

Doc. S1. Instructions for Ecology Under Lake Ice Data Collection Template

This document provides an overview on data and detailed field descriptions for the [n=136] rows in the Data Collection Template named: "IceEcologyDataTemplate_20141119.csv"

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We are on Pacific Time (PST).

Overview

The goal of this data collection template is to enable compilation of diverse existing data to summarize the big picture of physical and biological parameters in lakes during ice-on and ice-free periods. In drafting the data collection template, the steering committee attempted to identify the data fields and formats, based on the initial survey responses, which would be the 'lowest common denominators' for diverse raw data.

Key Principles

Five key principles will guide you in summarizing your data. Points 4 and 5 were the most challenging for us to finalize in our "beta" testing – any approach we vetted had shortcomings, but we believe the selected approaches will be robust to diverse data.

1. The fundamental goal is to have comparable data for a given sampling station between the ice-on and ice-free periods (Fig. 1). Therefore, for a given sampling station, there are two vectors of data observations (oriented in the template as a "winter " and a "summer " column) that need to be entered (Table 1). If you have winter data only, you may enter this data but do not enter only summer data for a given station.
2. Each column is a summary of data, for winter or for summer, from a given station in a given lake. The data, representing ice-on or ice-free periods, are aggregates [usually averages, coefficients of variation (CV) or maxima] of the samples researchers originally took at this station.
3. When multiple stations are sampled in a given lake and/or if multiple years of data are available for any given station, these additional data should be entered as additional columns (pairs of ice-on and ice-free columns).
4. You must determine the appropriate number of samples to aggregate in each of the ice-on and ice-free periods for your own lake(s). Given the diversity of existing data, we cannot provide a universal date range. The ice-on and ice-free aggregates should be defined as:
 - a. Ice-on: Summary (e.g., average) data for raw samples that were collected from water under the ice.
 - b. Ice-free: Summary data at the sample station for raw data that were collected under **stratified** summer conditions. This qualifier, i.e., that the water body during the ice-free period also be stratified, helps to standardize a typical representation of ice-free lake biology, avoiding the periods of most extreme seasonal transitions. (Our review of respondents' information suggests that this approach will work, but please contact us if you are working with a cold monomictic system!)
5. You must also aggregate sample data for each time period across a depth range. Future efforts may focus on compiling profile data, but for this initial effort, we want to characterize only the photic zone

during each of these ice-on and ice-free periods. A standard depth range cannot be provided here, as the relevant range will depend upon the systems under study.

The observations (columns) are therefore aggregations across **original sample dates** AND **depths** within a given station, in the ice-on and ice-free periods (see the Figure).

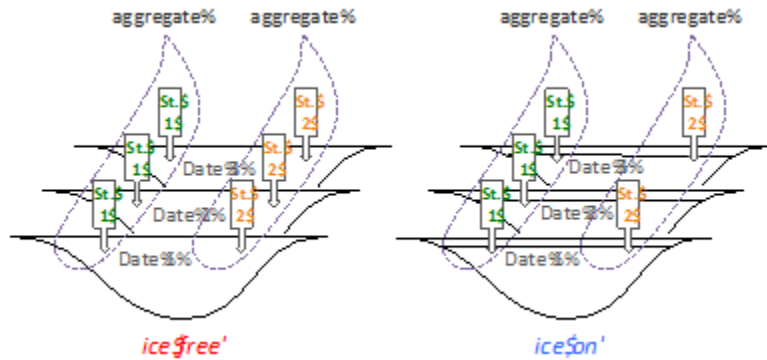


Fig. 1. Schematic of aggregation procedure for multiple dates and sampling stations (St. 1 and 2) within one theoretical lake during one year. In this example, aggregation of raw sample data would result in 4 data vectors (columns; see Table 1), each characterizing one station in the ice-free and ice-on periods. The depths sampled (defined as the photic zone) at each station during ice-free and ice-on periods may differ between aggregates. In this example, the sample *n* at St. 2 during the ice-on period is different from the other aggregates, which are accounted for with the ‘periodn’ field in the dataset.

General organization notes and instructions

- Fields in the DataClass *Researcher*, *Lake*, and *Station*, will likely have repeat-data among certain columns. This requires more copying and pasting than a relational database would for the researcher, however, in this case it also will help to significantly minimize follow-up and compilation effort required by the data management team. This approach will also help reduce confusion during data entry by a contributing researcher who has multiple stations at a given lake (see Table 1 below, which shows part of one year of fictional data for two lakes, Lake PoPo and Lake Cold, where Lake PoPo was sampled at two different stations).

