Operation Mendota Drain (OMD) Sampling Procedures

Sample Timing and Location

Lake sampling will occur once during the season, preferably during the clear water phase. The location is either Deep Hole (+43° 5' 54.64", -89° 24' 22.43) or University Bay (+43° 4' 58.33", -89° 25' 17.69").

At the sample location, the information in sections A-D should be collected and recorded in the lake sampling datasheets.

Water Column Profiles. The field meter (or sonde) must be calibrated in accordance with the manufacturer instructions and properly calibrated no longer than 24 hours prior to sampling of the lake. At regular intervals record: (1) dissolved oxygen concentration (mg/l) and percent saturation, (2) pH (S.U) and (3) temperature in degrees Celsius (°C). The first reading should be taken at the surface (0.5 m depth), the second at 1.0 m, and then at 1.0 m intervals. Final readings should correspond with the depth of the bottom samples approximately 0.5m from the bottom. Readings can be collected using a field meter connected to an appropriate length cord. The probe should be adequately weighted such that it falls vertically through the water column. Care should be taken to not submerge the probe into the sediment.

Secchi Depth. (20 cm diameter black-white disk). To measure Secchi depth, remove sunglasses if applicable. Lower the disk into water at a location outside the influence of direct sunlight, such as within the shadow of the boat. Follow Section C for instructions.

Photosynthetically active radiation (PAR). Designates the spectral range of solar radiation from 400 to 700 nanometers that photosynthetic organisms are able to use in the process of photosynthesis. Follow Section C for instructions.

Water Samples
Refer to Section B to see what should be sampled.

Generally, water samples are taken from 0.5 m from the surface.

RNA Samples. Collect the sample water at a depth of 0.5 m. Filtration volume size will depend on the particulate load of the water. Generally 200-300 ml of sample water is required. Filtering and storing should be performed in less than 10 min to avoid errors resulting from changes in gene expression of the bacterial populations in the lake. **Store the second and third filtered water samples for inorganic analyses (Attachment 1).**

Preservation - Sampled filters should be stored in screw cap tubes and frozen in liquid nitrogen in the dark until extraction.

Whether on board or in the lab, all apparatus should be clean and acid free. Assemble the filtration apparatus by gently resting a sterile 0.22 um pore-diameter nitrocellulose filter on the clean 47 mm filter holder. Assemble a 14-size silicone tube in the portable peristaltic pump and attach the filter holder to one extreme of the tube. Attach cheesecloth in the other extreme with duck tape to avoid bigger particles to pass.

Filtration should not exceed ¾ of the pump speed in order to avoid high filtration pressure. Higher filtration pressures may damage cells.

Supplement - Sampling Protocol

Initially, depth profile including temperature, pH, dissolved oxygen, and conductivity data must be collected at a maximum of 1-meter intervals. A thermocline exists if greater than 1°C change occurs within a depth change of 1 meter or less. Determination of the existence of a thermocline is essential for proper sampling for modeling.

Timing

Samples should be taken every 2 hours after sunrise.
Samples must be taken during sunlight for PAR and Secchi transparency.

Sampling

Water quality components
Using filtered water:

- Total Dissolved Nitrogen
- Total Dissolved Phosphorus
- Ammonia
- Urea
- Polyamines

Using unfiltered water:

