



ECOLOGICAL STATE OF DUROWSKIE LAKE

# WATER QUALITY

WĄGROWIEC – POZNAŃ 2017

**Supervisor:**

Dr. Naicheng Wu

**Master Students:**

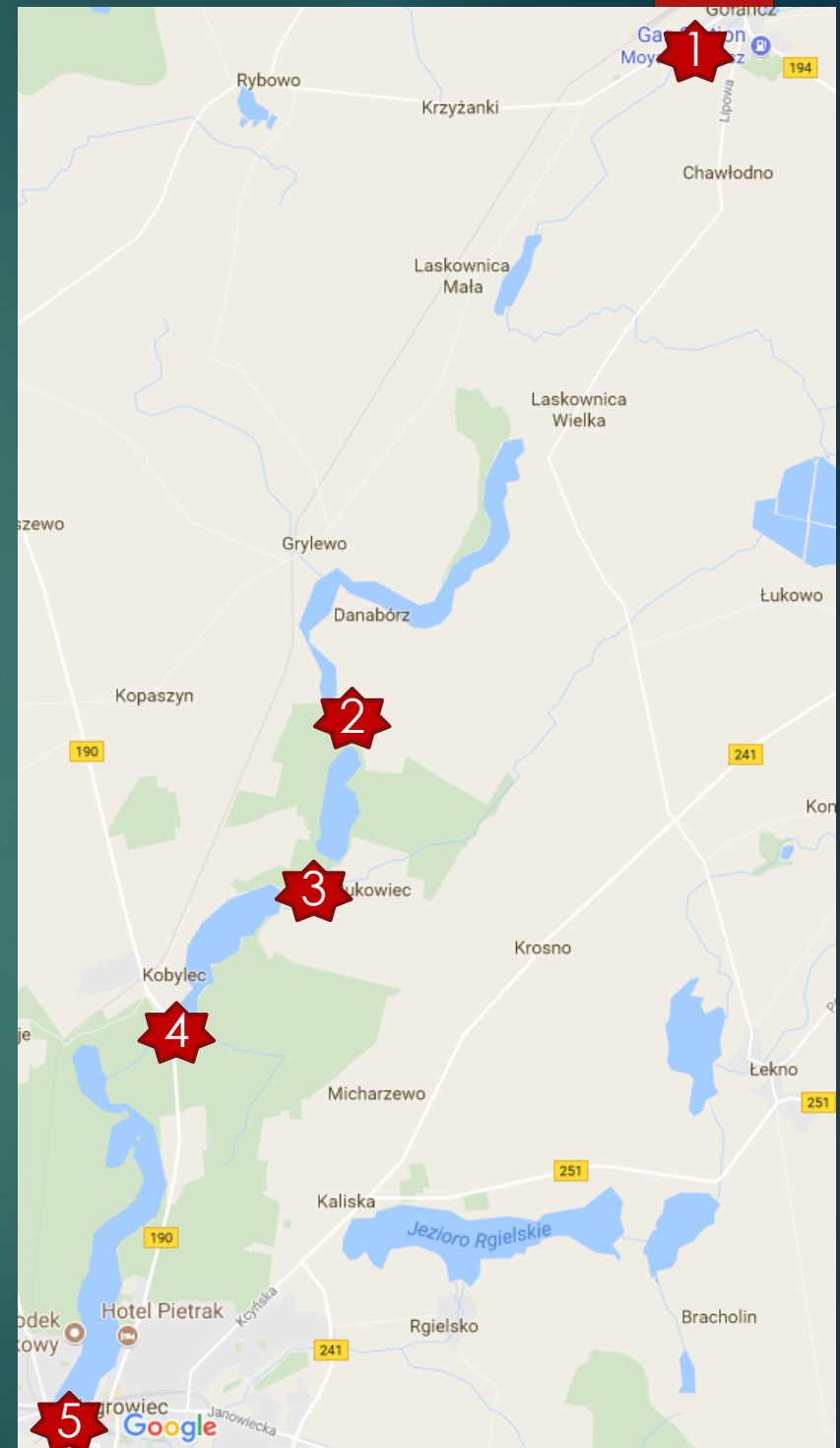
Gulzara Seitmaganbetova

Madina Alimbayeva

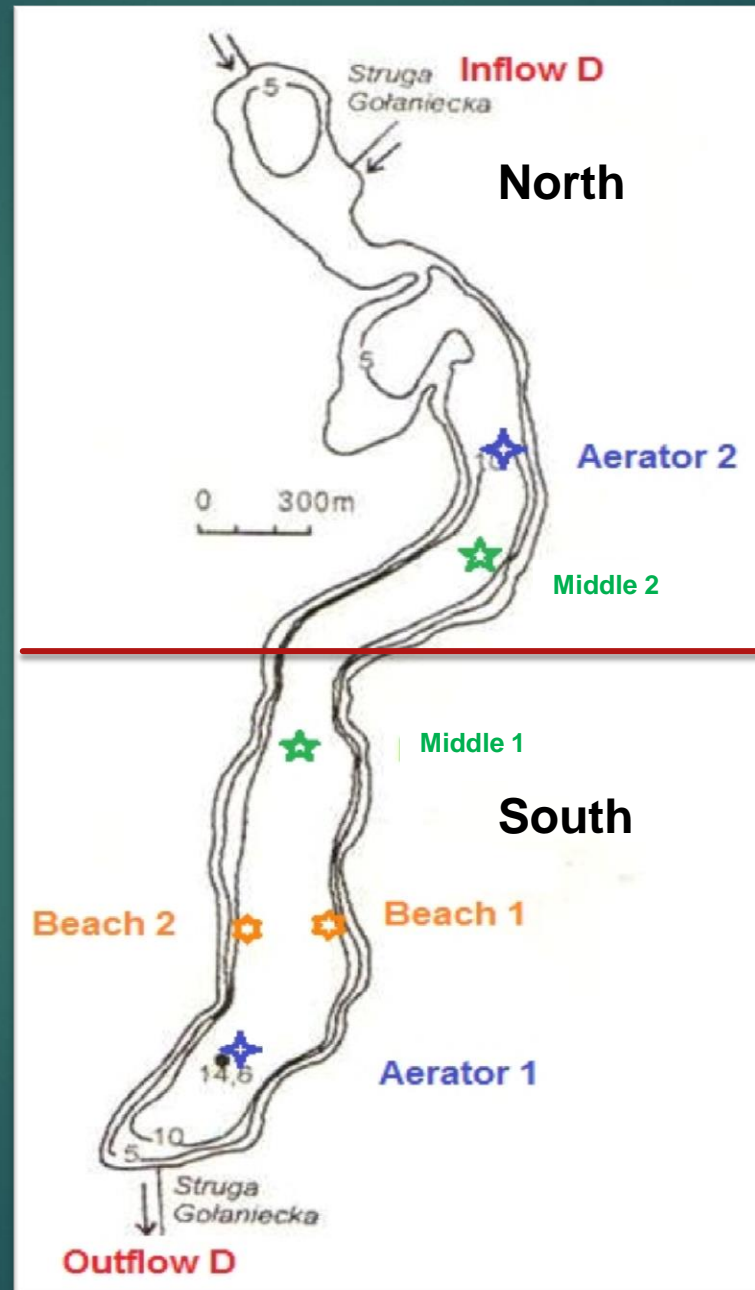
Millaray Sierra Olea

# Study area

- 1 Inflow Golancz
- 2 Inflow Bukowieckie
- 3 Inflow Kobylecki
- 4 Inflow Durowskie
- 5 Outflow Durowskie



# Study area



# Objectives

- I. Determination of nutrients inflow and outflow of the lake
- II. Assessment of current ecological state of the lake
- III. Evaluation of long-term changes during restoration

# Objectives

## Objective I:

### Nutrient Load

$$\text{Nutrient [mg/l]} \times \text{Discharge [m}^3\text{/s]} \times 86,4 = \text{Load [kg/d]}$$

