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Oklahoma Scenic Rivers Joint Phosphorus Study: Interim Report, 30 September 2016

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CRASR
Center for Reservoir & Aquatic Systems Research

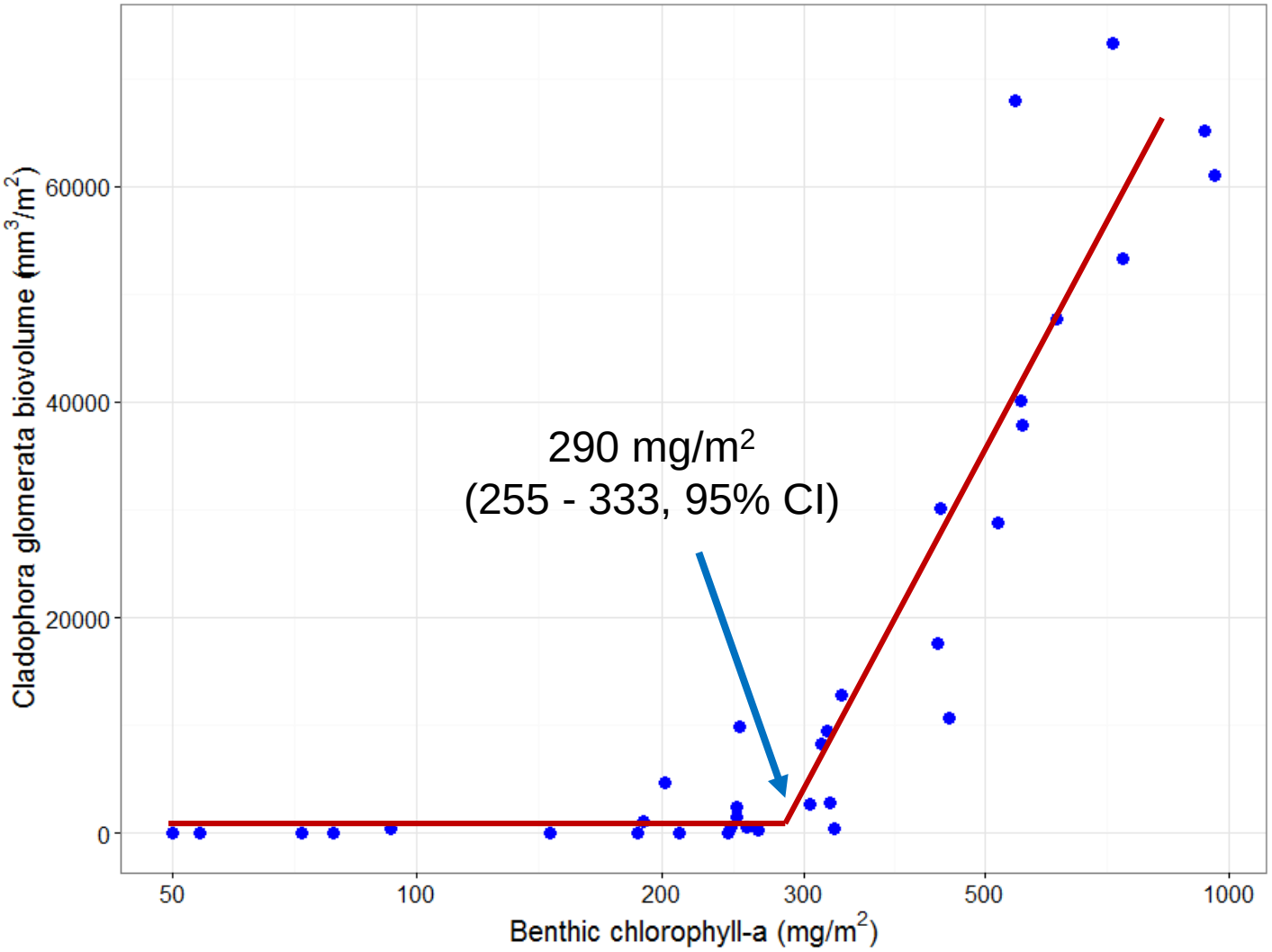
What is a nuisance level of benthic chlorophyll-a?

- 200 mg/m^2 is supported in literature as a nuisance level
  - May not apply to Ozark Highland rivers
  - Methods used to derive this number have been subjective
  - Sampling protocols used to select substrata, remove attached algae, and measure chlorophyll also may differ slightly from our study

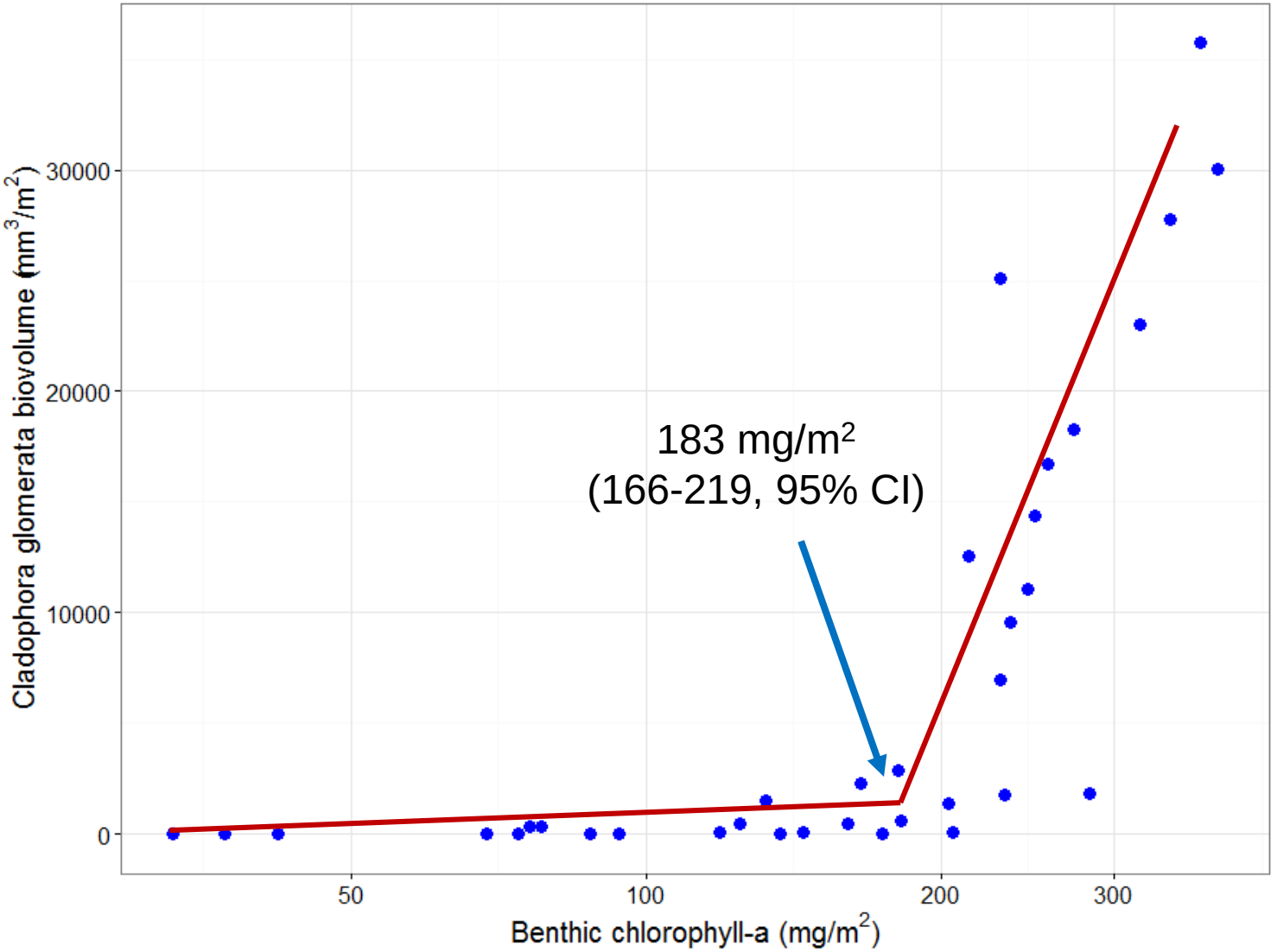
What is a nuisance level of benthic chlorophyll-a?

- *Cladophora glomerata* is the dominant nuisance filamentous species
  - What level of TP leads to increases in *Cladophora* (we've looked at this already)
  - What level(s) of benthic chlorophyll-a corresponds to blooms of *Cladophora* in our data set? **
- Segmented regression