- Total Nitrogen
- Total Phosphorus
- Cyanotoxins

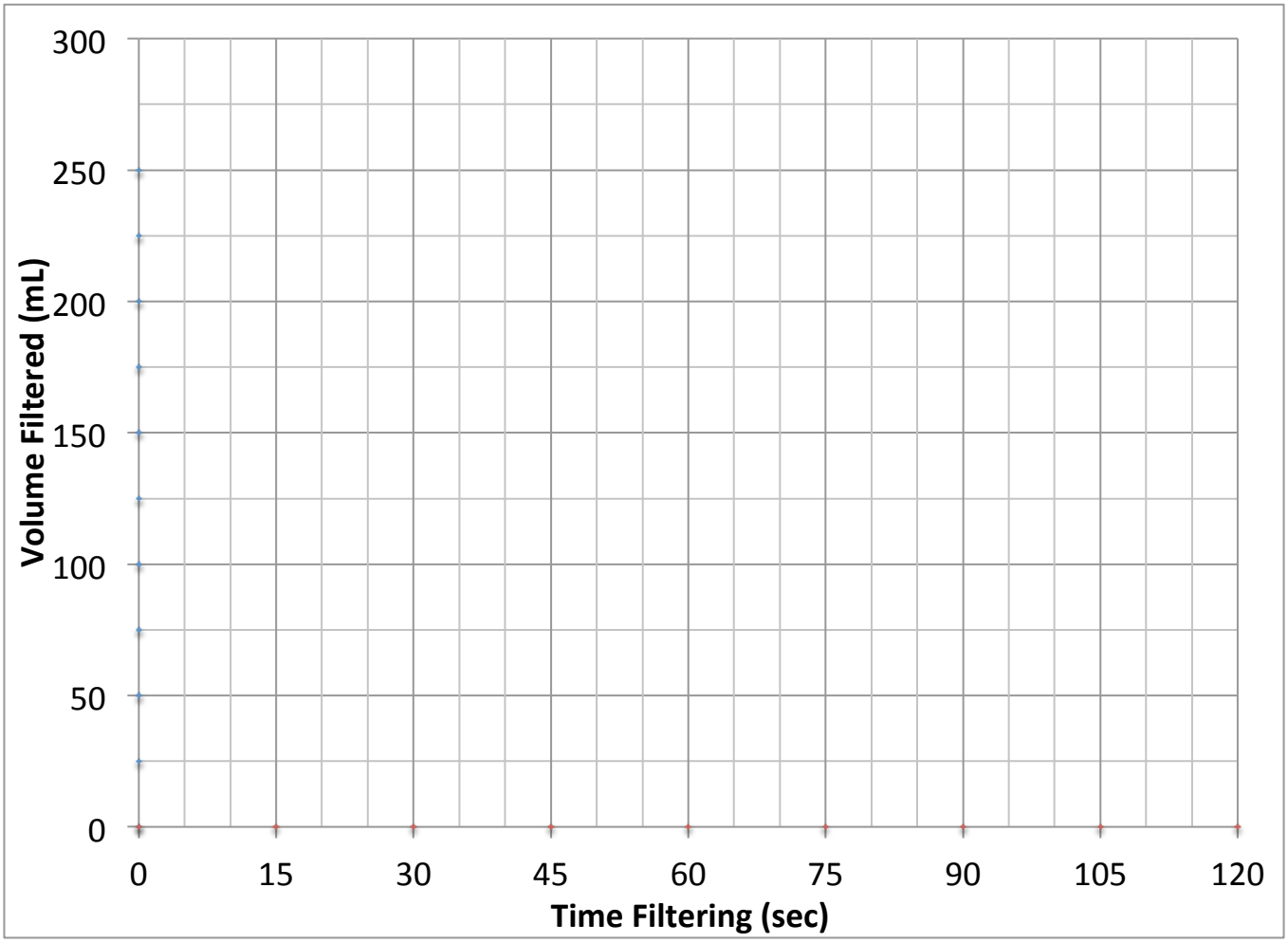
Physical parameters

- Temperature
- pH
- Conductivity
- Dissolved Oxygen
- Secchi Disk Transparency

Sample #	
People	
Date	

Filtering Plots

Fill this out to determine when to stop filtering
Filter until the **plot levels off, or for 2 minutes**, whichever comes first
Filter replicates 2 and 3 for the **same volume** as 1



Time (sec)	Volume (mL)

Time (sec)	Volume (mL)

Chosen Volume for all replicates:

Sample #:	Date:	Depth:

Filtered Water

Use water from first filter to **Rinse** graduated cylinder + larger bottle
Save water from 2nd and 3rd filters in larger bottle
After filtering, fill the small bottles from the larger bottle
Fill to at least minimum volume, but more is better
Max volume to fill is 1/4 inch below top line
If you have to skip a bottle, skip NO2

Time	
Person	

Analysis	Bottle size (mL)	Min fill (mL)	Actual fill (mL)	Notes
TDN, TDP, NH4, NO3+NO2	**125**	40		
NO2	**125**	20		
urea	**75**	20		
polyamines	**75**	20		

Unfiltered Water

After collecting filters, collect unfiltered water
Use the same tubing/pump/depth, just take the filter out
Rinse tubing for 30 sec
Collect straight into the bottles
Fill to 1/4 inch below top line

Time	
Person	

Analysis	Bottle size (mL)	Filled?	Notes
TN/TP	**125**		
cyanotoxins	**125**		

Unfiltered Water + Gluteraldehyde

Time	
Person	

Analysis	Bottle Type	Water (mL)	Gluteraldehyde (mL)
Phytoplankton + Zooplankton			
Notes:			

Sample #	
Date	

PAR

Hold arms length out from boat, on **sunny** side
The handheld portion is **not waterproof**
Hit "ave" to collect the reading. It averages readings over a short time period.
If it is alternating sun and clouds, take all readings in one or the other condition
For surface measurement, make sure it does not come out of the water during waves

