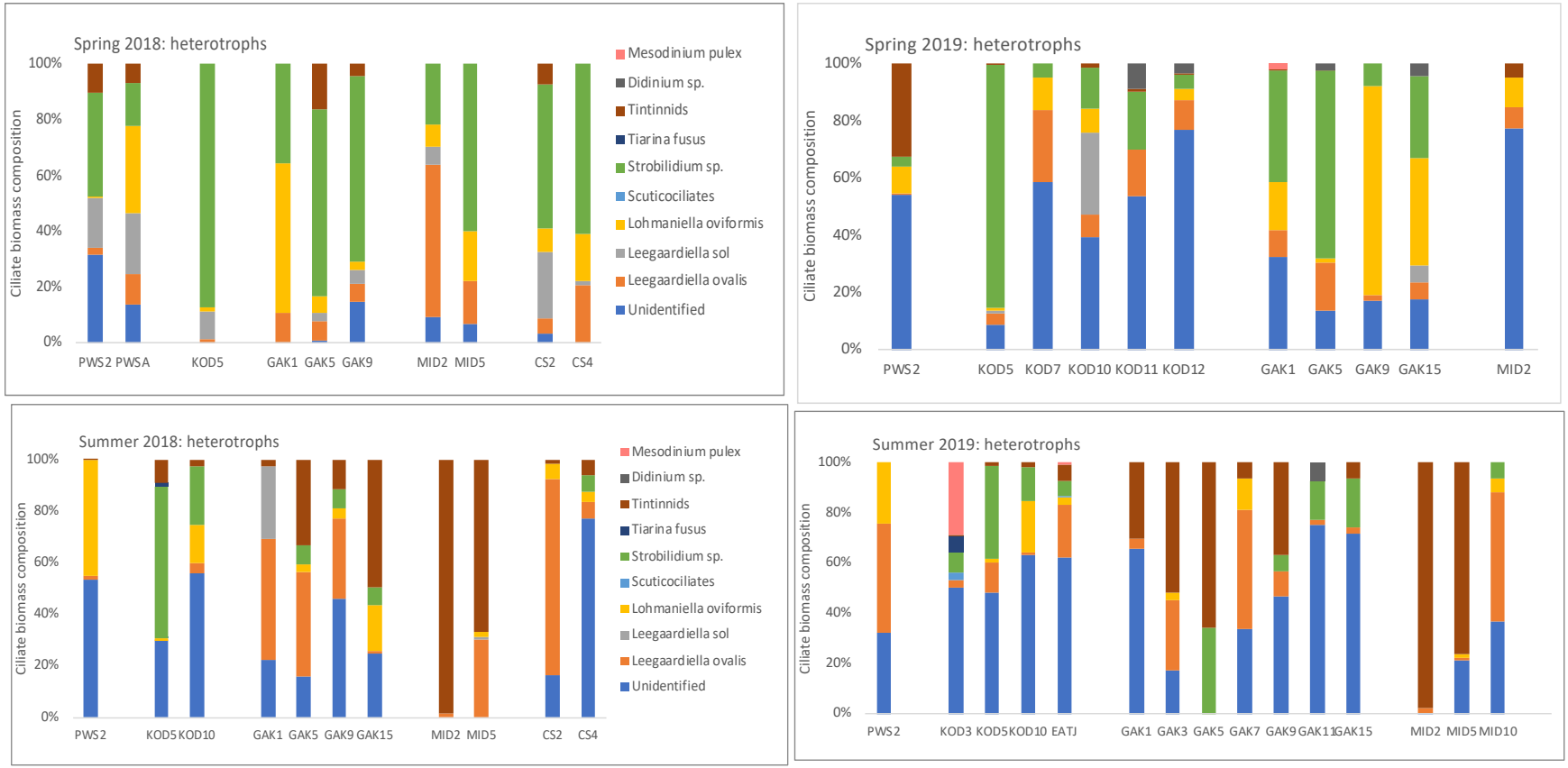

Fig. S1. Percent composition of heterotrophic ciliate community in the northern Gulf of Alaska. Left panels: 2018; right panels: 2019. Top panels: spring; bottom panels: summer.

