ECOLOGICAL STATE OF LAKE DUROWSKIE
What algae tell us?
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WĄGROWIEC
wyzwala energię

**Main aim:** What is the trophic state of Lake Durowskie?

Objectives: Horizontal (sampling sites) and Vertical (depth) analysis.

Why algae?

- Sensitive indicators for pollution and eutrophication.

- Support the basis of the food web in freshwater ecosystems.

- Environmental adaptive features on freshwater ecosystem.

Cyanobacteria
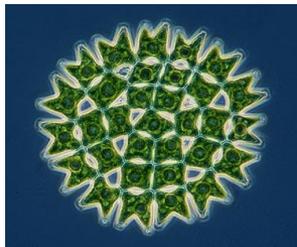
Green algae
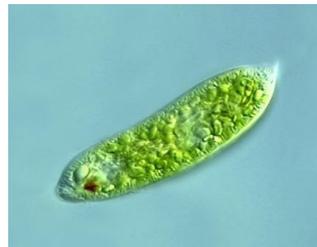
Euglenoids

Dinoflagellates

Diatoms

Periphyton
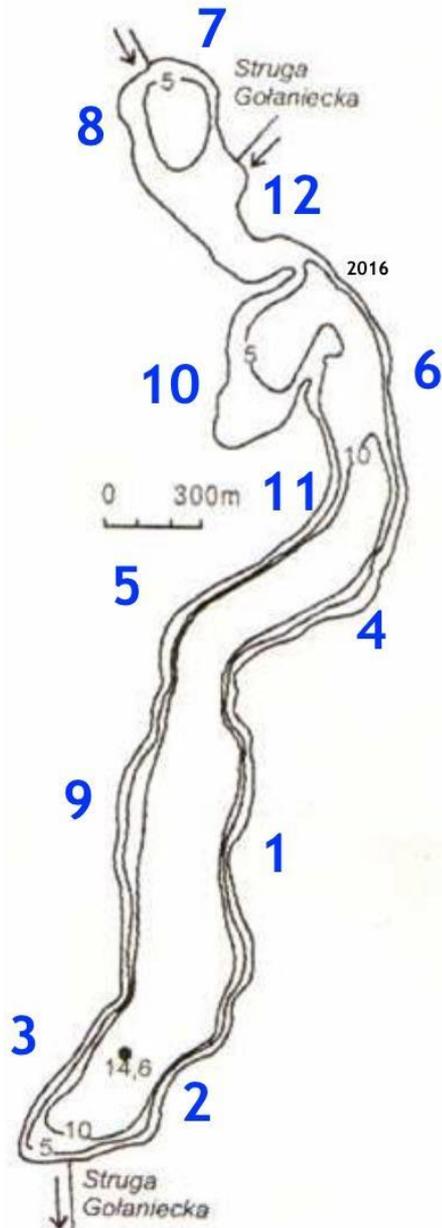
Phytoplancton
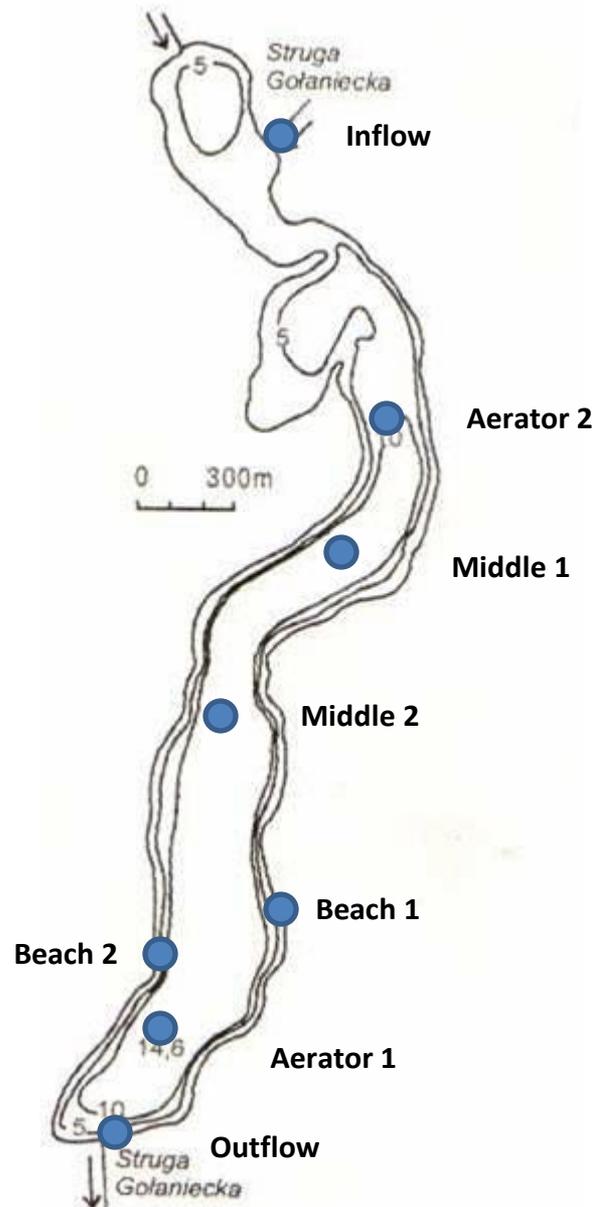
Sampling sites

Periphyton
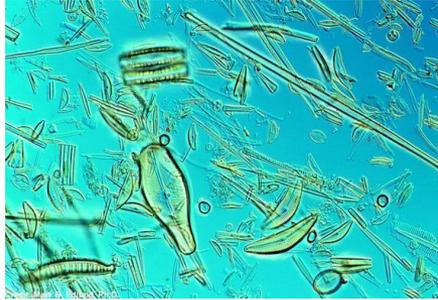
O$_2$,pH, Trophic Preference

DIATOME INDEX

>0,83	Very good
0,55 - 0,82	Good
0,30 - 0,54	Moderate
0,15 - 0,29	Poor
<0,15	Bad

Hildebrandia rivularis

Sampling ➡ **Identification** ➡ **Data Analysis**

Surface
1m
2m
3m
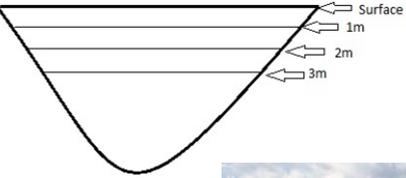
Jaccard Index (Similarity)

