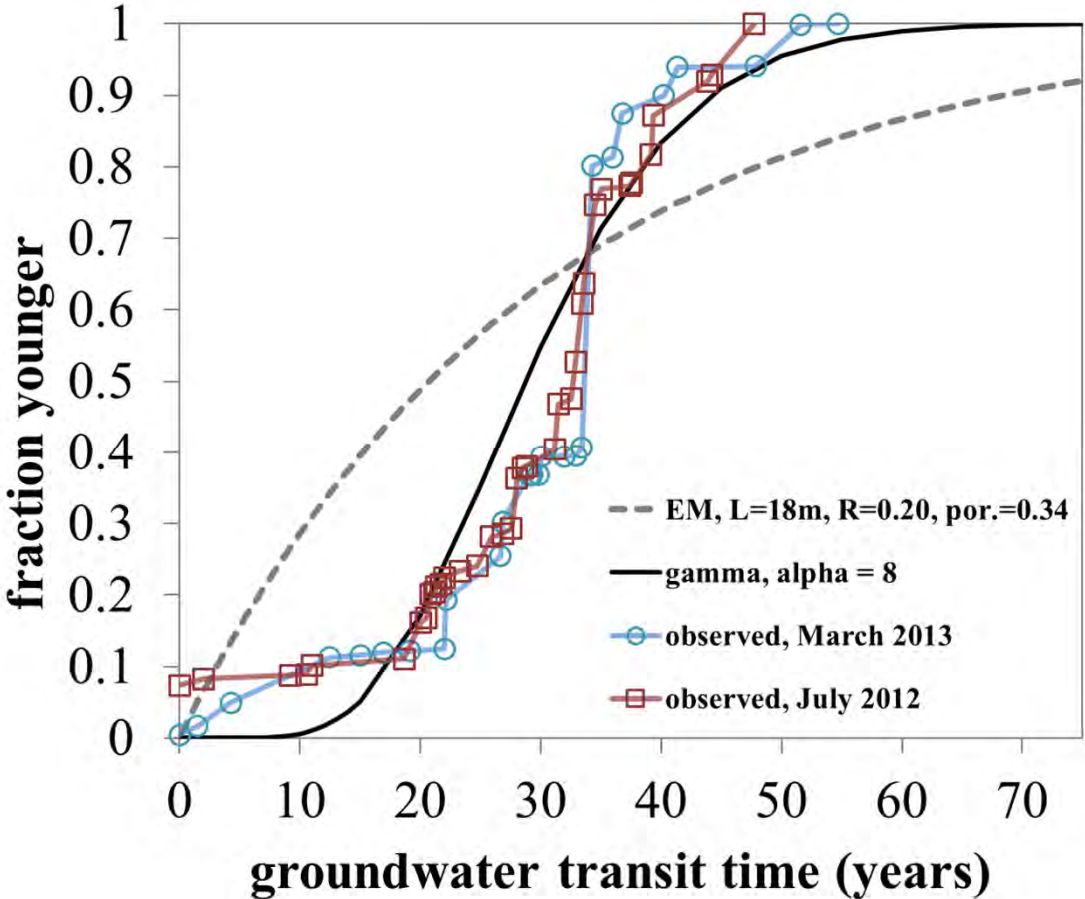


PFAS discharge from groundwater to stream (D), and watershed export by stream (E), Georgia Branch



How long will it take for PFAS to flush out of the aquifer? Depends in part on aquifer hydraulics

A recent coastal plain example from West Bear Creek, near Goldsboro NC (Gilmore et al. 2016)



The coastal plain aquifer discharges:

- A lot of 20-40 yr old groundwater
- Less groundwater that is younger (0-20 yr) or older (40-60 yr)

Practical research questions regarding PFAS transport from groundwater to streams

1. What is the rate of PFAS_{output} from groundwater to streams and other surface water?
2. How long will it take for the PFAS to flush out of the aquifer by groundwater discharge into streams and other surface water?
3. To what extent are the answers to questions 1 and 2 influenced by chemical properties of the PFAS in addition to the physical processes of groundwater flow and discharge?