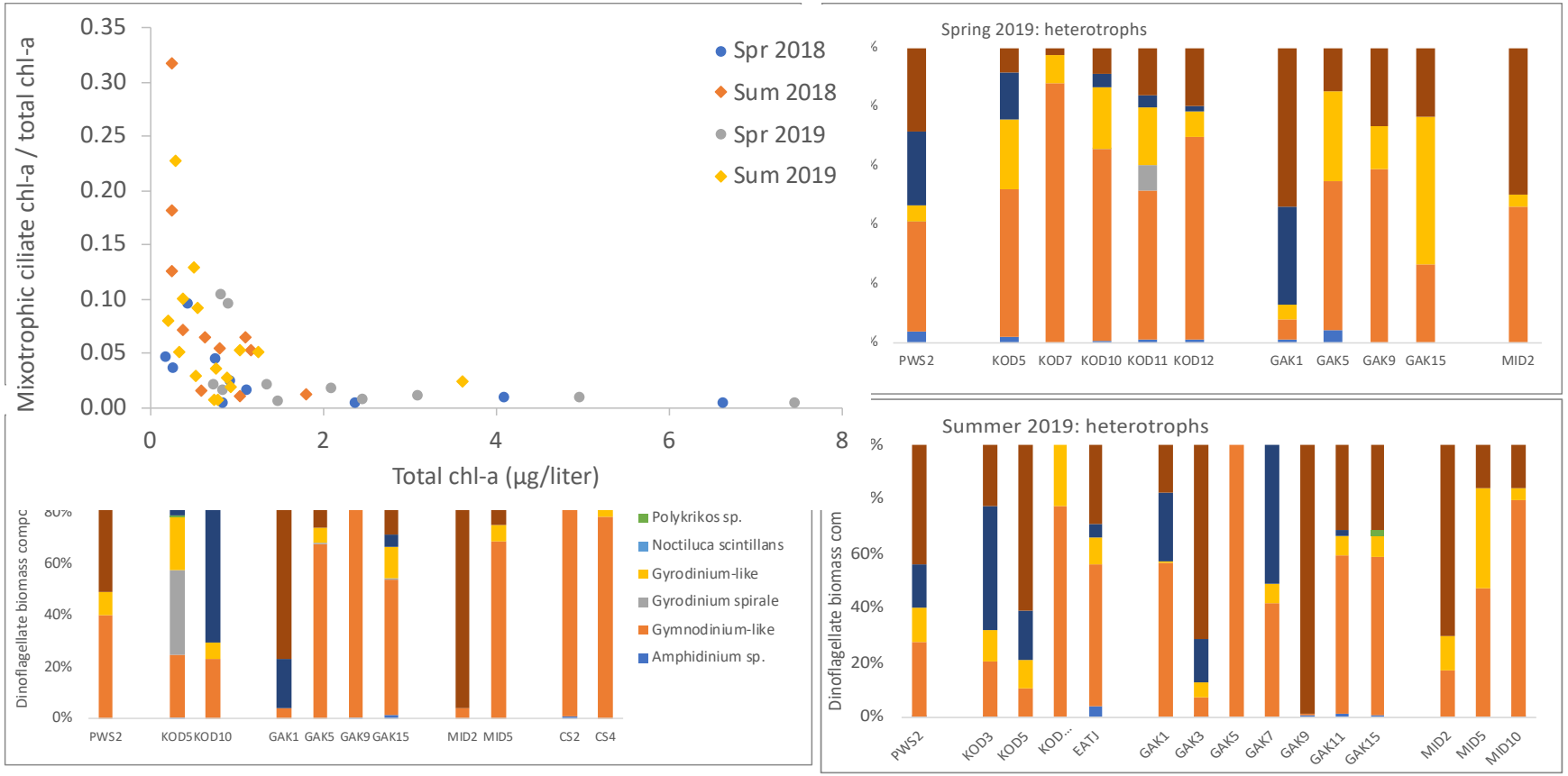

Fig. S2. Percent composition of >20 µm heterotrophic dinoflagellate community in the northern Gulf of Alaska. Left panels: 2018; right panels: 2019. Top panels: spring; bottom panels: summer.

