**GEISHA Metadata Template: Phytoplankton Taxonomy**

The purpose of this document is to provide the GEISHA group better knowledge of the strengths and weaknesses of your phytoplankton data set and how these might affect analysis of diversity and other indices to be derived from your data. Phytoplankton samples are difficult and time-consuming to process, and the techniques and level of expertise can vary from lab to lab, therefore it is important for us to understand the data as best as possible.

**Lake name:** Lake Erken

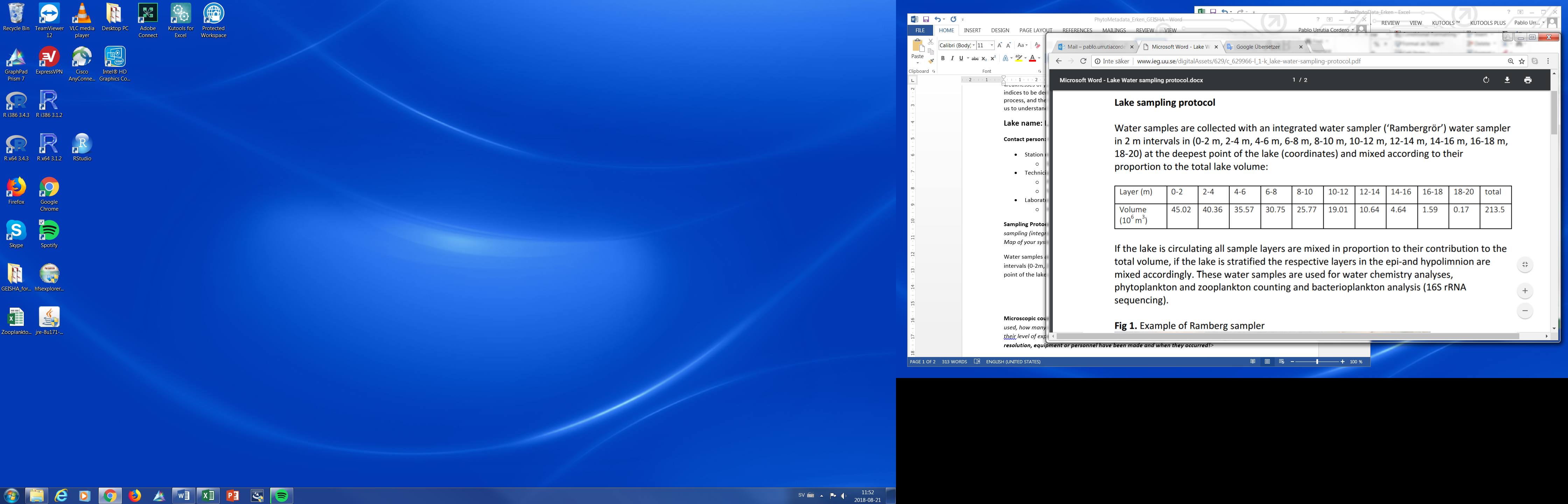
**Contact person: <name, affiliation and email address>**

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**Sampling Protocols:** *<briefly describe how the samples have been taken and preserved, dates, depth of sampling (integrated or discrete sampling), etc., and include any changes of equipment or methodology. Map of your system and location of sampling station(s) are also helpful>*

The Erken database for GEISHA contains weekly monitoring data during ice-free periods and monthly data during ice-cover periods, from 1991 (when the monitoring started at a weekly basis) till today. The samples were analyzed following the Swedish standard for phytoplankton enumeration using inverted microscopy (https://www.sis.se/api/document/preview/46525/). The samples (collected in 100mL glass bottles) are always preserved with a few drops of Lugol´s solution and stored at 4°C in dark until they are counted.