Table 1. Schematic cartoon table demonstrating the layout of the data entry template (csv file).

datacategory	dataclass	fieldname	1	2	3	4	5	6
metadata	aggregate	year	2002	2002	2002	2002	2002	2002
metadata	aggregate	season	iceon	iceoff	iceon	iceoff	iceon	iceoff
metadata	researcher	researcher	Mary.Burglar	Mary.Burglar	Mary.Burglar	Mary.Burglar	Mary.Burglar	Mary.Burglar
metadata	lake	lakename	Lake PoPo	Lake PoPo	Lake PoPo	Lake PoPo	Lake Cold	Lake Cold
metadata	lake	lakeregloc	Alberta	Alberta	Alberta	Alberta	Manitoba	Manitoba
metadata	lake	lakecountry	Canada	Canada	Canada	Canada	Canada	Canada
metadata	lake	lakearea	35	35	35	35	105	105
...
metadata	station	stationdistance	1.2	1.2	5.6	5.6	19	19
metadata	station	stationlat	57.068865	57.068865	57.033321	57.033321	58.54888	58.54888
metadata	station	stationlong	-105.076239	-105.076239	-105.09776	-105.09776	-108.846714	-108.846714
...
metadata	aggregate	startday	31	28	10	15	1	20
metadata	aggregate	startmonth	Dec	Jul	Jan	Jul	Jan	Jul
metadata	aggregate	startyear	2001	2002	2002	2002	2002	2002
...
biotaphyto	aggregate	maxphytoppr	2.11	0.56	12.33	3.44	5.66	1.22
biotaphyto	aggregate	phytopprunit	$\mu\text{g C L}^{-1} \text{h}^{-1}$	$\mu\text{g C L}^{-1} \text{h}^{-1}$	$\mu\text{g C L}^{-1} \text{h}^{-1}$	$\mu\text{g C L}^{-1} \text{h}^{-1}$	$\mu\text{g C L}^{-1} \text{h}^{-1}$	$\mu\text{g C L}^{-1} \text{h}^{-1}$
biotaphyto	aggregate	phytomethod	Vertical tow...	Vertical tow...	Vertical tow...	Vertical tow...	Vertical tow...	Vertical tow...

- You will need to provide relevant information for each sampling station. If multiple stations are to be reported in one lake or multiple years summarized for any station, columns can be added. Use the column naming convention demonstrated in the first 4 example columns: each aggregate will have a unique identifier column number and the first two cells in each column identify the year and ice-on or ice-free status of the aggregate.
- Use 'NA' to indicate 'missing data' for any given cell, which may be missing for various reasons – e.g. the data weren't collected, the question is deemed 'not applicable,' otherwise 'unknown' by the researcher, or per specific 'fielddescription' column instructions.
- ***The majority of contributors will likely not be able to fill out the vast majority of the data fields in the template. Do not panic if you enter a lot of NAs, you are in good company.***
- Units: Please enter data using the units provided in the fielddescription field. If this cannot be accomplished, the appropriate entry for a given field would be 'NA'. We understand that this will be a challenging step for many researchers, but it will also be necessary given the large scope of this synthesis. Certain fields allow you to enter the units in any format, but require in a follow up field that the unit used be described. Such data will be evaluated as unit free ratios comparing ice-on and ice-free periods.

Table 2. Field-specific instructions (field names match with those in the associated .csv file). Please read and follow the guidelines provided in the 'fielddescription' and 'additional instructions' columns when preparing data. 'NA' may be entered in any field which cannot be completed (see above) or based on specific instructions in the rationale section below.

fieldname	fielddescription (follow format of 'text' below)	Additional instructions or rationale for each field (if the fielddescription field is not sufficient).
year	Year of sampling	If the ice period spans two calendar years, 'year' refers to the <i>ice-off</i> year.

season	Enter 'iceon' or 'iceoff'	
researcher	Researcher Name (‘Firstname.Lastname’)	Point of contact for this data.
lakename	Best proper name (‘Lake X’, or ‘X Lake’, ‘X Reservoir’, etc.) [name that would appear in a publication]	Lakes may be essentially un-named, informally named, and some have different names. Despite this variability, strive for entering the proper name that you and most other researchers working on this system would use in a formal publication.
lakeregloc	Region (Province or State or similar)	Similar to previous; please enter a descriptive regional identifier, generally a province, state, or similar.
lakecountry	Country	Nation of lake; if lake is shared among nations, enter nation where research station or effort is based.
lakearea	Surface area of lake (km ²)	
lakemeandepth	Mean depth of lake (m)	Enter best-known estimate of the mean depth of the lake. If the mean lake depth is unknown, enter ‘NA’.
lakemaxdepth	Maximum known depth of lake (m)	Enter best-known estimate of the maximum depth of the lake. If this depth is unknown, enter ‘NA’.
lakeelevation	Elevation of lake (m) above sea level	
watershedarea	Lake watershed (catchment) size (km ²)	Enter best-known estimate of the watershed area.
h2o residence	Lake water residence time in days (real number)	Enter best-known estimate of the lake water residence time; if this is unknown, enter ‘NA’.
lakefetch	Fetch - maximum distance from shore to shore (km)	Enter the maximum distance from shore to shore on the lake, the max distance over which wind travels on the lake.