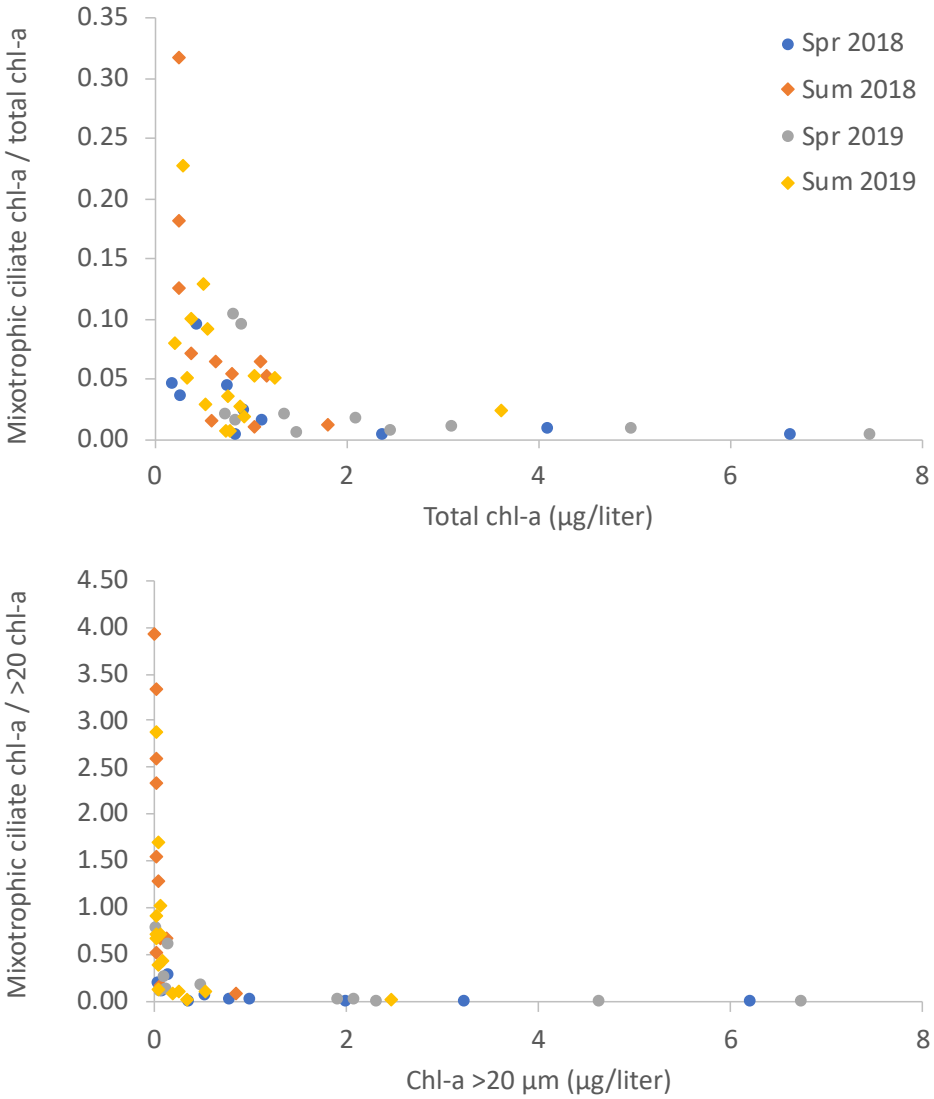

Fig. S3. Mixotrophic ciliate contribution to (upper) total chlorophyll-a and (lower) chlorophyll-a in cells >20 µm for samples collected during 4 cruises to the northern Gulf of Alaska.

