WATER QUALITY

Linking watershed health to agricultural practices

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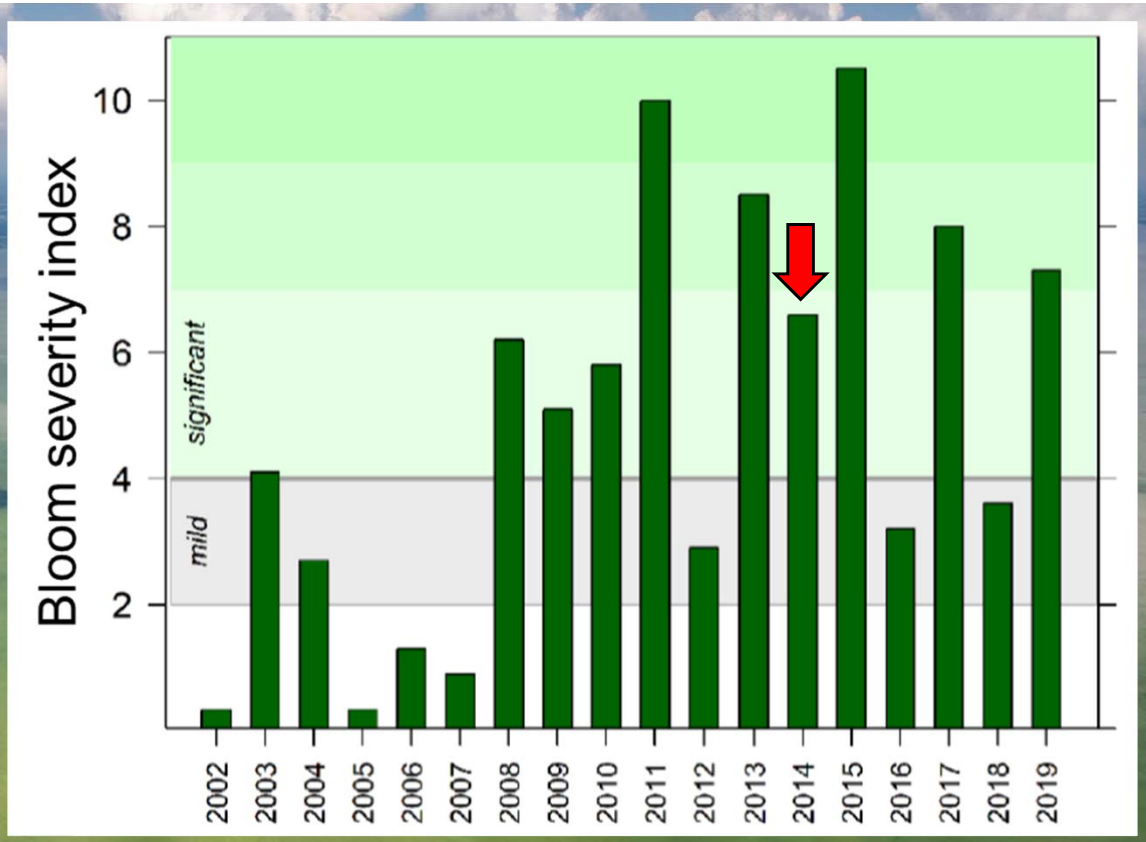
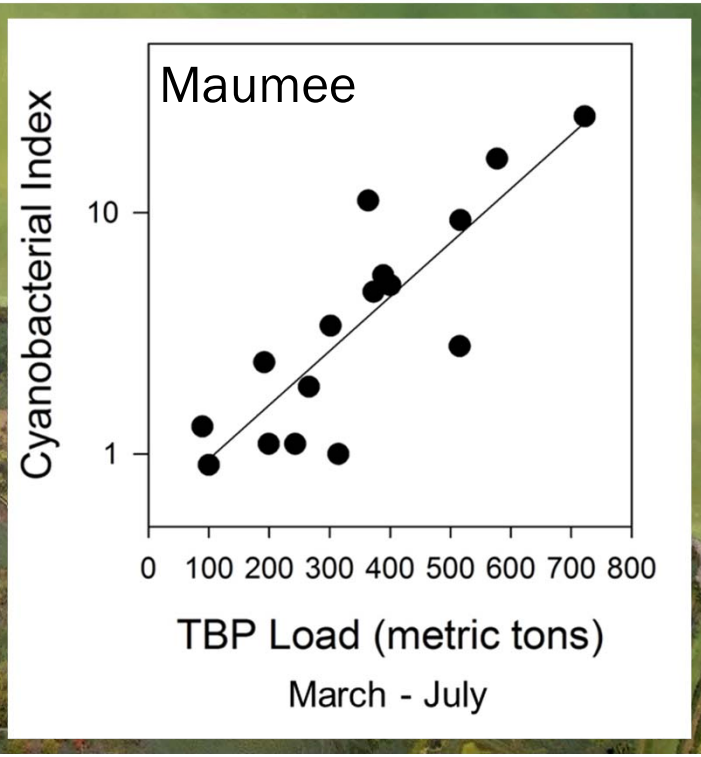
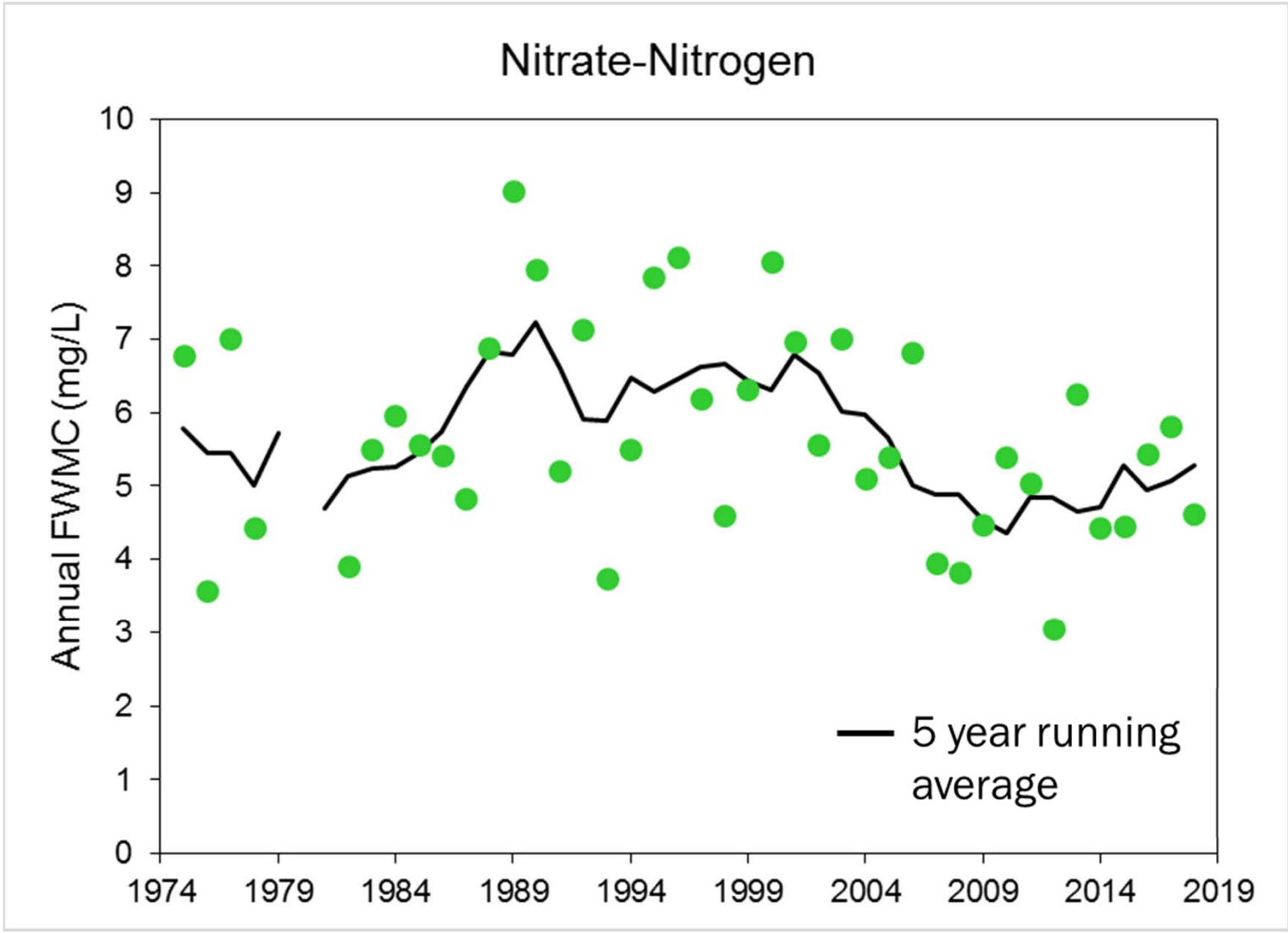