## Objective II and III:

### Trophic State Index (TSI) (Carlson and Simpson 1996)



# Methods

- **Measurements of discharge**
  - Flow velocity [m/s]
  - Width [m]
  - Depth [m]
- **Physico-chemical parameters**
  - Temperature [°C]
  - pH
  - Conductivity [ $\mu\text{S}/\text{cm}$ ]
  - Oxygen [mg/l, %]
  - Nutrients ( $\text{PO}_4$ , TP,  $\text{NH}_4$ ,  $\text{NO}_3$ ,  $\text{NO}_2$ )
  - Transparency [m]
- **Biological parameter**
  - Chlorophyll-a [ $\mu\text{g}/\text{l}$ ]

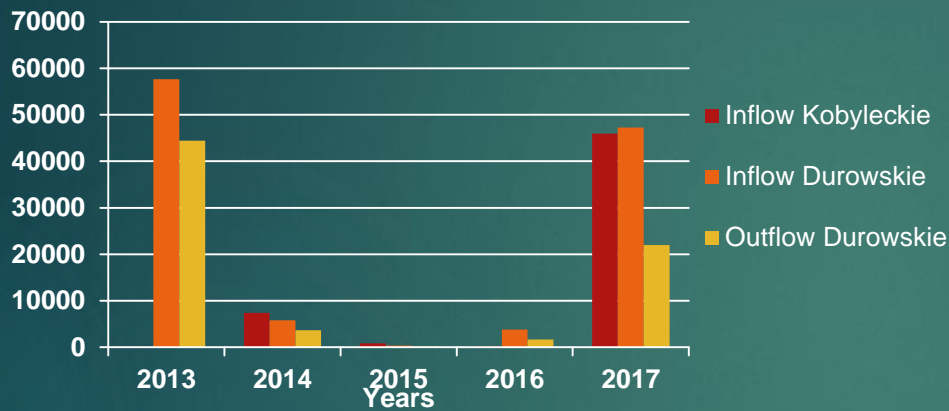


# Results

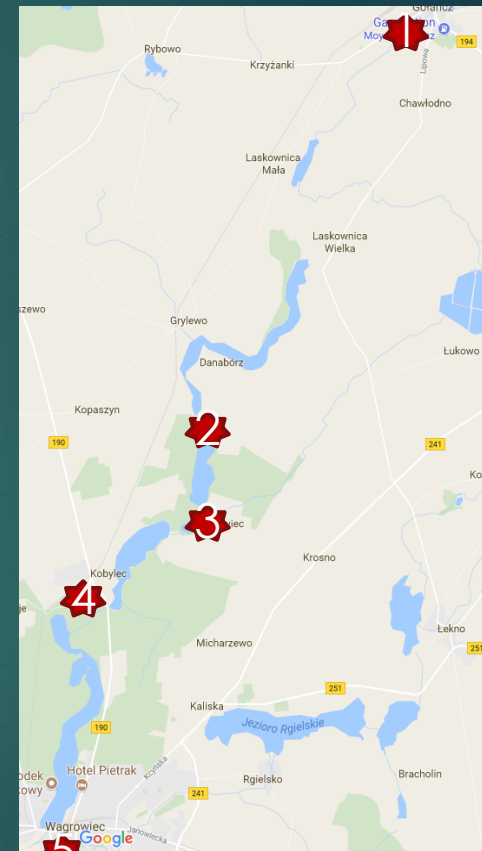
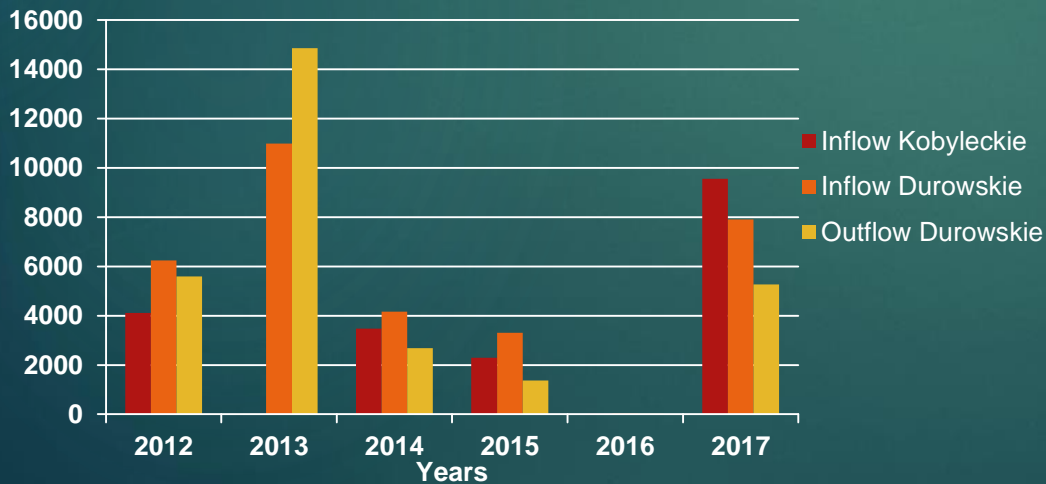


