

# Ecosystem response to **fresh-water discharge** from Keum River Estuarine Weir

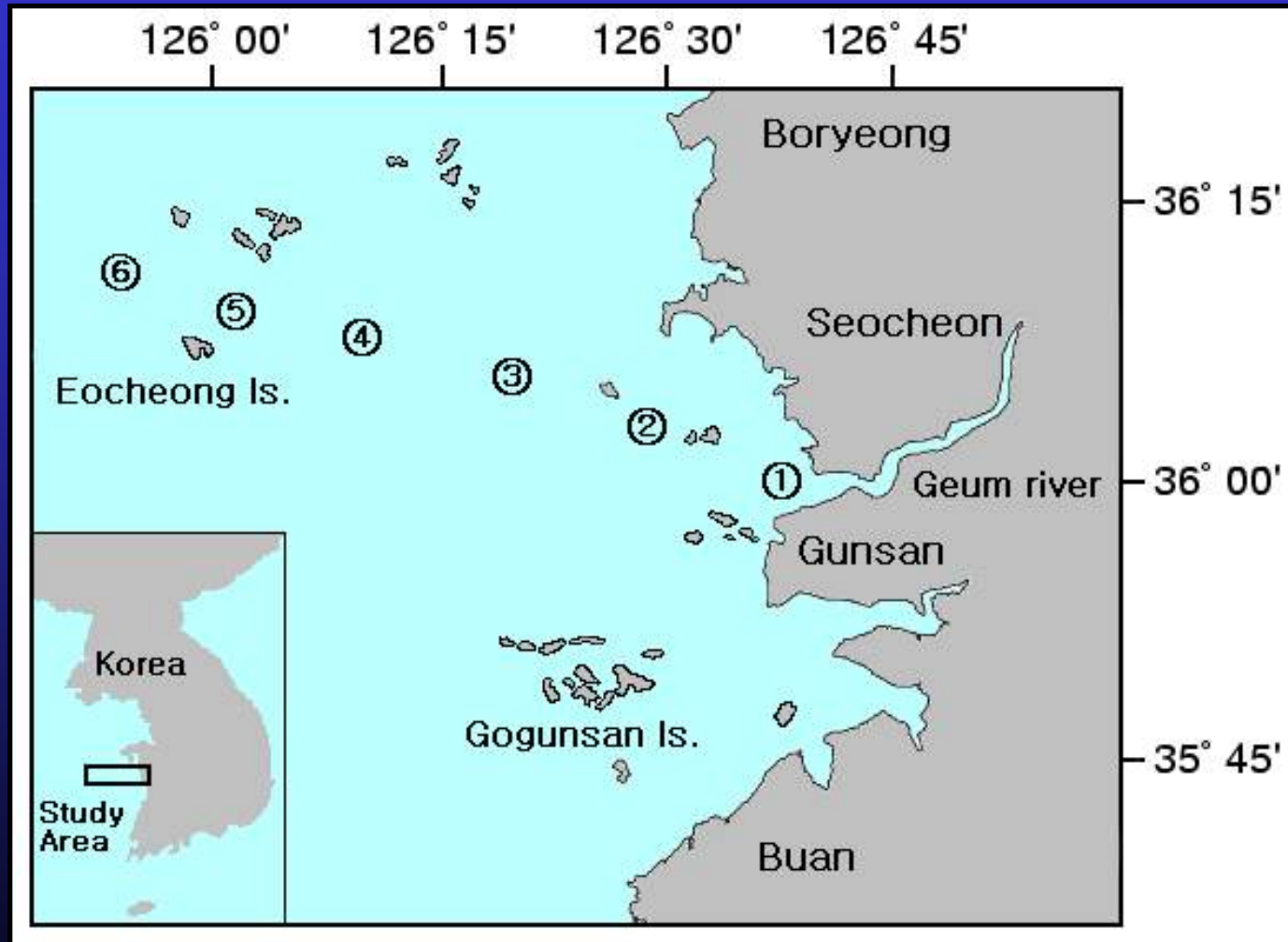
## 1. Distribution of **phytoplankton** and **anchovy larvae**

**Wonho Yih<sup>1</sup>, Young Geel Kim<sup>1</sup>, Sundo Hwang<sup>2</sup>**

<sup>1</sup> Department of Oceanography, Kunsan National University, Kunsan, 573-030, Korea.

<sup>2</sup> South Sea Fisheries Research Institute, NFRDI, Yeosu, 556-823, Korea

# Study Area



# Keum River Estuarine Weir



# Outline

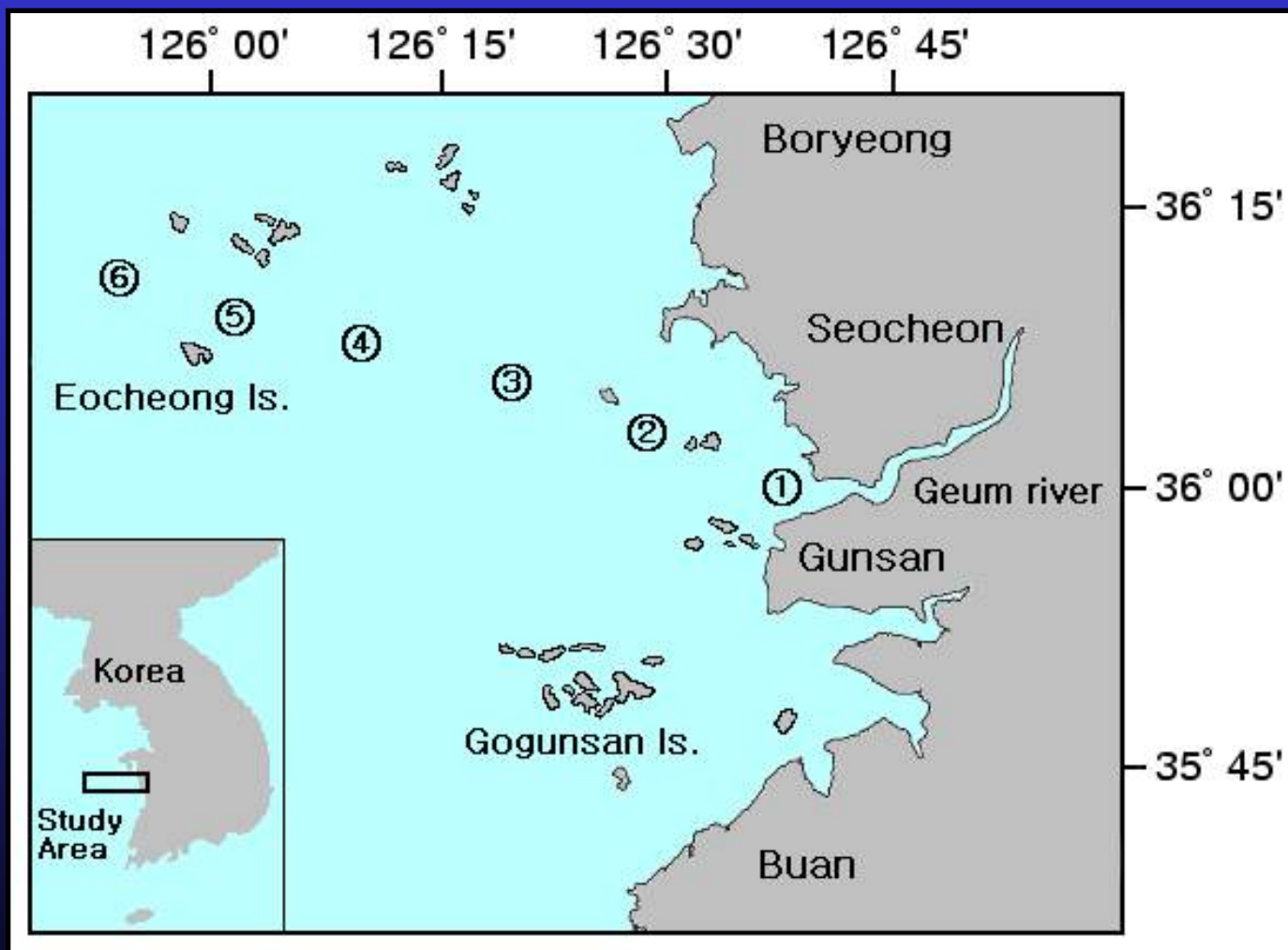
- Objectives
- Material & Methods
- Results and Discussion
- Conclusion
- Further Study

# Objectives

- To understand the short-term ecosystem response to the irregular freshwater discharges from Keum River Estuarine Weir
- To understand the spatio-temporal distribution of phytoplankton and anchovy

# Material & Methods

# Sampling Stations



(Periods : April - Sep. 2001)

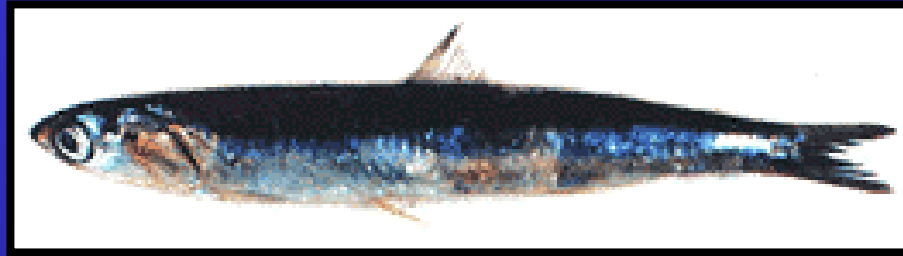
# Field sampling & measurement

- Water Temperature
- Salinity
- Light transmission
- Chlorophyll fluorescence
- Phytoplankton
- Anchovy (egg, larvae)