2019
Aerial Associates Photography

Stumpf et al., 2016 JGLR

Long-term trends in annual nutrient concentrations from the Maumee River



Bullerjahn et al, 2016

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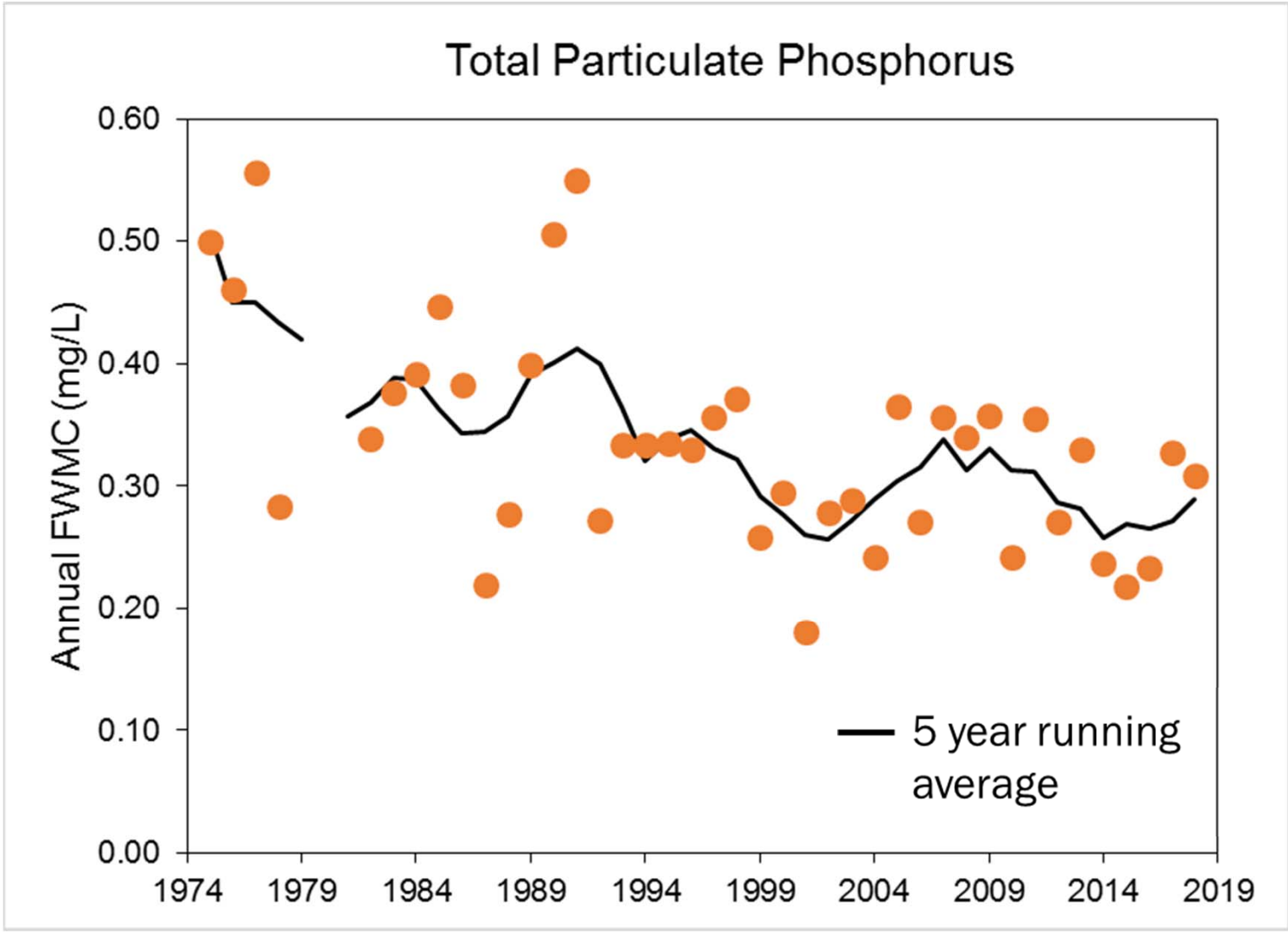