# Nutrient Loads 2012-2017

## Nitrate NO<sub>3</sub> (kg/y)



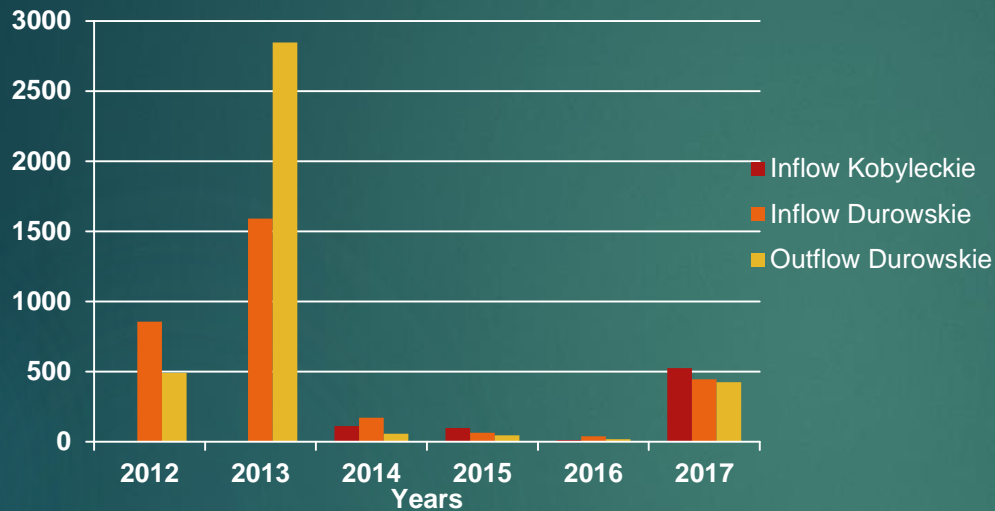
## Ammonium NH<sub>4</sub> (kg/y)



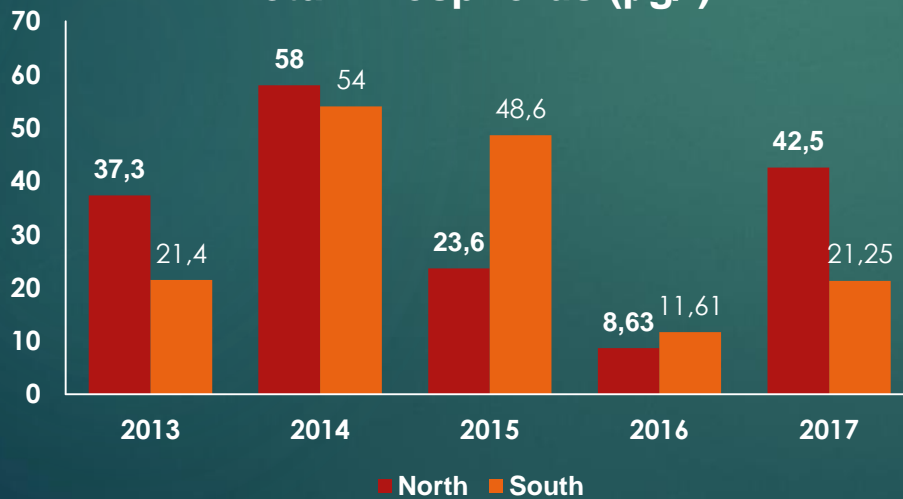


# Nutrient Loads 2012-2017

## Total Phosphorus (kg/y)

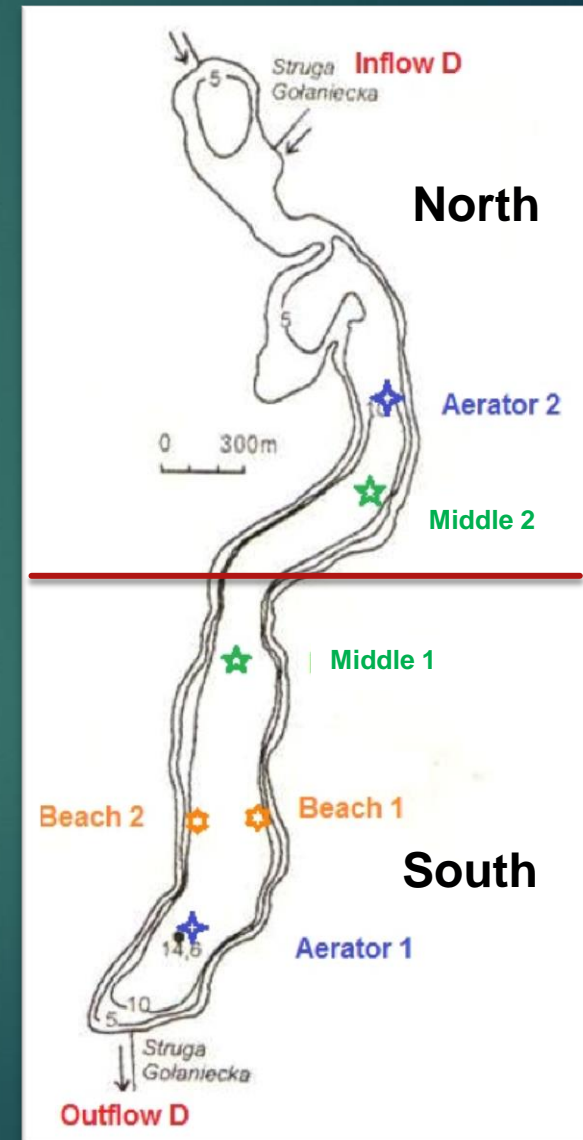
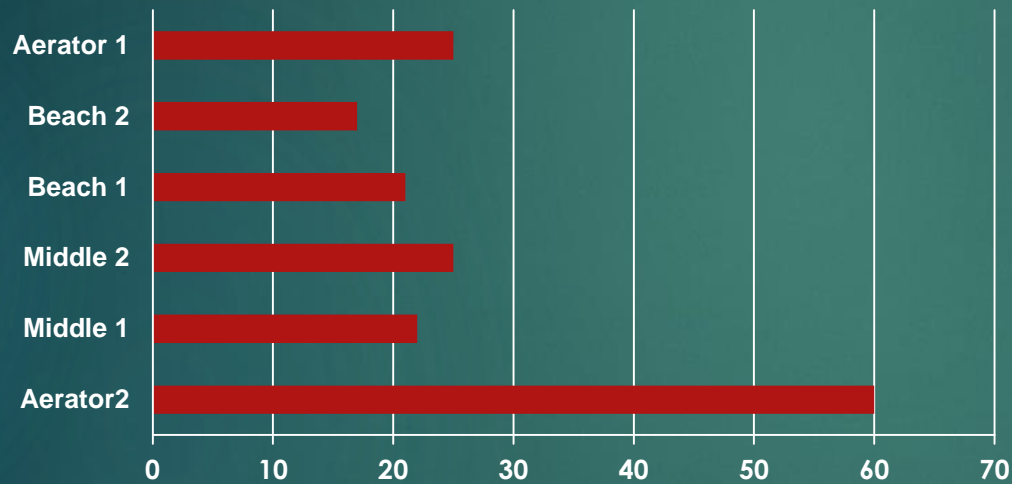


