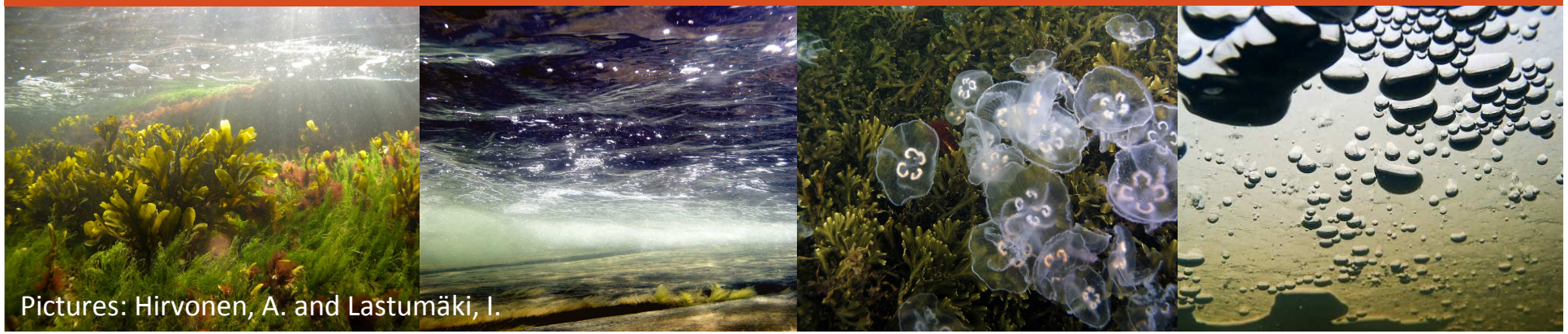


Baltic Sea EWE food web model

- recent activities and next steps

Susa Niiranen[1], Thorsten Blenckner[1], Maciej Tomczak[1] and Olle Hjerne[2]

[1]Baltic Nest Institute
[2]Systems ecology, Stockholm University

ECOSUPPORT GA, Norrköping, 15.10.2010

Stockholm Resilience Centre
Research for Governance of Social-Ecological Systems

Stockholm University

Baltic Nest Institute

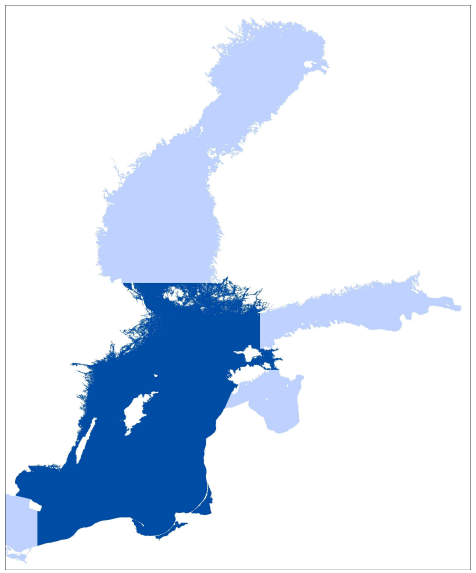
food web model applied to study Central
ea dynamics

Ecopath (mass-balance)