Mixed Index

Diversity Index

Phytoplankton

Periphyton

2010　　　**2011/2012**　　　**2013/2015**　　　**2016**

East bank

Ecological indicator?
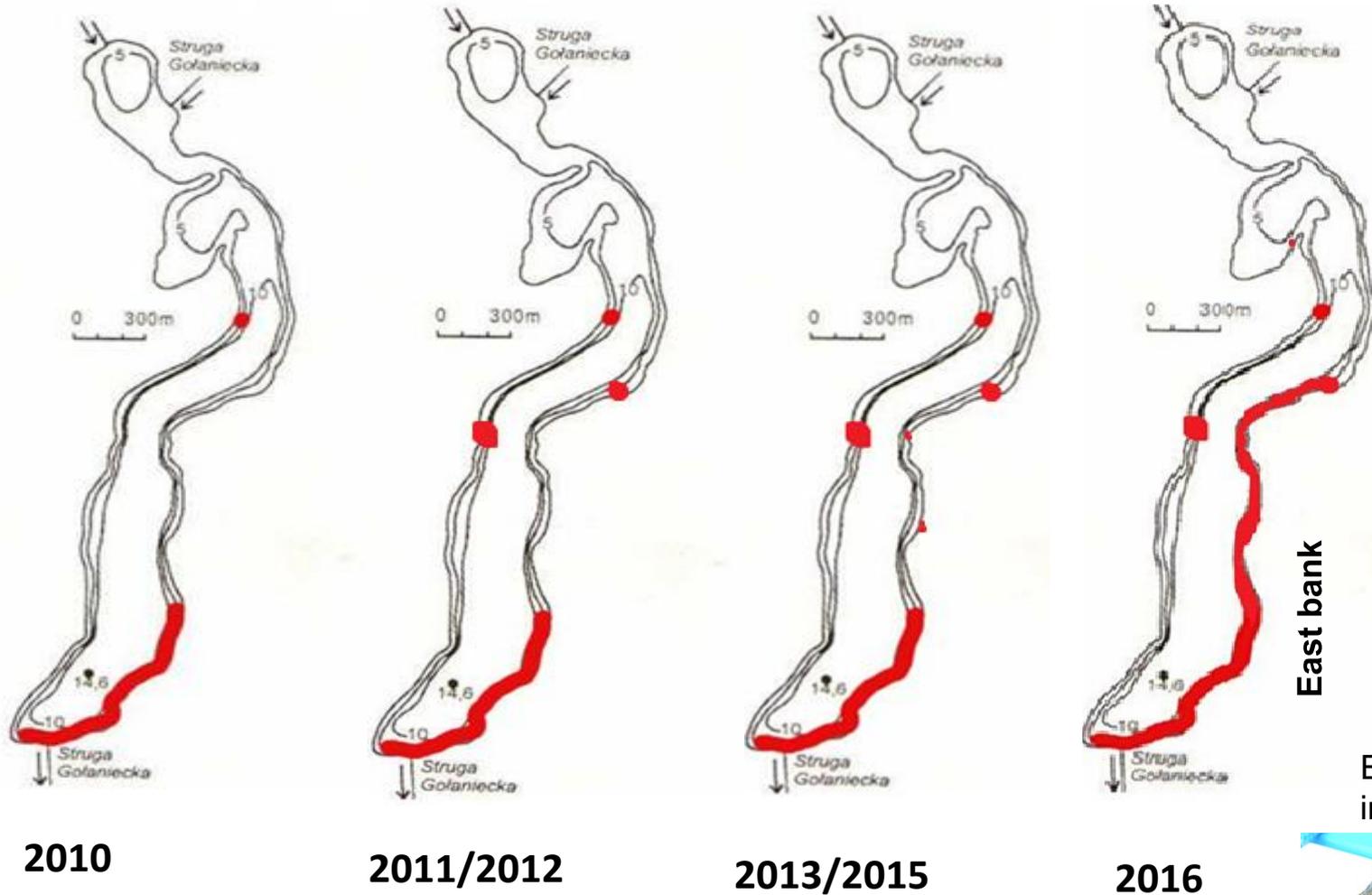
Fresh Water Red Algae – *Hildebrandia rivularis*