## Total Phosphorus (µg/l)



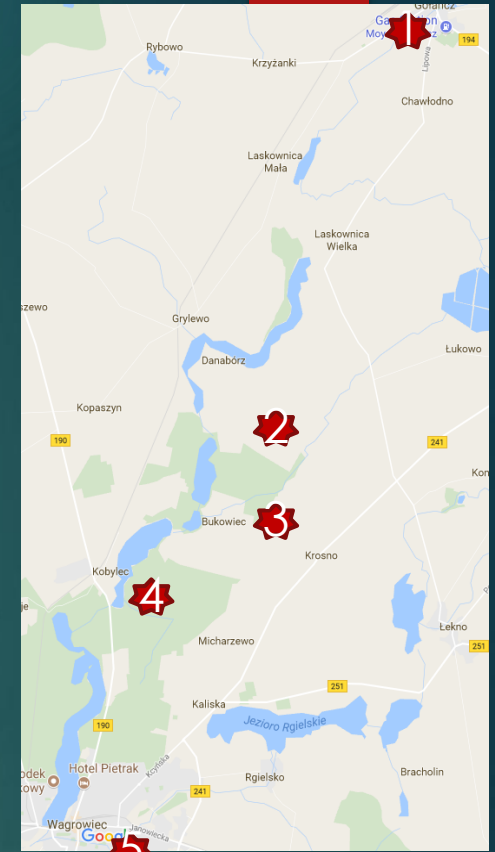
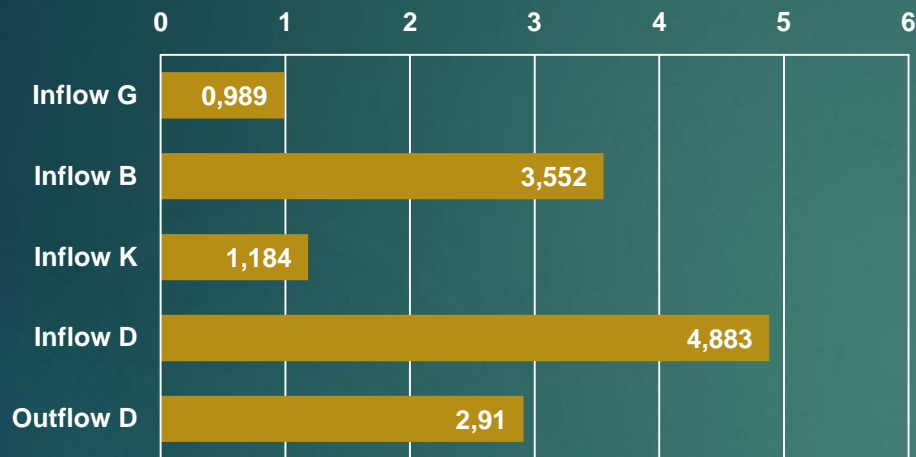
# Nutrient Concentration 2017

Total Phosphorus ( $\mu\text{g/l}$ )  
Whole lake



# Nutrients Concentration 2017

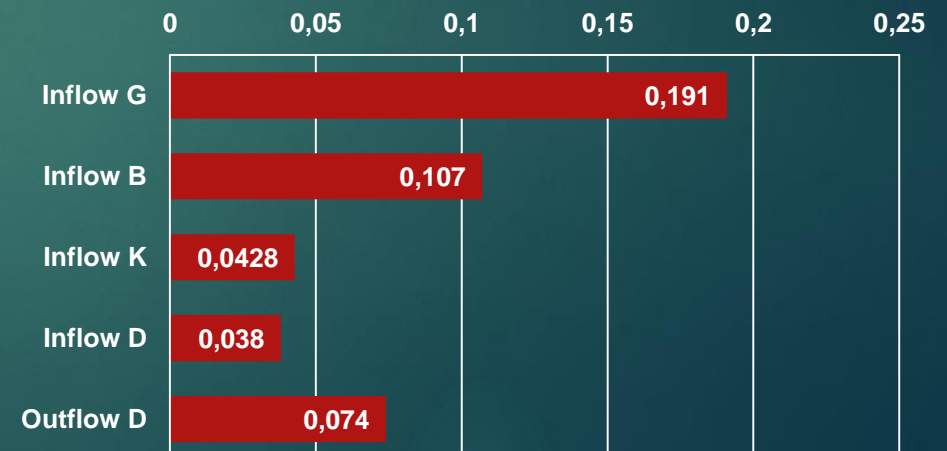
## Nitrate NO<sub>3</sub> (mg/l)