Bullerjahn et al, 2016

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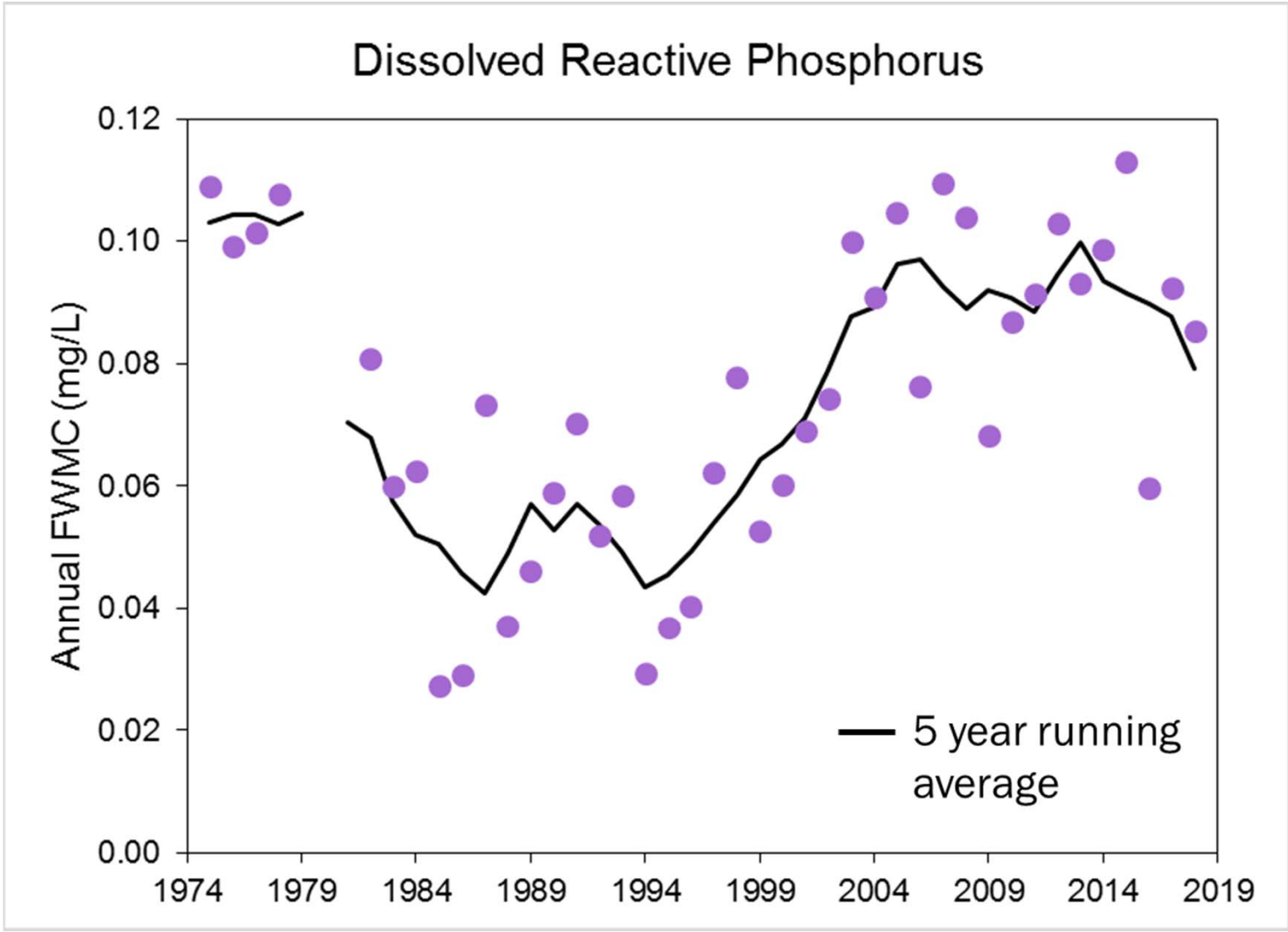
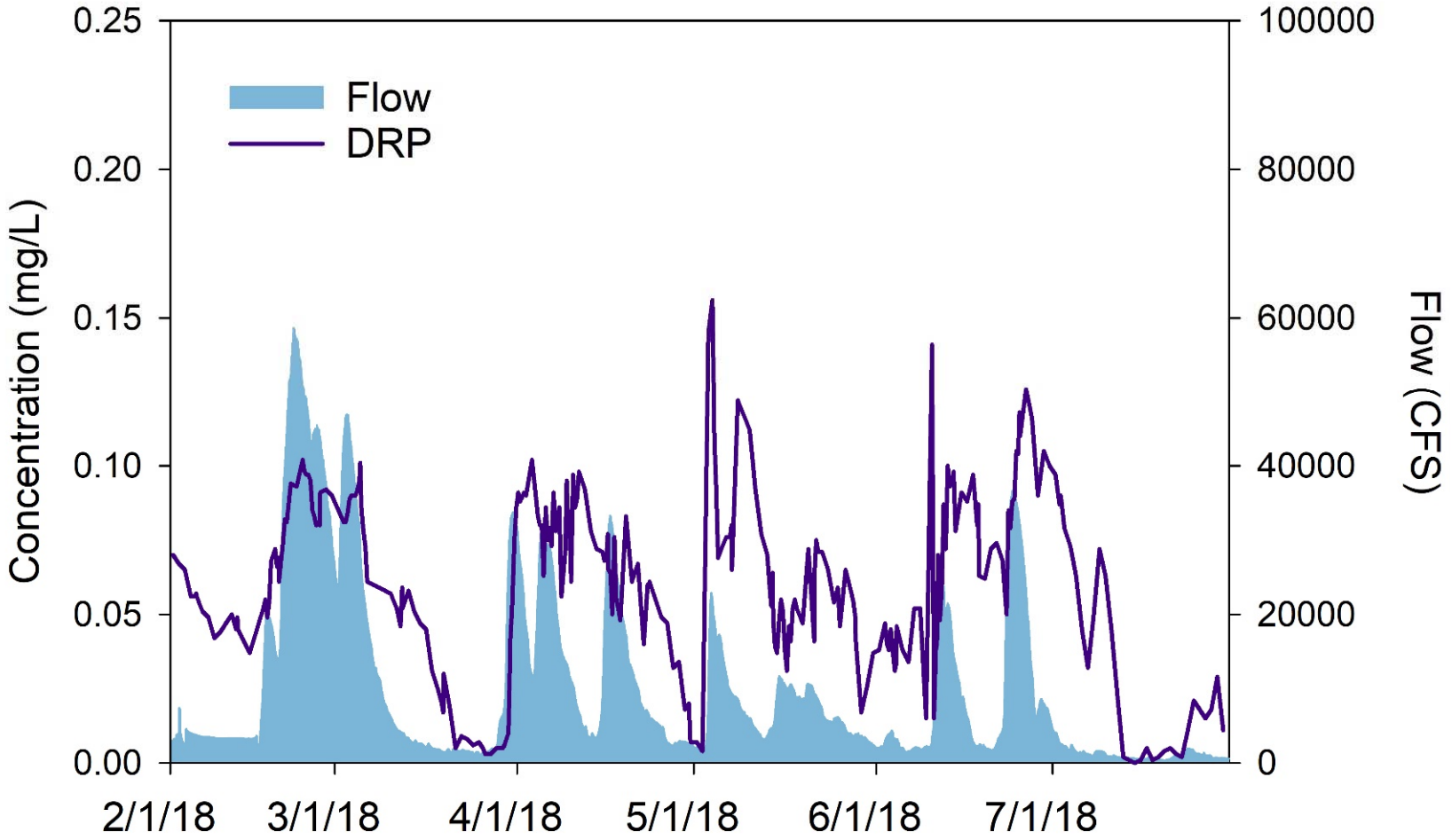