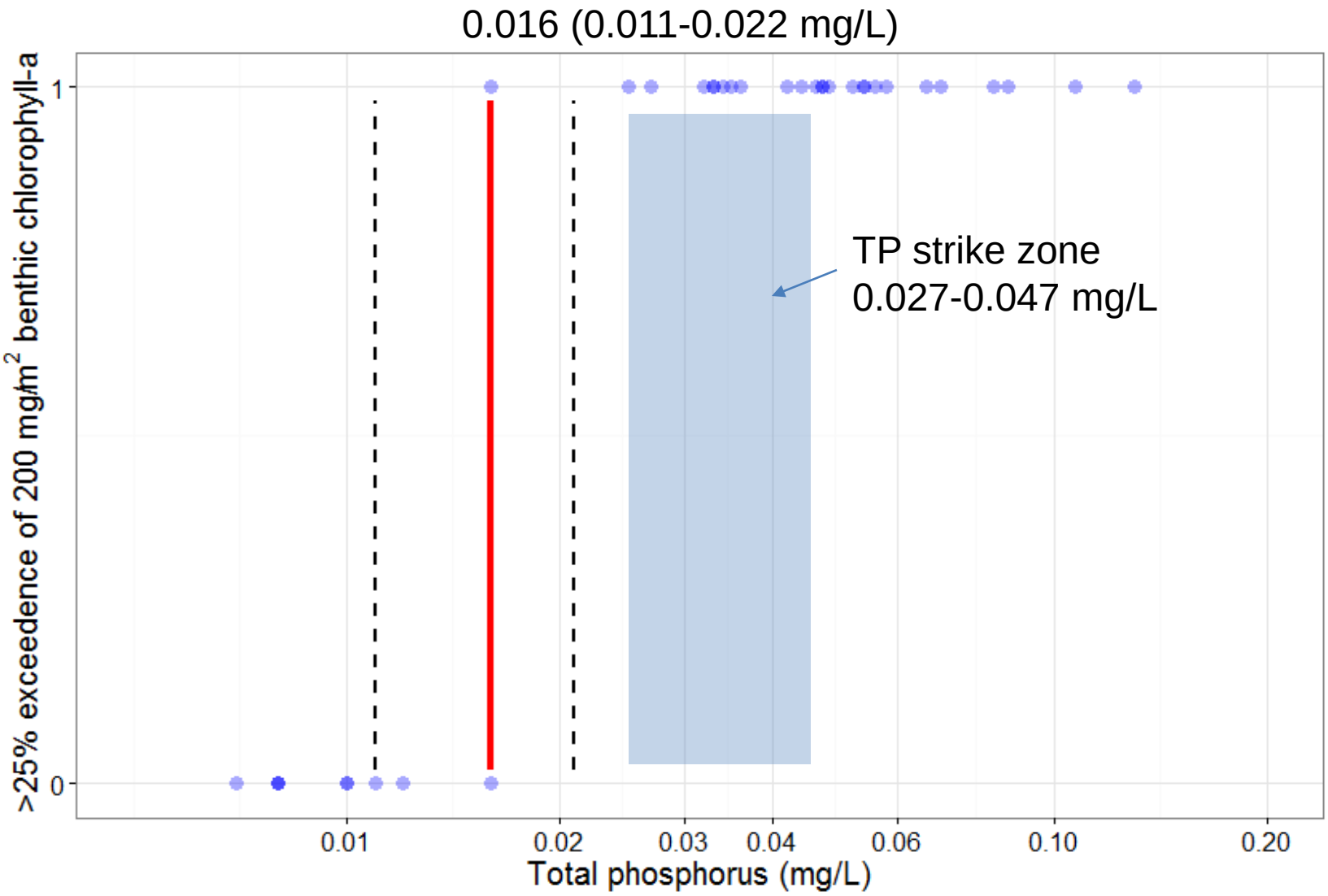
Mean chlorophyll vs. *Cladophora* biovolume, Year 1 (June 2014-April 2015)



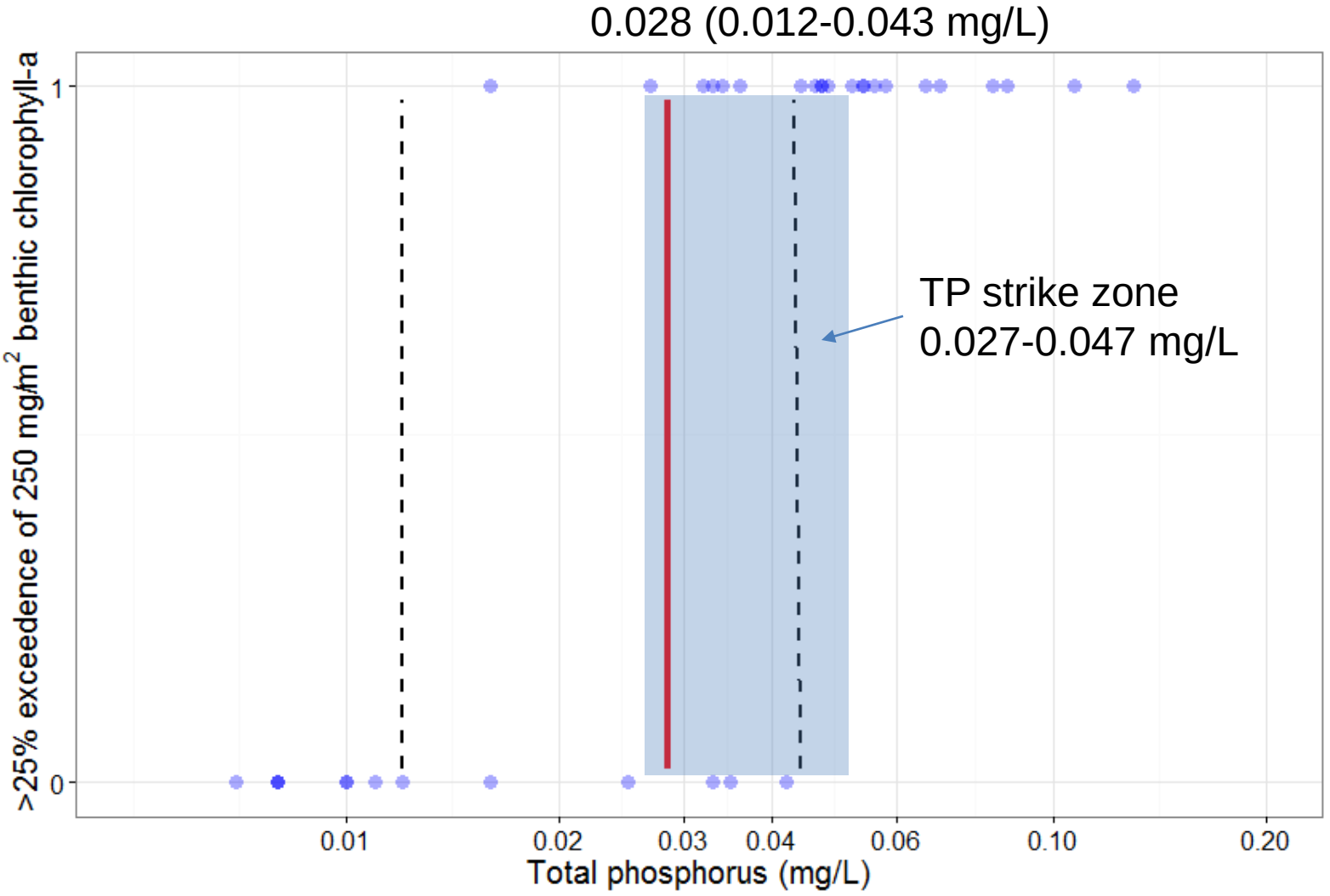
Mean chlorophyll vs. *Cladophora* biovolume, Year 2 (April 2015- April 2016)



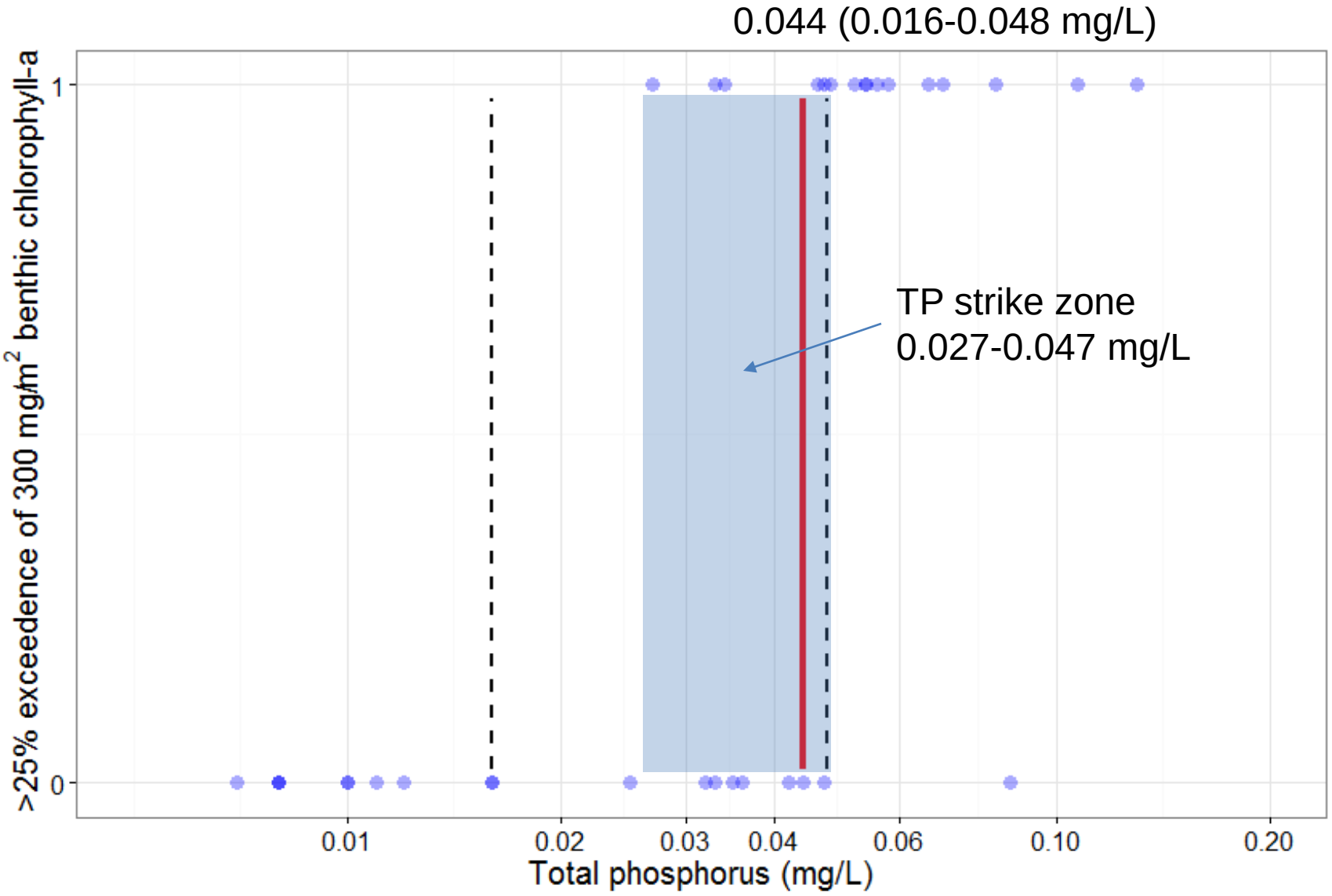
CHLA (200 mg/m^2) exceedance frequency >25%
TP change points (binomial)



CHLA (250 mg/m^2) exceedance frequency >25%
TP change points (binomial)