## Ammonium NH<sub>4</sub> (mg/l)

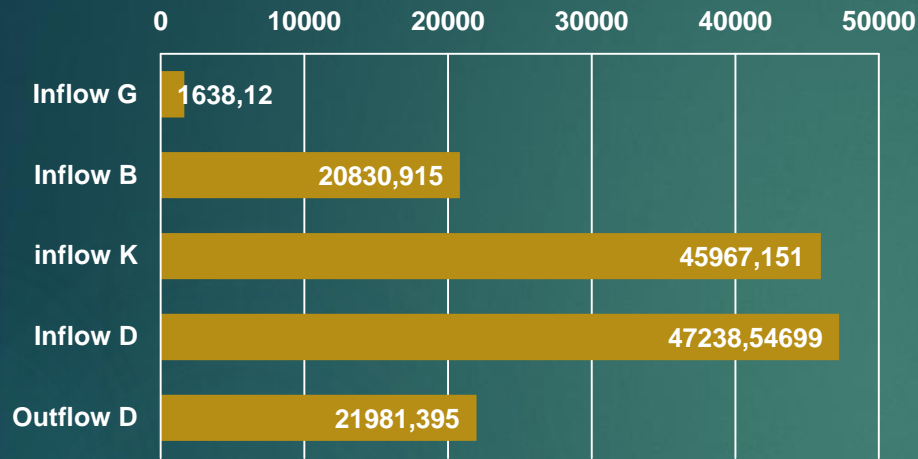


## Total Phosphorus (mg/l)

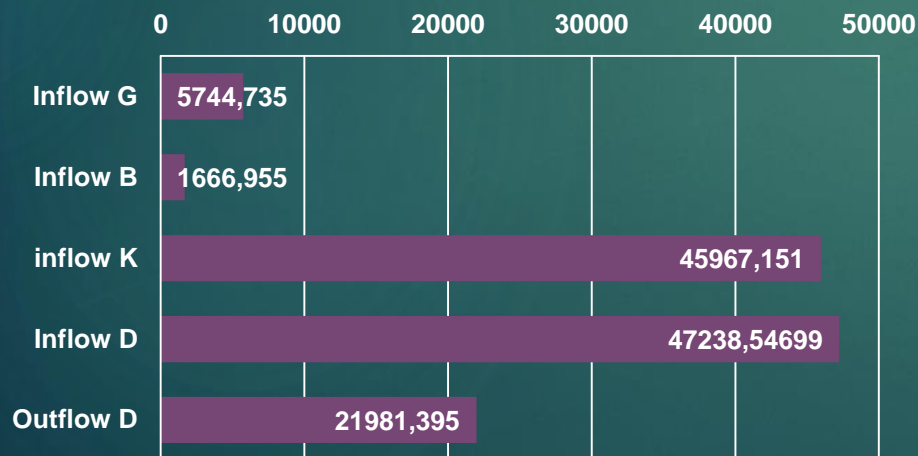


# Nutrient Loads 2017

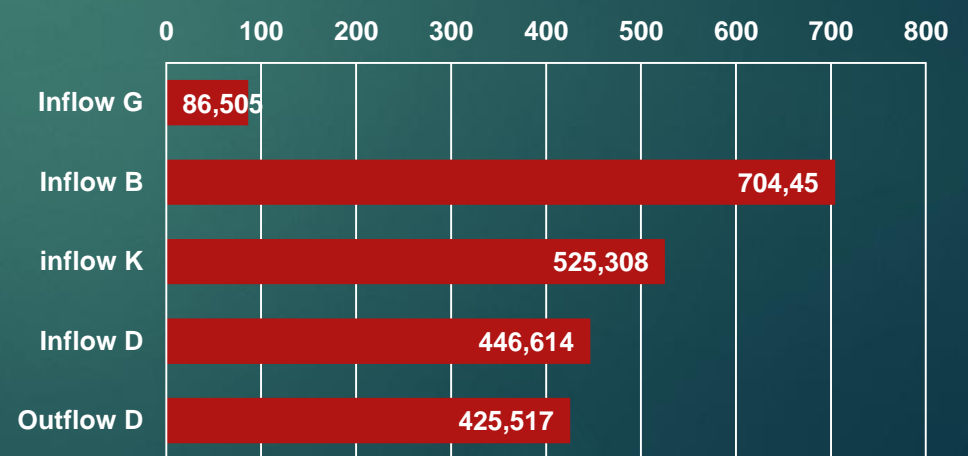
## Nitrate NO<sub>3</sub>(kg/y)



