		units	Brett 2019	Merritt & Miller 2016	Daly 2019
1	TP loading	tons TP/yr	152	272	254
2	TN loading	tons TP/yr	2022	2145	2542
3	TN/TP ratio	molar ratio	29.4	17.5	22.2
4	Hydraulic loading	acre feet/yr	674057	646171	699135
5	*Hydraulic loading*	*m3/s*	*26.4*	*25.3*	*27.3*
6	TP input concentration	µg/L	183	341	294
7	TP input conc (Merritt & Miller 2016)	µg/L	-	634	-
8	TN input concentration	µg/L	2432	2691	2947
9	WWTP TP loading	tons/yr	91.8	215	193
10	WWTP TN loading	tons/yr	675	1174	1194
11	% WWTP TP loading	percent	60%	79%	76%
12	WWTP Hydraulic loading	acre feet/yr	27920	53126	52997
13	*WWTP Hydraulic loading*	*m3/s*	*1.1*	*2.1*	*2.1*
14	WWTP TP concentration	µg/L	2666	3281	2956
15	WWTP TN concentration	µg/L	19594	17915	18272
16	TP output mass flow (Jordan R)	tons/yr	23.4	26	24.7
17	Hydraulic export (Jordan R)	acre feet/yr	295286	336045	315666
18	*Hydraulic export (Jordan R)*	*m3/s*	*11.5*	*13.1*	12.3
19	TP output concentration (Jordan R)	µg/L	64.2	62.7	63.5
20	TP retention	unitless	0.85	0.90	0.90

WWTP flows (af/yr)	Brett 2019	Merritt & Miller 2016	Daly (2019)
Orem	4854	8949	9382
Provo	12164	15048	12692
Timpanogos	4446	17169	20238
Springville	2753	4172	3938
Spanish Fork	2381	4884	4683
Salem	467	1200	236
Payson	855	1704	1828

		units	Brett 2019	Merritt & Miller 2016	Daly 2019
1	TP loading	tons TP/yr	152	272	254
2	TN loading	tons TP/yr	2022	2145	2542
3	TN/TP ratio	molar ratio	29.4	17.5	22.2
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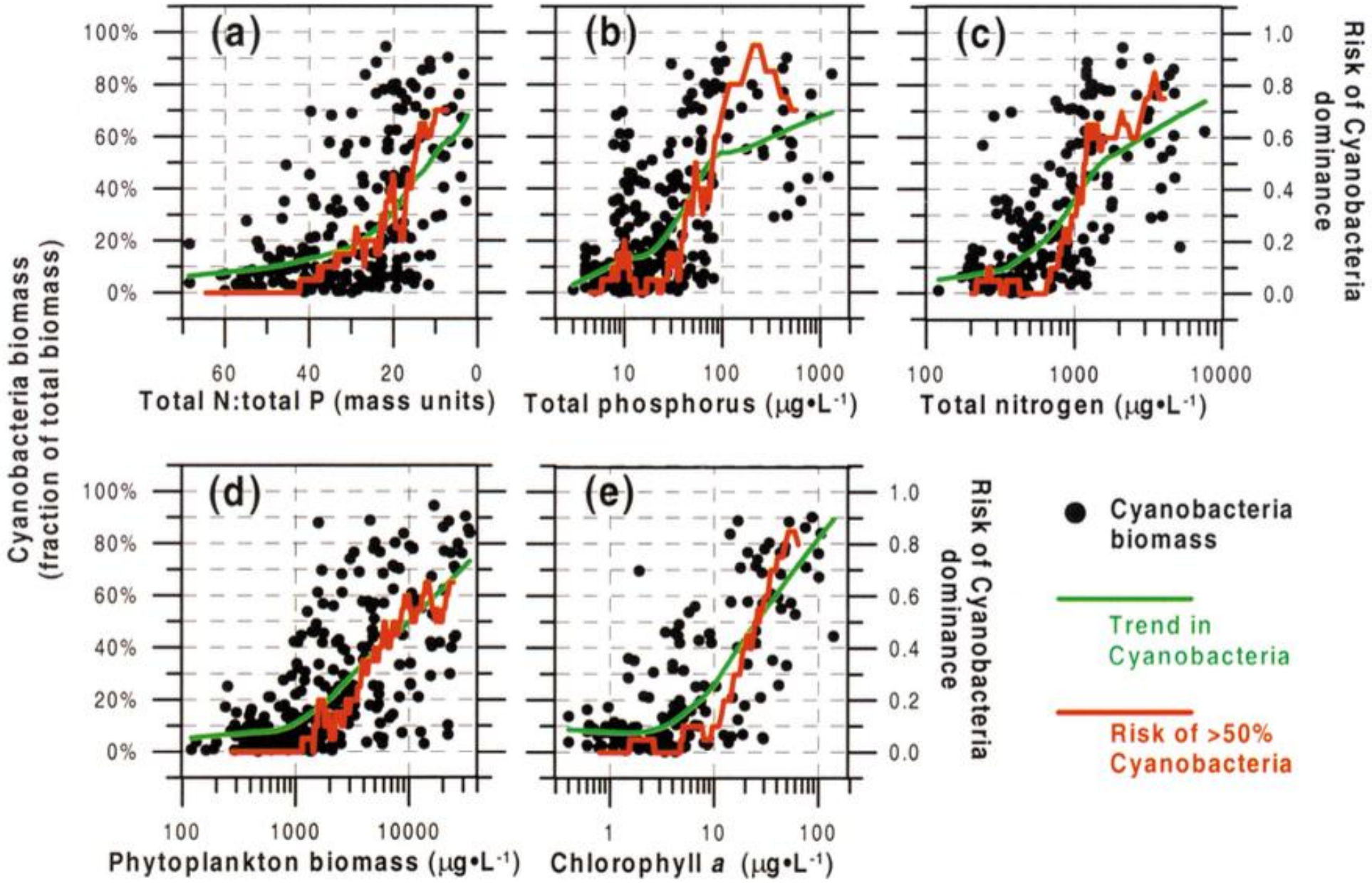
19	TP output concentration (Jordan R)	µg/L	64.2	62.7	63.5
20	TP retention	unitless	0.85	0.90	0.90