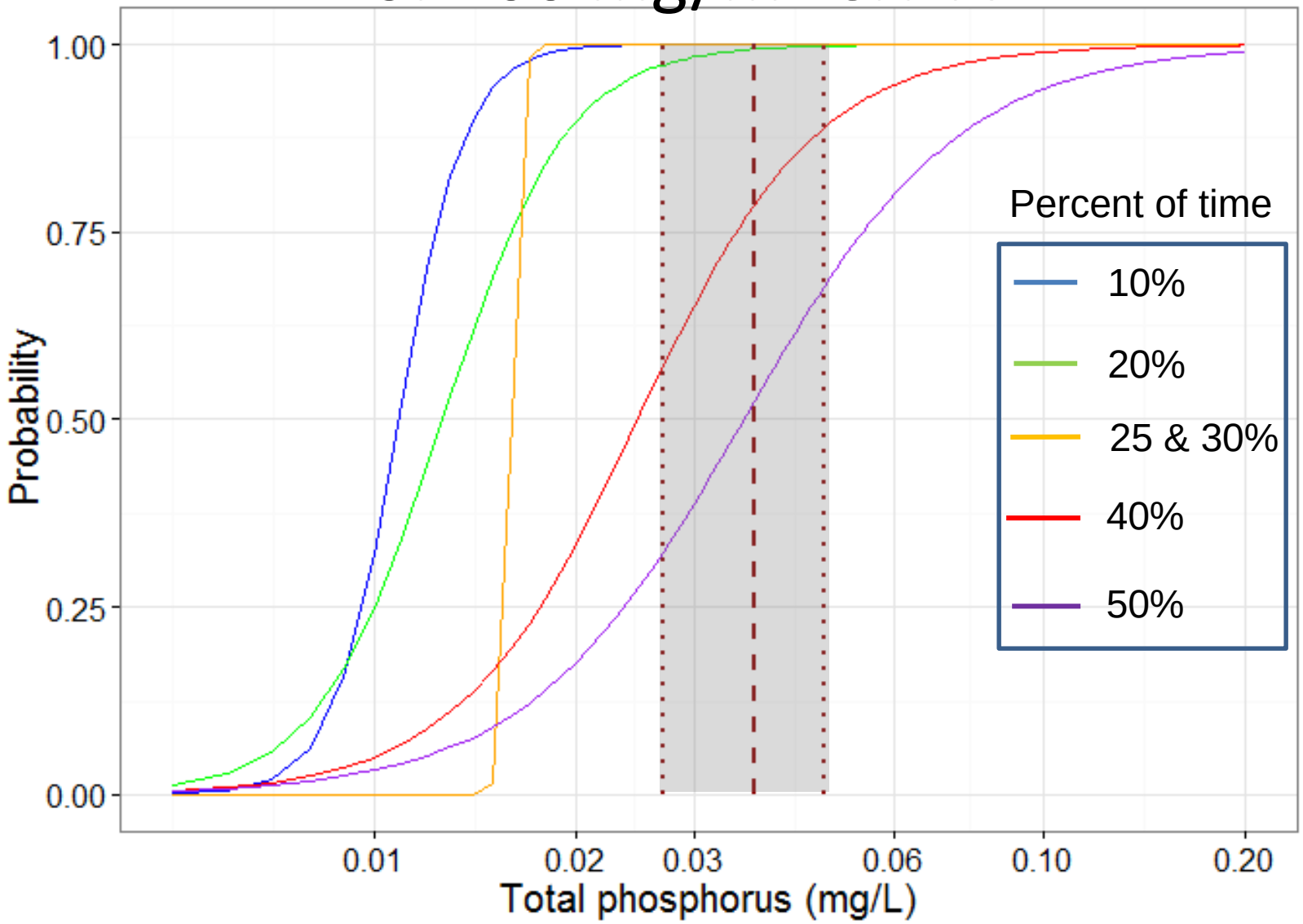
CHLA (300 mg/m^2) exceedance frequency >25%
TP change points (binomial)



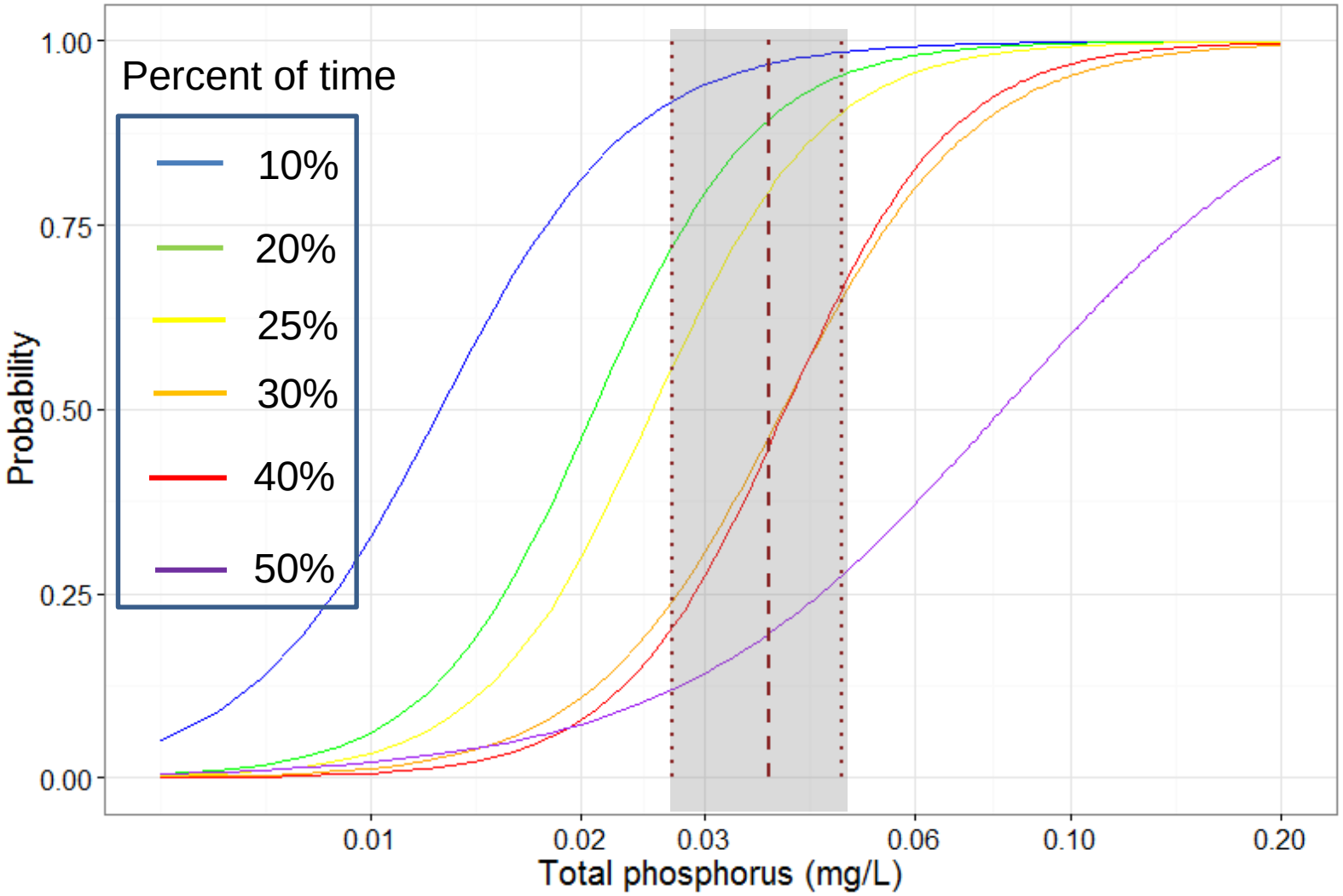
TP change points (binomial) for CHLA frequency of exceedance

			Bootstrap quantiles (TP, mg/L)			
CHLA mg/m^2	Exceedance frequency	TP change point (mg/L)	5%	50%	95%	p value
200	10%	0.014	0.008	0.012	0.018	0.001
200	20%	0.016	0.008	0.016	0.022	0.001
200	25%	0.016	0.011	0.016	0.022	0.001
200	30%	0.016	0.011	0.016	0.021	0.001
200	40%	0.016	0.016	0.016	0.035	0.001
200	50%	0.026	0.016	0.026	0.047	0.001
250	10%	0.014	0.008	0.012	0.033	0.001
250	20%	0.014	0.010	0.016	0.042	0.001
250	25%	0.043	0.012	0.029	0.043	0.001
250	30%	0.045	0.016	0.044	0.048	0.001
250	40%	0.043	0.022	0.042	0.047	0.001
250	50%	0.033	0.033	0.045	0.056	0.015
300	10%	0.016	0.010	0.016	0.033	0.001
300	20%	0.026	0.016	0.032	0.047	0.001
300	25%	0.044	0.016	0.044	0.048	0.001
300	30%	0.044	0.016	0.044	0.048	0.001
300	40%	0.045	0.033	0.044	0.056	0.002
300	50%	0.047	0.042	0.047	0.057	0.031