## Fresh-water discharge data

- Daily monitoring DB (Keumkang Office, MAF, Korea)

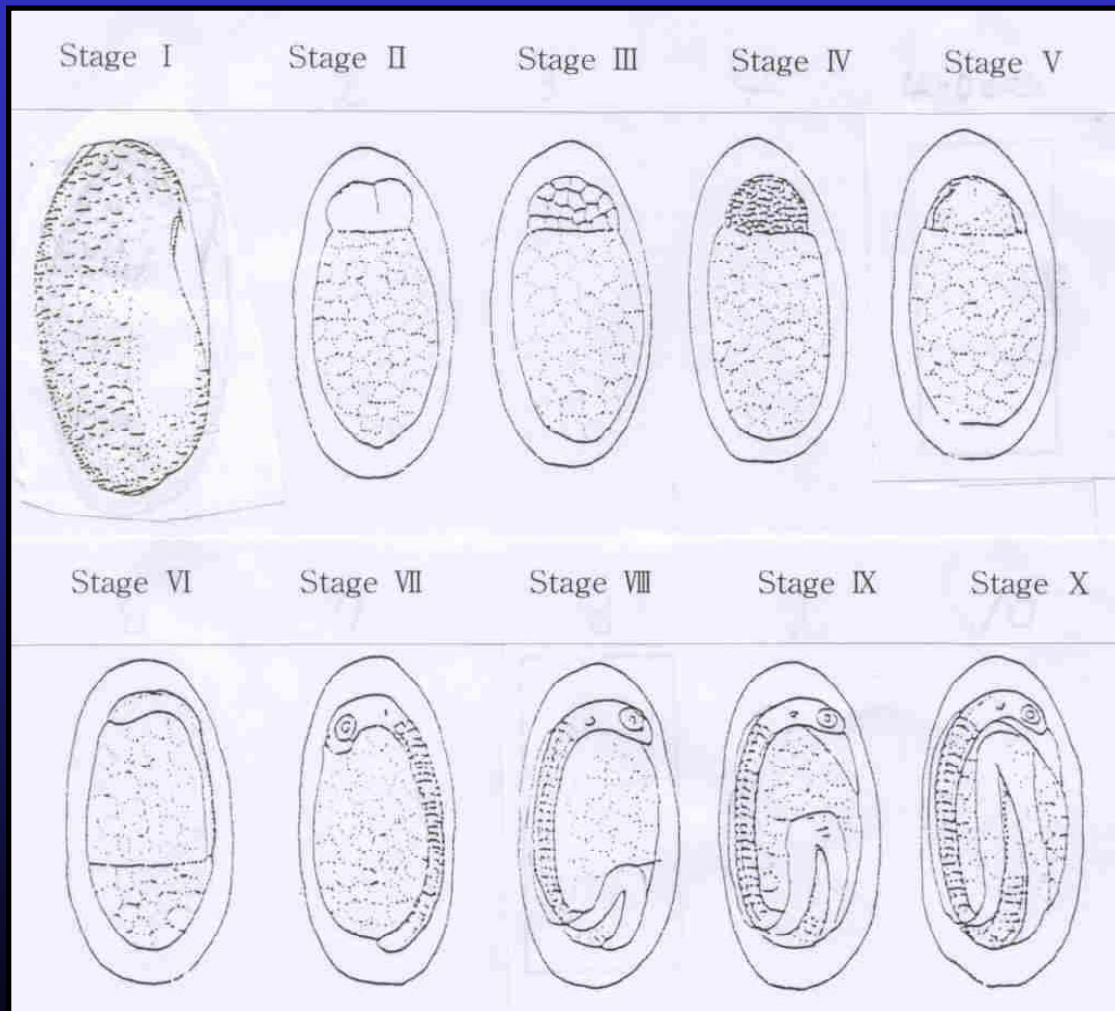




## ■ Anchovy ■

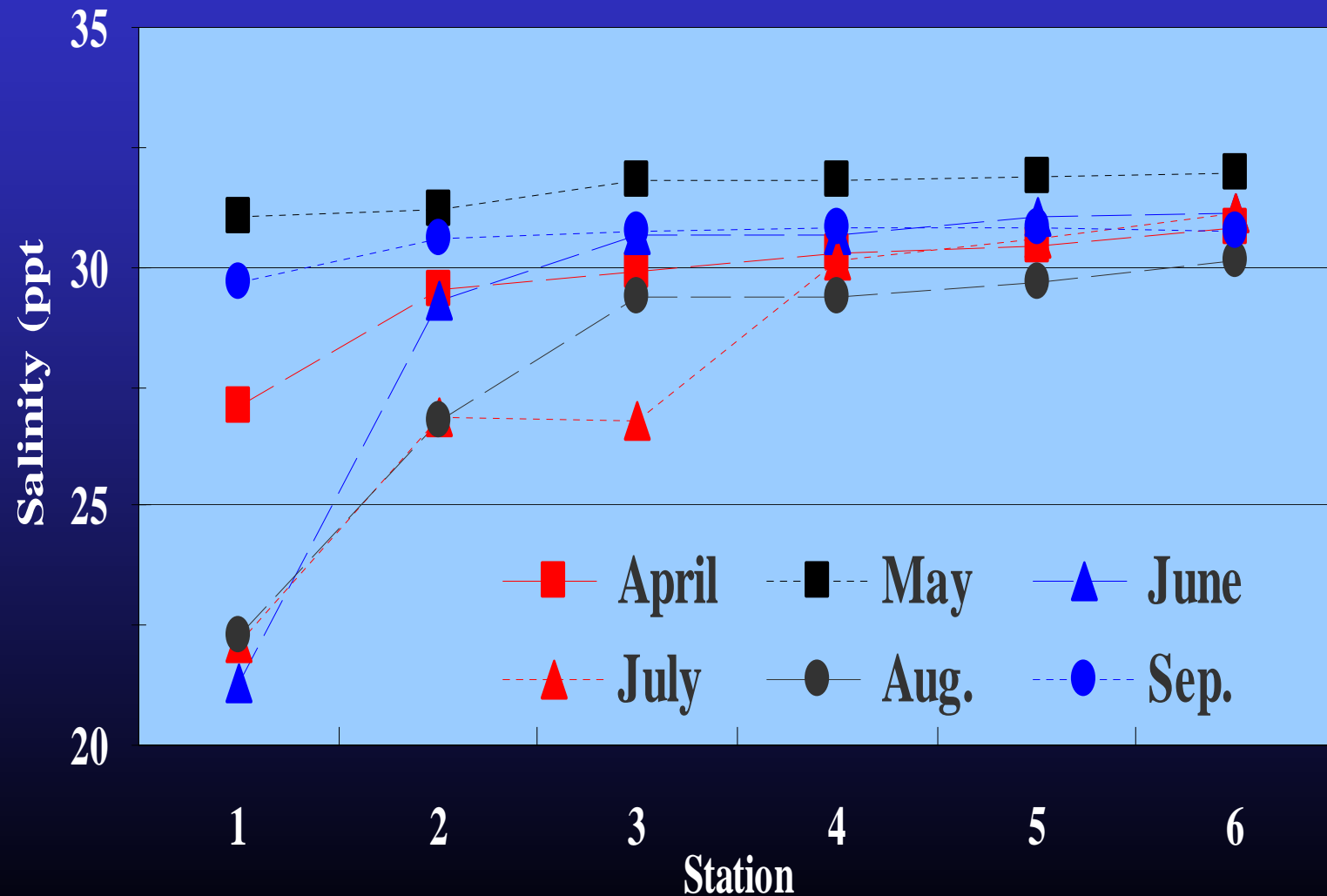
- ▶ *Engraulis japonicus*
- ▶ Fish for human food
- ▶ Distributed over extensive areas