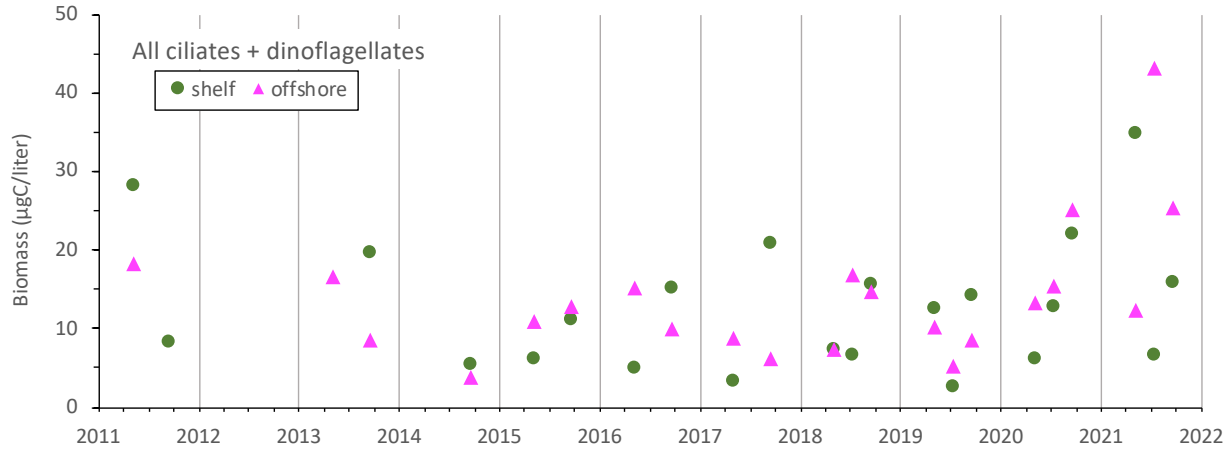

Fig. S4. Time series of total ciliate plus dinoflagellate biomass (includes mixotrophs and heterotrophs) from 2011 through 2021 in the northern Gulf of Alaska. Data are multi-station averages from 10 m depth (Lugol's-preserved samples) taken at shelf and offshore GAK stations (Fig. 1) on the Seward Line in early May, July (beginning 2018) and mid-September. Red bars show marine heatwave periods. Blue line indicates average time-series biomass (shelf: 14.11 µgC liter^{-1}; offshore: 14.05 µgC liter^{-1})

Table S1. Comparisons among studies in the ratio of autotrophic : heterotrophic dinoflagellate biomass. Where available, ratios for <20 µm, >20 µm, and total dinoflagellate communities are included. Ratios for this study are medians of values from 10-12 stations; values from other studies are means. nr: not reported

Location	Season	Depth	Ratio auto:hetero biomass			Reference
			<20 µm	>20 µm	all sizes	
Northern Gulf of Alaska	Spring 2018	10 m	0.40	0.39	0.43	This study
	Summer 2018	10 m	0.62	0.42	0.64	
	Spring 2019	10 m	0.88	0.12	0.98	
	Summer 2019	10 m	0.63	1.10	0.44	
Open subarctic Pacific	Summer and Fall	0-80 m integrated	0.88	1.68	nr	Booth et al. 1993
North Atlantic	Early spring bloom	0-30 m integrated	nr	nr	1.9	Sieracki et al. 1993
North Atlantic	Late spring bloom	0-30 m integrated	nr	nr	1.3	Sieracki et al. 1993
Arabian Sea nearshore	Fall (late monsoon)	0-100 m integrated	2.24	0.98	1.94	Garrison et al. 1998
Arabian Sea offshore	Fall (late monsoon)	0-100 m integrated	0.88	0.00	0.36	Garrison et al. 1998

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