Periphyton

Species O₂ preference

Content of 0²
- High (75%-100%)
- Middle (50%)
- Low (30%)
- Others
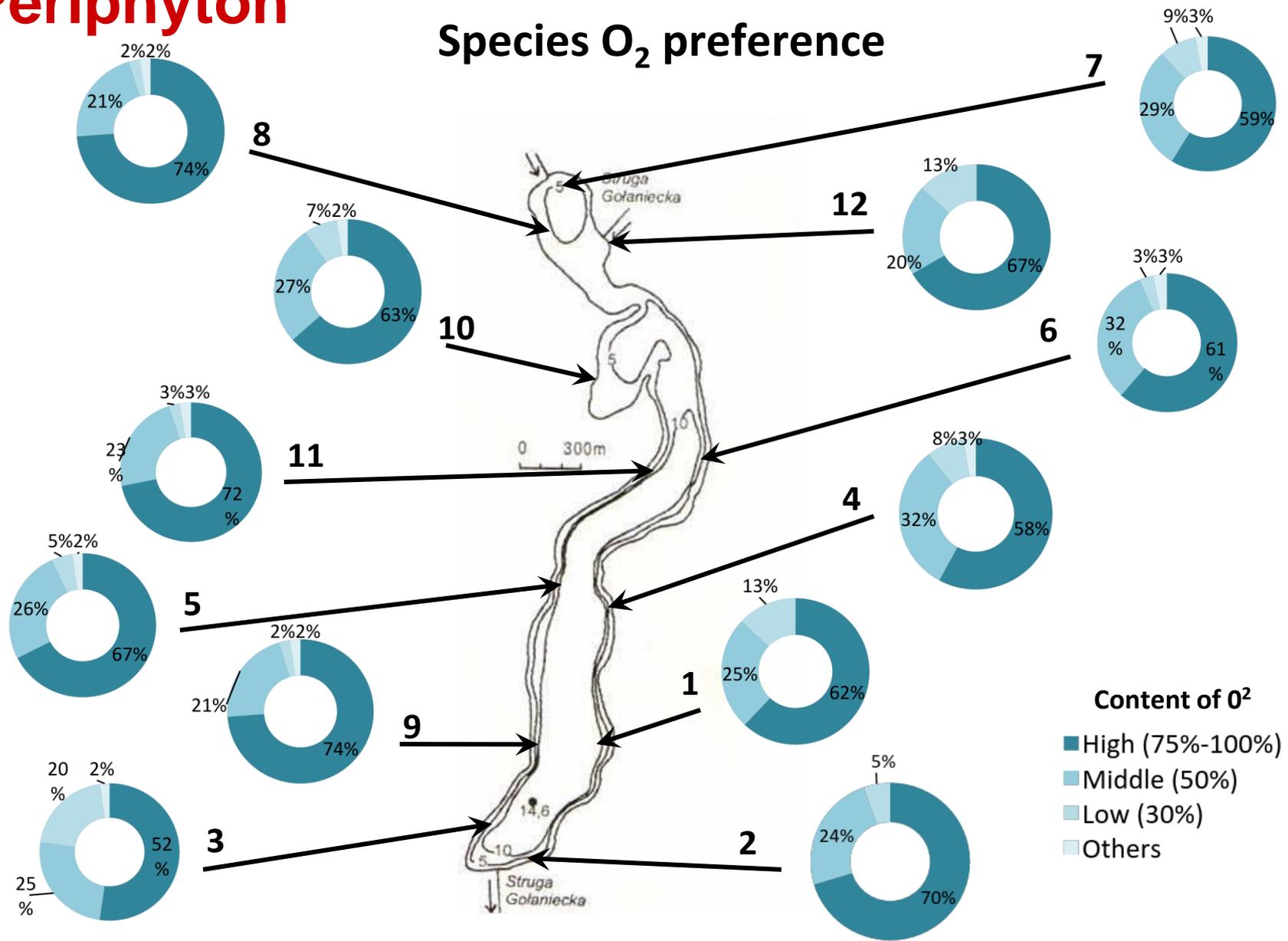
Periphyton

Species Trophic preference

Trophic level
- Oligotrophic
- Mesotrophic
- Eutrophic
- Hypertrophic
- Others
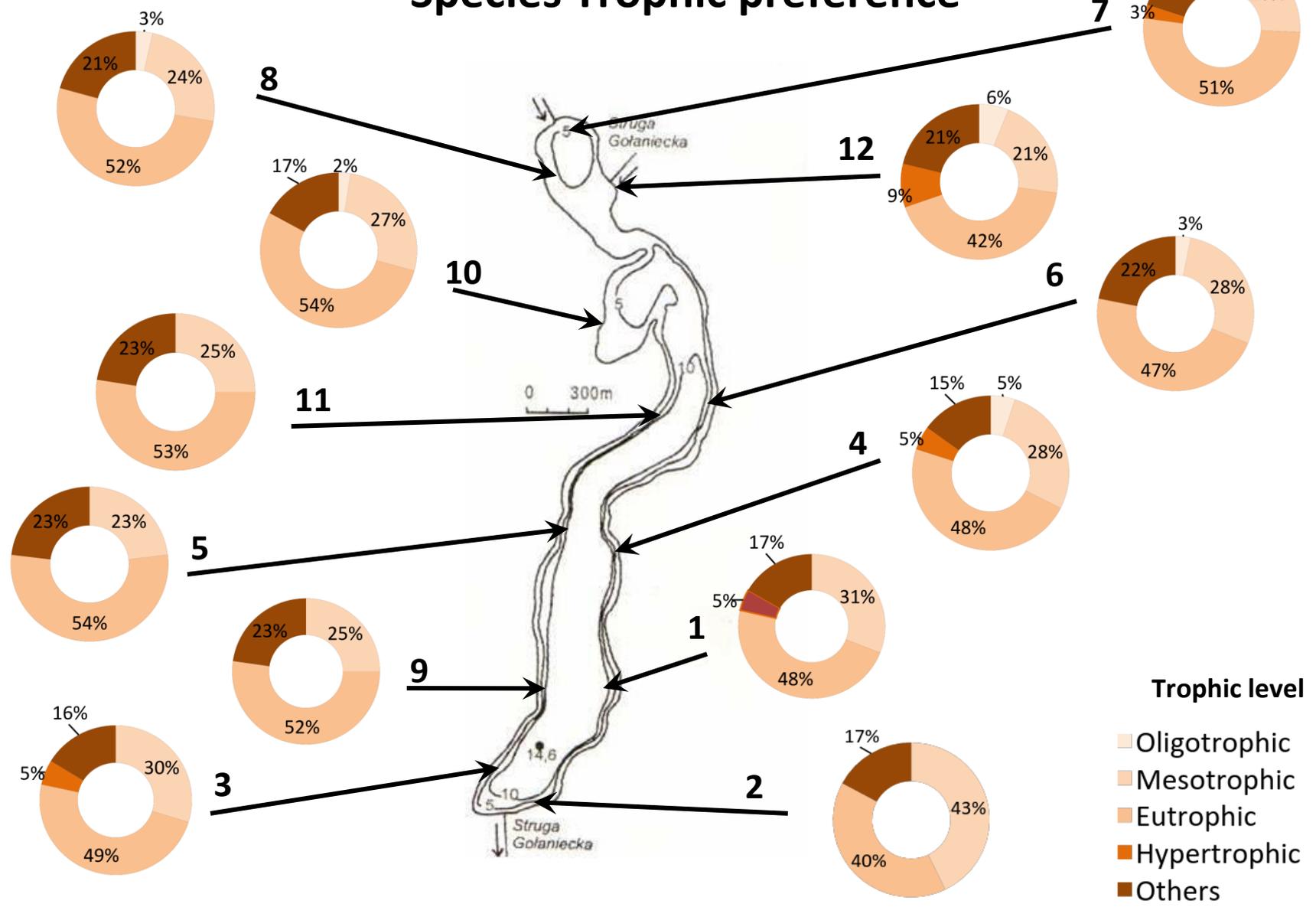
Periphyton