Water samples are collected with an integrated water sampler (‘Rambergrör’) water sampler in 2m intervals (0-2m, 2-4m, 4-6m, 6-8 m, 8-10m, 10-12m, 12-14m, 14-16 m, 16-18m, 18-20m) at the deepest point of the lake and mixed according to their proportion to the total lake volume:



If the lake is circulating, all sample layers are mixed in proportion to their contribution to the total volume. If the lake is stratified the respective layers in the epi-, meta- and hypolimnion are mixed accordingly. These water samples are also used for water chemistry analyses.

**Microscopic counts:** *<describe methods and equipment used for counting, which magnification has been used, how many individuals have been counted, taxonomic resolution, who counted the samples and their level of expertise, etc. Please include information if any changes of methodology, taxonomic resolution, equipment or personnel have been made and when they occurred!>*

The samples are all analysed at the Erken Laboratory, which is certified by SWEDAC (Swedish Board for Accreditation and Conformity Assessment). The microscopic counts are done on an inverted microscope with counting chambers, ranging from 5 to 25ml. The choice of chambers depends on the phytoplankton density, i.e., sample abundances are adjusted with the differences in chamber volumes, so that the counts are normally done over similar cell densities. A similar standard counting screening method is then employed by counting small-sized taxa over either a number of fields of view or transects (400X magnification), medium-sized taxa over transects (100X magnification) and large-sized taxa over a part or entire of the bottom of the chamber (100X magnification).

The technicians who counted the samples changed over the years:

1991 – 2007: Judit Padisak’s lab - this may include different people

2008 – 2015, 2016: Yang Yang

2013, 2017: Pia Larsson

**Calculations:** *<if applies, describe how the data have been processed, determination of cell dimensions and how the biovolume and/or biomass have been calculated, etc.>*

The Opticount software is used to compute cell biomasses from cell count data (<http://science.do-mix.de/software_opticount.php>), this for the years 2008-2017. This software was not used for the 1991-2007 period. This information has been requested to Judit Padisak´s lab - we will try to update this as soon as we receive more information.

**Comments:** *<if applies, please write down any additional information about the data, which you might find relevant for data processing >*

1. **Samples from 13-04-1992 to 09-06-1992, 27-11-1992 to 04-05-1994, 01-06-1994 to 09-06-1994 (this represents samples ranging for about 3 monitoring years, from 1992 to 1994)**: The depths at which the samples were taken for these periods are unknown (not registered at the original computer databases). However, they come registered as “epilimnion”, “metalimnion” and “hypolimnion”. This indicates that the samples were taken at either of these three strata (either at a specific depth within these strata and over the entire depth range that each of the strata consisted of). For simplicity, the depths at the GEISHA dataset have been referred to as 3m (taken at the epilimnion), 8m (taken at the metalimnion) or 15m (taken at the hypolimnion).
2. **Samples at 06-05-1997, 21-05-1997, 17-02-1998, 24-12-2001 (these are 4 specific dates)**: There is no information on whether these particular samples represent the “epilimnion”, “metalimnion” or hypolimnion”.

* **The file named as “uknown\_depths\_Erken” summarizes the dates where the depth is unknown, also for the water chemistry data and, the pH and EC sonde data**

1. **Frequency of monitoring**: Note that, at occasions, the frequency of monitoring either increased over the weekly routing samplings or decreased if samples were not possible to be taken for any reason.
2. **Integrated samples**: Note that samples are generally integrated over a depth range of either the entire water column (if this one is mixed) or over the entire range of a specific stratus (epilimnion, metalimnion or hypolimnion). However, there are years where, in addition to these integrated samples, integrated samples (collected with a Rambergrör sampler) were taken at a specific depths of the water column (this is indicated in the dataset as a sampled taken at e.g., 5m minimum depth and 5 m maximum depth if the sampler was deployed at a 5 m depth).

**References:** *<list references or links to data repositories and method descriptions, include taxonomic keys used>*

Swedish Standard for phytoplankton enumeration: https://www.sis.se/api/document/preview/46525/

Opticount software: http://science.do-mix.de/software\_opticount.php