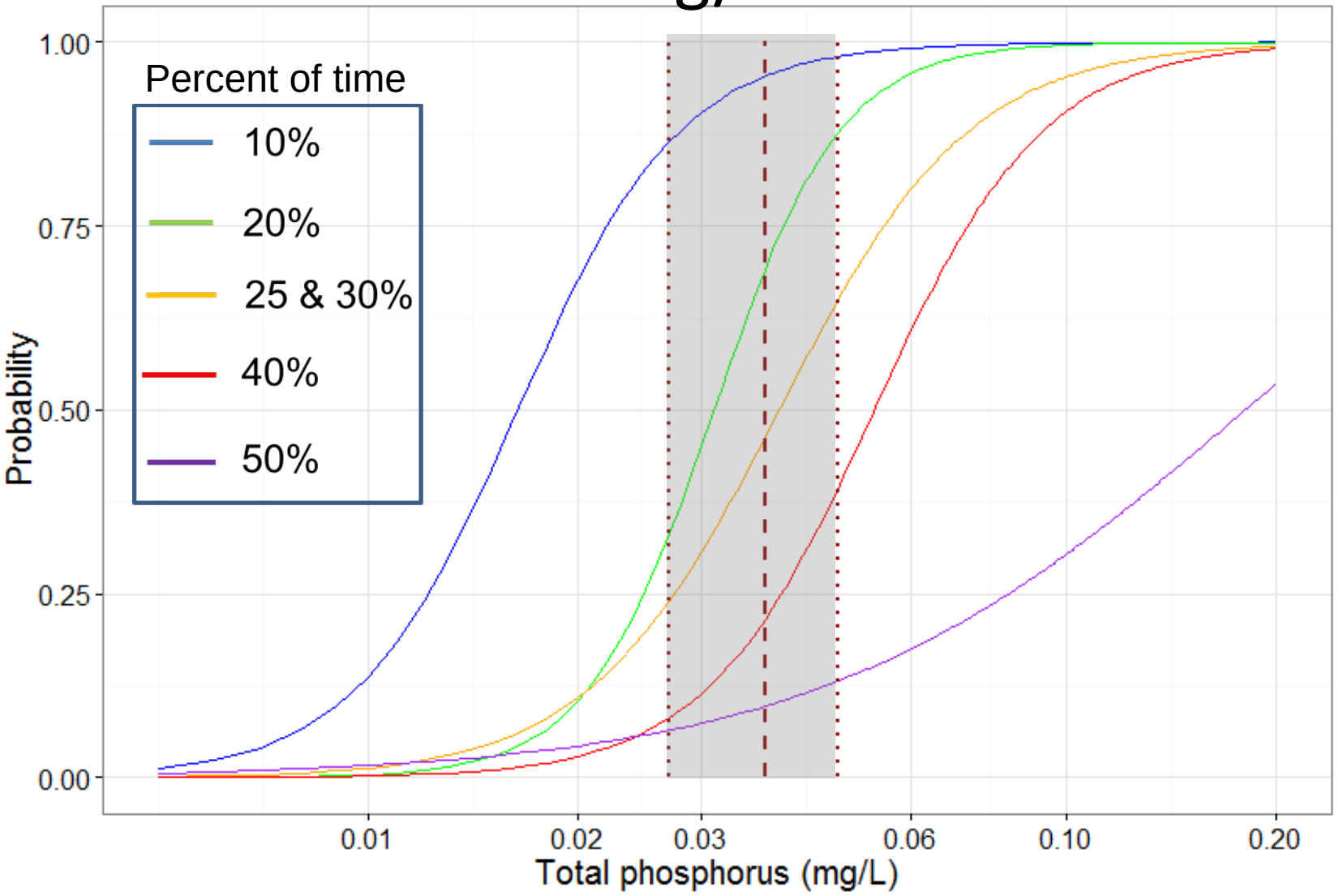
Exceedance probability of 200 mg/m^2 CHLA



Exceedance probability of 250 mg/m^2 CHLA



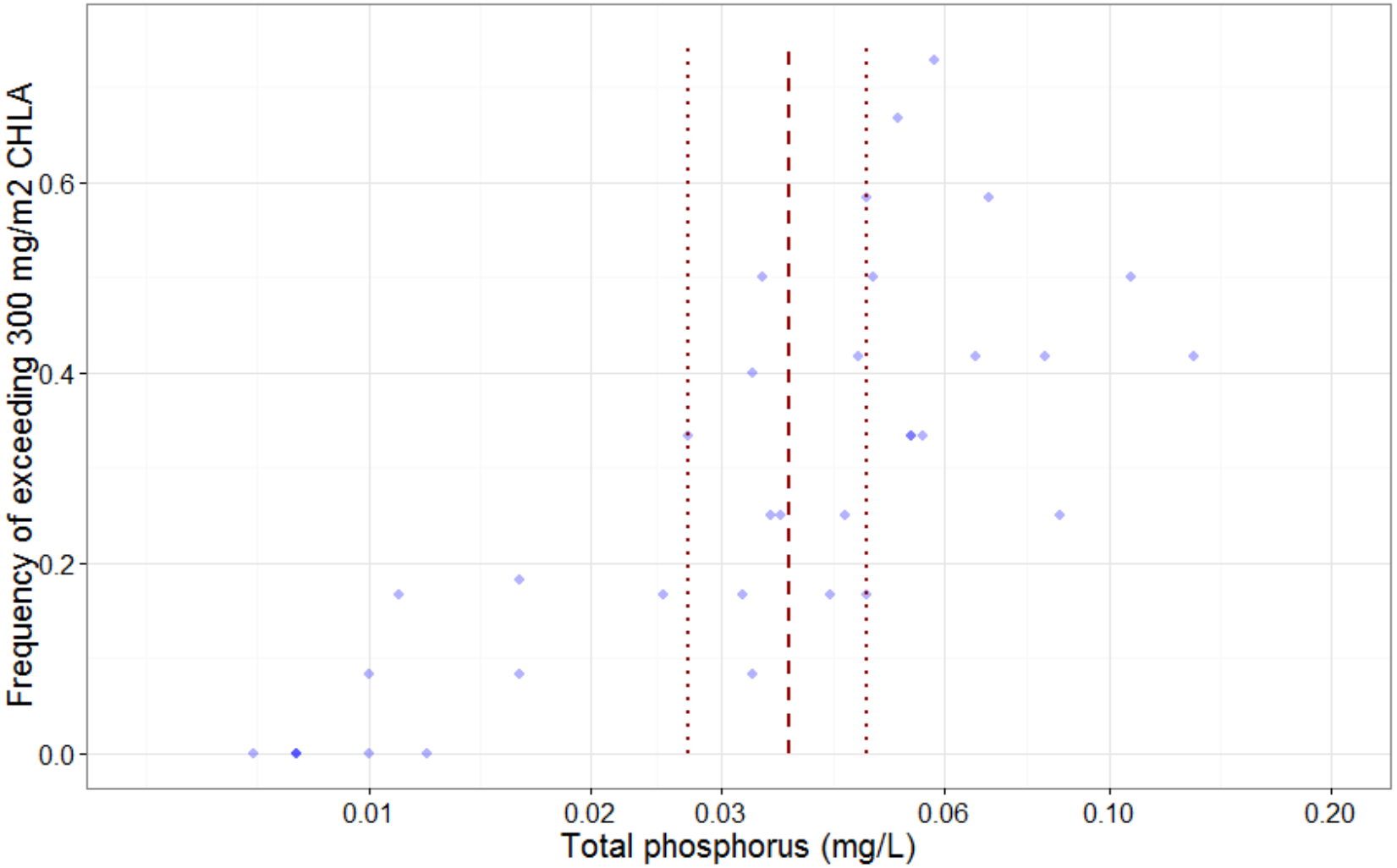
Exceedance probability of 300 mg/m^2 CHLA



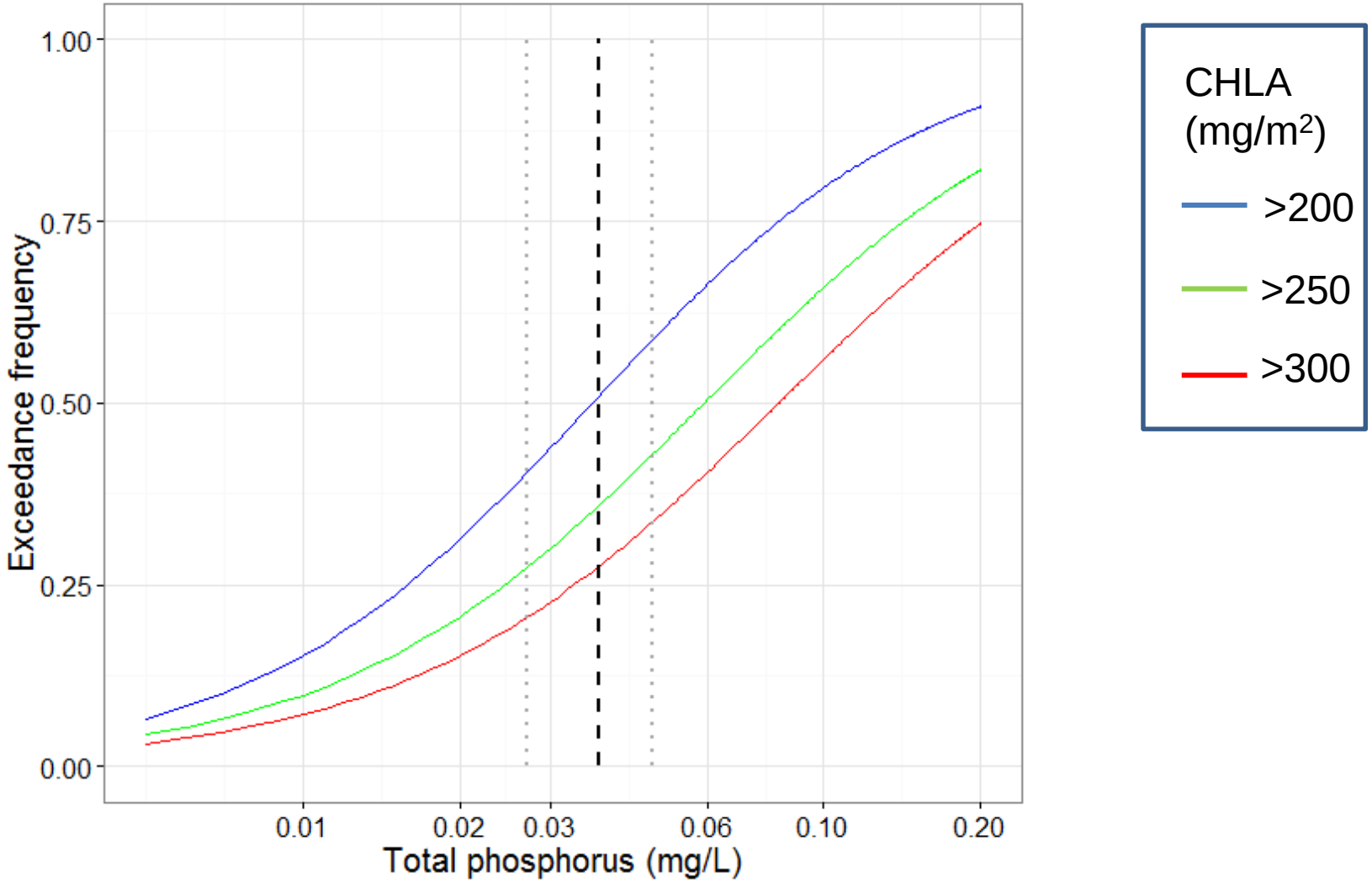
Probability of CHLA exceedance at TP concentrations of 0.027, 0.037, and 0.047 mg/L