## Ammonium NH<sub>4</sub> (kg/y)

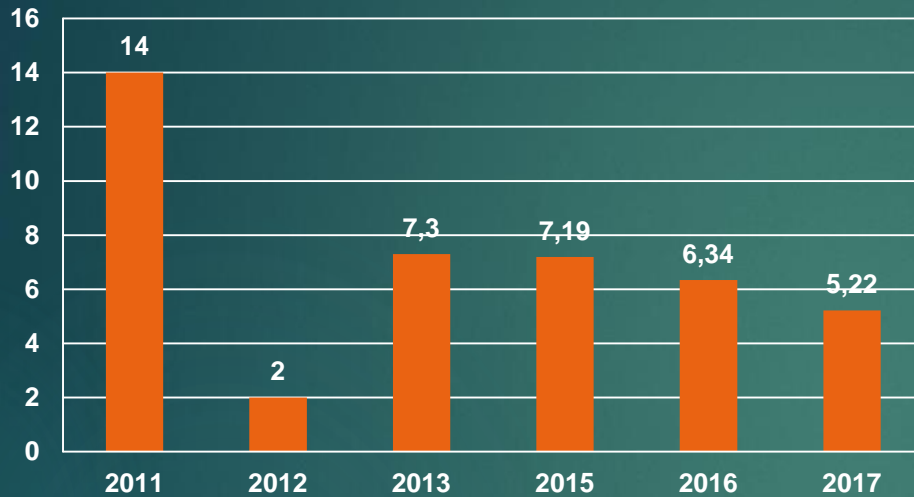


## Total Phosphorus (kg/y)

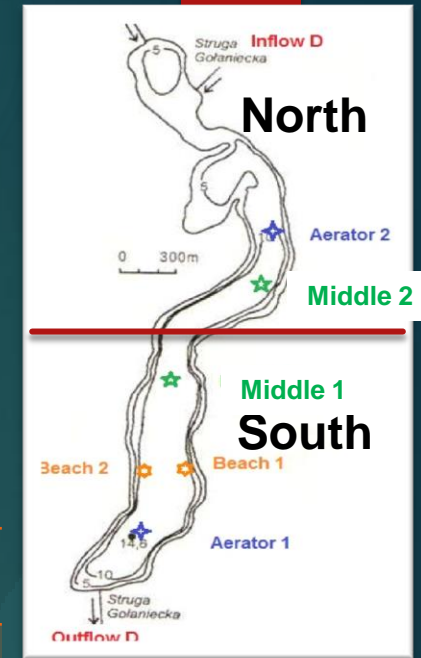


# Chlorophyll α 2017

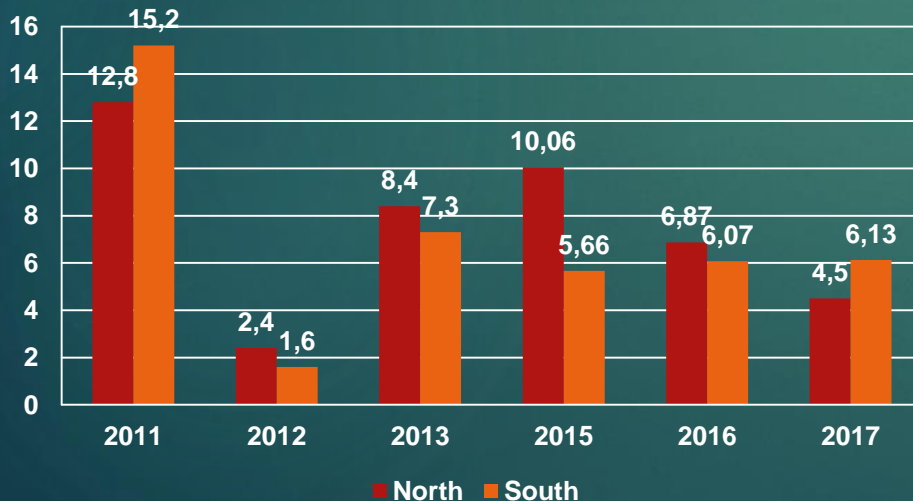
## Chlorophyll α (µg/l) Whole lake



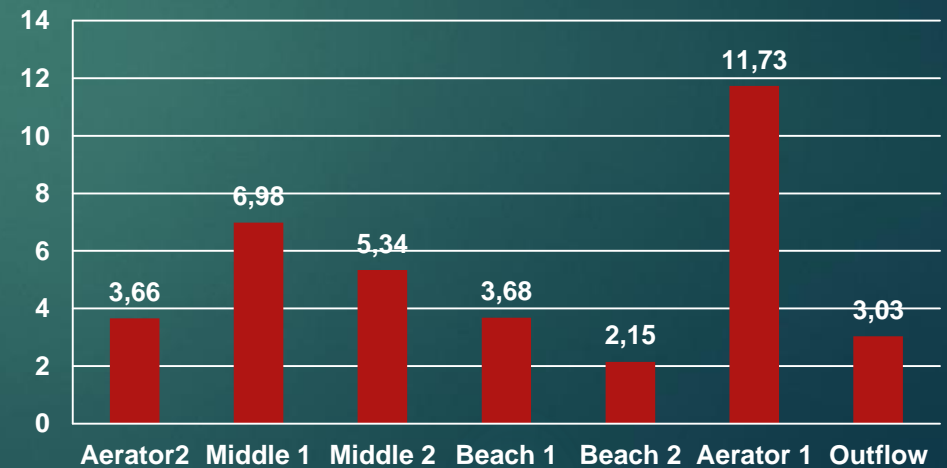
Chlorophyll α (µg/l)	Trophic state
0-2,6	Oligotrophic
2,6-7,3	Mesotrophic
7,3-56	Eutrophic
56-155+	Hypereutrophic