# Development of Anchovy egg

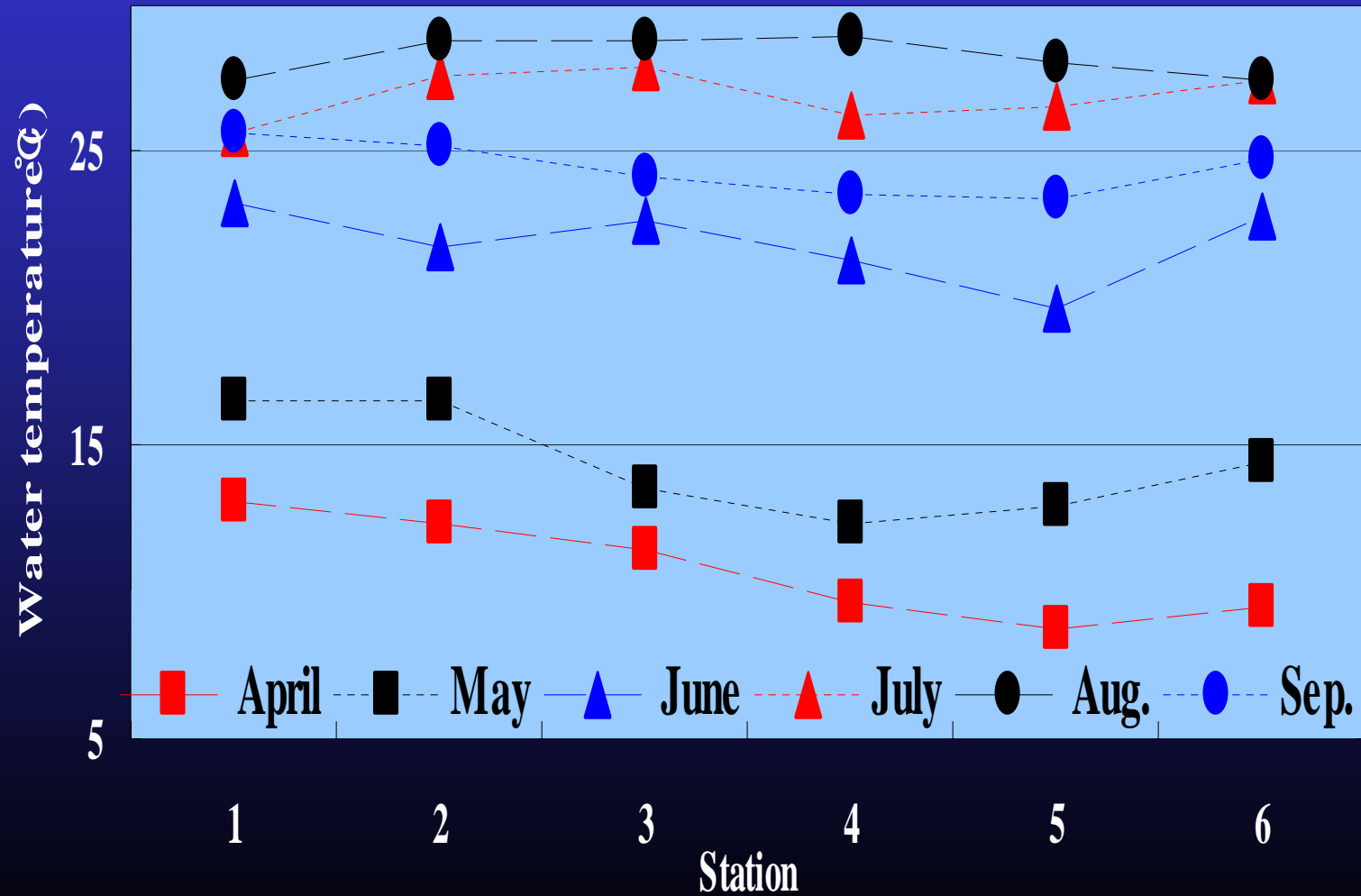


# ■ Results and Discussion

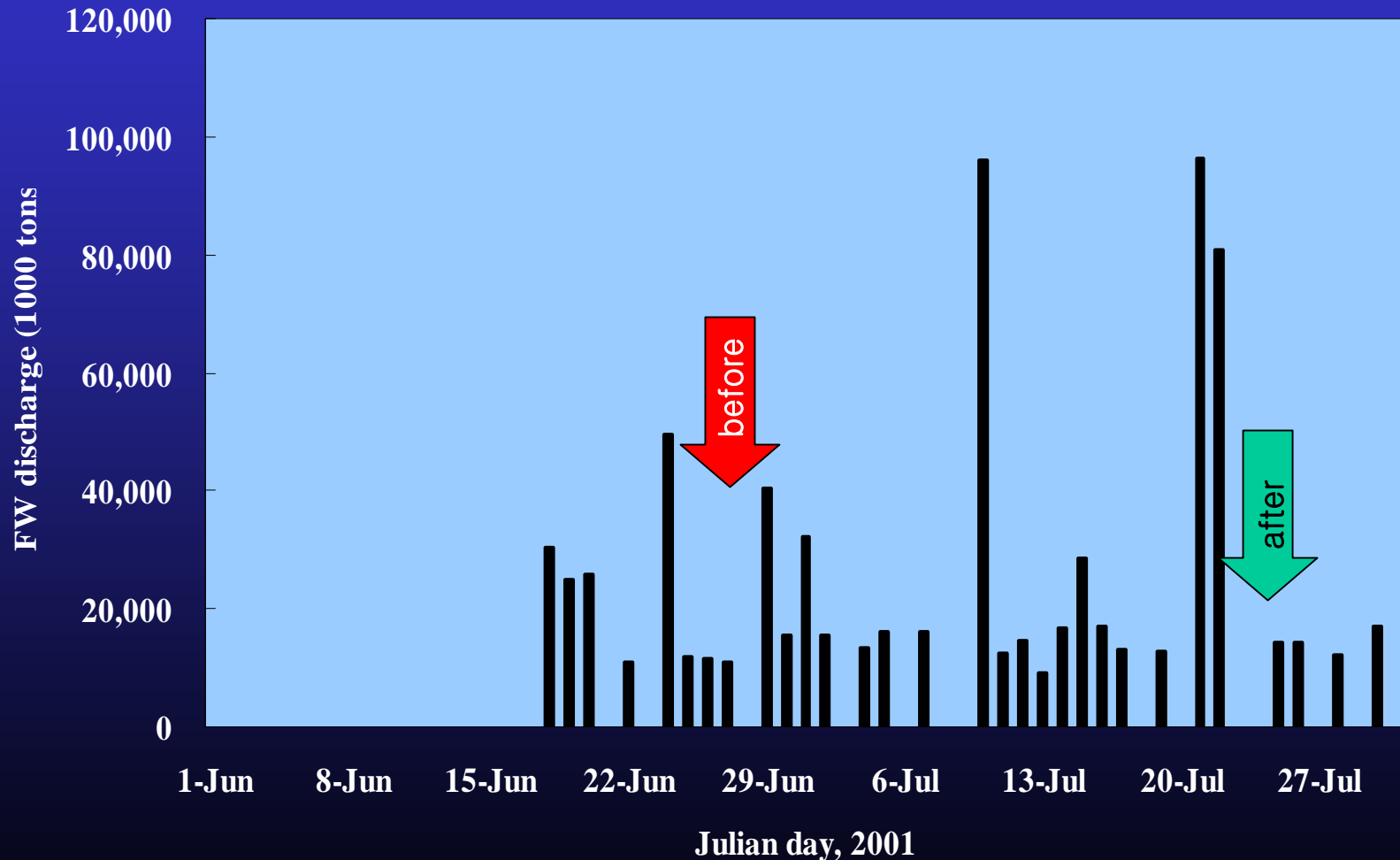
# Monthly variation of salinity (2001.4-2001.9)



# Monthly variation of water temperature (2001.4-2001.9)

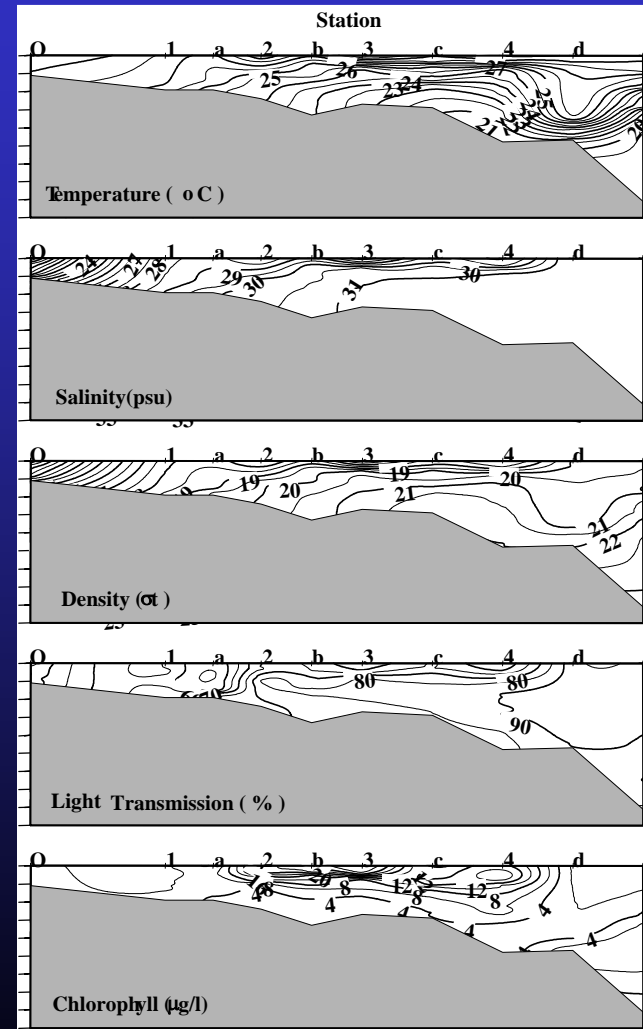
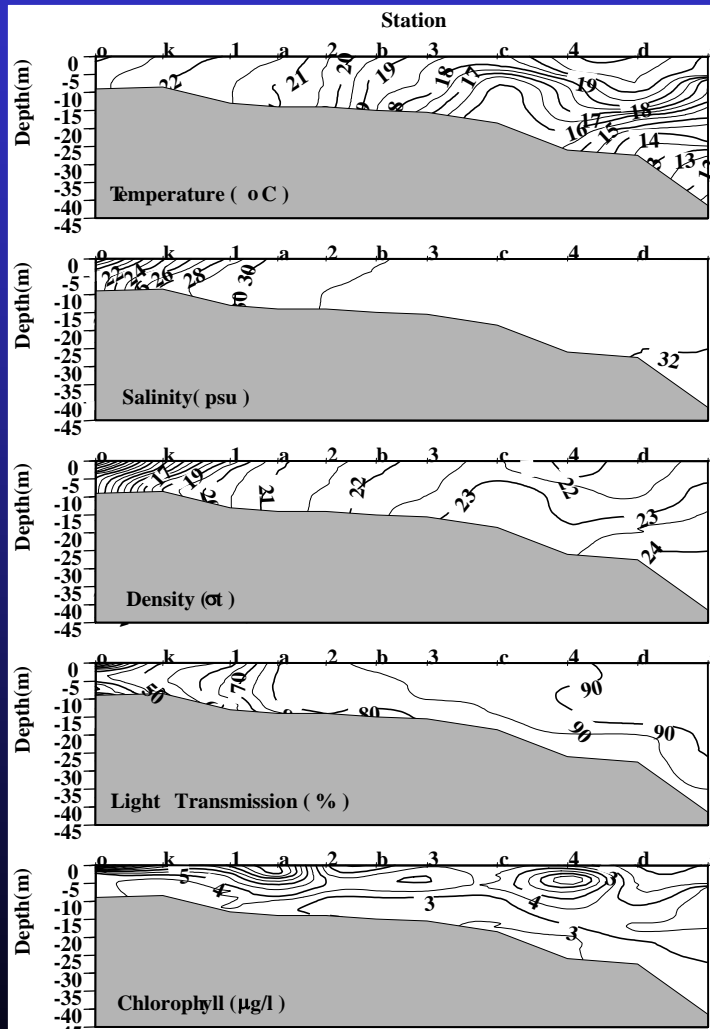