		Probability		
CHLA mg/m^2	Exceedance frequency	0.027 mg/L	0.037 mg/L TP	0.047 mg/L
200	10%	0.999	0.999	0.999
200	20%	0.972	0.993	0.997
200	25%	1.000	1.000	1.000
200	30%	1.000	1.000	1.000
200	40%	0.567	0.786	0.889
200	50%	0.322	0.525	0.678
250	10%	0.920	0.968	0.985
250	20%	0.723	0.894	0.953
250	25%	0.558	0.797	0.902
250	30%	0.241	0.463	0.649
250	40%	0.205	0.449	0.662
250	50%	0.120	0.196	0.275
300	10%	0.865	0.953	0.981
300	20%	0.332	0.692	0.876
300	25%	0.241	0.463	0.649
300	30%	0.241	0.463	0.649
300	40%	0.082	0.215	0.392
300	50%	0.065	0.094	0.131

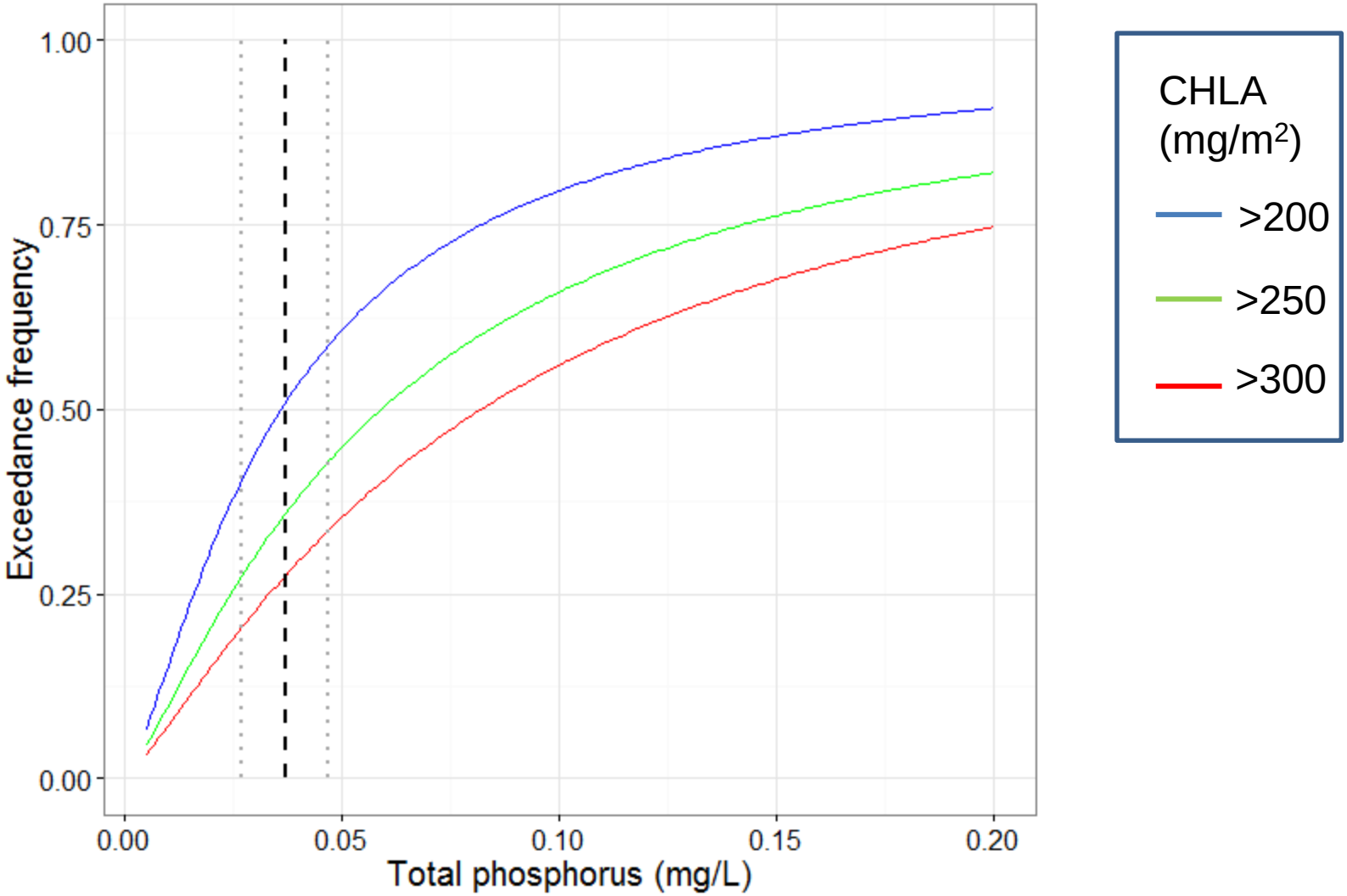
Exceedance frequency of 300 mg/m^2 CHLA (n=12 events)



Exceedance frequency at 200, 250, and 300 mg/m^2 CHLA (TP on log scale)



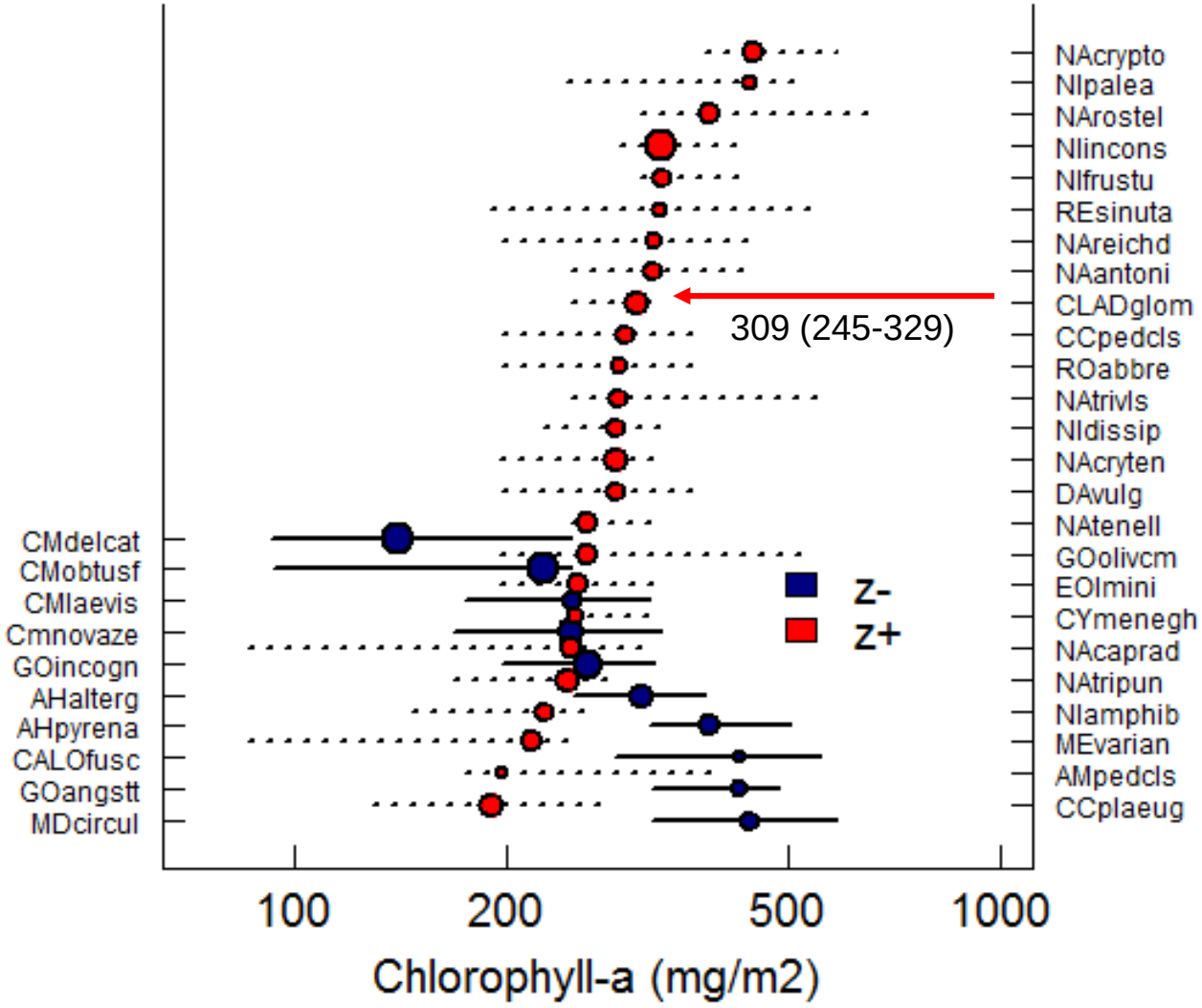
Exceedance frequency of 200, 250, and 300 mg/m^2 CHLA



TITAN: Mean chlorophyll-a as predictor. Year 1 (June 2014- April 2015)