Bullerjahn et al, 2016

Hydrology controls DRP concentrations, whereas source drives nitrate concentrations



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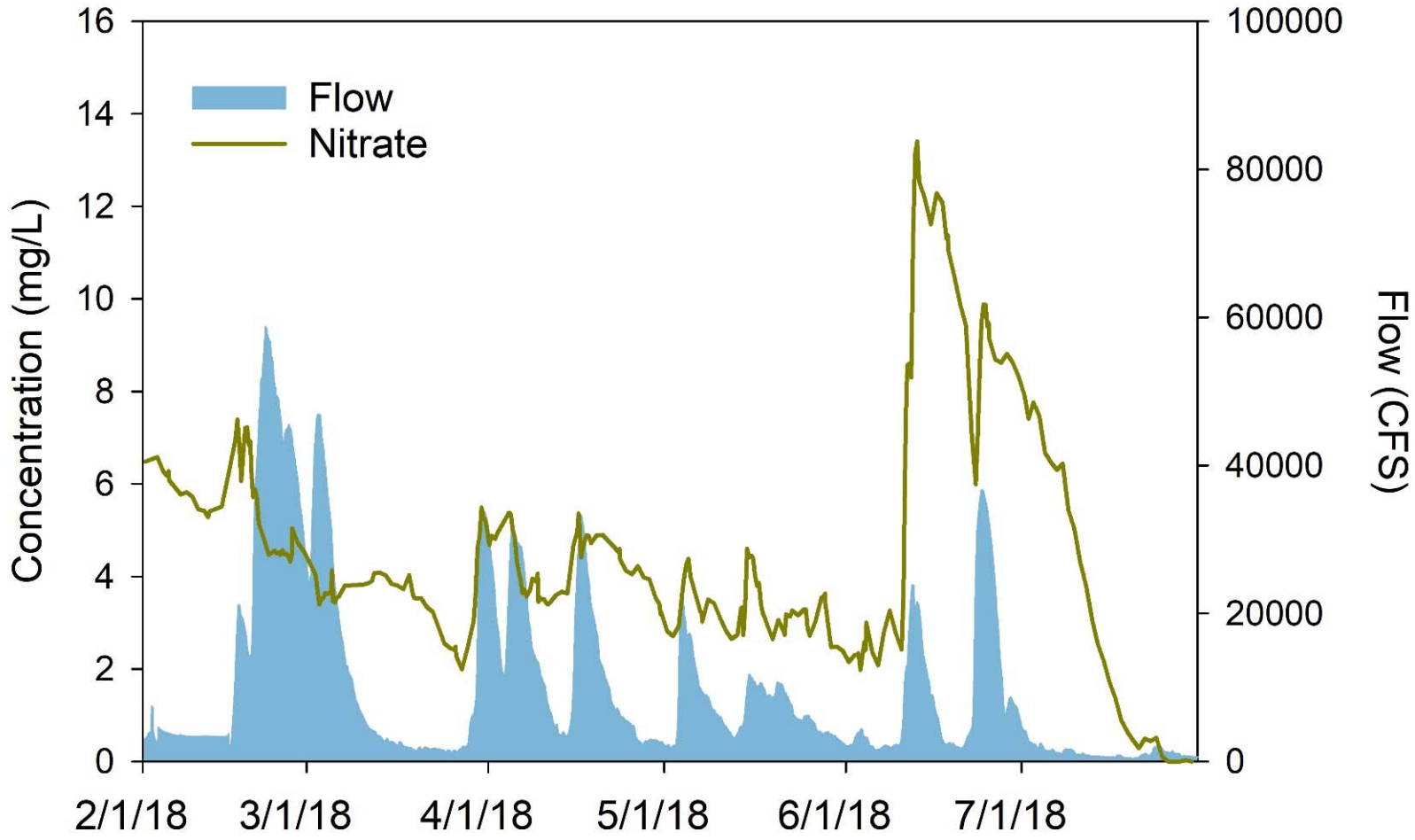