stationdistance	Minimum distance (km) from shore to sampling station	This field characterizes the relative station location and proximity to shore within in a lake.
stationname	Name used by researcher that identifies sampling station	Optional field for benefit of researcher in keeping track of station name.
stationdepth	Depth (m) at sampling station [also the depth of benthic biota (fields below) if sampled]	Enter the depth of the lake at the station where sampling occurred. There are fields below for reporting benthic biota. It is assumed that the depth entered here is also the depth at which benthic samples were collected.
stationlat	Latitude in deg.decimaldeg (for sampling station)	Please provide coordinates in Degrees.Decimal degrees for sampling station (i.e., ##.#####...). If you don't know the coordinates of the sampling station, try estimating them using googlemaps or similar
stationlong	Longitude in deg.decimaldeg (for sampling station)	
multiplestations	Are you entering data for multiple stations in this lake ('Yes' or 'No')	This simple field is an internal check that allows the data management team to know whether to expect different stations being entered within the same lake.
startday	Calculated aggregate begins on this date - Day ('##')	A unique column (observation) is being entered for each ice-on or ice-free period. These date fields identify the date that define the start of the sample period. Day, month and year fields are separated to ensure that differences in date convention or MS Excel's manipulations don't confound the data.
startmonth	Calculated aggregate begins on this date - Month (1st 3 letters of month in English; e.g., 'Dec')	
startyear	Calculated aggregate begins on this date - Year ('####')	
endday	Calculated aggregate ends on this date - DAY ('##')	These date fields identify the date that define the end of the ice-on or ice-free aggregation period.
endmonth	Calculated aggregate ends on this date - Month (1st 3 letters	

	of month in English; e.g., 'Dec')	
endyear	Calculated aggregate ends on this date - Year ('####')	
iceduration	Length of ice cover at station on lake in days (real number, may differ from aggregation period)	Best known estimate for the length of ice cover at the station on the lake in a given year. This may differ from the ice-on aggregation period. For example, the ice-on aggregation period (data entered below) is tied to the days that researchers actually sampled, but the ice-on period is likely distinct from this. For stratified samples, use 'NA'. If the time of ice-on and ice-off at the particular station is unknown, enter best estimates based on dates for the lake.
periodn	Number of 'samples' contributing to the calculated seasonal aggregate (real number)	This is the number of sampling dates that were used to calculate aggregates within each ice-on or ice-free period; this field is important because it will characterize how many samples went into generating the summary values.
samplenarrat	Brief narrative describing anything we should know about the sampling protocol or number of samples	
sampletype	Type of sample data ['in situ' (includes manual and autonomously collected), OR 'remote sensed']	There are two valid responses: 'in situ' or 'remote sensed'. Please note that our definition of remote sensing data is that it was collected from the air or by satellite. Measurements collected manually or by autonomous sensors are both considered 'in-situ' if the measurements were made in the lake.
photicdepth	Depth of photic zone (m)	Values in each column are aggregated across the photic zone (please see ' Key Principles #5 ', above); this field allows the

		researcher to characterize the depth of the defined photic zone.
sampledepth	Maximum depth normally sampled (m)	Typical maximum depth of samples included here. e.g., if photic zone is 20 m but you usually only have samples to 10 m, enter '10'. If necessary, make any notes about sampling depths in the 'samplenarrat' field.
icedepth	Average surface ice thickness (cm; 'NA' for didn't measure, 0 if no ice)	This is the average across <i>n</i> samples that contribute to the ice-on aggregate.
snowdepth	Average snow depth on ice (cm; 0 for no snow, including summer OR , 'NA' if not measured)	This is the average across <i>n</i> samples that contribute to the ice-on aggregate.
icenarrat	Brief narrative describing other ice-specific variables collected	e.g., ice clarity, etc.
sidata	Is there stable isotope data associated with aggregate? ('no' OR , if yes: 'delC', 'delN', 'delS', etc.)	If there is SI data associated with the sampling period covered by this aggregate (i.e., could be from from seston, zooplankton, fish, or other) identify the isotopes that you have data for in a list, separated by commas following the name convention provided (e.g., 'delC, delN' would be entered a researcher had any d ¹³ C and d ¹⁵ C data). If no SI data, enter 'no'.
fadata	Is there fatty acid data associated with aggregate? ('no' OR , if yes: 'proportional' or 'concentrations')	If there is FA data associated with this sampling aggregate (see previous) identify whether the FA data are proportions of total FA or FA concentrations. If no FA data are available, enter 'no'.
gutdata	Is there consumer gut content data associated with sample period? ('yes' or 'no')	Is there is gut content data associated with this sampling aggregate (from fish or other organism); 'yes' or 'no'.