Sum(z-) community-level change point = 245 (168-386) mg/m2

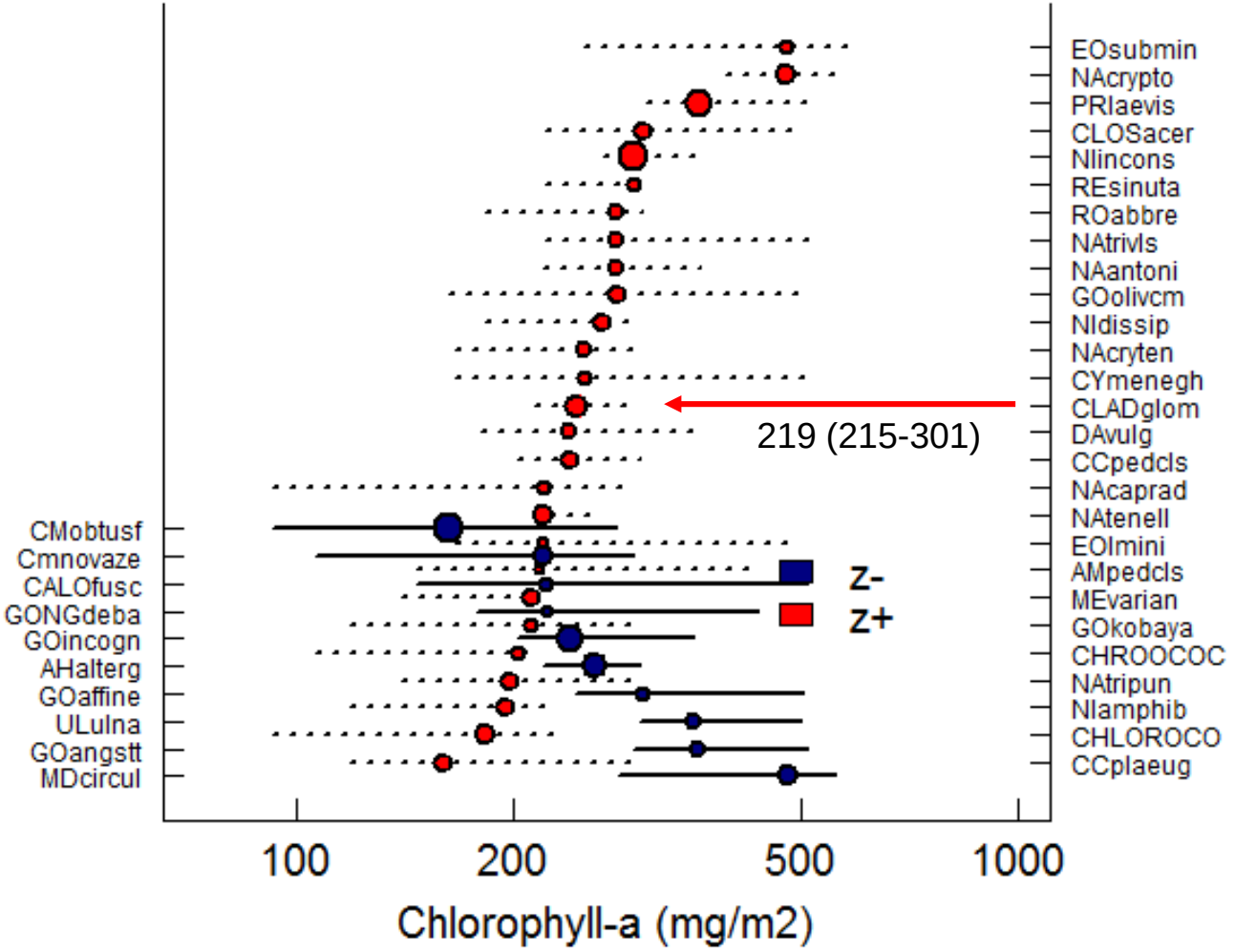
Sum(z+) change point = 309 mg/m2



TITAN: Mean chlorophyll-a as predictor. Year 1.5 (October 2014-October 2015)

Sum(z-) community-level change point = 296 (166-376) mg/m2

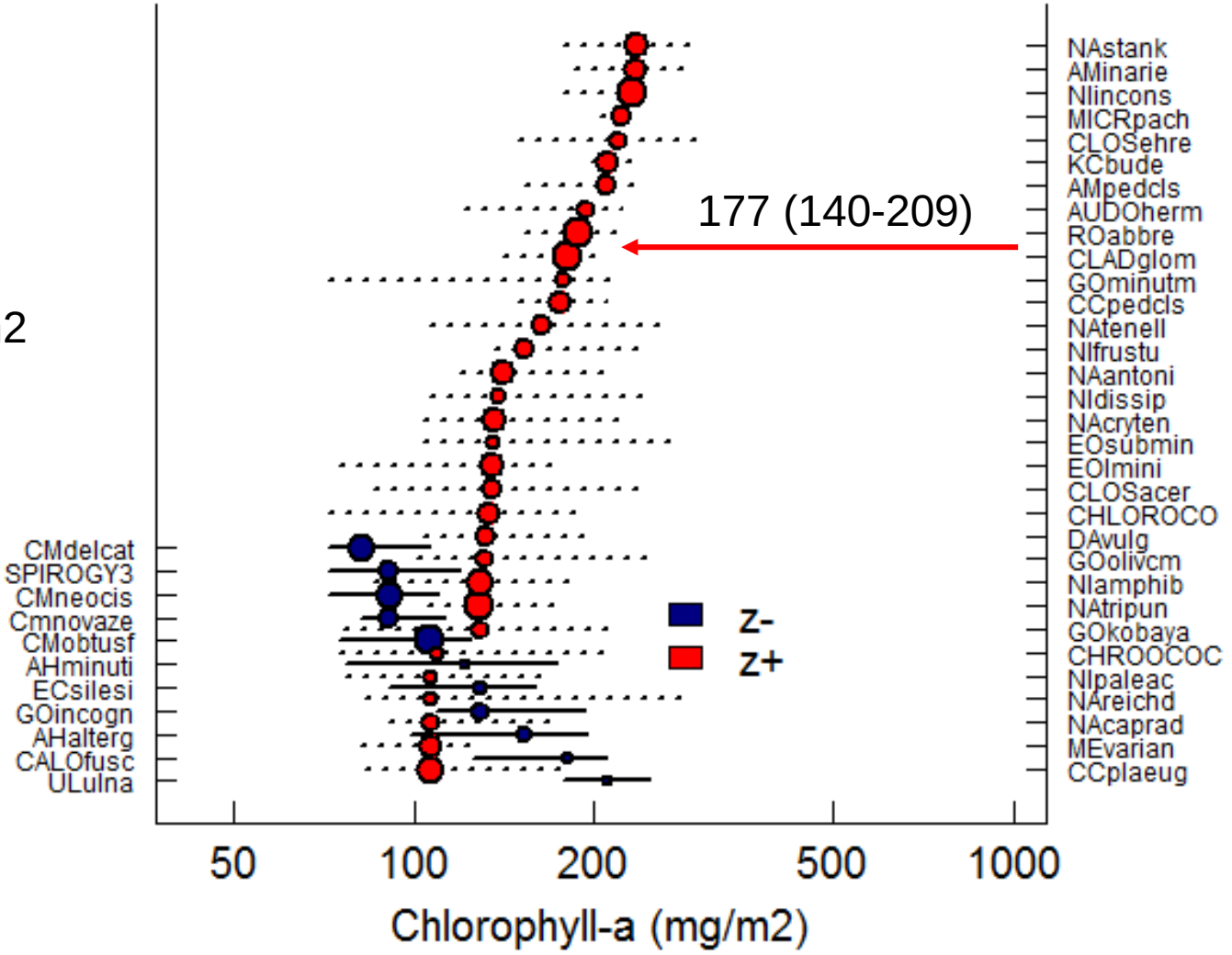
Sum(z+) change point = 293 (183-299) mg/m2



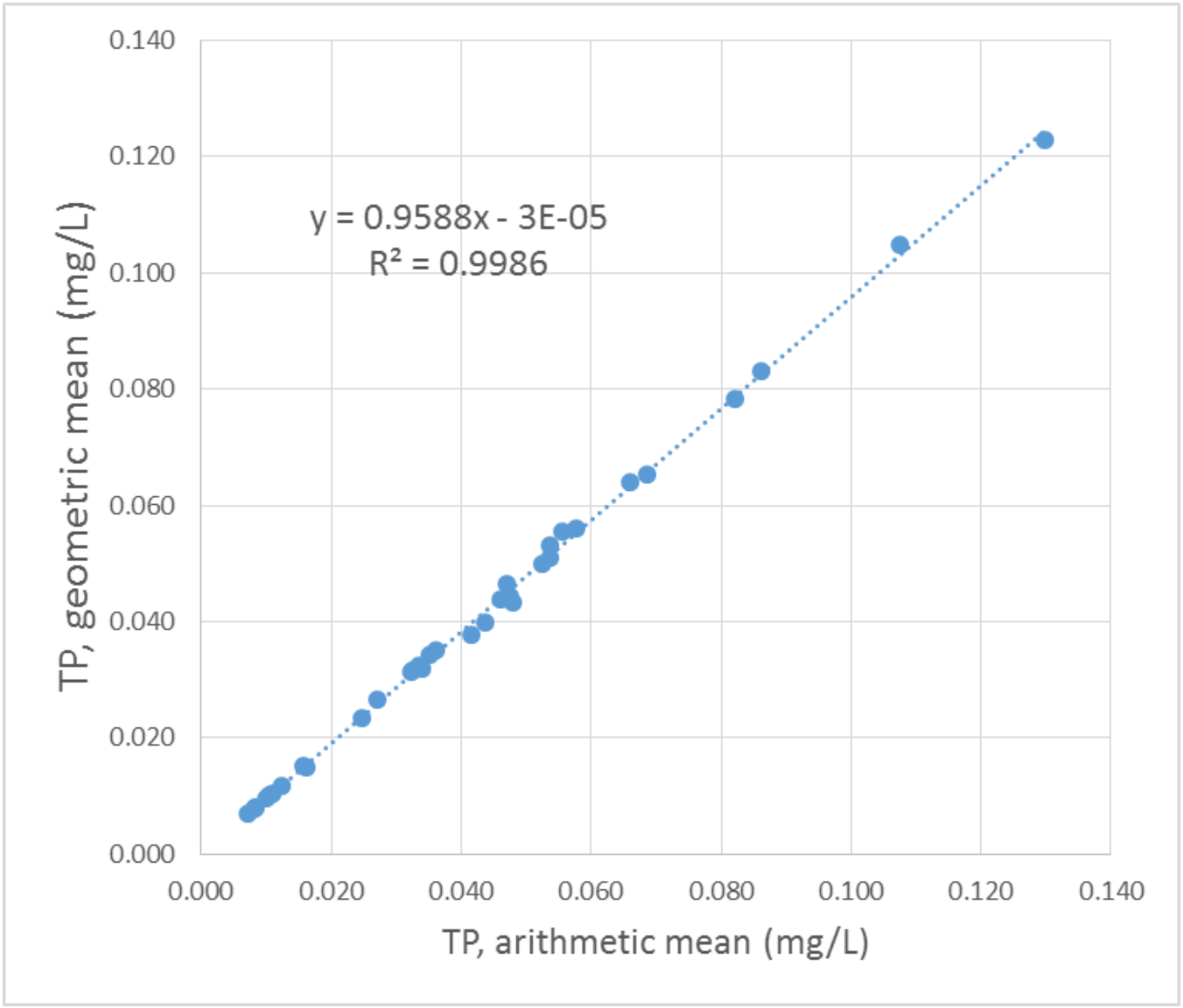
TITAN: Mean chlorophyll-a as predictor. Year 2 (June 2015-April 2016)