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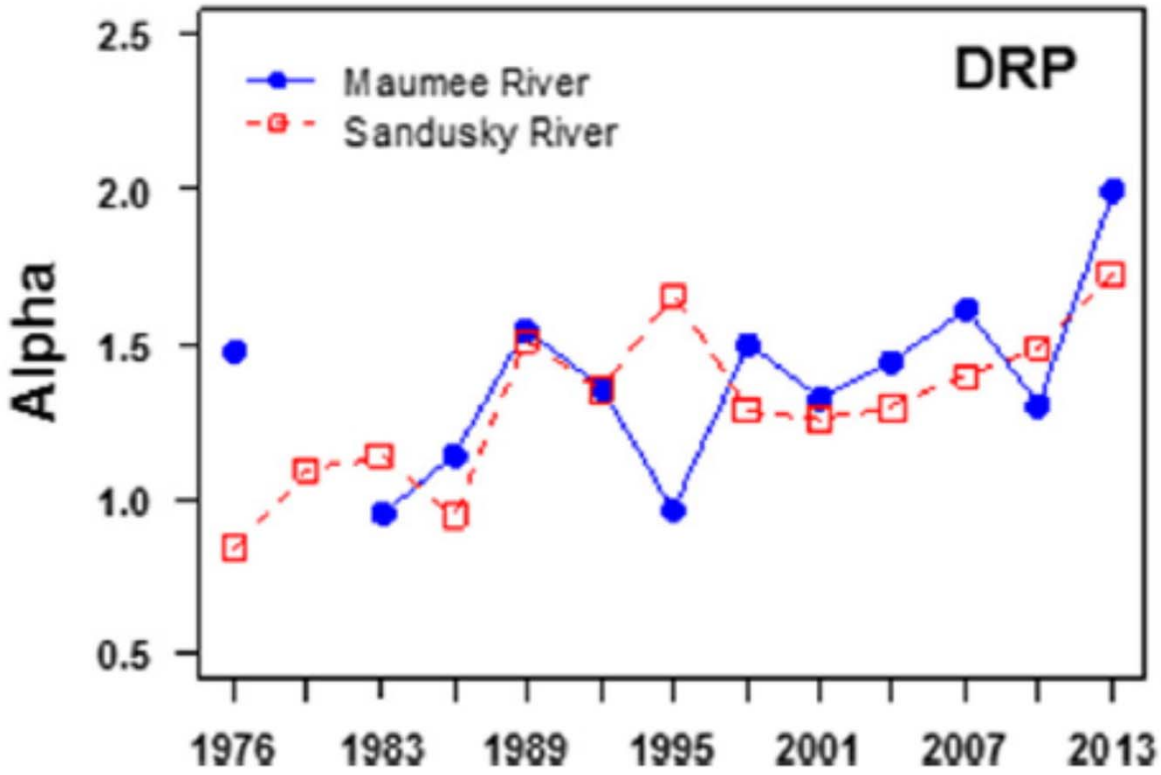
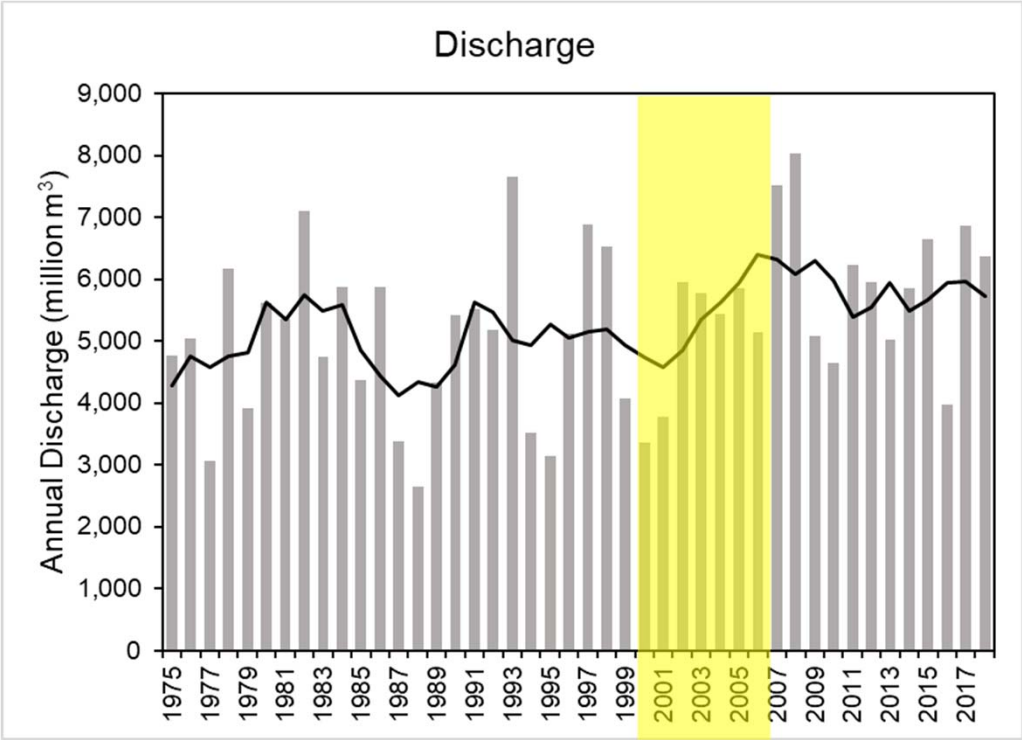
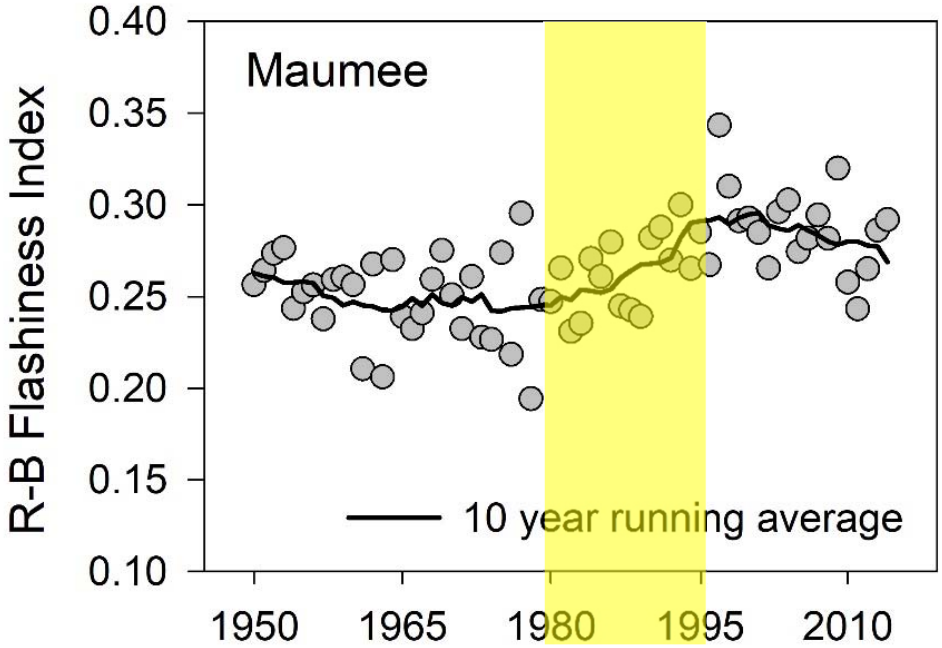
An increase in memory (α) suggests stronger hydrologic control on DRP concentrations



Williams et al., 2016 JGLR

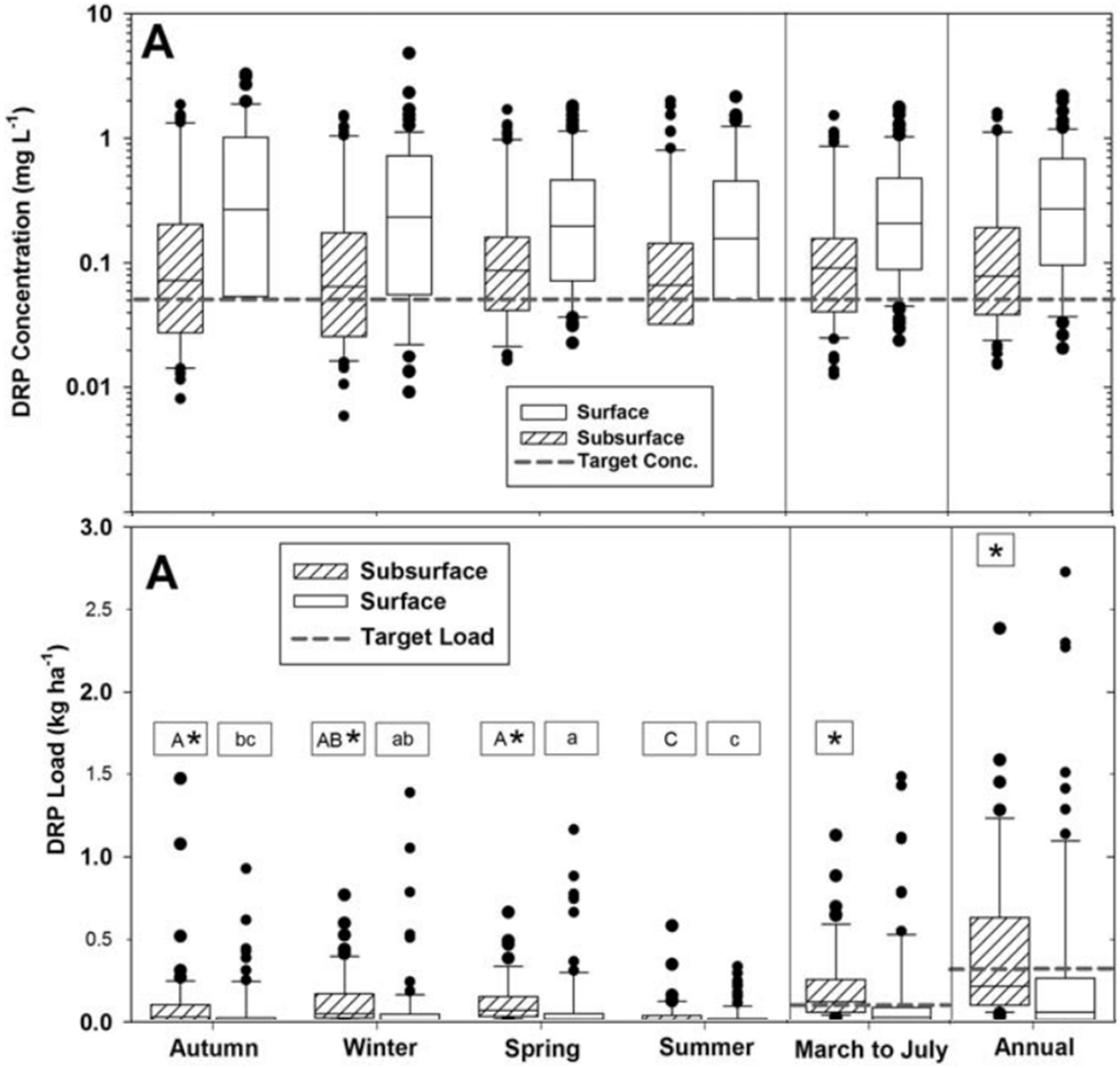
Increases in precipitation and tile drain intensity may be enhancing hydrologic controls on P