foodwebnarrat	Brief narrative describing food web/biomarker/gut content data, and organisms	This field allows for a brief description and/or qualifying information summarizing the previously requested food web indicator data that may be available (e.g., SI or FA biomarkers, gut contents). Provide brief description of what was sampled (fish, seston, macrophytes, etc?).
watertemp	Average water temperature (deg C) at sample station during depth/date range of aggregate	Average water temperature across n samples that contribute to the ice-on or ice-free aggregate.
airtemp	Average air temp (deg C) at sample station during date range of aggregate	Average air temperature across n samples that contribute to the ice-on or ice-free aggregate.
averadiation	Average photosynthetically active radiation (PAR) ($\mu\text{mol photons m}^2 \text{s}^{-1}$) at surface	Average PAR value across n samples that contribute to the ice-on or ice-free aggregate. The PAR aggregate should be from measurements taken at mid-day throughout the sampling window. If this is not possible, enter 'NA'.
cvradiation	Coefficient of variation (CV) of PAR (of aggregate) (stdev / average)	CV of PAR for the ice-on or ice-free aggregate. CV is the standard deviation divided by the average (i.e., previous field) calculated across n samples that contribute to the ice-on or ice-free aggregate. Unit free.
avesecchidepth	Secchi depth (m) (of aggregate); average	Average secchi depth across n samples that contribute to the ice-on or ice-free aggregate.
cvsecchidepth	Secchi depth (of aggregate) (stdev / average); CV	CV of sechhi depth for the ice-on or ice-free aggregate. CV is the standard deviation divided by the average (i.e., previous field) calculated across n samples that contribute to the ice-on or ice-free aggregate. Unit free.

avetotphos	Total P (of aggregate) ($\mu\text{g P L}^{-1}$); average	Average total phosphorus concentration in the water across n samples that contribute to the ice-on or ice-free aggregate.
cvtotphos	Total P (of aggregate) (stdev / average); CV	CV of total phosphorus for the ice-on or ice-free aggregate. CV is the standard deviation divided by the average (i.e., previous field) calculated across n samples that contribute to the ice-on or ice-free aggregate. Unit free.
maxtotphos	Total P (of aggregate) ($\mu\text{g P L}^{-1}$); maximum	Maximum observed value of total P within the ice-on or ice-free aggregate.
avetotdisphos	Total dissolved P (of aggregate) ($\mu\text{g P L}^{-1}$); average	Average total dissolved phosphorus concentration in the water across n samples that contribute to the ice-on or ice-free aggregate.
cvtotdisphos	Total dissolved P (of aggregate) (stdev / average); CV	CV of total dissolved phosphorus for the ice-on or ice-free aggregate. CV is the standard deviation divided by the average (i.e., previous field) calculated across n samples that contribute to the ice-on or ice-free aggregate. Unit free.
maxtotdisphos	Total dissolved P (of aggregate) ($\mu\text{g P L}^{-1}$); maximum	Maximum observed value of total dissolved phosphorous concentration within the ice-on or ice-free aggregate.
avetotnitro	Total N (of aggregate) ($\mu\text{g N L}^{-1}$); average	Average total nitrogen concentration in the water across n samples that contribute to the ice-on or ice-free aggregate.
cvtotnitro	Total N (of aggregate) (stdev / average); CV	CV of total nitrogen for the ice-on or ice-free aggregate. CV is the standard deviation divided by the average (i.e., previous field) calculated across n samples that contribute to the ice-on or ice-free aggregate. Unit free.