Do cyanobacteria have a threshold at 30 ug TP/L?



$$\mathrm{TP}_{\mathrm{lake}} = \frac{\mathrm{TP}_{\mathrm{in}}}{1 + \sigma\tau_{\mathrm{w}}}$$

$$TP_{lake} = \frac{TP_{in}}{1 + \sigma\tau_w}$$

WWTP supply 76% of the phosphorus to Utah Lake

Utah Lake ”retains” 90% of its TP inputs

Reducing WWTP effluent TP from the current 3 mg/L to 1 mg/L

Should reduce the input TP concentration from 294 to 146 ug/L, and

Reduce the lake TP concentration from 64 to 32 ug/L

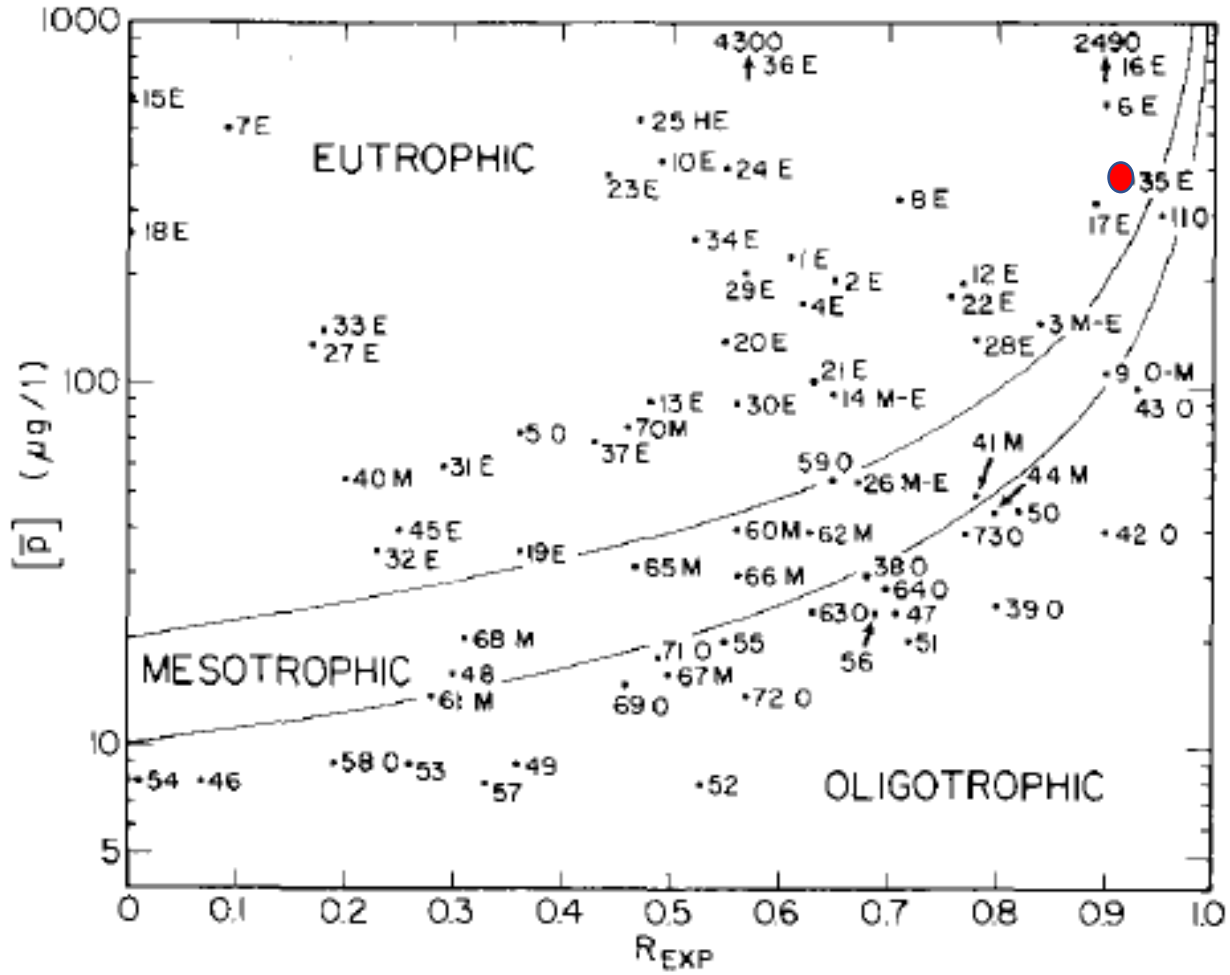


FIG. 1. Graph of mean tributary phosphorus concentration ($[\bar{p}]$) vs. phosphorus retention coefficient (R_{exp}) for lakes summarized in Tables 1 and 2. O = oligotrophic; M = mesotrophic; E = eutrophic; HE = hypereutrophic. Lines are solutions of equation (3) for $[\bar{p}]$ and R_{exp} values that produce lake concentrations of 10 and 20 μg/liter.

Does phytoplankton biomass level off at higher TP concentrations?