Species pH preference

Legend:
- Acidophilous
- Circumneutral
- Alkaliphilous
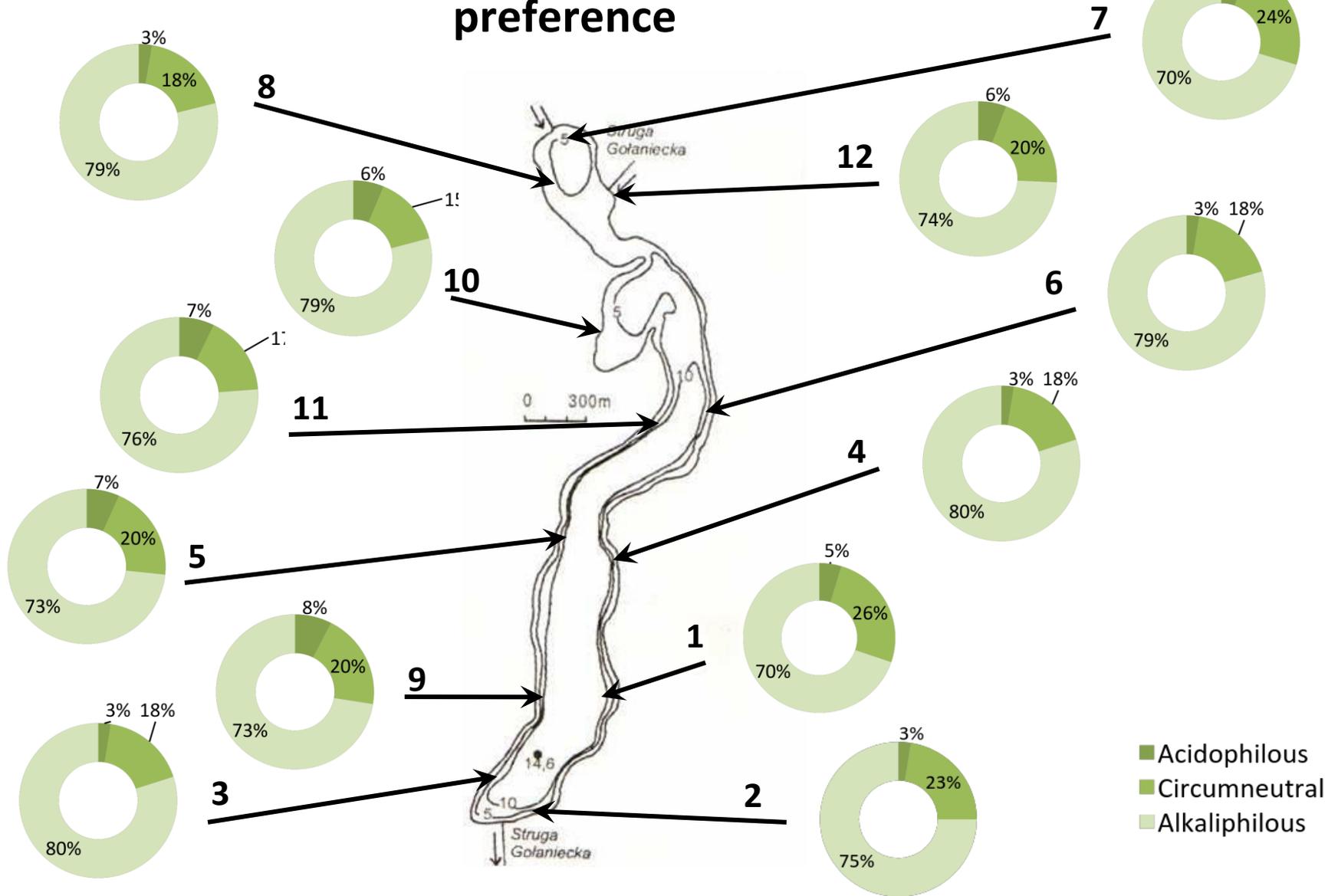
Periphyton

Diatom Index

Phytoplankton

Number of species

Phytoplankton

Similarity of species
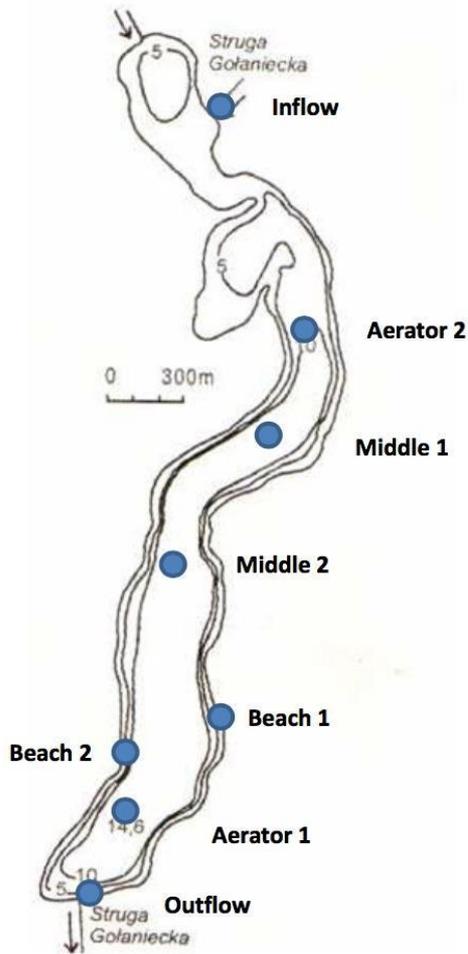
| YEAR	2009	2010	2011	2012	2013	2014	2015	2016
2008	84	51	43	33	40	52	82	35
2009	-	48	28	20	29	35	39	13
2010	-	-	42	42	62	47	37	35
2011	-	-	-	34	58	47	50	40
2012	-	-	-	-	77	49	59	47
2013	-	-	-	-	-	52	78	45
2014	-	-	-	-	-	-	57	40
2015								43

