**Supplementary Material for:** 

## Response of hydrology and CO<sub>2</sub> flux to experimentally-altered rainfall frequency in a temperate poor fen, southern Ontario, Canada.

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**Table S1:** Mean values of set-point diurnal meteorological conditions in growth chamber and the study site (May-September 2015).

Location	Diurnal Phase	Air	Relative	Vapour	PAR	Number of
		temperature	Humidity	Pressure	(µmol m <sup>-2</sup> s <sup>-1</sup> )	hours in each
		(°C)	(%)	Deficit		diurnal phase
Chamber	Day	19.2	69	0.69	300	15
	Night	12.1	90	0.14	0	9
Field	Day	19.1	69.7	0.67	635	15
	Night	12.1	93.8	0.09	0	9

**Table S2:** Precipitation characteristics of treatments in the growth chamber and the study site

 (May-September 2015).

Location	Treatment	Frequency	# of dry days	Amount per	% of days
			between events	event (mm)	with rain
Chamber	HiFreq-Lab	3x/ week	1-2	2.3	42
	MedFreq-Lab	1x/ week	6	6.9	14
	LowFreq-Lab	0.5x/ week	13	13.8	7
Field	Ambient	$3(\pm 2)x/$ week	2( <u>+</u> 2)	6 ( <u>+</u> 9)	38
	HiFreq	3x/ week	1( <u>+</u> 1)	5 ( <u>+</u> 2)	42
	MedFreq	1x/ week	6( <u>+</u> 1)	13( <u>+</u> 6)	14
	LowFreq	0.5x/ week	13( <u>+</u> 1)	29( <u>+</u> 8)	7



Figure S1: Water table fluctuation between rainfall frequency treatments in (a) Moss, (b) Sedge + Moss, and (c) Moss + Shrub monoliths.



Figure S2: Near-surface volumetric moisture content fluctuation between rainfall frequency treatments in (a) Moss, (b) Sedge + Moss, and (c) Moss + Shrub monoliths.



Figure S3: Hydrologic controls on CO<sub>2</sub> exchange in *S. capillifolium*-dominated field plots, depicting relationships in (a) GEP, (b) ER, and (c) NEE between rainfall frequency treatments. Relationships in (a) and (c) are unimodal with indicated correlation coefficients and significance. Relationships in (b) are linear and are indicated with correlation coefficients. All regressions in (b) were significant at p < 0.001.