- Precipitation intensity increased in the late 1990s (# of events >2”) *(Aaron Wilson, OSU Climate Office)*
- Tile drain extent increased 23% from 1974-2012 *(NASS, 2012)*
  - Anecdotal evidence for increased intensity in the mid 2000s

ncwqr.org, Choquette et al. 2018, State of the Great Lakes Indicator Report 2017



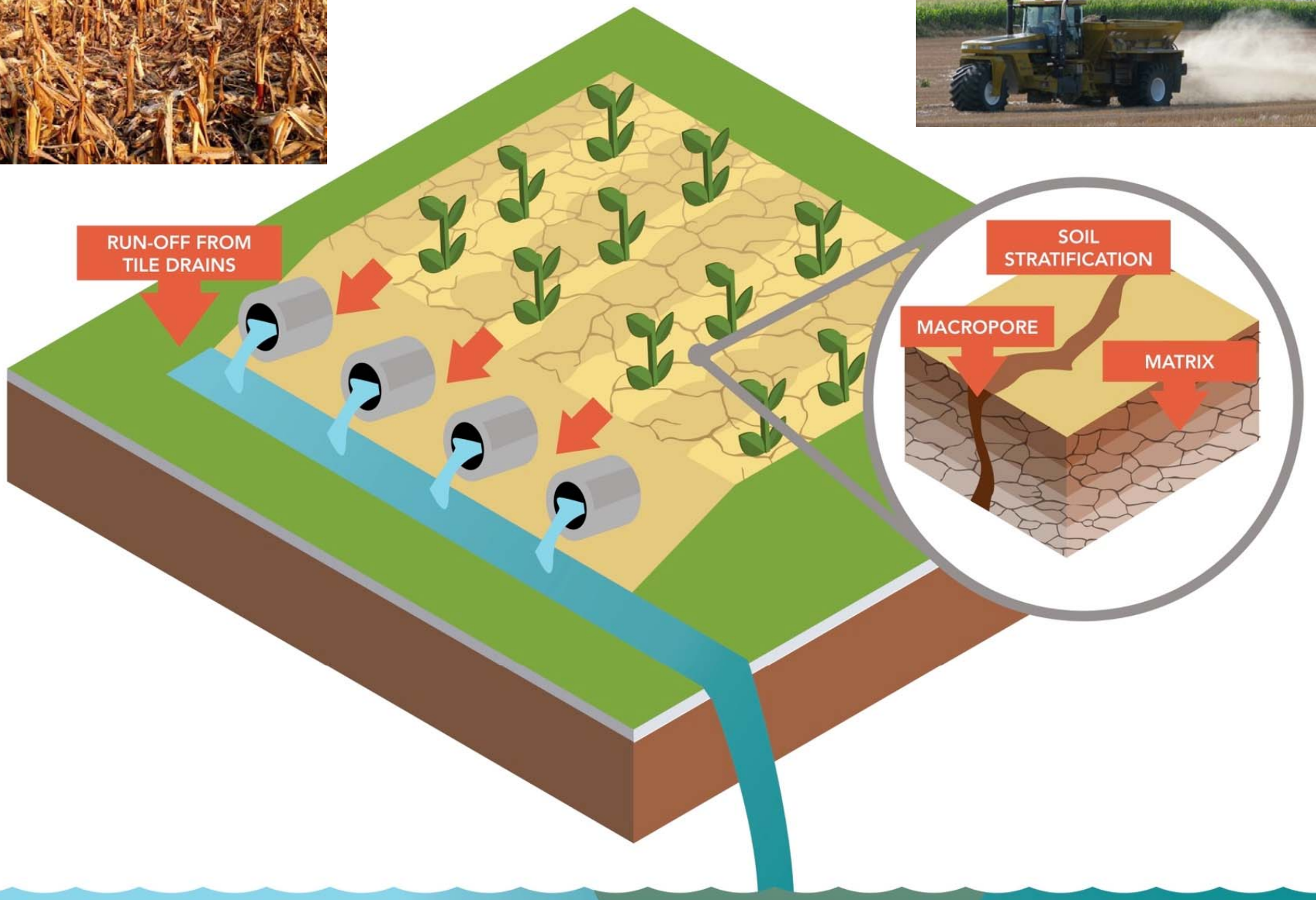
We know nitrate losses are high in tile drains, but what about DRP?