+53 %

Jaccard Index- % Similarity

Phytoplankton Diversity
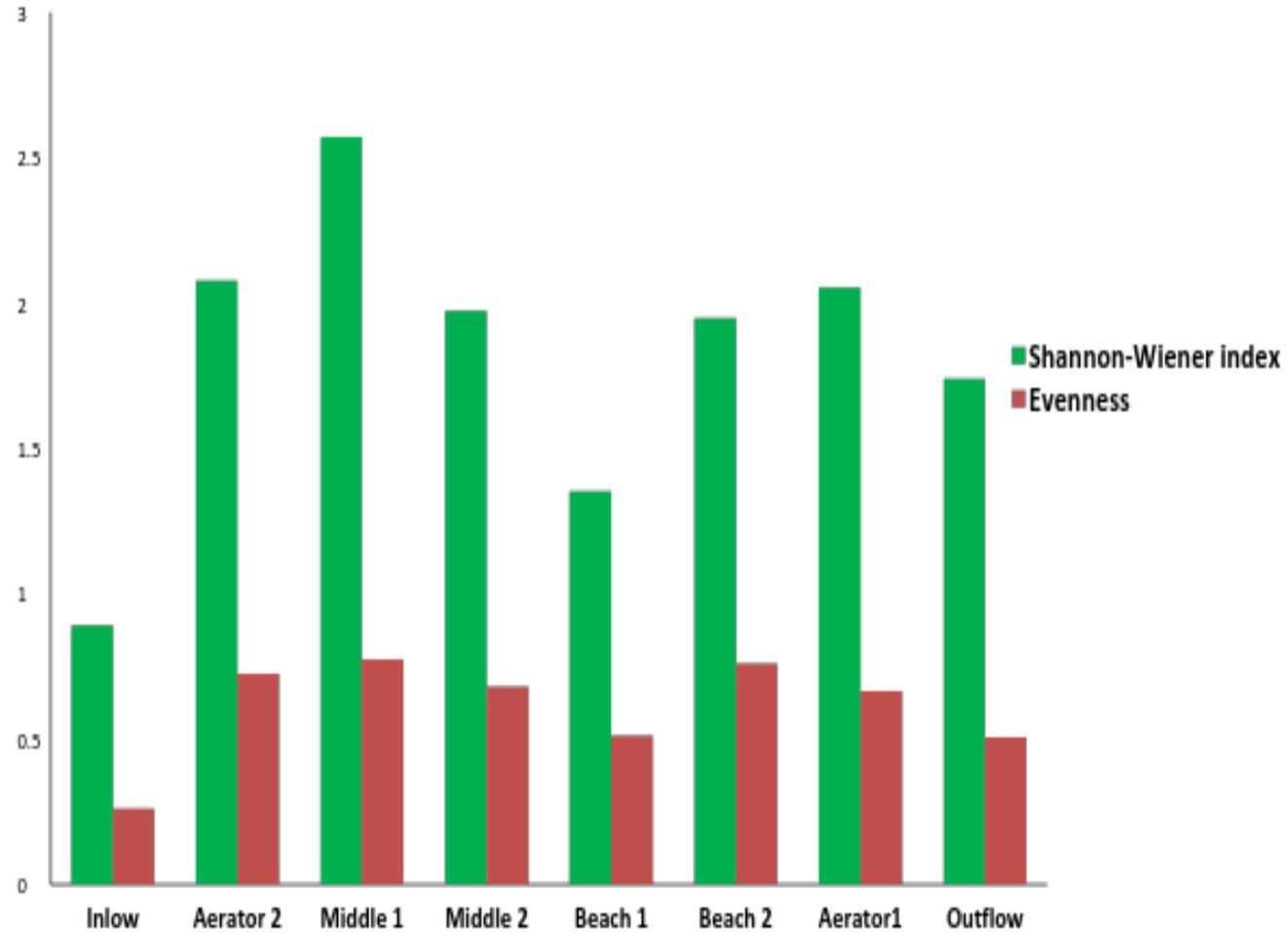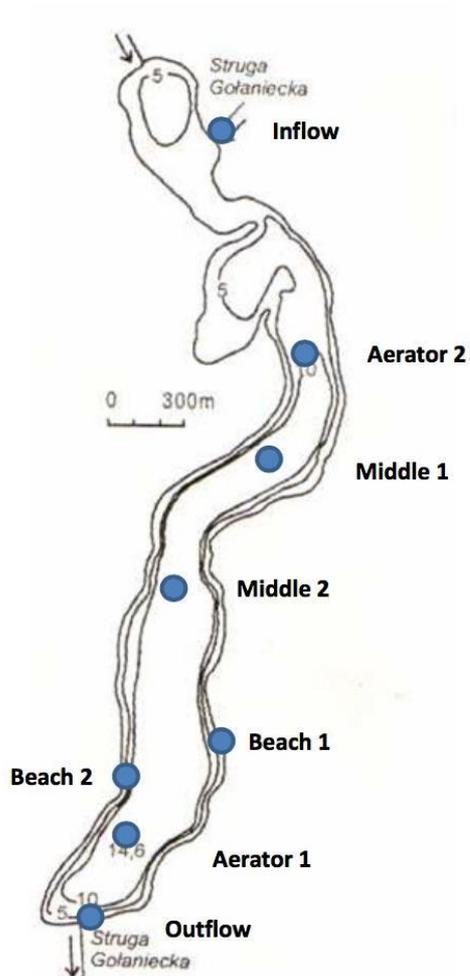
Abundance of Phytoplankton groups