maxtotnitro	Total N (of aggregate) ($\mu\text{g N L}^{-1}$); maximum	Maximum observed value of total nitrogen concentration within the ice-on or ice-free aggregate.
avetotdissnitro	Total dissolved N (of aggregate) ($\mu\text{g N L}^{-1}$); average	Average total dissolved N (nitrate+nitrite+ammonium) across n samples that contribute to the ice-on or ice-free aggregate.
cvtotdissnitro	Total dissolved N (of aggregate) (stdev / average); CV	CV of total dissolved nitrogen for the ice-on or ice-free aggregate. CV is the standard deviation divided by the average (i.e., previous field) calculated across n samples that contribute to the ice-on or ice-free aggregate. Unit free.
maxtotdissnitro	Total dissolved N (of aggregate) ($\mu\text{g N L}^{-1}$); maximum	Maximum observed value of total dissolved N (nitrate+nitrite+ammonium) concentration within the ice-on or ice-free aggregate.
avetotdoc	Total dissolved organic C (of aggregate) (mg C L^{-1}); average	Average total dissolved organic carbon concentration in the water across n samples that contribute to the ice-on or ice-free aggregate.
cvtotdoc	Total dissolved organic C (of aggregate) (stdev / average); CV	CV of total dissolved organic carbon for the ice-on or ice-free aggregate. CV is the standard deviation divided by the average (i.e., previous field) calculated across n samples that contribute to the ice-on or ice-free aggregate. Unit free.
maxtotdoc	Total dissolved organic C (of aggregate) (mg C L^{-1}); maximum	Maximum observed value of total dissolved organic C concentration within the ice-on or ice-free aggregate.
avesuva	Specific UV absorbance (of aggregate) ($\text{L mg C}^{-1} \text{m}^{-1}$); average	Average UV absorbance in the water across n samples that contribute to the ice-on or ice-free aggregate.

cvsuva	Specific UV absorbance (of aggregate) (stdev / average); CV	CV of UV absorbance for the ice-on or ice-free aggregate. CV is the standard deviation divided by the average (i.e., previous field) calculated across n samples that contribute to the ice-on or ice-free aggregate. Unit free.
maxsuva	Specific UV absorbance (of aggregate) ($L\ mg\ C^{-1}\ m^{-1}$); maximum	Maximum observed value of UV absorbance within the ice-on or ice-free aggregate.
avecolor	Water Color - actual (of aggregate), Platinum units (Pt, $mg\ L^{-1}$); average	Average water color across n samples that contribute to the ice-on or ice-free aggregate.
cvcolor	Water Color - actual (of aggregate), Platinum units (stdev / average); CV	CV of water color for the ice-on or ice-free aggregate. CV is the standard deviation divided by the average (i.e., previous field) calculated across n samples that contribute to the ice-on or ice-free aggregate. Unit free.
maxcolor	Water Color - actual (of aggregate), Platinum units (Pt, $mg\ L^{-1}$); max	Maximum observed water color value within the ice-on or ice-free aggregate.
avechla	Chlorophyll-a (of aggregate)' ($\mu g\ L^{-1}$); average	Average total chlorophyll-a concentration in the water across n samples that contribute to the ice-on or ice-free aggregate.
cvchla	Total Chlorophyll-a (of aggregate) (stdev / average); CV	CV of total chlorophyll-a concentration for the ice-on or ice-free aggregate. CV is the standard deviation divided by the average (i.e., previous field) calculated across n samples that contribute to the ice-on or ice-free aggregate. Unit free.
maxchla	Chlorophyll-a (of aggregate) ($\mu g\ L^{-1}$); maximum	Maximum observed value of chlorophyll-a concentration within the ice-on or ice-free aggregate.
waterchemnarrat	Brief narrative describing water chemistry methods	Optional field for researcher to offer additional information or qualifications on

		the various water chemistry parameters collected above.
profiles	Would you submit 'raw' water chemistry profile data in a follow up effort? ('yes', 'no', and brief answer)	We recognize both: 1) the potential limitations of aggregating samples, but also 2) that many researchers may not be able or willing to submit raw profile data. Please indicate whether you are interested in submitting raw profile data in a follow up data collection effort with 'yes', 'no', and a brief description of the data.
avephytoppr	Phytoplankton primary production (PPR) (of aggregate); average (a rate, but is also a unit free field)	Average calculated rate of PPR in the water across n samples that contribute to the ice-on or ice-free aggregate. This is a unit free field, because researchers may calculate this in different ways. We will calculate ice-free:ice-on PPR ratios with these data. However, if possible, the preferred units for PPR are $\mu\text{g C L}^{-1} \text{h}^{-1}$.
maxphytoppr	Phytoplankton primary production (PPR) (of aggregate); maximum (a rate, but is also a unit free field)	Maximum calculated rate of PPR in the water across n samples that contribute to the ice-on or ice-free aggregate (also see previous field description).
phytopprunit	Report units for ave and max ppr rates (e.g., $\mu\text{g C L}^{-1} \text{h}^{-1}$ is preferred)	Ideally all researchers will report PPR in the units of $\mu\text{g C L}^{-1} \text{h}^{-1}$. Otherwise, we will make ice-free to ice-on comparisons of PPR using a unit-free ratio. It is of course critical only that units used are consistent within your own calculations.
phytopprnarrat	Brief narrative describing the PPR method	Describe the method used to calculate phytoplankton PPR.
phytomethod	Brief narrative describing phytoplankton sampling method	Describe the phytoplankton sampling method; size of net, depth of tow, etc.
avephytomass	Total phytoplankton biovolume (of aggregate) (mm^3/L); average	Average total phytoplankton dry biovolume across n samples that contribute to the ice-on or ice-free aggregate.