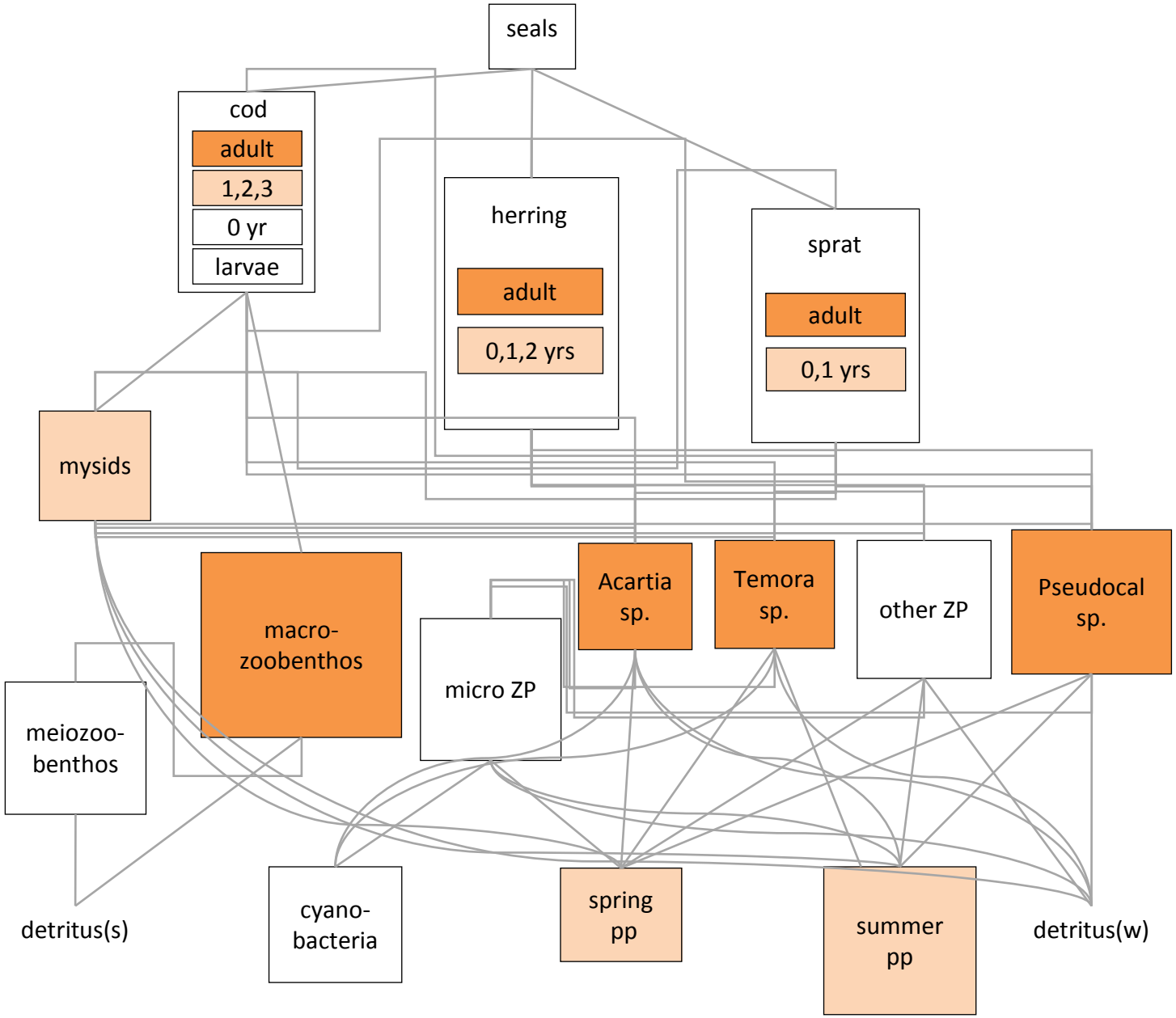
$$P = M_p + F + M_{other} + BA + migration$$
$$C = P + Unass.\ food + R$$

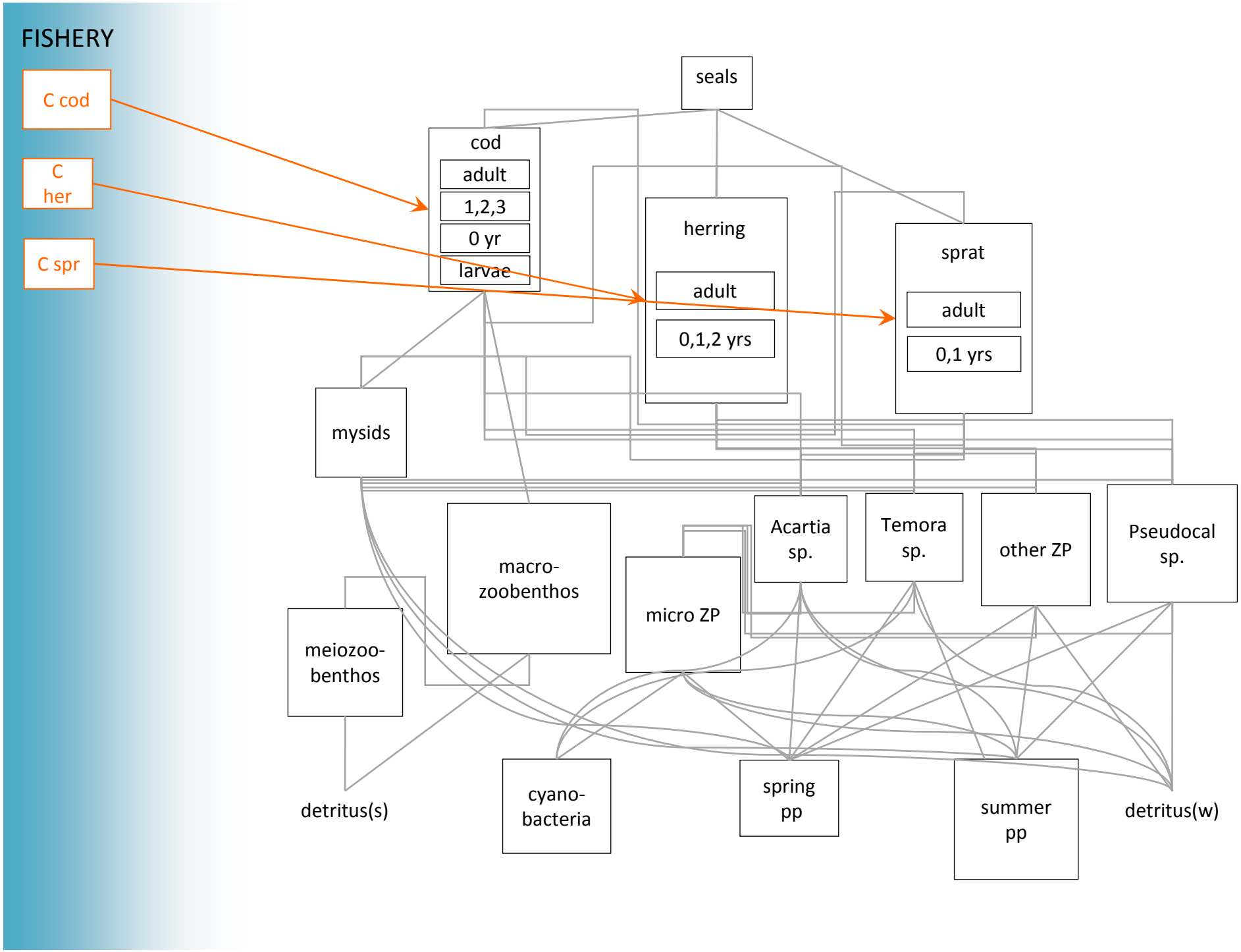
Ecosim (simulation)