# Daily **fresh-water discharge** from Keum River Weir (2001.6-2001.7)



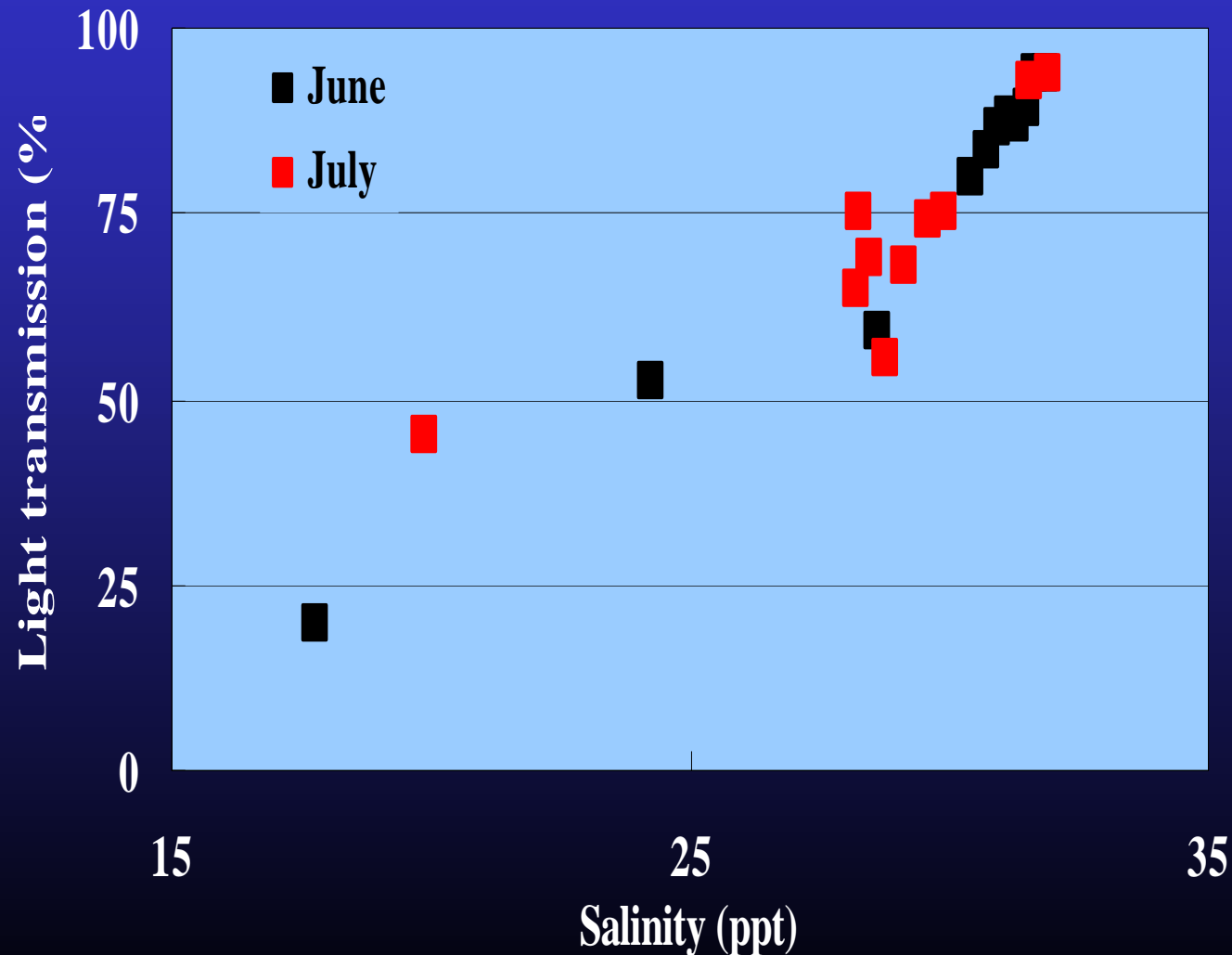
# T, S, D, LT and chlorophyll

before(left)& after(right) flooding (2001)



# Light transmission : Salinity

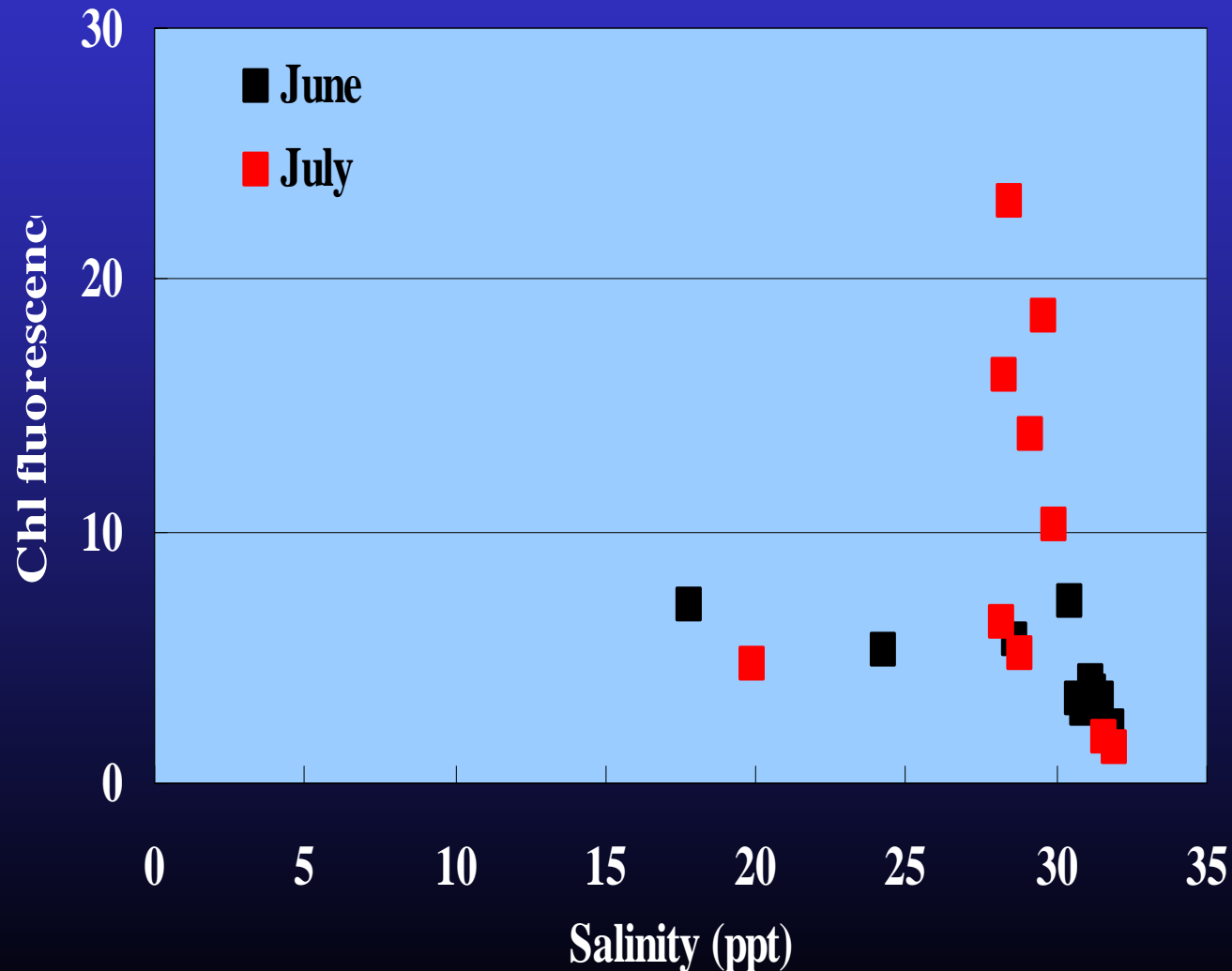
before(**June**)& after(**July**) flooding (2001)