Surface runoff has higher concentrations

Subsurface drainage has higher loading

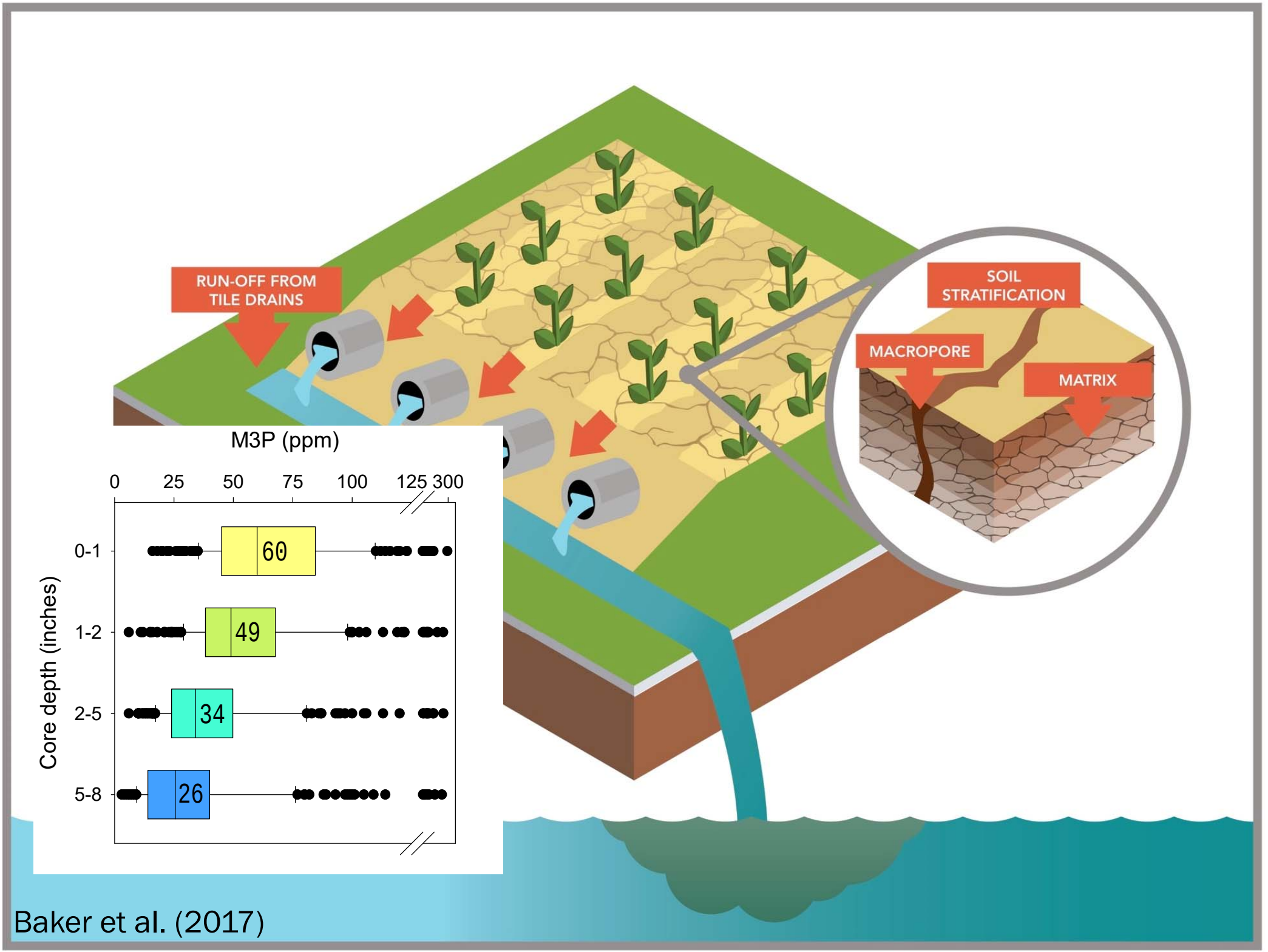
81% discharge
71% of DRP load

Pease et al. 2018, JGLR



85% of P application is commercial, soil test P in maintenance range

LakeErieAlgae.com



Baker et al. (2017)