(ind/m²)
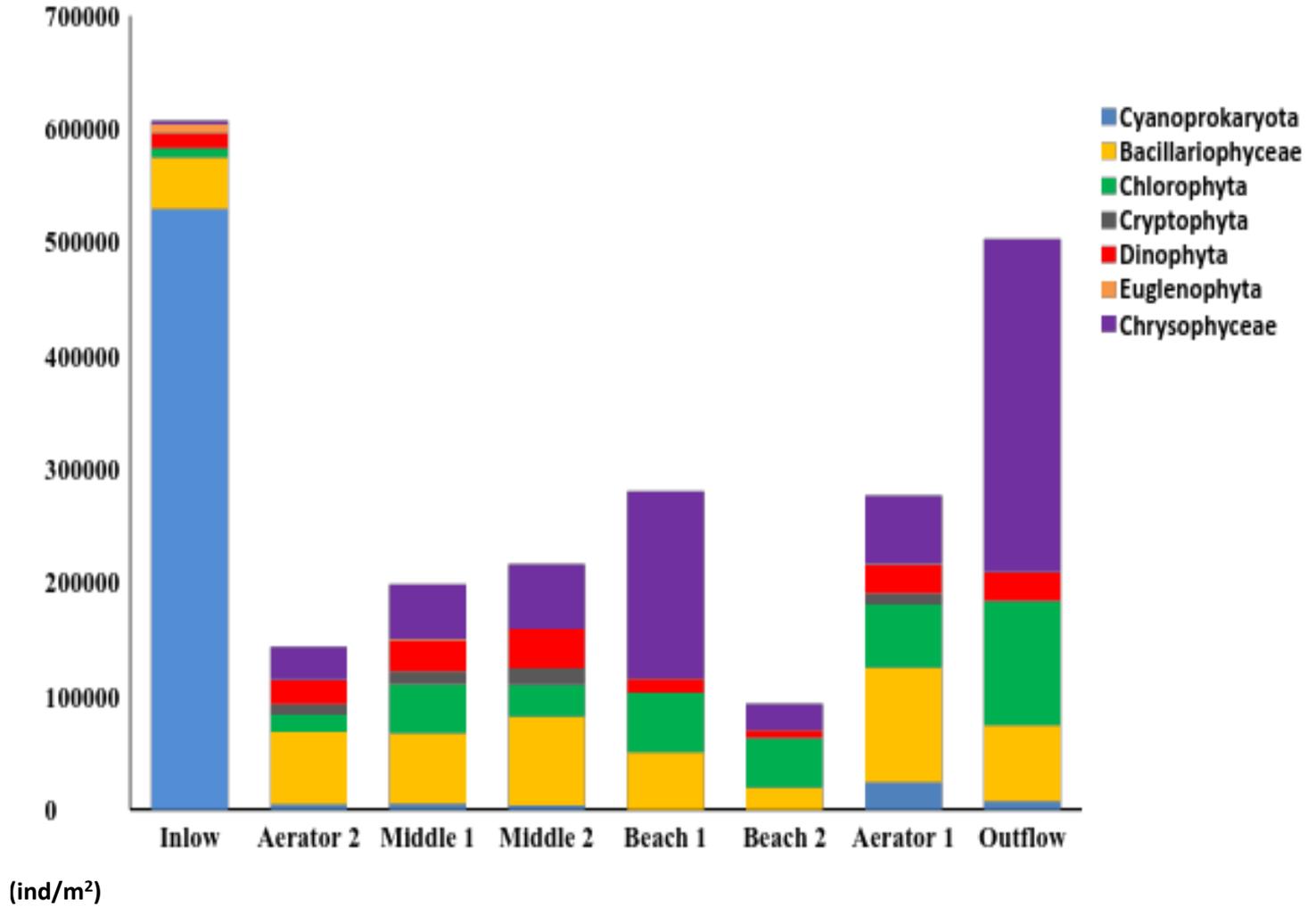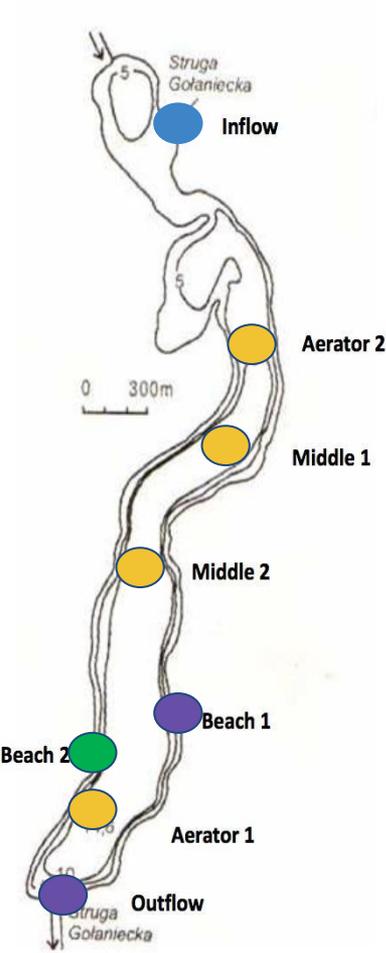
Site

Mixed Index of Nygaard

- Q = (Cyanobacteria + Chlorococcales + Centric diatoms + Euglenoids) /Desmids

Year / Station	2008	2009	2010	2011	2012	2013	2014	2015	2016
Inflow	-	-	1.8	17	9	19	3.8	17	7
Aerator 2	-	26	11.5	5	8	14	20	4.3	12
Middle 1	-	9	12.5	13	3	5.5	11	4.8	7.7
Middle 2	-	-	8.3	18	9	7.5	20	4	8.5
Beach 1	-	-	-	3	9	7	5	5,5	-
Beach 2	-	-	-	-	5	6	10	12	-
Aerator 1	9.7	16	8.3	9	7	8	9	6.7	-
Outflow	-	-	6.5	5	-	12	8	8	14

|	
Dystrophy	0.0 - 0.2
Oligotrophy	0.2 - 1.0
Mesotrophy	1.0 - 3.0
Eutrophy	3.0 – 5.0
Hypertrophy	5.0 – 43.0

PMPL index

PMPL = [YCh + YBm + YCy] / 3

where:

YCh - Chlorophyll-a concentrations
YBm - General biomass of phytoplankton
YCy - Biomass of cyanobacteria