cvphytomass	Total phytoplankton biovolume (of aggregate) (stdev / average); CV	CV of total phytoplankton dry biovolume for the ice-on or ice-free aggregate. CV is the standard deviation divided by the average (i.e., previous field) calculated across n samples that contribute to the ice-on or ice-free aggregate. Unit free.
maxphytomass	Total phytoplankton biovolume (of aggregate) (mm^3/L); maximum	Maximum observed total phytoplankton biovolume across n samples that contribute to the ice-on or ice-free aggregate.
avephytcount	Total phytoplankton cell count (of aggregate) (number of cells L^{-1}); average	Average total phytoplankton cell count (L^{-1}) for the aggregated sample across n samples that contribute to the ice-on or ice-free aggregate.
cvphytcount	Total phytoplankton cell count (of aggregate) (stdev / average); CV	CV of total phytoplankton cell count for the ice-on or ice-free aggregate. CV is the standard deviation divided by the average (i.e., previous field) calculated across n samples that contribute to the ice-on or ice-free aggregate. Unit free.
maxphytcount	Total phytoplankton cell count (of aggregate) (number of cells L^{-1}); maximum	Maximum observed total phytoplankton cell count (L^{-1}) across n samples that contribute to the ice-on or ice-free aggregate.
propchloro	Proportion of chlorophytes (proportion of the total phyto count; 1 of 6 categories that sum to 1)	Proportion of the total phytoplankton cells counted that are chlorophytes, cryptophytes, cyanobacteria, diatoms, dinoflagellates, or other. For each phytoplankton group i across n samples that contribute to the ice-on or ice-free aggregate, sum the group cell count and divide by the total phytoplankton cell count from those n samples.
propcrypto	Proportion of cryptophytes (proportion of the total phyto count; 1 of 6 that sum to 1)	
propcyano	Proportion of cyanobacteria (proportion of the total phyto count; 1 of 6 that sum to 1)	

propdiatom	Proportion of diatoms (proportion of the total phyto count; 1 of 6 that sum to 1)	
propdino	Proportion of dinoflagellates (proportion of the total phyto count; 1 of 6 that sum to 1)	
propotherphyto	Proportion of other phytoplankton (proportion of the total phyto count; 1 of 6 that sum to 1)	
aveciliamass	Total ciliate biovolume (of aggregate) (mm ³ /L); average	Average total heterotrophic ciliate biovolume across <i>n</i> samples that contribute to the ice-on or ice-free aggregate.
cvciliamass	Total ciliate biovolume (of aggregate) (stdev / average); CV	CV of total heterotrophic ciliate biovolume for the ice-on or ice-free aggregate. CV is the standard deviation divided by the average (i.e., previous field) calculated across <i>n</i> samples that contribute to the ice-on or ice-free aggregate. Unit free.
maxciliamass	Total ciliate biovolume (of aggregate) (mm ³ /L); maximum	Maximum observed total heterotrophic ciliate biovolume across <i>n</i> samples that contribute to the ice-on or ice-free aggregate.
aveciliacount	Total ciliate cell count (of aggregate) (number of cells L ⁻¹); average	Average total heterotrophic ciliate cell count across <i>n</i> samples that contribute to the ice-on or ice-free aggregate.
cvciliacount	Total ciliate cell count (of aggregate) (stdev / average); CV	CV of total heterotrophic ciliate cell count for the ice-on or ice-free aggregate. CV is the standard deviation divided by the average (i.e., previous field) calculated across <i>n</i> samples that contribute to the ice-on or ice-free aggregate. Unit free.
maxciliacount	Total ciliate cell count (of aggregate) (number of cells L ⁻¹); maximum	Maximum observed heterotrophic ciliate cell count across <i>n</i> samples that contribute to the ice-on or ice-free aggregate.