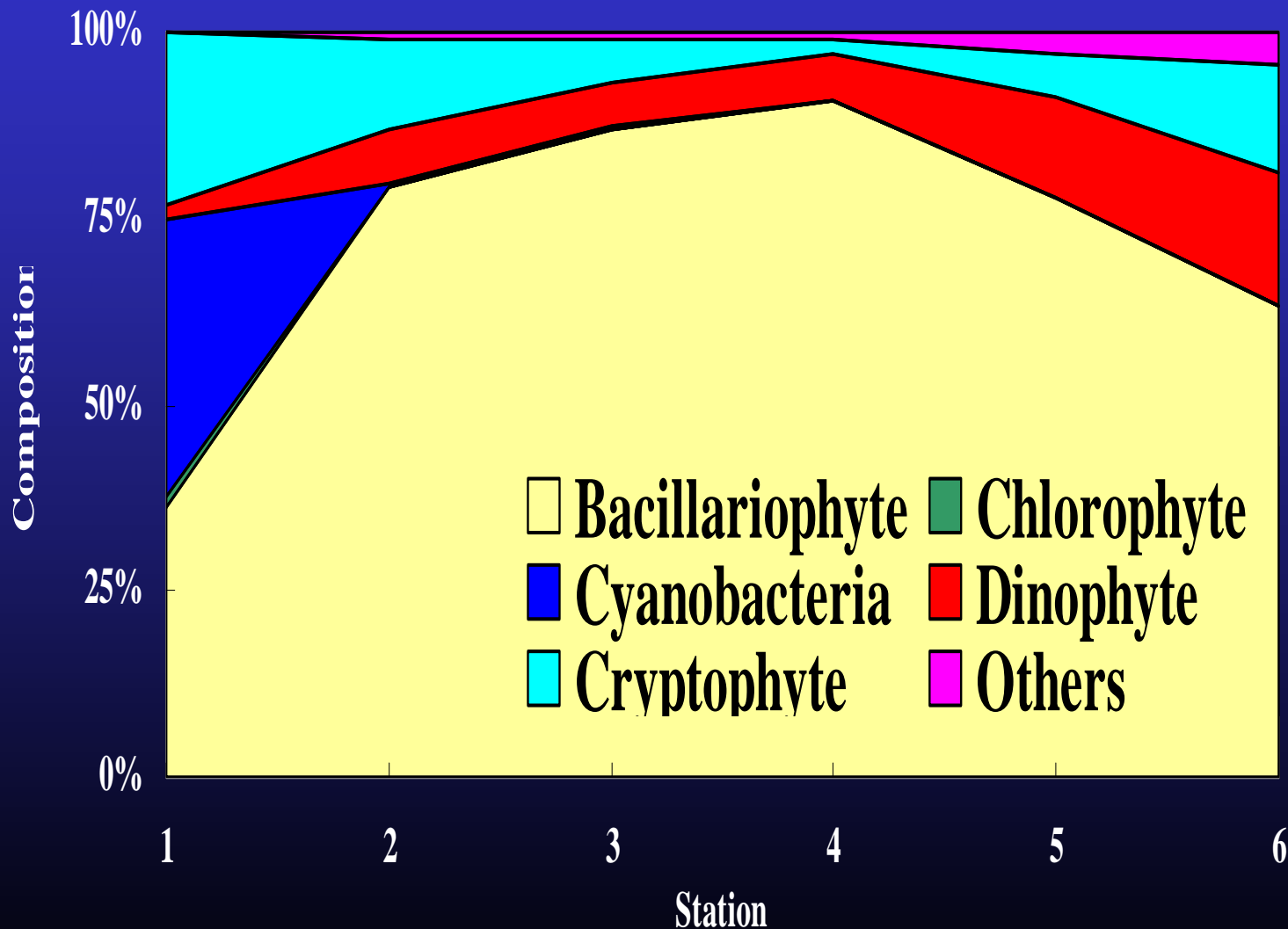


# Chlorophyll fluorescence : Salinity

**before(June)& after(July) flooding (2001)**

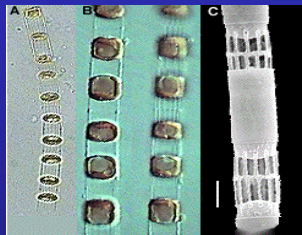


# Dominance of **phytoplankton** groups (2001.4-2001.9)



# Dominant **phytoplankton** species

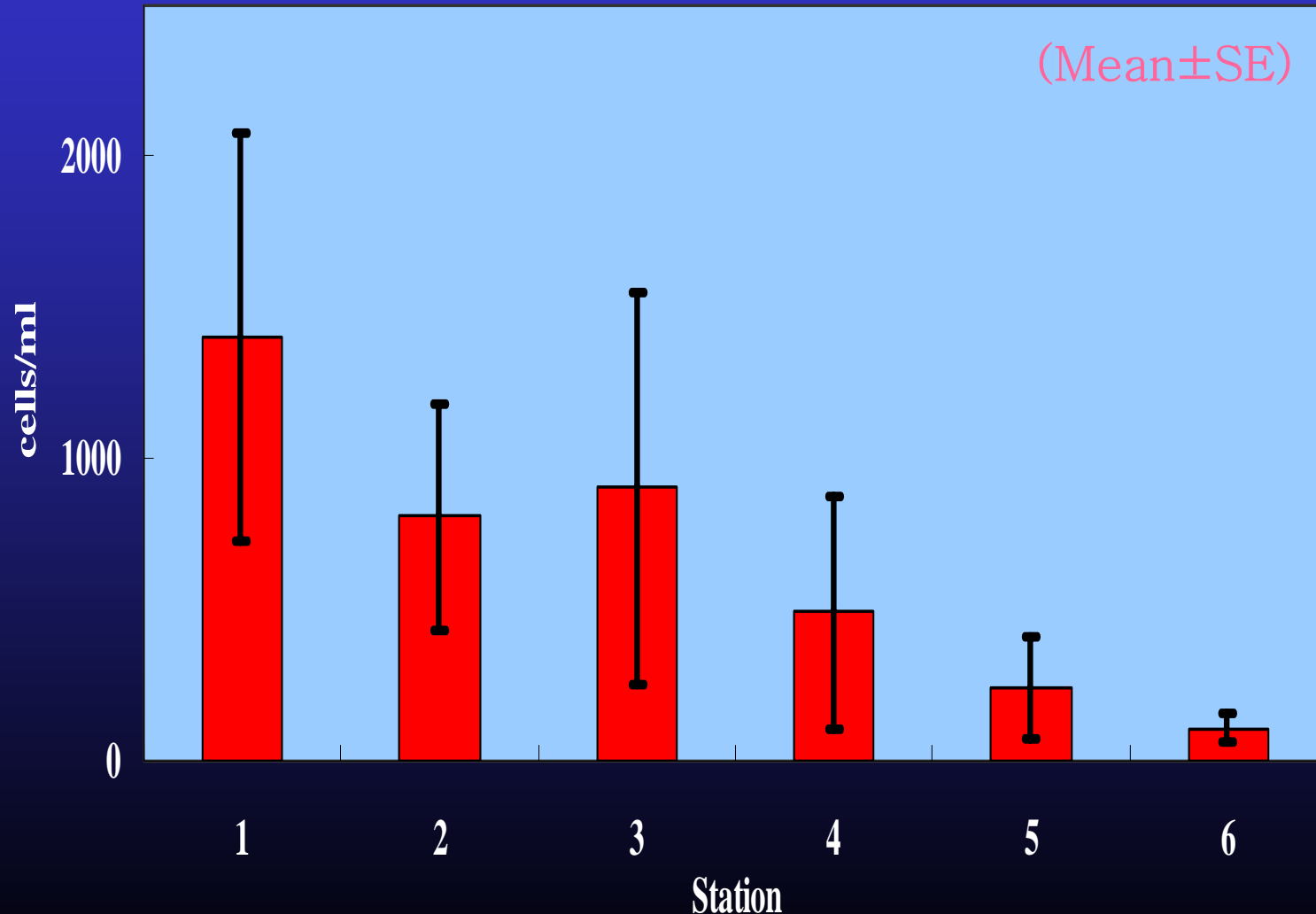
(2001.4~2001.9)