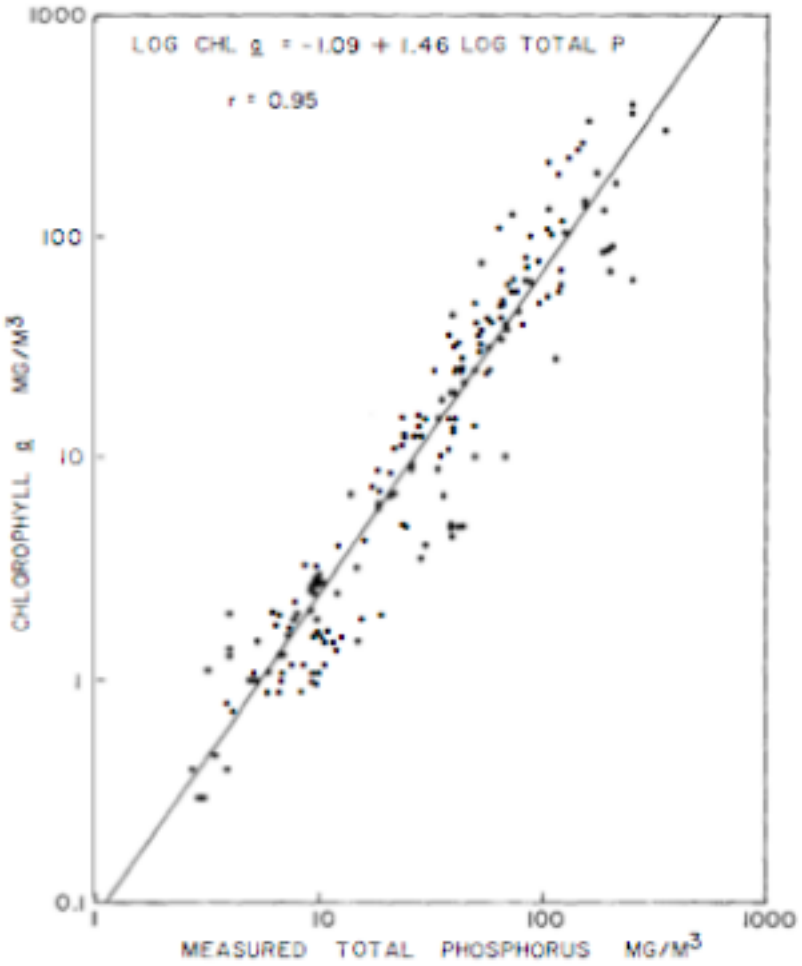
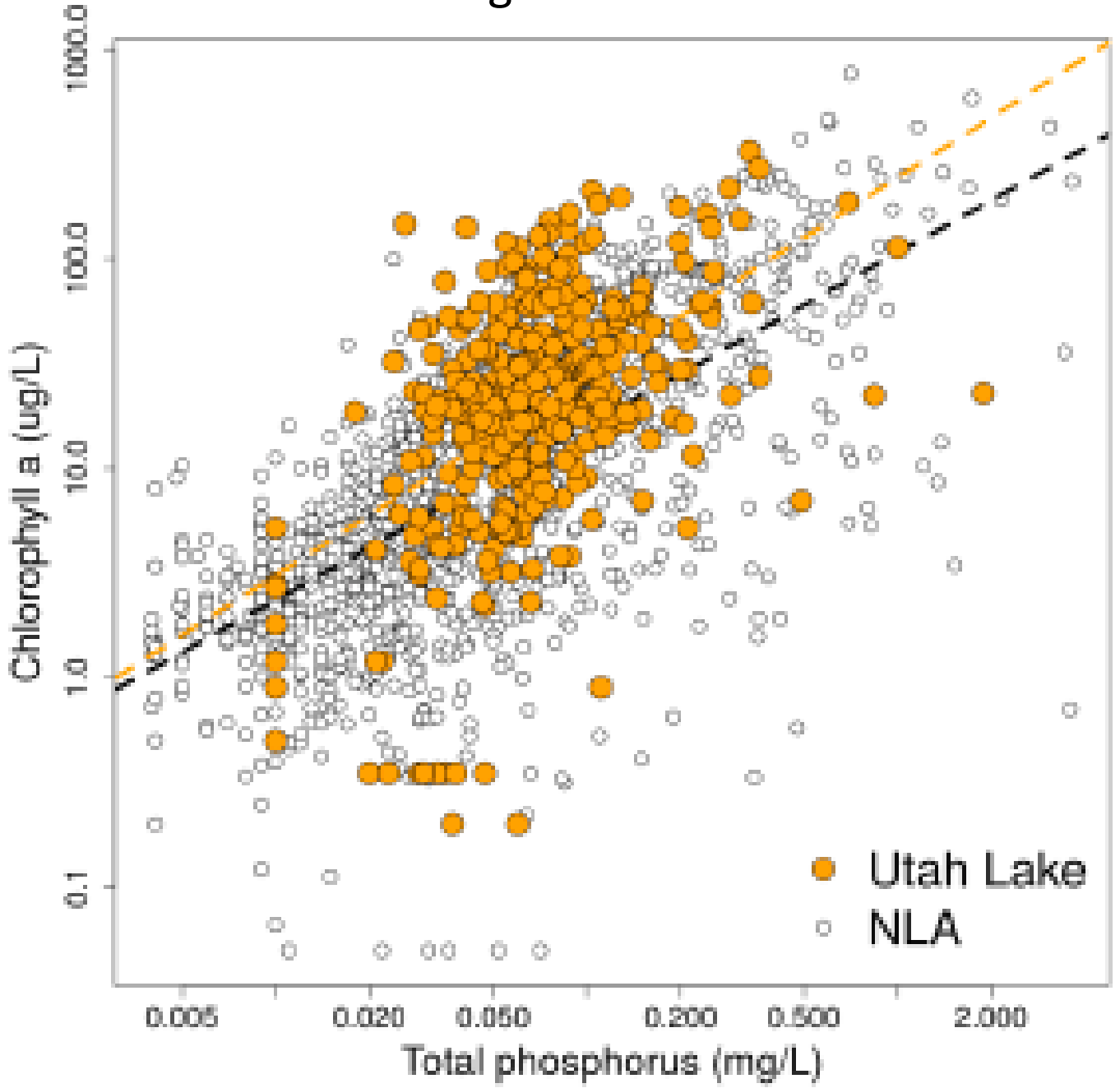


FIGURE 1.—Relationship between summer levels of chlorophyll *a* and measured total phosphorus concentration for 143 lakes.