## Chlorophyll α (µg/l)

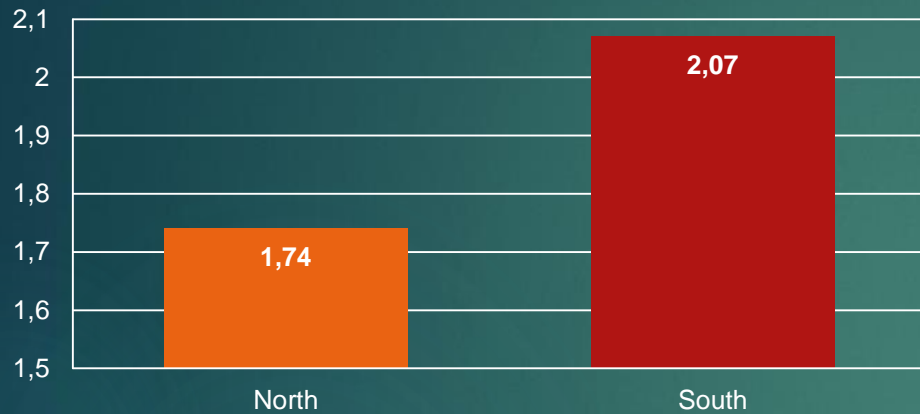


## Chlorophyll α (µg/l)

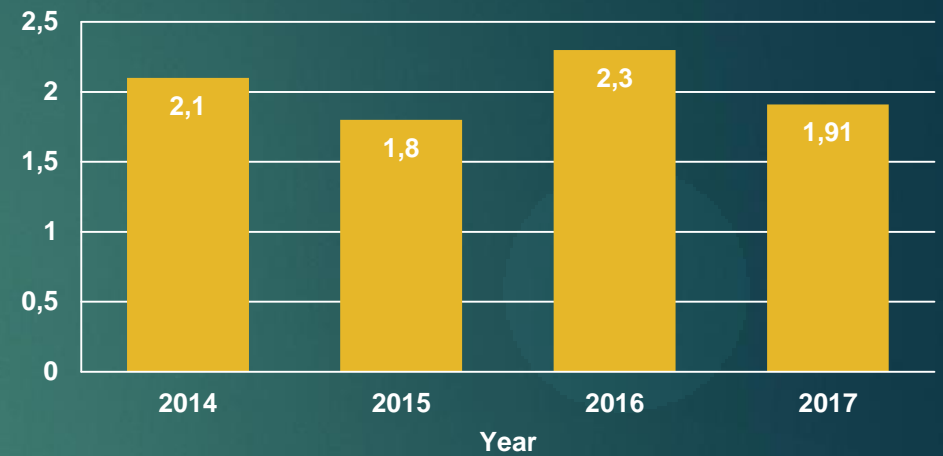


# Turbidity

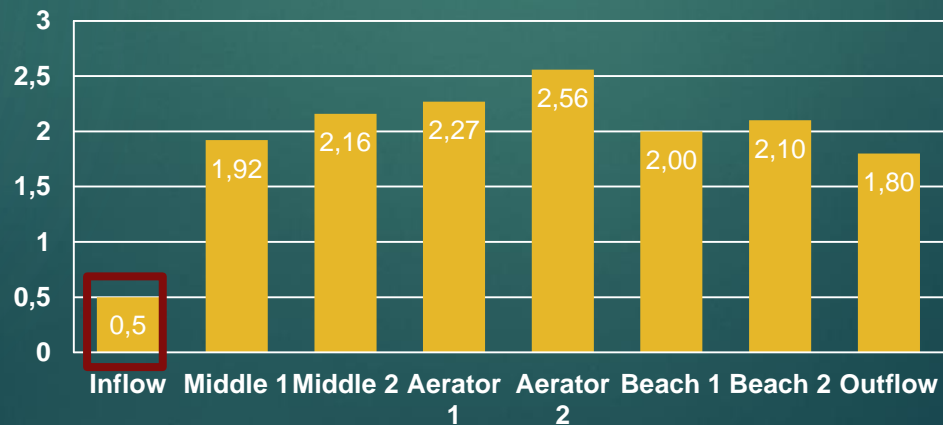
## Secchi Disk (m) 2017



## Secchi Disk (m)

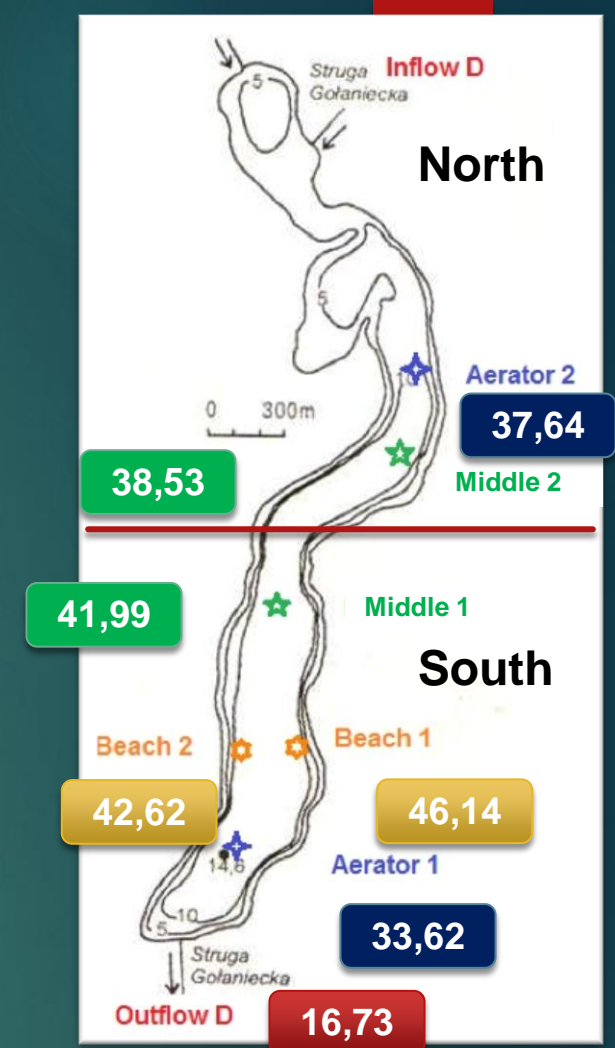
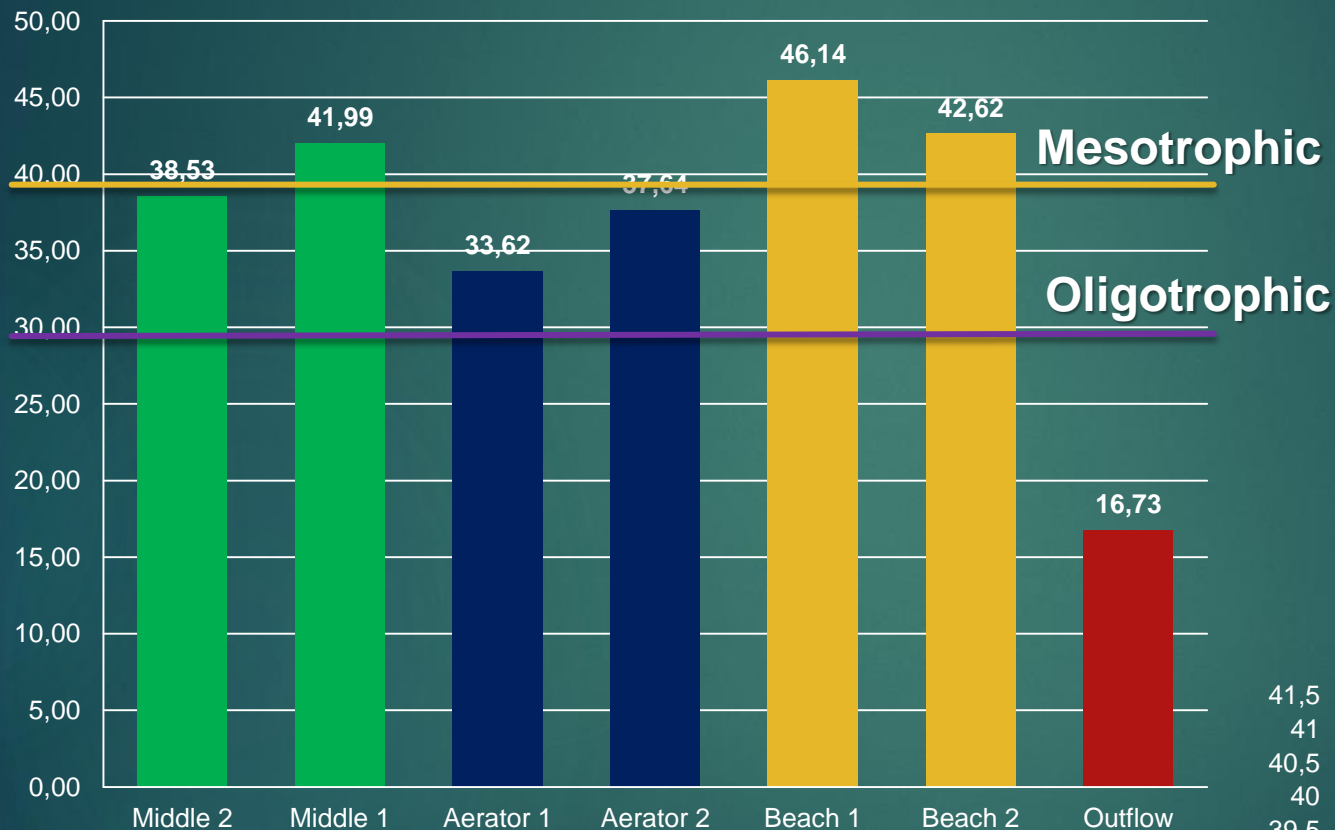