Time	
Cloud cover	
Person	

Depth (m)	Reading	Notes
Surface		
1		
2		
3		
4		
5		
6		

Secchi

Take your **sunglasses** off
Take measurement on the **shady** side of the boat, in boat's shadow
Down measurement: lower until you can't see it anymore
Up measurement: lower an extra meter, then raise until you first see it
Estimate to the nearest 1/4 meter

Time	
Cloud cover	

Person	Down (m)	Up (m)

Notes:

YSI Profile

The EXO2 sonde records measurements every 2 seconds
Lower it to depth and allow a few seconds to **equilibrate**
Record the **time and depth,** it time stamps its measurements
Leave **safety line** tied with a bowline to side of boat at all times

Sample #	
Date	
Person	

Depth (m)	**Time**	**pH (S.U.)**	**DO (mg/L)**	**% Sat**	**T (°C)**
0.5					
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Date: _____ **Location:** _____ **Depth:**_____

Filter #	Replicate	Start Time	End Time	Volume (mL)	Sample #	People	Notes
ME 15 0256	**1**				1		
ME 15 0257	**2**						
ME 15 0258	**3**						
ME 15 0259	**4**						
ME 15 0260	**1**				2		
ME 15 0261	**2**						
ME 15 0262	**3**						
ME 15 0263	**1**				3		
ME 15 0264	**2**						
ME 15 0265	**3**						

Date: _____ **Location:** _____ **Depth:**_____

Filter #	Replicate	Start Time	End Time	Volume (mL)	Sample #	People	Notes
ME 15 0266	**1**				4		
ME 15 0267	**2**						
ME 15 0268	**3**						
ME 15 0269	**4**						
ME 15 0270	**1**				5		
ME 15 0271	**2**						
ME 15 0272	**3**						
ME 15 0273	**1**				6		
ME 15 0274	**2**						
ME 15 0275	**3**						

Date: _____ **Location:** _____ **Depth:**_____

Filter #	Replicate	Start Time	End Time	Volume (mL)	Sample #	People	Notes
ME 15 0276	**1**				7		
ME 15 0277	**2**						
ME 15 0278	**3**						
ME 15 0279	**4**						
ME 15 0280	**1**				8		
ME 15 0281	**2**						
ME 15 0282	**3**						
ME 15 0283	**1**				9		
ME 15 0284	**2**						
ME 15 0285	**3**						

Date: _____ **Location:** _____ **Depth:**_____

Filter #	Replicate	Start Time	End Time	Volume (mL)	Sample #	People	Notes
ME 15 0286	**1**				10		
ME 15 0287	**2**						
ME 15 0288	**3**						
ME 15 0289	**4**						
ME 15 0290	**1**				11		
ME 15 0291	**2**						
ME 15 0292	**3**						
ME 15 0293	**1**				12		
ME 15 0294	**2**						
ME 15 0295	**3**						
ME 15 0296	**1**				13		
ME 15 0297	**2**						
ME 15 0298	**3**						

Date: _____ **Location:** _____ **Depth:**_____

EXTRA PAGE, fill in filter numbers if you use this page.

Filter #	Replicate	Start Time	End Time	Volume (mL)	Sample #	People	Notes
ME 15	1						
ME 15	2						
ME 15	3						
ME 15	1						
ME 15	2						
ME 15	3						
ME 15	1						
ME 15	2						
ME 15	3						
ME 15	1						
ME 15	2						
ME 15	3						

Date: _____ **Location:** _____ **Depth:**_____

EXTRA PAGE, fill in filter numbers if you use this page.

Filter #	Replicate	Start Time	End Time	Volume (mL)	Sample #	People	Notes
ME 15	1						
ME 15	2						
ME 15	3						
ME 15	1						
ME 15	2						
ME 15	3						
ME 15	1						
ME 15	2						
ME 15	3						
ME 15	1						
ME 15	2						
ME 15	3						

Date: _____ **Location:** _____ **Depth:**_____

EXTRA PAGE, fill in filter numbers if you use this page.

Filter #	Replicate	Start Time	End Time	Volume (mL)	Sample #	People	Notes
ME 15	1						
ME 15	2						
ME 15	3						
ME 15	1						
ME 15	2						
ME 15	3						
ME 15	1						
ME 15	2						
ME 15	3						
ME 15	1						
ME 15	2						
ME 15	3						

Date: _____ **Location:** _____ **Depth:**_____

EXTRA PAGE, fill in filter numbers if you use this page.

Filter #	Replicate	Start Time	End Time	Volume (mL)	Sample #	People	Notes
ME 15	1						
ME 15	2						
ME 15	3						
ME 15	1						
ME 15	2						
ME 15	3						
ME 15	1						
ME 15	2						
ME 15	3						
ME 15	1						
ME 15	2						
ME 15	3						