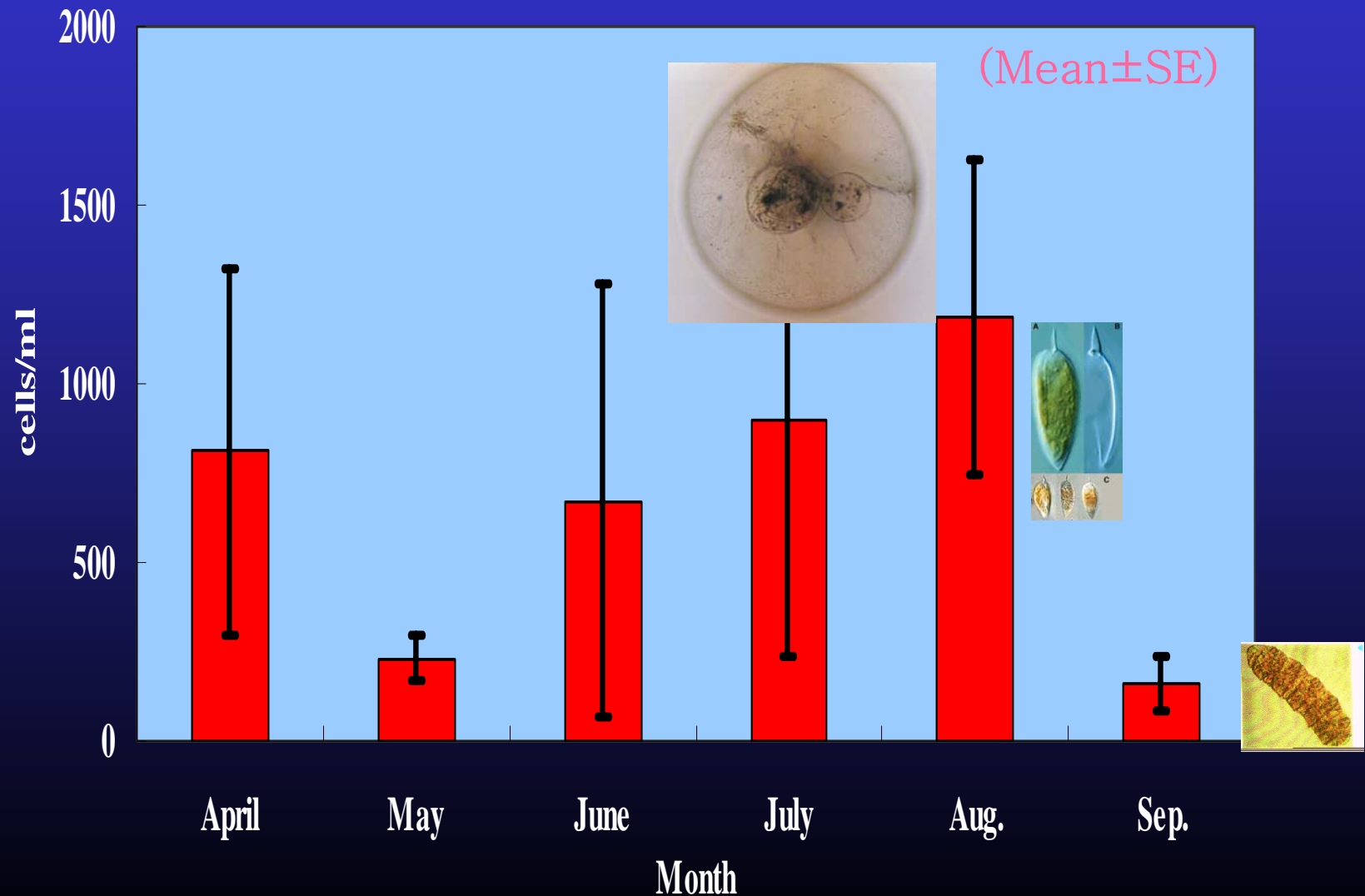
Dominant Species	Maximum (cells/ml)	Mean (cells/ml)
<i>Skeletonema costatum</i>	8485	570
<i>Eucampia zodiacus</i>	556	78



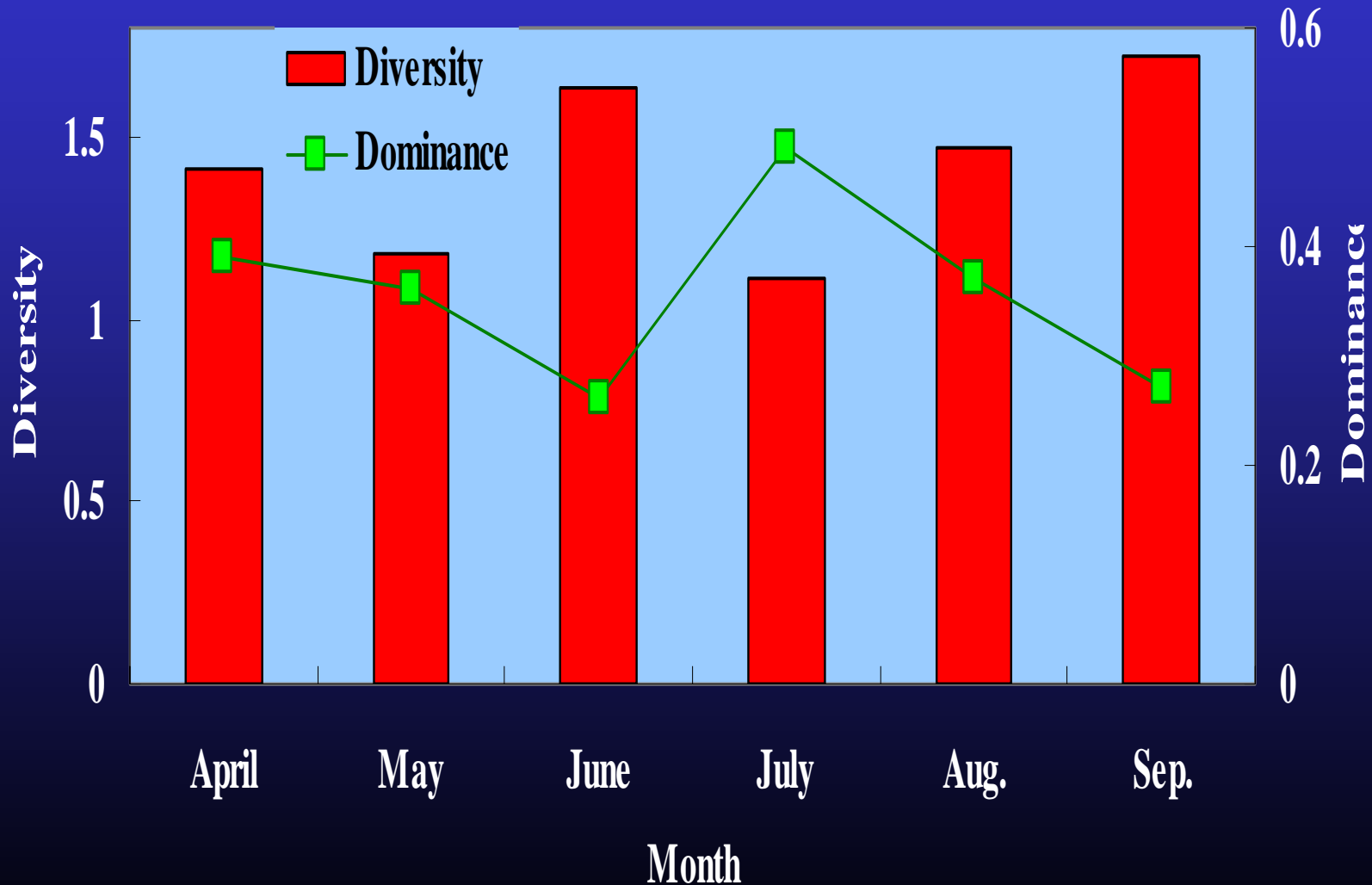
# Spatial variation of mean phytoplankton abundance (2001)



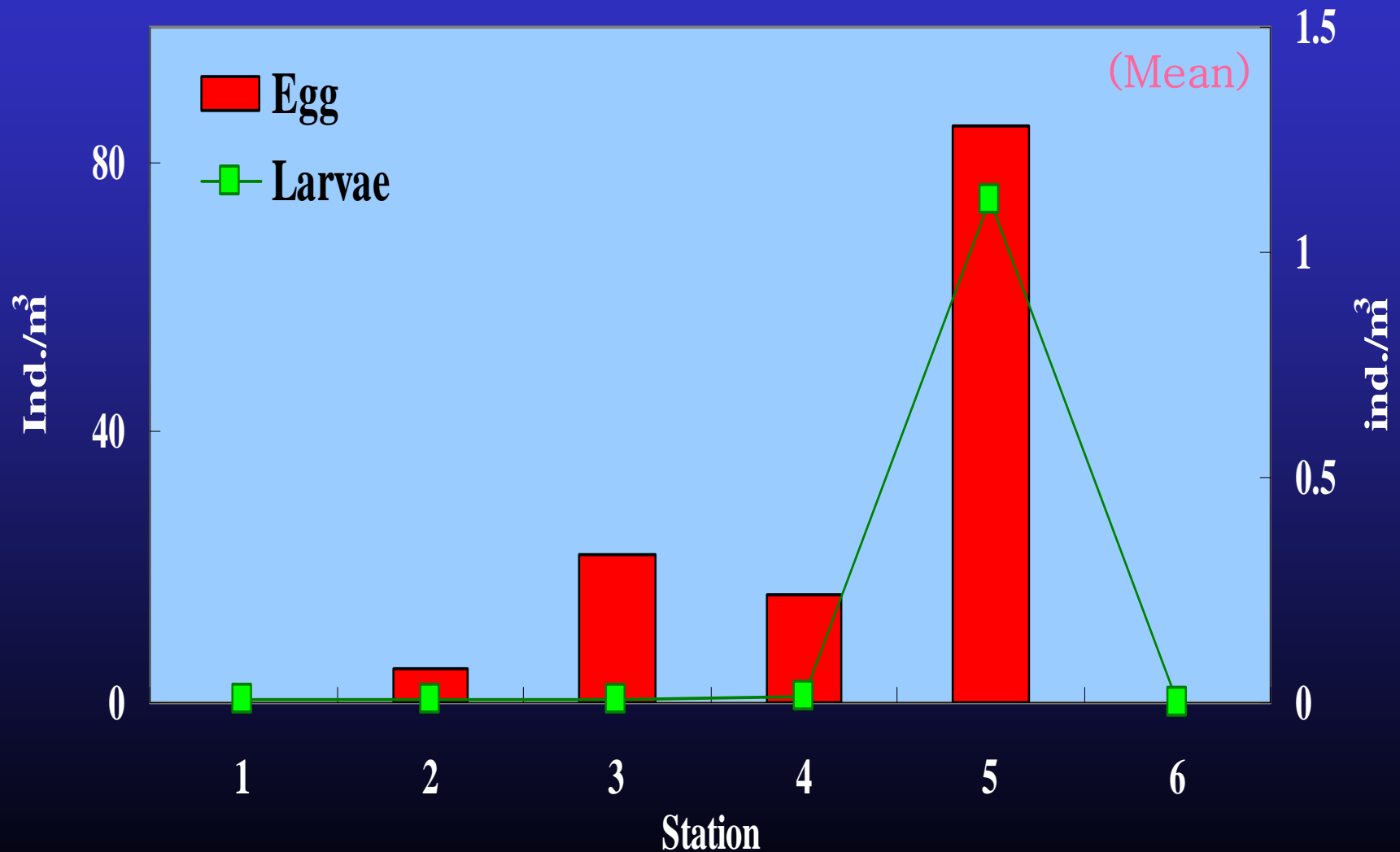
# Monthly variation of mean phytoplankton abundance (2001)