## Secchi Disk (m) 2017

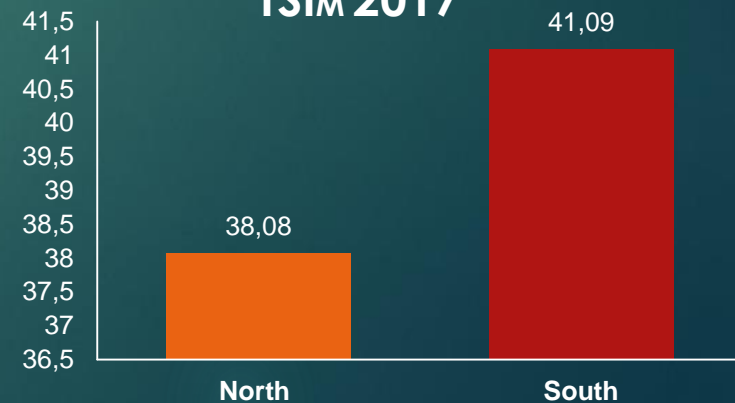


# Trophic State Index (TSI)

In Lake TSI<sub>M</sub>

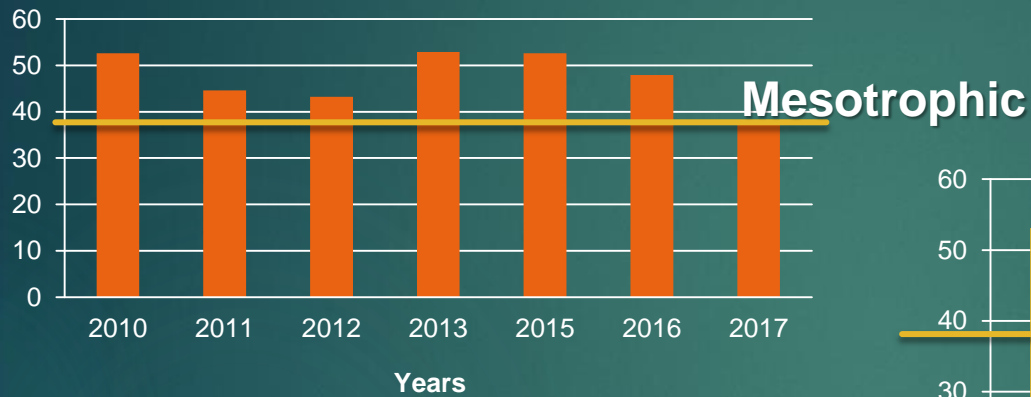


TSI<sub>M</sub> 2017

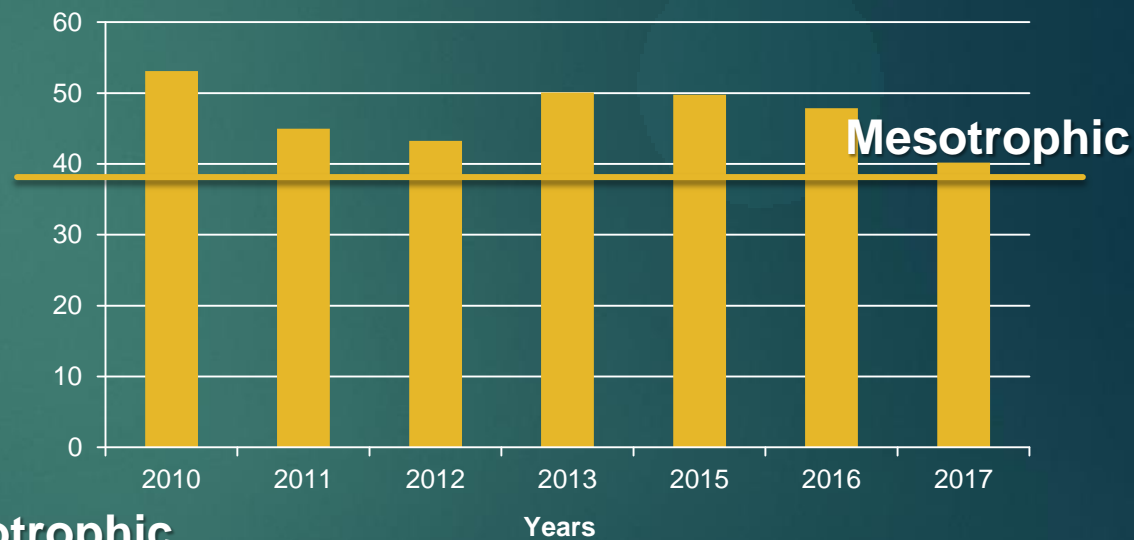


# Trophic State Index (TSI)

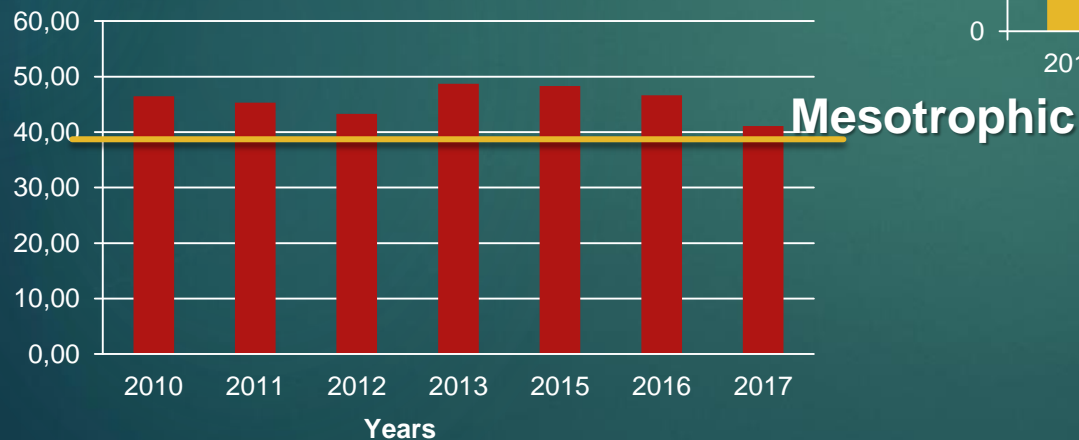
## TSI<sub>M</sub> in North



## TSI<sub>M</sub> in Whole lake



## TSI<sub>M</sub> in South



TSI <sub>M</sub>	Trophic state
<30-40	Oligotrophic
40-50	Mesotrophic
50-70	Eutrophic
70-100+	Hypereutrophic



# Conclusion

- ▶ Major source of nutrients are incoming from upstream catchments and accumulating in Lake Durowskie .
- ▶ State of the lake is Mesotrophic.
- ▶ High TSI and Chlorophyll a value for South part of the lake.
- ▶ The general state of the lake has improved in comparison to previous years.



# Thank you!

**Supervisor:**

Dr. Naicheng Wu

**Master Students:**

Gulzara Seitmaganbetova

Madina Alimbayeva

Millaray Sierra Olea