Sum(z-) community-level change point = 90 (84-121) mg/m2

Sum(z+) change point = 134 (106-217) mg/m2

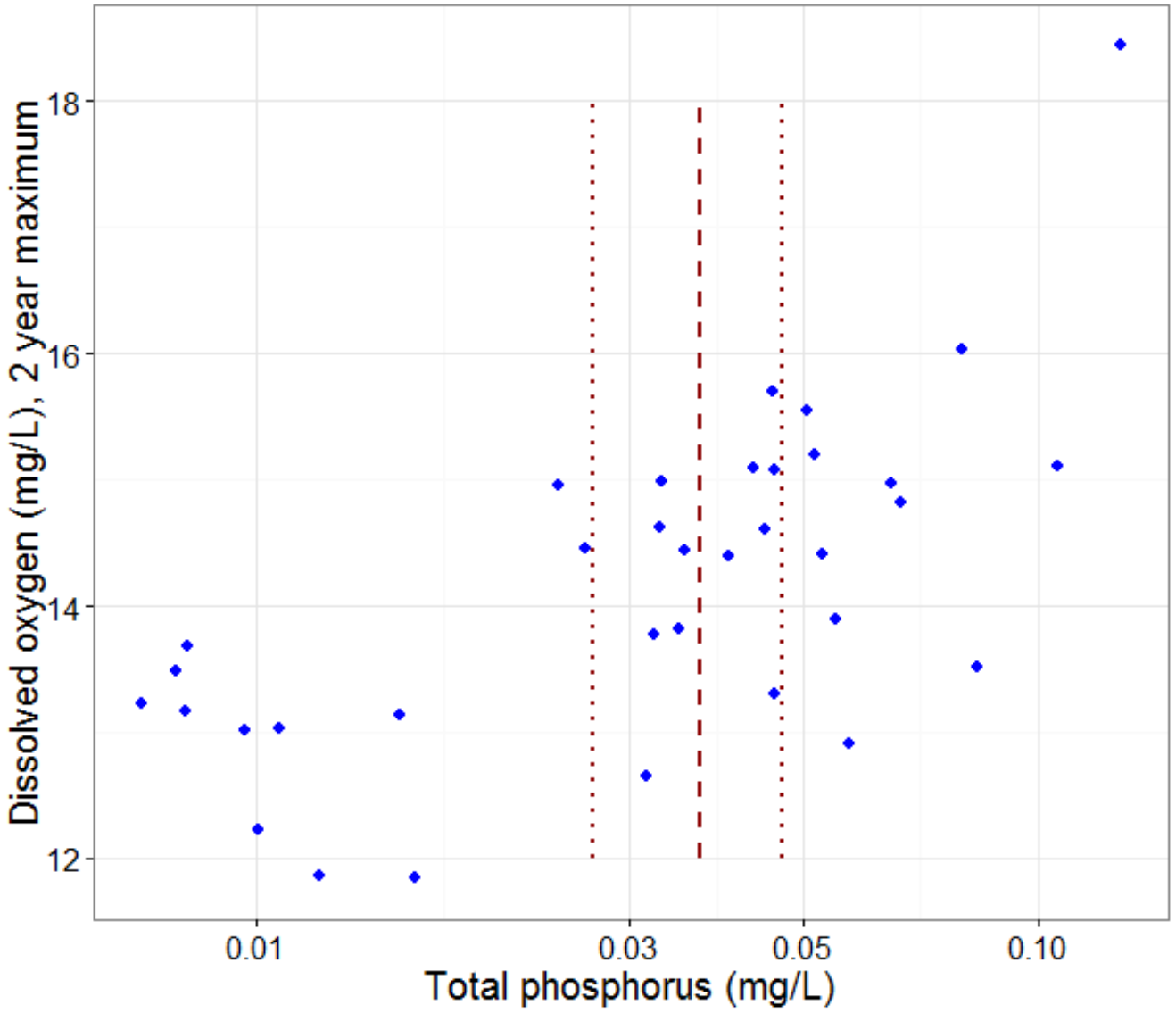


Geometric vs. arithmetic mean TP: 2 year data (n=12 events)