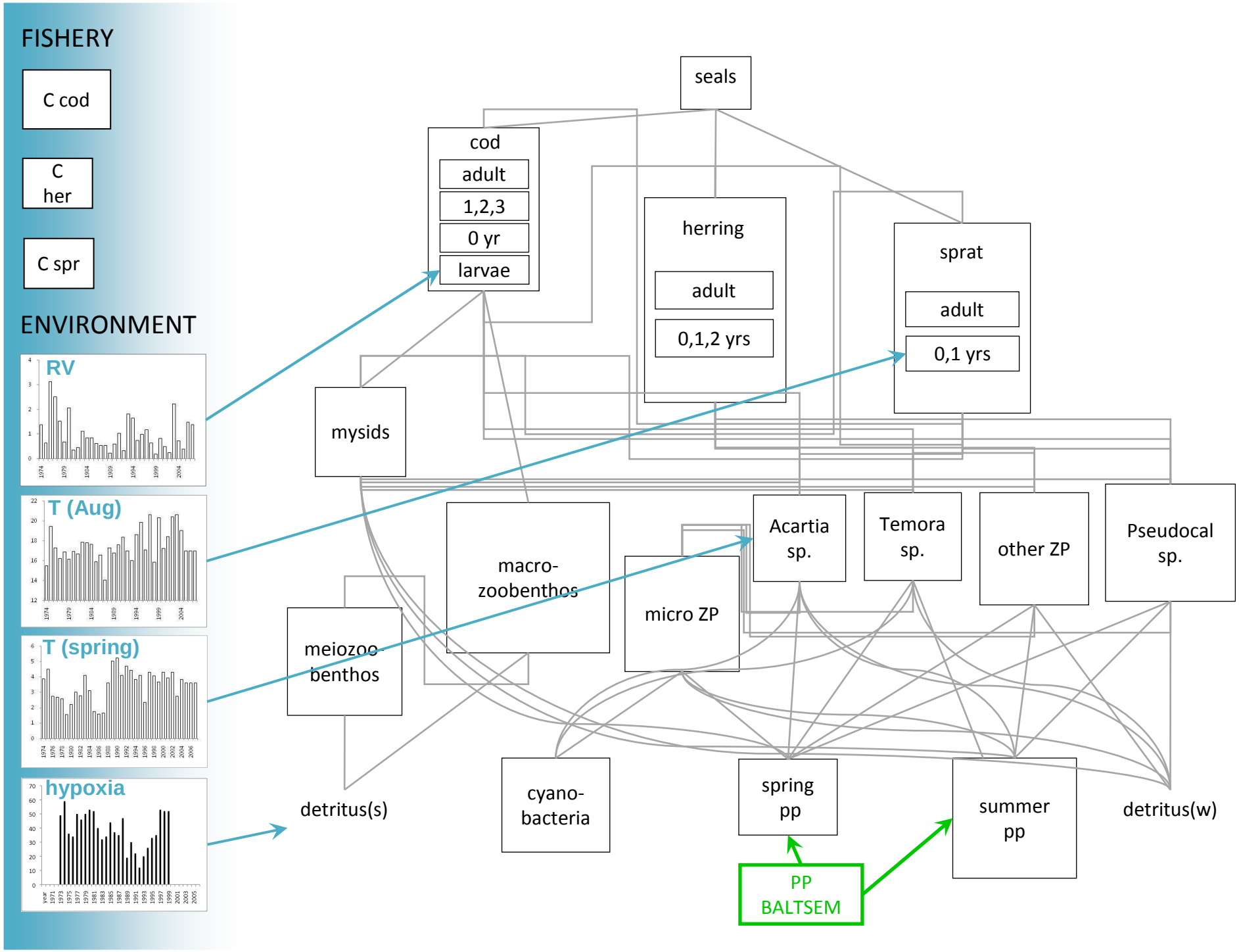
$$\frac{dB_i}{dt} = f(B) - M_0 \cdot B_i - F_i \cdot B_i - \sum_{j=1}^{n} c_{ij}(B_i, B_j)$$