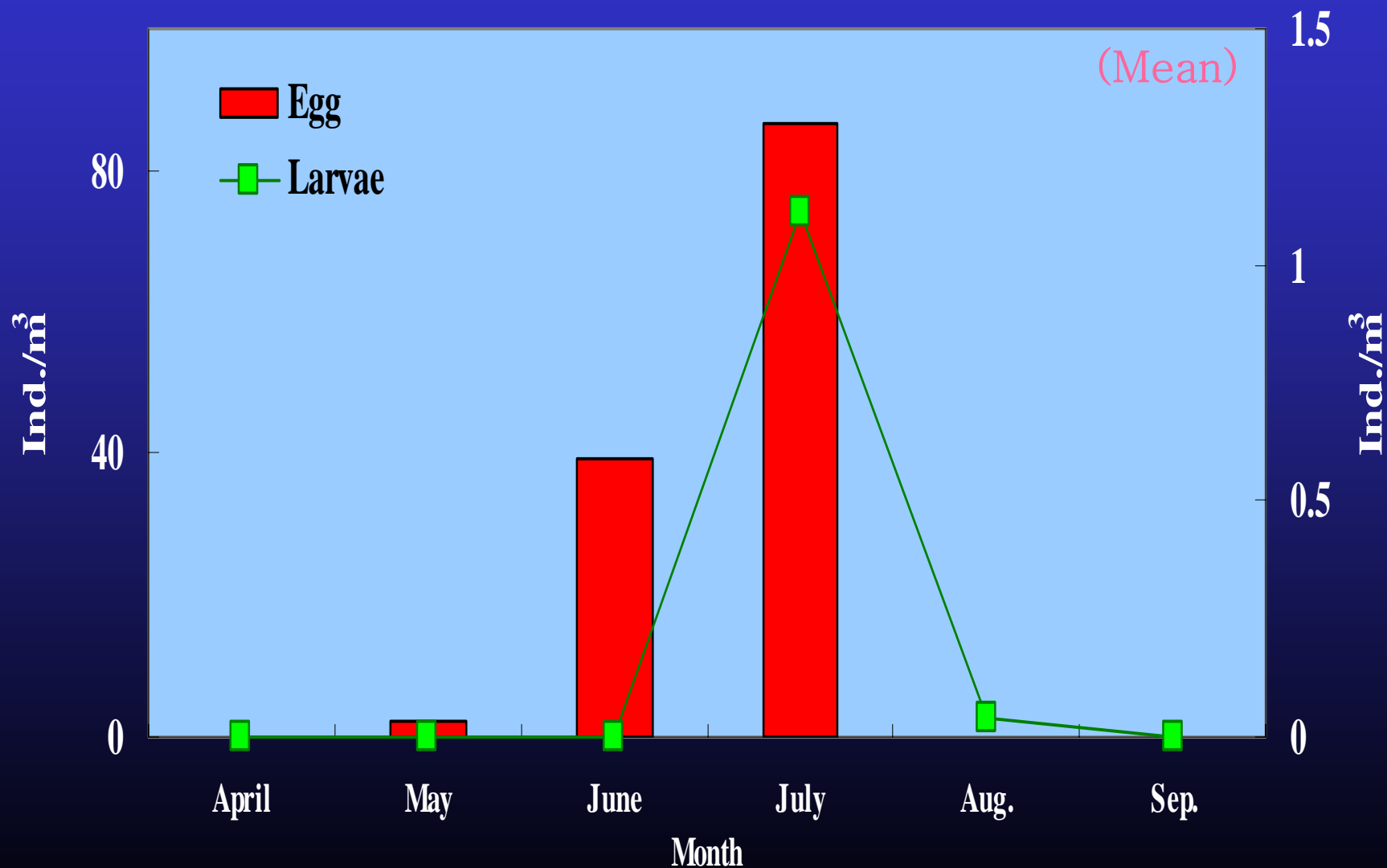
# Monthly variation of mean phytoplankton diversity & dominance