avehnfmass	Total heterotrophic nano-flagellate (HNF) biovolume (of aggregate) (mm^3/L); average	Average total HNF biovolume across n samples that contribute to the ice-on or ice-free aggregate.
cvhnfmass	Total heterotrophic nano-flagellate (HNF) biovolume (of aggregate) (stdev / average); CV	CV of total HNF biovolume for the ice-on or ice-free aggregate. CV is the standard deviation divided by the average (i.e., previous field) calculated across n samples that contribute to the ice-on or ice-free aggregate. Unit free.
maxhnfmass	Total HNF biovolume (of aggregate) (mm^3/L); maximum	Maximum observed total HNF biovolume across n samples that contribute to the ice-on or ice-free aggregate.
avehnfcount	Total HNF cell count (of aggregate) (number of cells L^{-1}); average	Average total HNF cell count across n samples that contribute to the ice-on or ice-free aggregate.
cvhnfcount	Total HNF cell count (of aggregate) (stdev / average); CV	CV of total HNF cell count for the ice-on or ice-free aggregate. CV is the standard deviation divided by the average (i.e., previous field) calculated across n samples that contribute to the ice-on or ice-free aggregate. Unit free.
maxhnfcount	Total HNF cell count (of aggregate) (number of cells L^{-1}); maximum	Maximum observed total HNF cell count across n samples that contribute to the ice-on or ice-free aggregate.
zoopmethod	Brief narrative describing zooplankton sampling method	Describe the zooplankton sampling method; size of net, depth of tow, etc.
avezoopmass	Total zooplankton biomass (of aggregate) ($\mu\text{g dw L}^{-1}$); average	Average total zooplankton dry biomass across n samples that contribute to the ice-on or ice-free aggregate.
cvzoopmass	Total zooplankton biomass (of aggregate) (stdev / average); CV	CV of total zooplankton dry biomass for the ice-on or ice-free aggregate. CV is the standard deviation divided by the average (i.e., previous field) calculated across n samples that contribute to the ice-on or ice-free aggregate. Unit free.

maxzoopmass	Total zooplankton biomass (of aggregate) ($\mu\text{g dw L}^{-1}$); maximum	Maximum observed total zooplankton dry biomass across n samples that contribute to the ice-on or ice-free aggregate.
avezoopcount	Total zooplankton count (of aggregate) (number of organisms L^{-1}); average	Average total count of zooplankton individuals (L^{-1}) across n samples that contribute to the ice-on or ice-free aggregate.
cvzoopcount	Total zooplankton count (of aggregate) (stdev / average); CV	CV of total count of zooplankton individuals for the ice-on or ice-free aggregate. CV is the standard deviation divided by the average (i.e., previous field) calculated across n samples that contribute to the ice-on or ice-free aggregate. Unit free.
maxzoopcount	Total zooplankton count (of aggregate) (number of organisms L^{-1}); maximum	Maximum observed total zooplankton individuals (L^{-1}) across n samples that contribute to the ice-on or ice-free aggregate.
propdaphnia	Proportion of daphnid cladocerans (proportion of total zoop count; 1 of 6 categories that sum to 1)	Percentage of the total zooplankton individuals counted that are daphnid cladocerans, non-daphnid cladocerans, cyclopoids, calanoid copepods, rotifers, or other. For each zooplankton group i across n samples that contribute to the ice-on or ice-free aggregate, sum the group count and divide by the total zooplankton count from those n samples.
propothercladoc	Proportion of other cladocerans (proportion of total zoop count; 1 of 6 that sum to 1)	
propcyclopoid	Proportion of cyclopoids (proportion of total zoop count; 1 of 6 that sum to 1)	
propcalanoid	Proportion of calanoid copepods (proportion of total zoop count; 1 of 6 that sum to 1)	
proprotifer	Proportion of rotifers (proportion of total zoop count; 1 of 6 that sum to 1)	