Ecological status	PMPL
very good	0,0 - 1,0
good	1,01 - 2,0
moderate	2,1 - 3,0
poor	3,1 - 4,0
bad	4,01 - 5,0
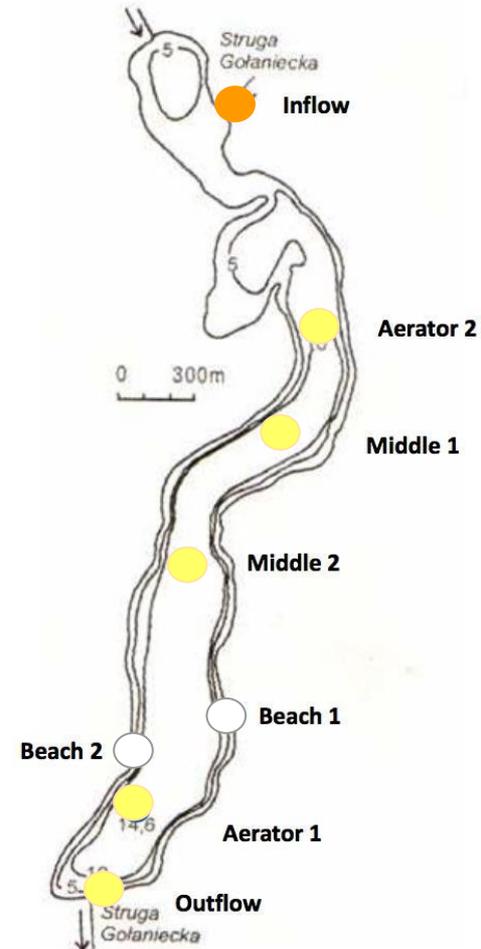
# Bio Manipulation

Top down

zooplankton-Middle 1

density (ind/l)

Middle 1   density (ind/l)

Pike

Roach

Rotifera

Cyanobacteria

Copepoda
Cladocera

Perch
Pike

Roach

Rotifera

Phytoplankton

Copepoda
Cladocera
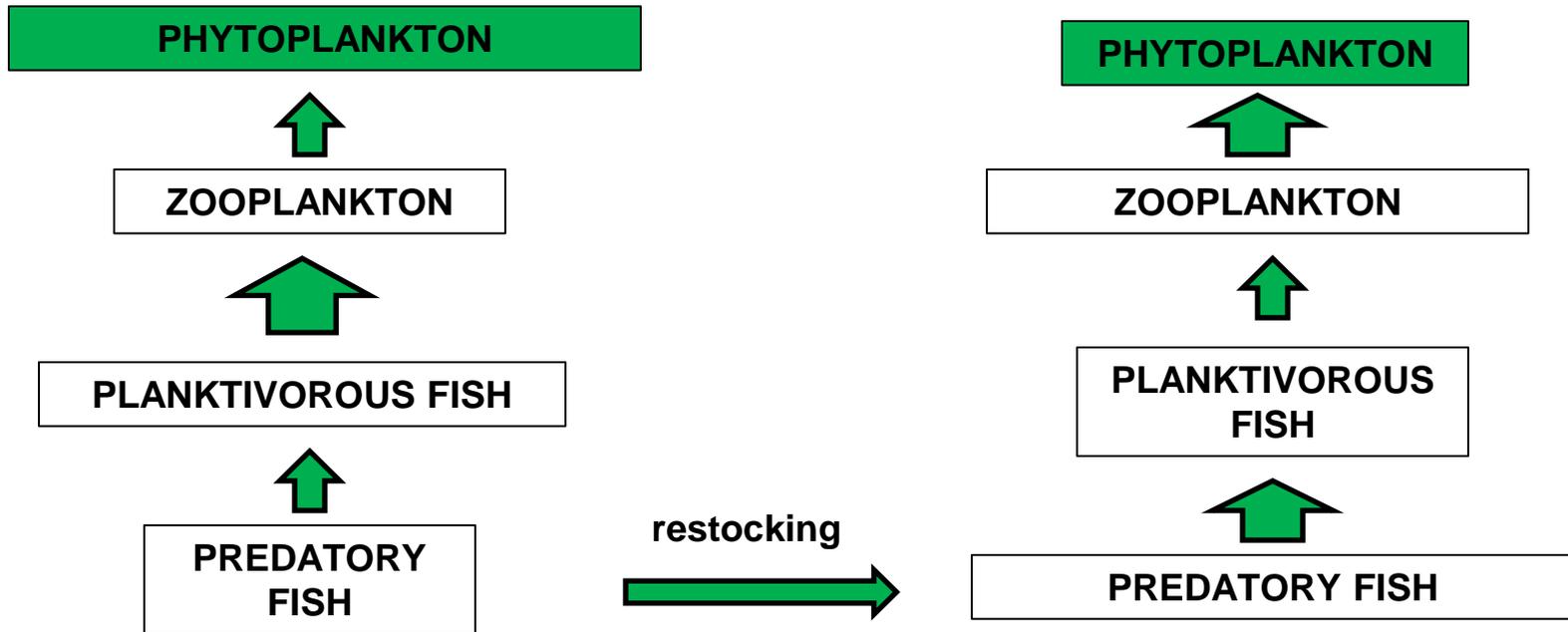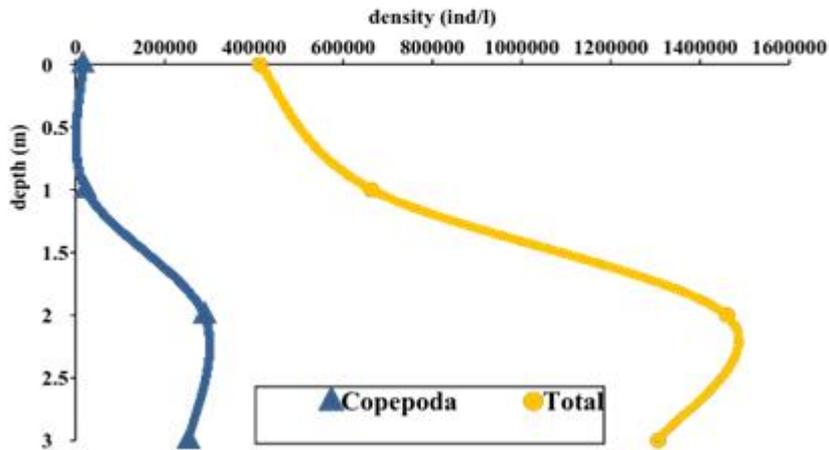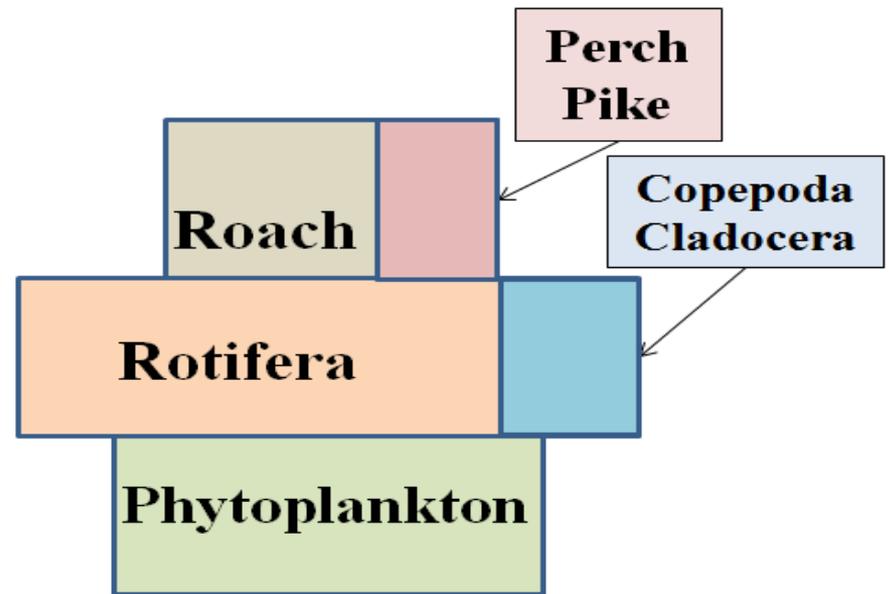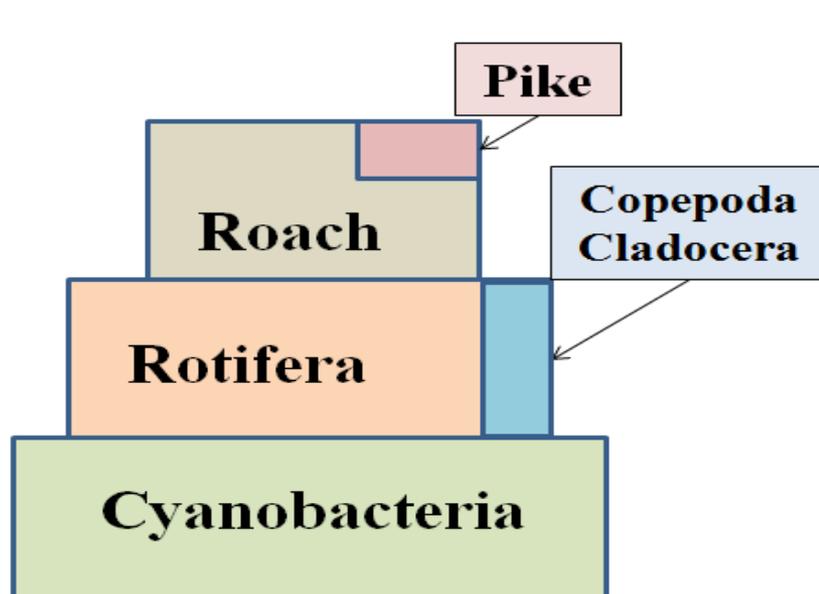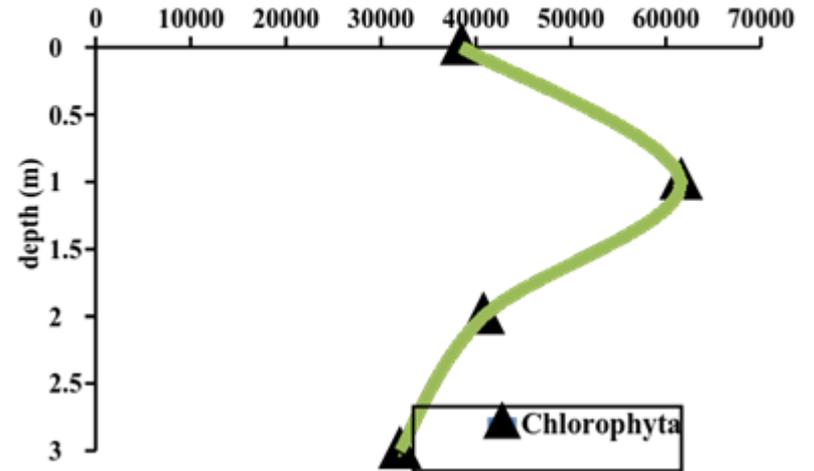
- **Horizontal analysis**