9
8
7
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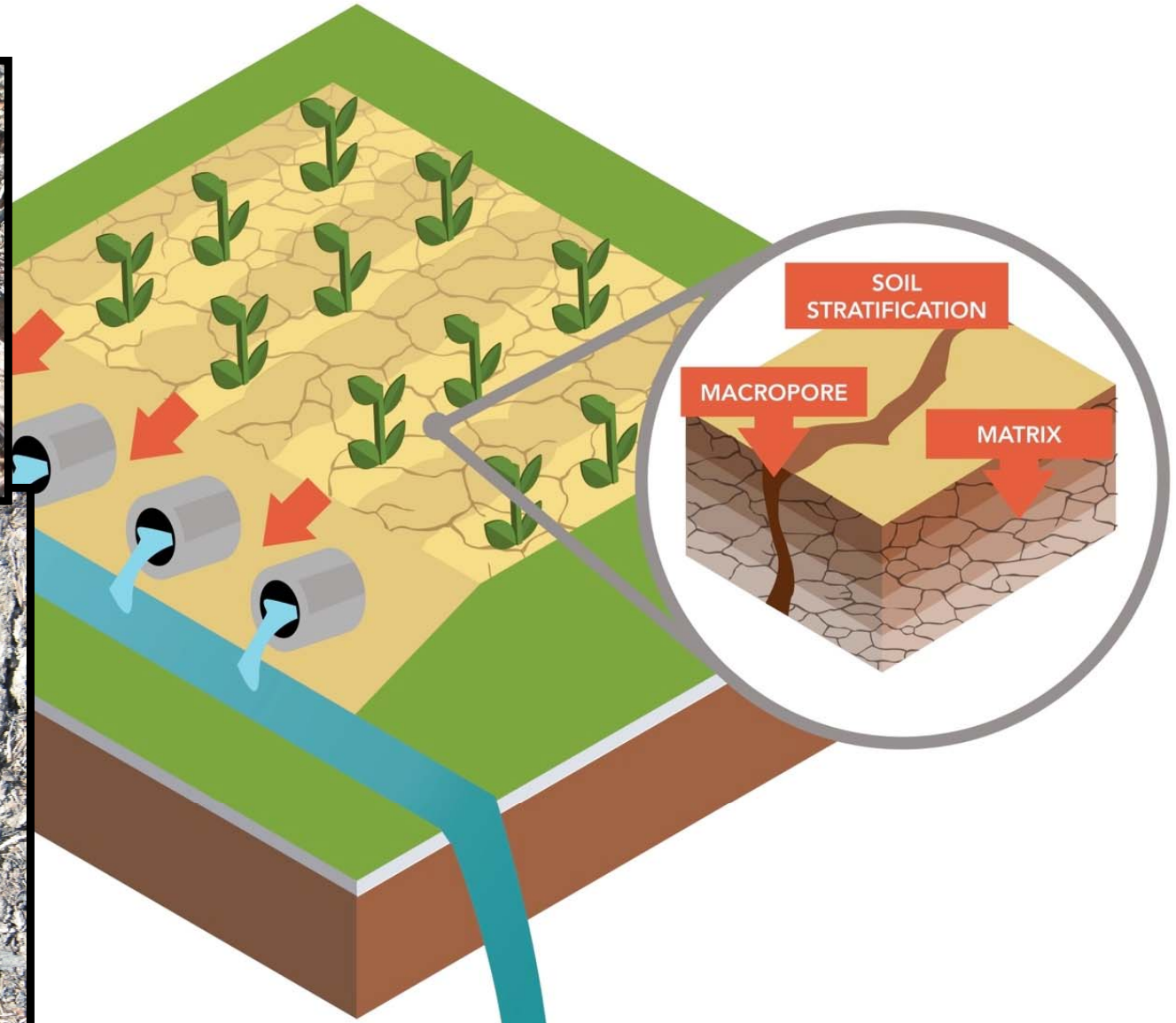
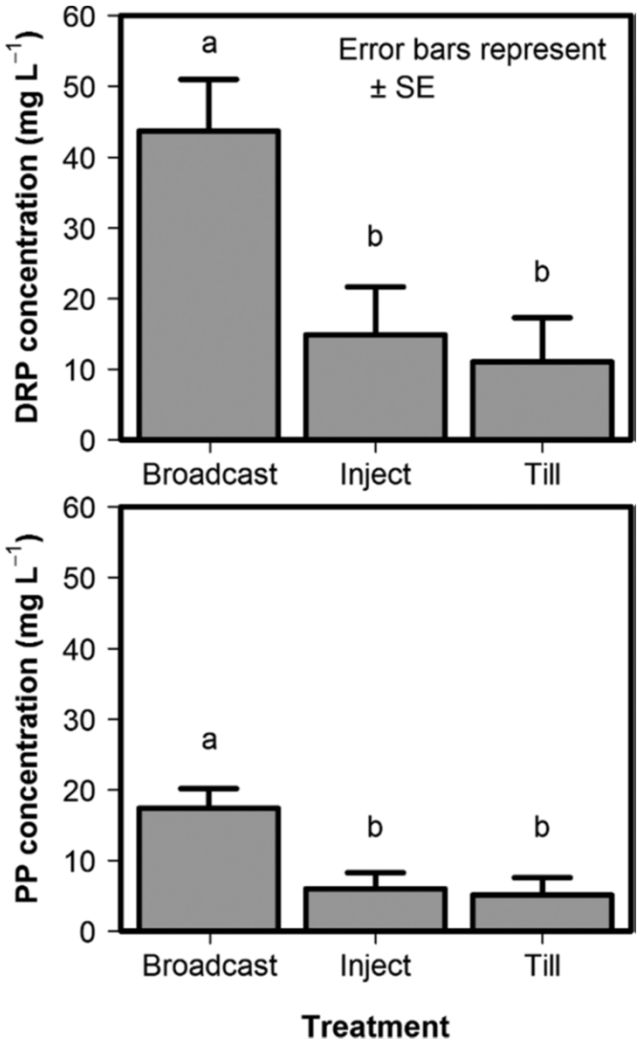
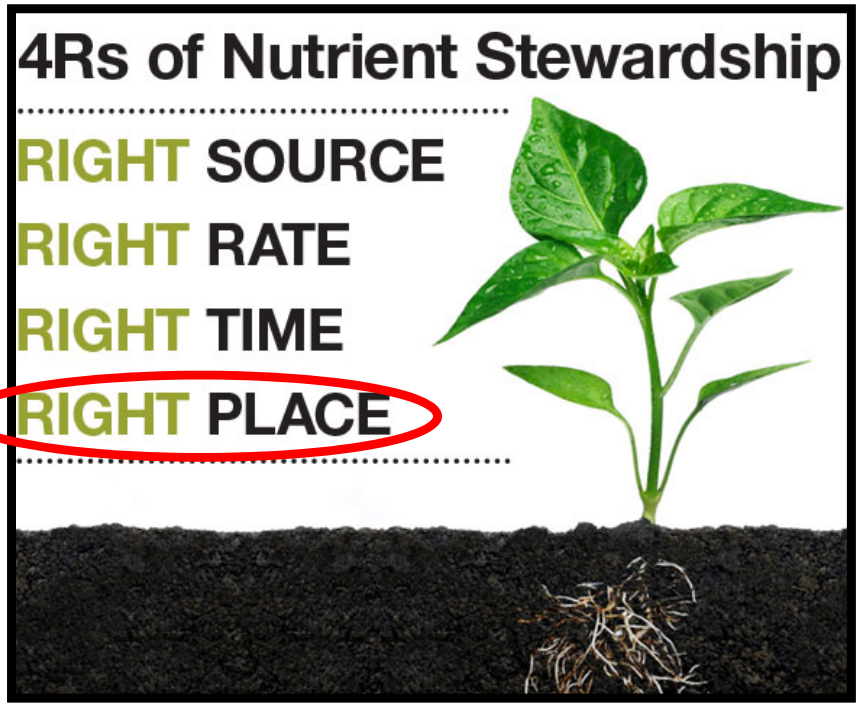

SOIL
STRATIFICATION
MACROPORE
MATRIX

Fertilizer injection is as effective as intensive tillage at reducing phosphorus



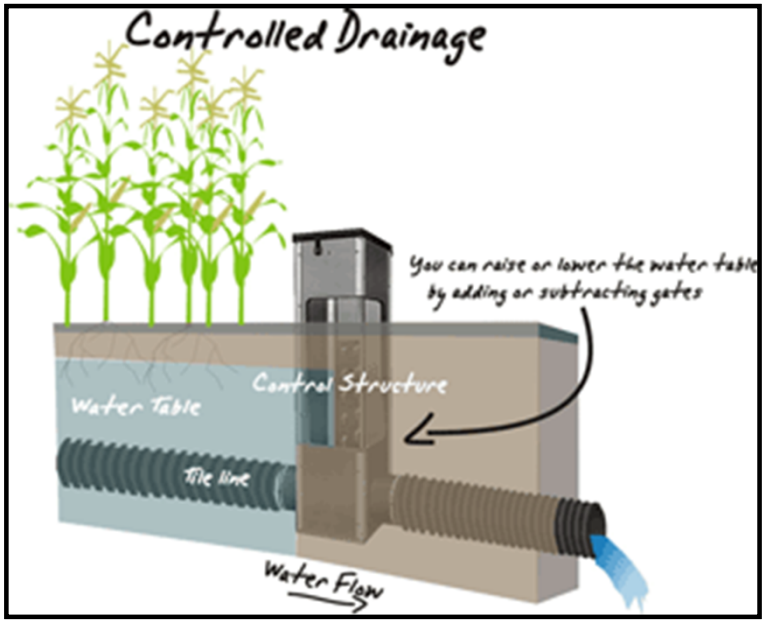
Study examined phosphorus in pan lysimeters after a rainfall simulation



Williams et al. (2018)

Other BMPs

- Controlled drainage
  - Ohio study found decreased tile discharge by 8 – 34%, nitrate loads by -8 – 44%, and dissolved P loads by 40 – 68% *(Williams et al. 2015)*
  - However, concentrations were not significantly decreased
  - What would be the effectiveness from March – July?
- Cover crops and dissolved P
  - Some studies found increased dissolved P loads with cover crops (especially with freeze-thaw) *(Liu et al. 2014, Bechmann et al. 2005, Elliott 2013)*
  - Other studies found little influence of cover crops on dissolved P loads *(Zhang et al. 2017, Kevin King pers.comm., Dave Baker pers.comm.)*
  - One study found decreased DRP in spring *(Hanrahan et al. 2018)*



Thanks!

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Special thanks to all our support!

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