propotherzoop	Proportion of other zooplankton (proportion of total zoop count; 1 of 6 that sum to 1)	
avebactcount	Total bacterioplankton cell count (of aggregate) (number of cells L ⁻¹); average	Average bacterial cell count across <i>n</i> samples that contribute to the ice-on or ice-free aggregate.
cvbactcount	Total bacterioplankton cell count (of aggregate) (stdev / average); CV	CV of total bacterial cell count for the ice-on or ice-free aggregate. CV is the standard deviation divided by the average (i.e., previous field) calculated across <i>n</i> samples that contribute to the ice-on or ice-free aggregate. Unit free.
maxbactcount	Total bacterioplankton cell count (of aggregate) (number of cells L ⁻¹); maximum	Maximum observed bacterial cell count across <i>n</i> samples that contribute to the ice-on or ice-free aggregate.
avebactprod	Bacterioplankton production (BPP) (of aggregate); average (a rate, but is also a unit free field)	Average BPP (as inferred from several potential methods, including 3H-Leucine, 14C-Leucine, or 3H-Thymidine incorporation) across <i>n</i> samples that contribute to the ice-on or ice-free aggregate. This is a unit free field, because researchers may calculate this in different ways, reporting different units. We will calculate ice-free:ice-on BPP ratios with these data. However, if possible, the preferred units for PPR are $\mu\text{g C L}^{-1} \text{h}^{-1}$.
cvbactprod	Bacterioplankton production (BPP) (of aggregate) (stdev / average); CV	CV of BPP for the ice-on or ice-free aggregate. CV is the standard deviation divided by the average (i.e., previous field) calculated across <i>n</i> samples that contribute to the ice-on or ice-free aggregate. Unit free.
maxbactprod	Bacterioplankton production (BPP) (of aggregate); maximum (a rate, but is also a unit free field)	Maximum calculated rate of BPP in the water across <i>n</i> samples that contribute to the ice-on or ice-free aggregate (also see previous field description).

bactprodunit	Report units for ave and max BPP rates ($\mu\text{g C L}^{-1} \text{h}^{-1}$ is preferred)	Ideally all researchers will report BPP in the units of $\mu\text{g C L}^{-1} \text{h}^{-1}$. Otherwise, we will make ice-free to ice-on comparisons using a unit-free ratio. It is only critical that units used are consistent within your own calculations.
bactprodmeth	Method used to infer BPP (e.g., incorporation of ^3H -Leucine, ^{14}C -Leucine, ^3H -Thymidine with reference)	Provide brief description of method used for inference of BPP, including a reference describing the method.
bactcompnarrat	Brief narrative describing other composition data; e.g., DNA inferred bacterial community composition	Provide a brief narrative describing existing bacterial community composition data associated with sampling aggregate that may be leveraged for future analysis; include basic information about method used.
bensubstrate	Substrate type at benthic station; 1 of 5 categories (organic, silt, sand, rock, mixed)	Categorize the dominant substrate where benthic organisms were sampled, across n samples that contribute to the ice-on or ice-free aggregate, into one of the five general categories.
avebenalgalmass	Total benthic algal biomass (of aggregate) ($\mu\text{g dw per cm}^2$ substrate); average	Average benthic algal dry biomass across n samples that contribute to the ice-on or ice-free aggregate.
cvbenalgalmass	Total benthic algal biomass (of aggregate) (stdev / average); CV	CV of benthic algal dry biomass for the ice-on or ice-free aggregate. CV is the standard deviation divided by the average (i.e., previous field) calculated across n samples that contribute to the ice-on or ice-free aggregate. Unit free.
maxbenalgalmass	Total benthic algal biomass (of aggregate) ($\mu\text{g dw per cm}^2$ substrate); maximum	Maximum total observed benthic algal dry biomass across n samples that contribute to the ice-on or ice-free aggregate.
avebenchla	Total benthic Chl-a (of aggregate) ($\mu\text{g per cm}^2$ substrate); average	Average total benthic chlorophyll-a per cm^2 of substrate across n samples that

		contribute to the ice-on or ice-free aggregate.
cvbenchla	Total benthic Chl-a (of aggregate) (stdev / average); CV	CV of total benthic chlorophyll-a for the ice-on or ice-free aggregate. CV is the standard deviation divided by the average (i.e., previous field) calculated across n samples that contribute to the ice-on or ice-free aggregate. Unit free.
maxbenchla	Total benthic Chl-a (of aggregate) ($\mu\text{g per cm}^2$ substrate); maximum	Maximum observed benthic Chl-a per cm^2 of substrate across n samples that contribute to the ice-on or ice-free aggregate.
macrophytemass	Total benthic macrophyte biomass (g dw m^2) (including vascular plants and bryophytes)	Average total macrophyte biomass dw per m^2 of substrate across n samples that contribute to the ice-on or ice-free aggregate.
benamphdens	Amphipoda density (ind. m^2)	Average density of benthic organisms in the broad categories of amphipods, gastropods, bivalves, Insecta, and oligochaetes across n samples that contribute to the ice-on or ice-free aggregate.
bengastrodens	Gastropoda density (ind. m^2)	
benbivalvedens	Bivalvia density (ind. m^2)	
beninsectdens	Insecta density (ind. m^2)	
benoligodens	Oligochaeta density (ind. m^2)	
fishnarrat	Narrative describing potentially relevant fish data	Narrative describing potentially relevant fish data for ice-on and ice-free periods. E.g., catch per unit effort, total length, total mass, age/growth or sex/size at maturity, isotopic data, organ weight data, or other.