# Spatial variation of mean anchovy abundance (2001)

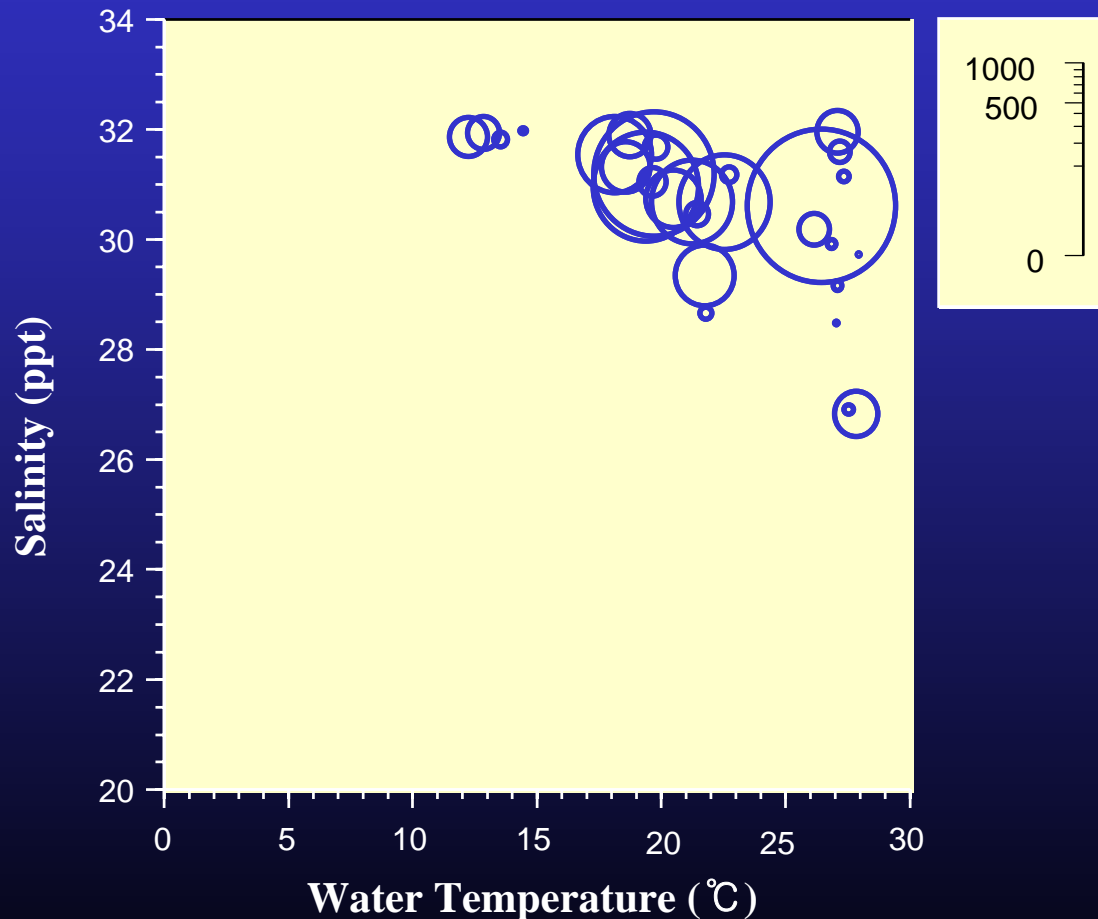


# Monthly variation of mean anchovy abundance (2001)

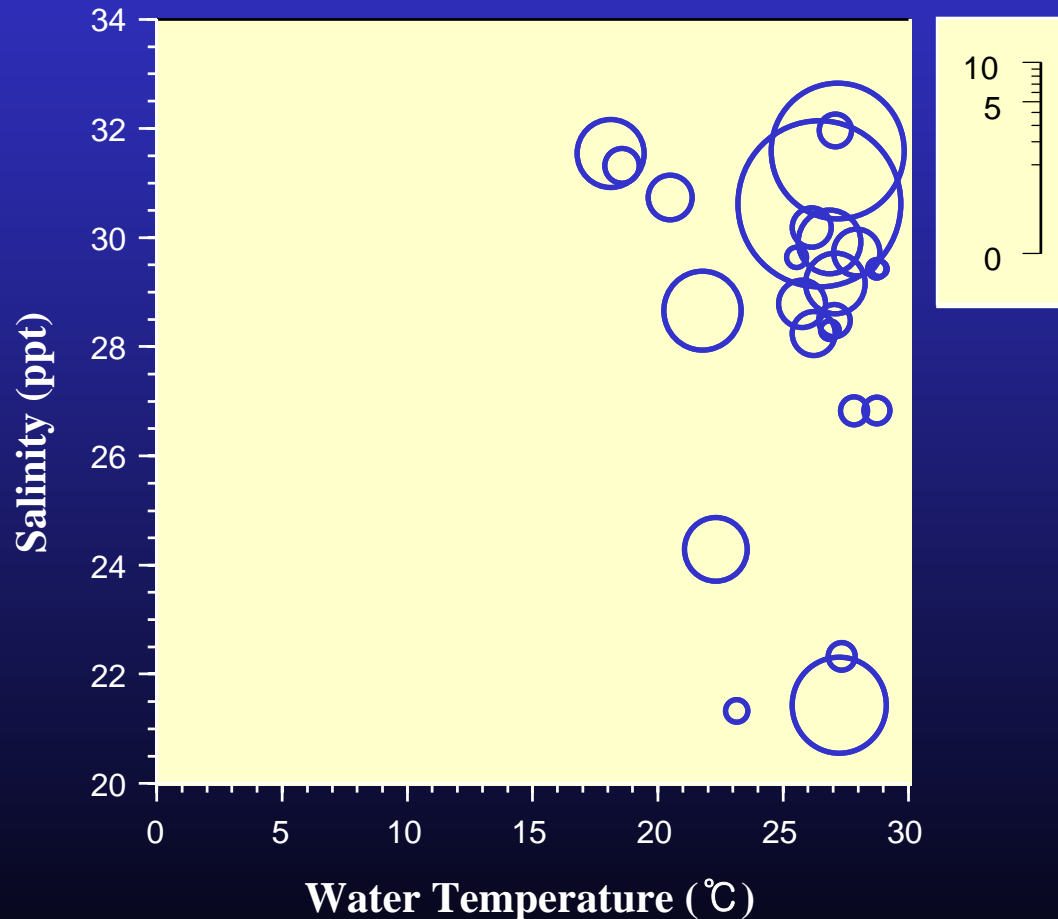




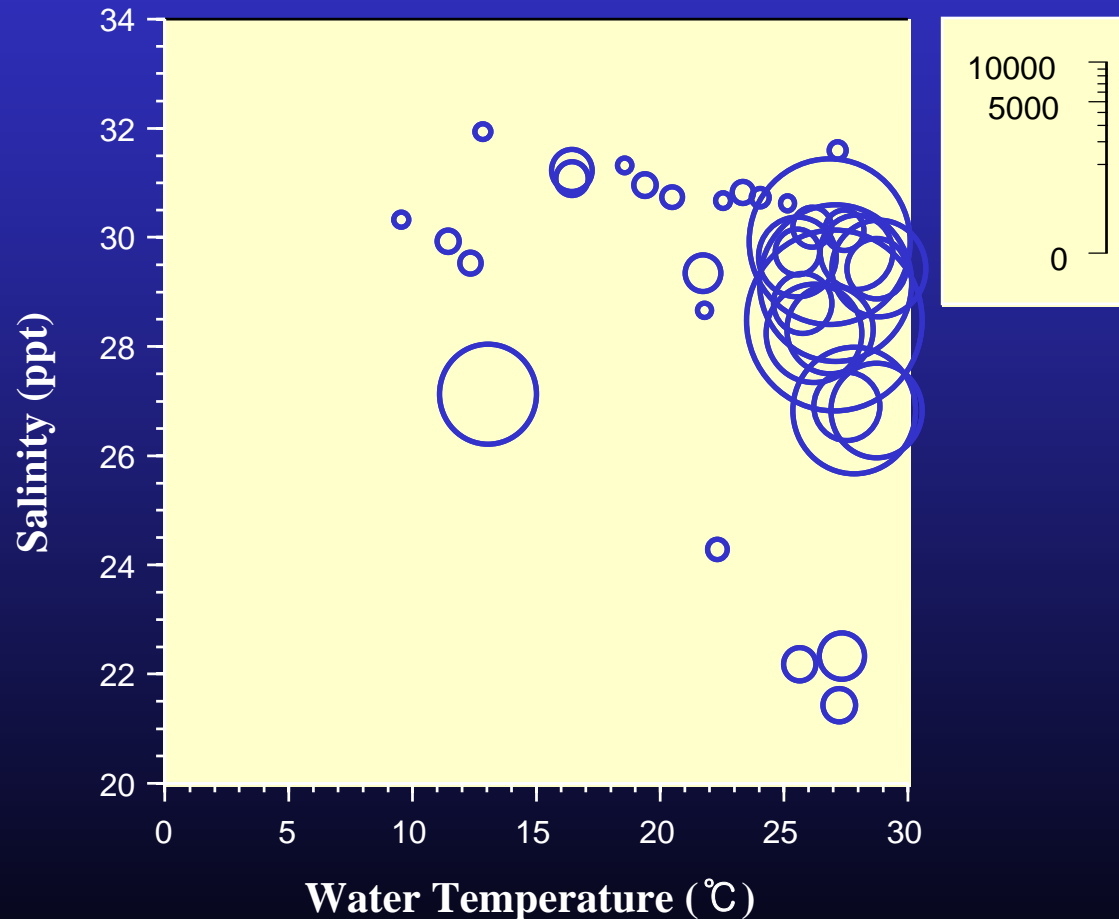
# Anchovy egg (ind./m<sup>3</sup>) on temperature-salinity plane (2001.4~2001.9)



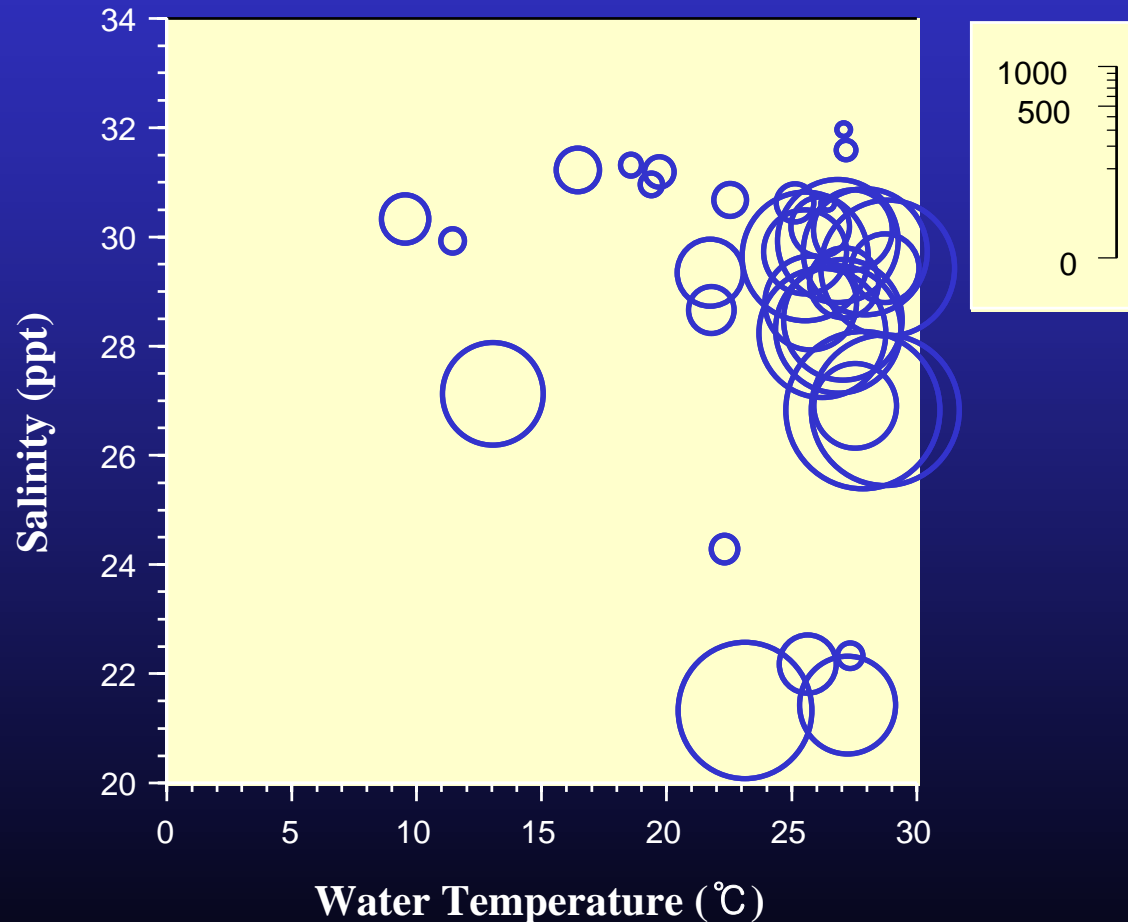
# Anchovy larvae (ind./m<sup>3</sup>) on temperature-salinity plane (2001.4~2001.9)



# *Skeletonema costatum* (cells/ml) on temperature-salinity plane (2001.4~2001.9)



# *Eucampia zodiacus* (cells/ml) on temperature-salinity plane (2001.4~2001.9)



## ■ Conclusion

- In summer **fresh-water discharge** from Keumgang Lake **plays a key role** in forming less-saline watermass and stimulating active growth of major phytoplankton species.
- Thus, the spatio-temporal scale of the freshwater discharge is the governing factor to the **microbial food web ecosystem** in summer.
- **Uncoupling** of phytoplankton distribution with the occurrence of anchovy larvae was found.

## ■ Future Study

- Feeding habit of anchovy larvae and its prey species in the gut.
- Migration pattern of anchovy in the vicinity of the present study area