Does phytoplankton biomass level off at higher TP concentrations?



What is the background TP concentration for Utah Lake

Dr. Merritt says this is 150 ug/L

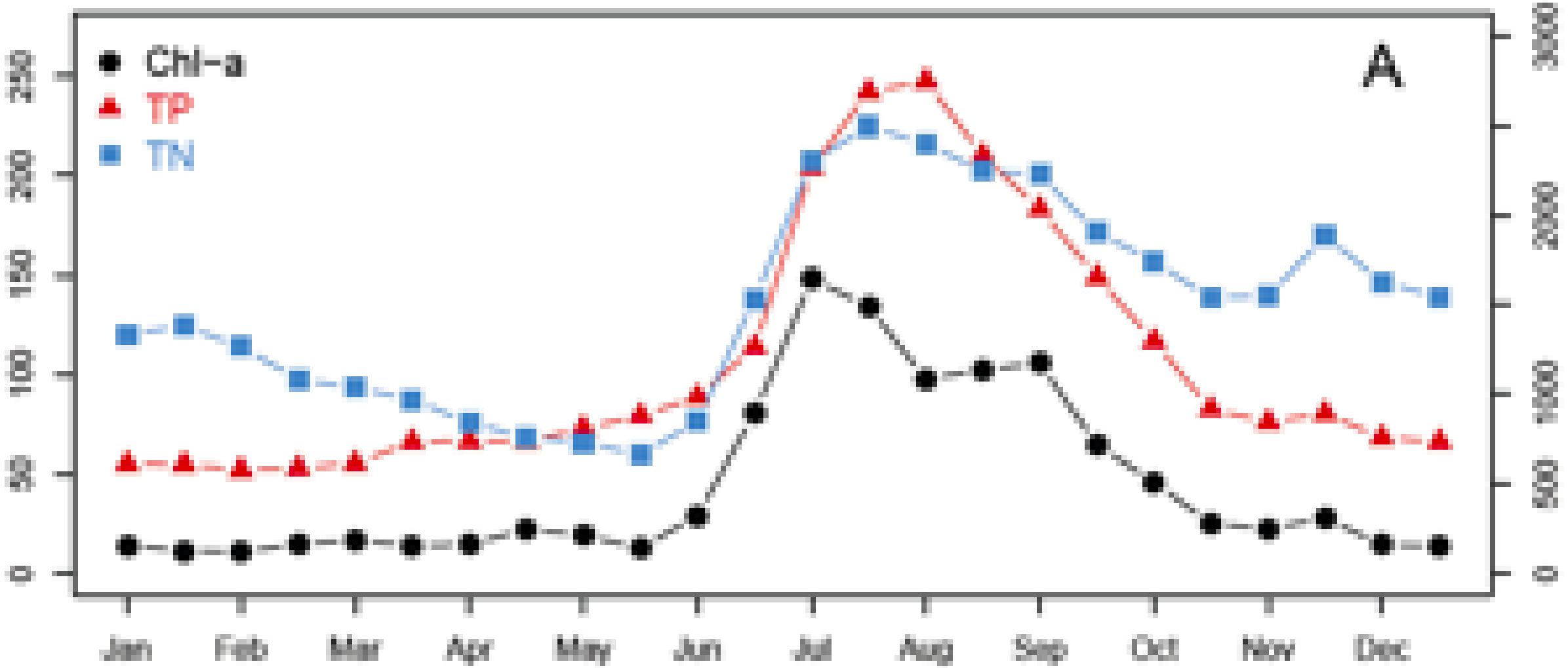
the mass balance data indicate rivers/streams/springs have a flow weighted TP concentration of ca. 50 ug/L