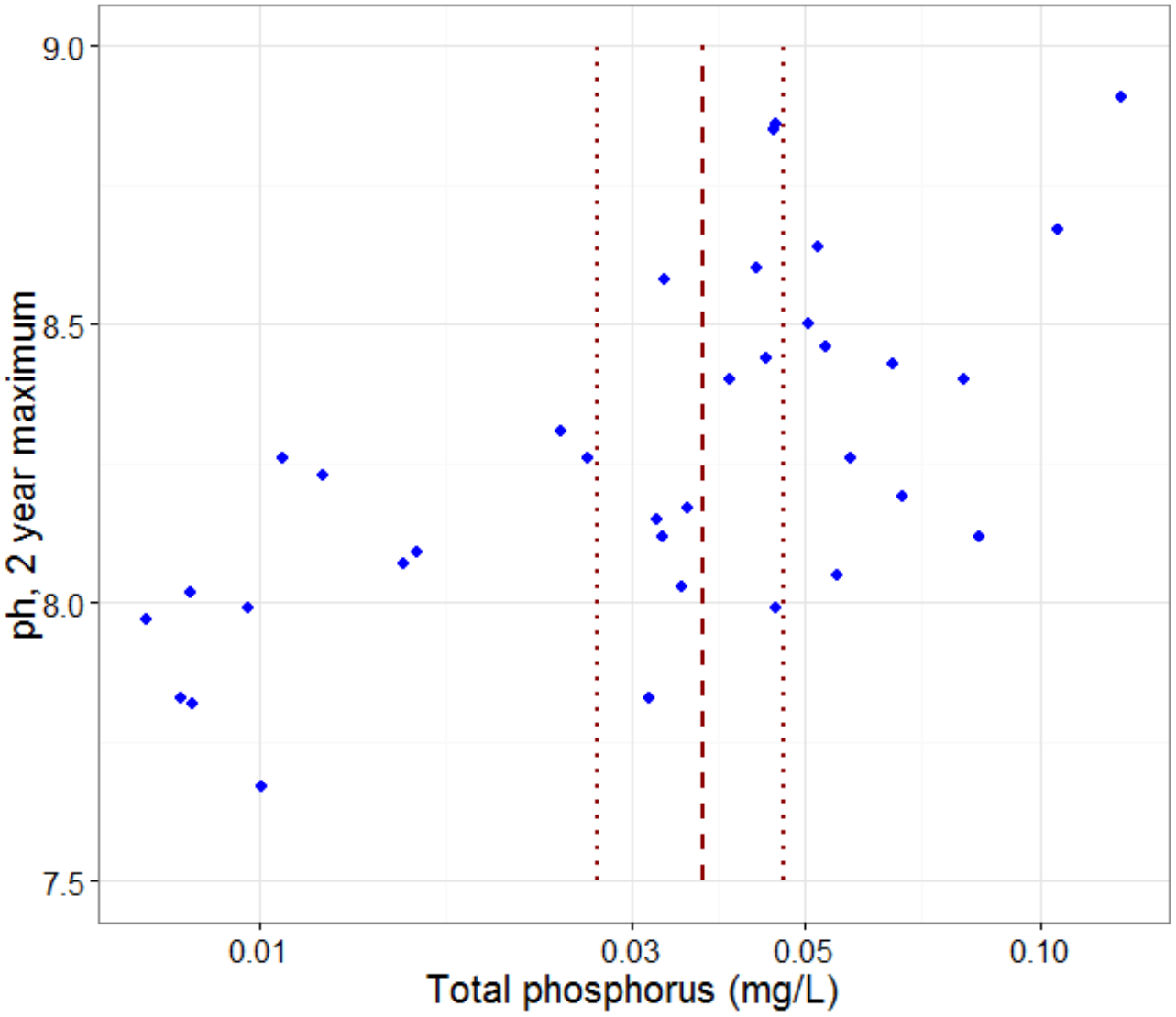


EXO1 sonde instantaneous and 48-h data

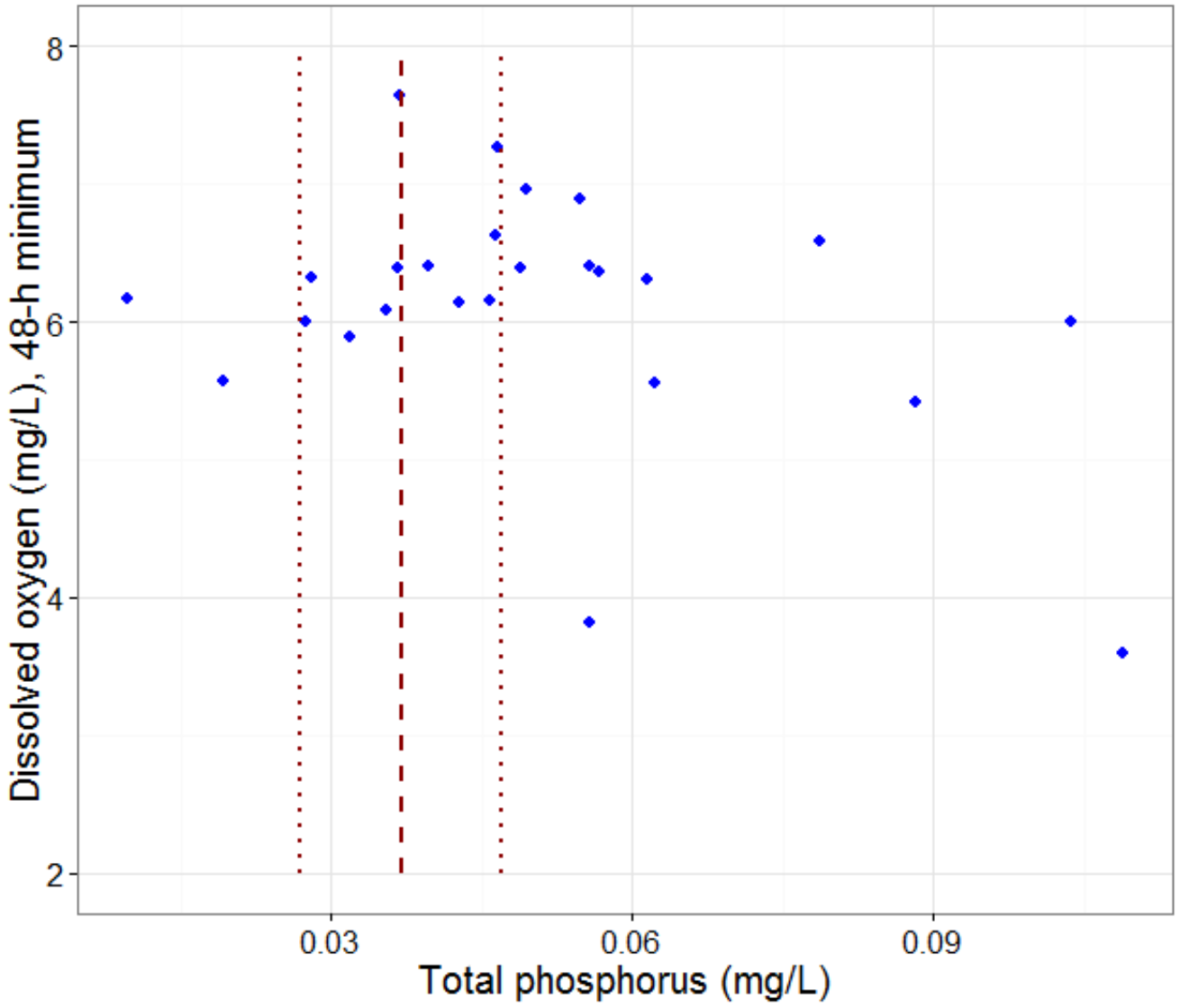
TP vs. DO (2-y maximum, n=12)



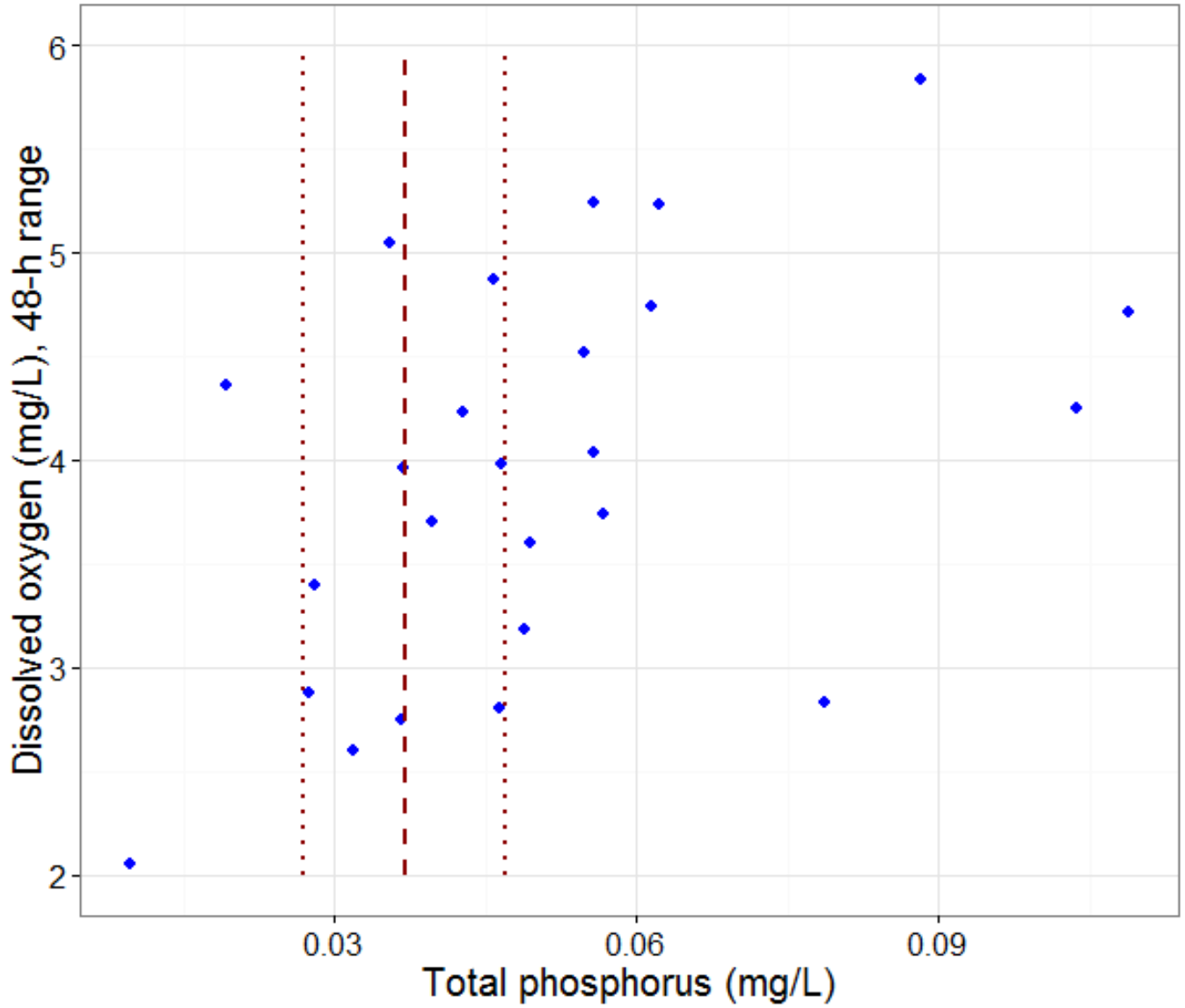
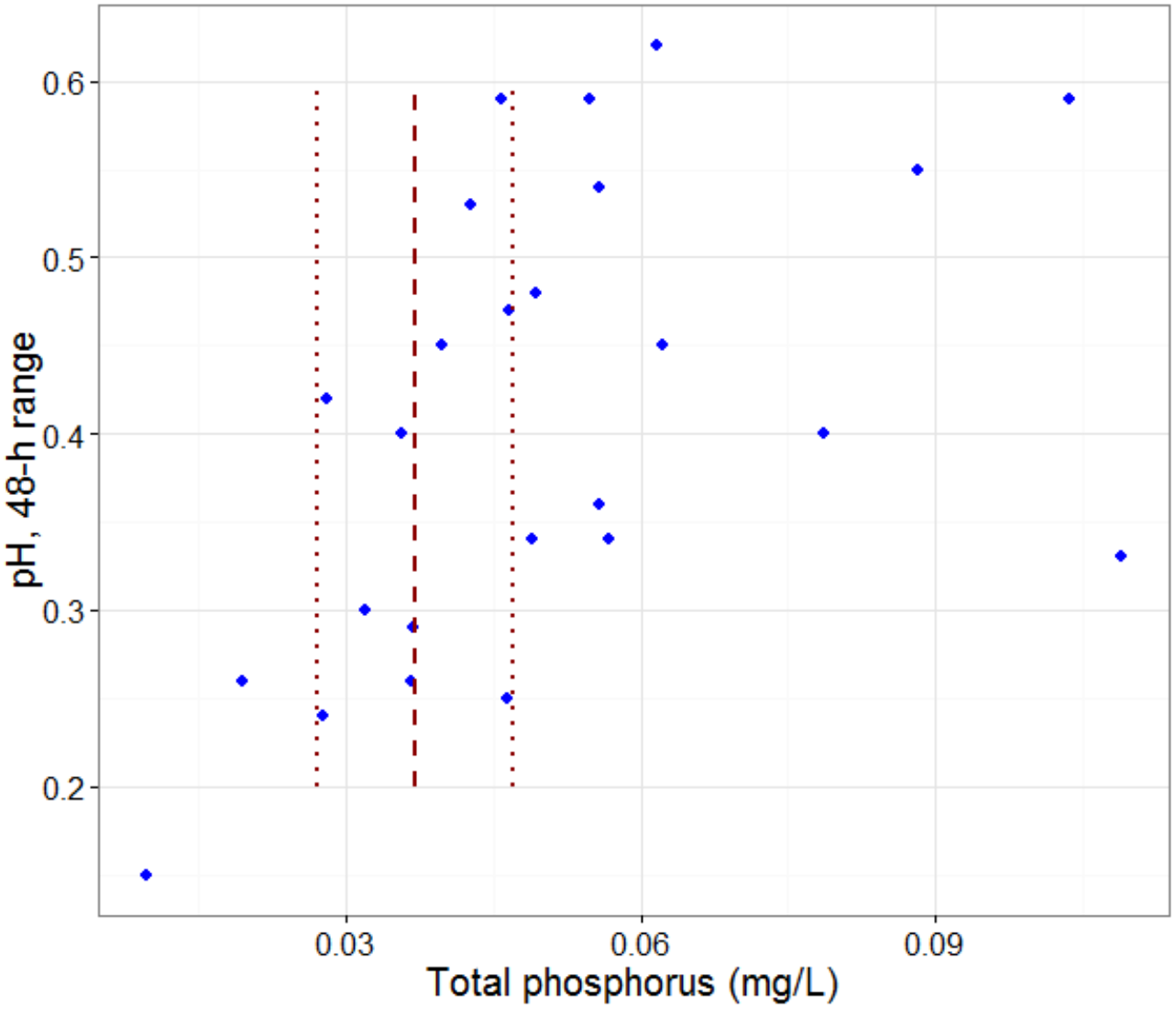
TP vs. pH (2-y maximum, n=12)



TP vs. DO, 48-h minimum, Sep 2015



TP vs. DO, 48-h range, Sep 2015



TP vs. pH, 48-h range, Sep 2015