

### Box S1. Under ice ecology data summarization - key principles

There were five key principles used for summarizing data in this synthesis. These principles were a critical point of emphasis in instructions for data aggregation.

1. The core goal was to compile comparable data for a given sampling station between the ice-on and ice-free periods (Fig S1). Therefore, for a given lake, sampling station or year, there are two vectors of data observations (oriented in the template as an "ice-on" and a "ice-off" column) that need to be entered.
2. Each column is a computed summary of data, representing ice-on or ice-free periods for a given lake, station or year. Data are calculated aggregates [averages, coefficients of variation (CV), or maxima] of the original samples researchers originally took in each season.
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 were entered as additional columns (pairs of ice-on and ice-free columns).
4. Researchers were asked to determine the appropriate number of samples to aggregate in each of the ice-on and ice-free periods for lake(s). Given the diversity of existing data, there was no universal, *a priori* date range. The ice-on and ice-free aggregates defined as:
  - a. Ice-on: Summary data for raw samples that were collected from water under the ice.
  - b. Ice-free: Summary data for raw data collected under stratified summer conditions. This qualifier, that the water body during the ice-free period also be stratified, was designed to standardize a typical representation of ice-free lake biology, avoiding the periods of most extreme seasonal transitions. For a small minority of lakes (or specific sites within lakes) that were polymictic or lacked reliable summer stratification, summer data were from a representative open water period chosen by the primary data contributors, usually midsummer.
5. Researchers aggregated sample data for each time period across a depth range, nominally defined as the photic zone in each season. An *a priori* standard depth range could not be provided, as the relevant range will depend upon the systems under study.