Ostermiller et al. 2019 indicated streams in the headswaters of Utah Lake have 1—20 ug TP/L

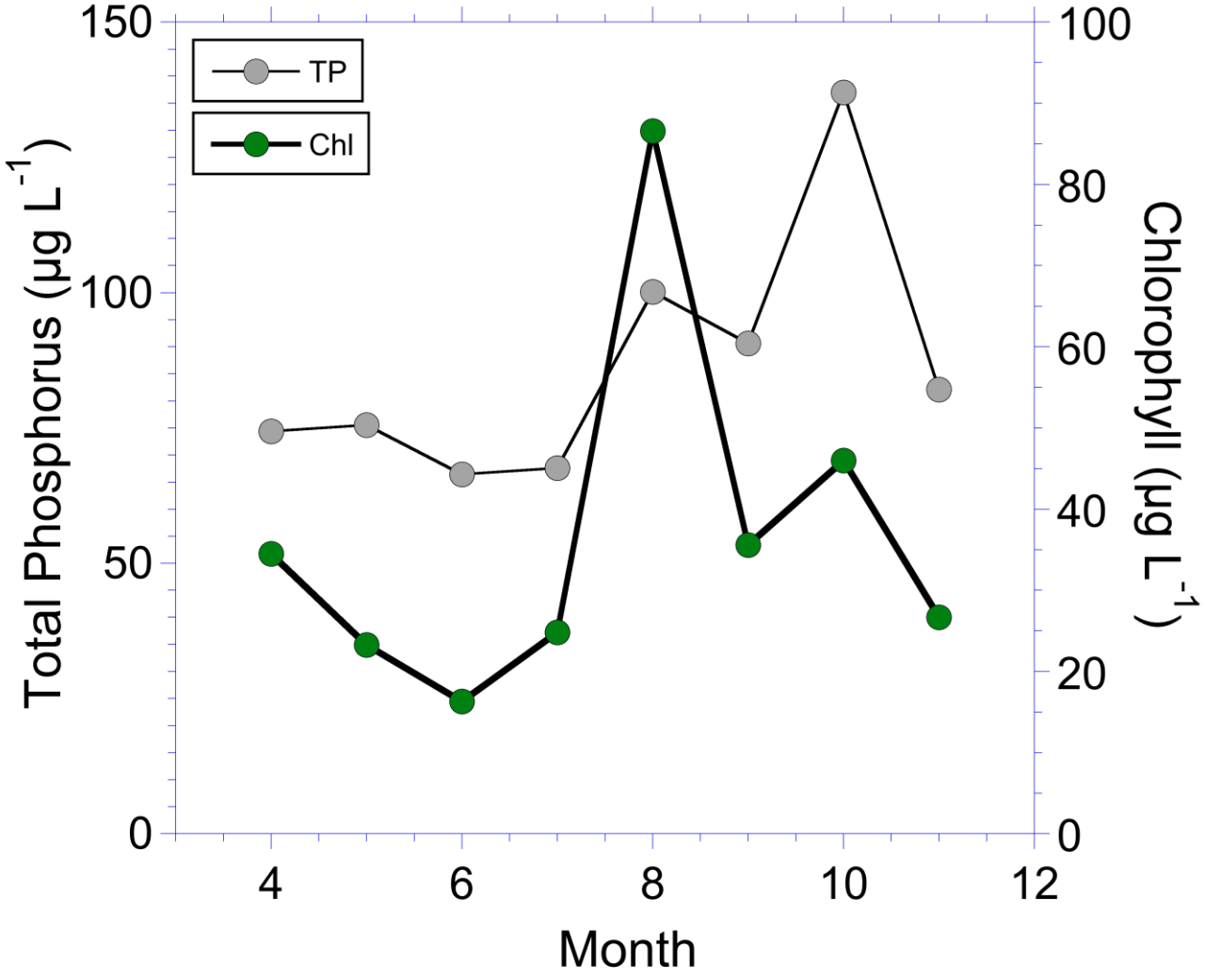
Does atmospheric deposition swamp all other sources of phosphorus inputs?

Are Utah Lake sediments an inexhaustible source of phosphorus?

TP and Chl in Upper Klamath Lake (Oregon)



TP and Chl in Upper Utah Lake



Does light limitation control phytoplankton production in Utah Lake?

$$I = I_o(1 - e^{-kz}))/(kz)$$