  Periphyton

  – Spreading more through the east bank
  – Preferences change towards good water quality
 – Still eutrophic conditions are maintained

  Phytoplankton

  – Number of species is increased; diversity is relatively maintained
  – High abundance of cyanobacteria in inflow
  – According to categories used in Poland,

  Lake Durowskie - Moderate state

  – Regarding phytoplankton group – Eutrophic lake.
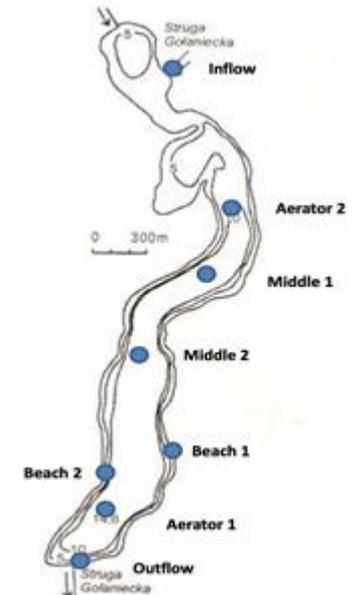
- **Vertical analysis**

  Bio-manipulation show positive effects on phytoplankton reduction; However the success of Bio manipulation is still on risk.
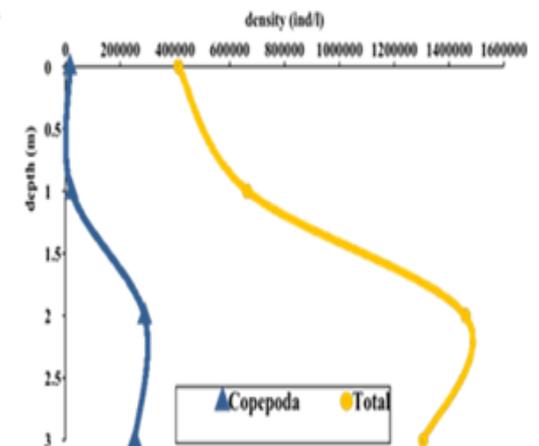
Thank you for your attention!