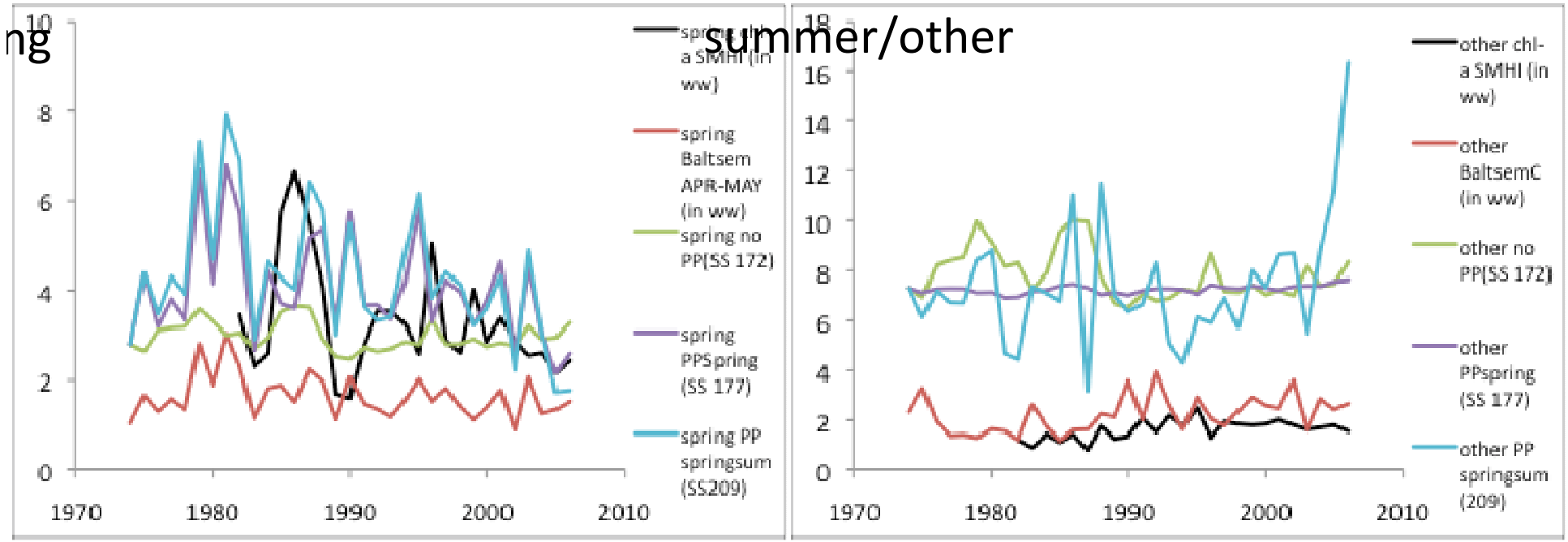
Ecopath with Ecosim → www.ecopath.org


seals
cod
adult
1,2,3
0 yr
larvae
herring
adult
0,1,2 yrs
sprat
adult
0,1 yrs
mysids
macro-
zoobenthos
micro ZP
Acartia
sp.
Temora
sp.
other ZP
Pseudocal
sp.
meiozoo-
benthos
detritus(s)
cyano-
bacteria
spring
pp
summer
pp
detritus(w)


FISHERY
C cod
C her
C spr
seals
cod
adult
1,2,3
0 yr
larvae
herring
adult
0,1,2 yrs
sprat
adult
0,1 yrs
mysids
macro-zoobenthos
micro ZP
Acartia sp.
Temora sp.
other ZP
Pseudocal sp.
meiozoo-benthos
detritus(s)
cyano-bacteria
spring pp
summer pp
detritus(w)

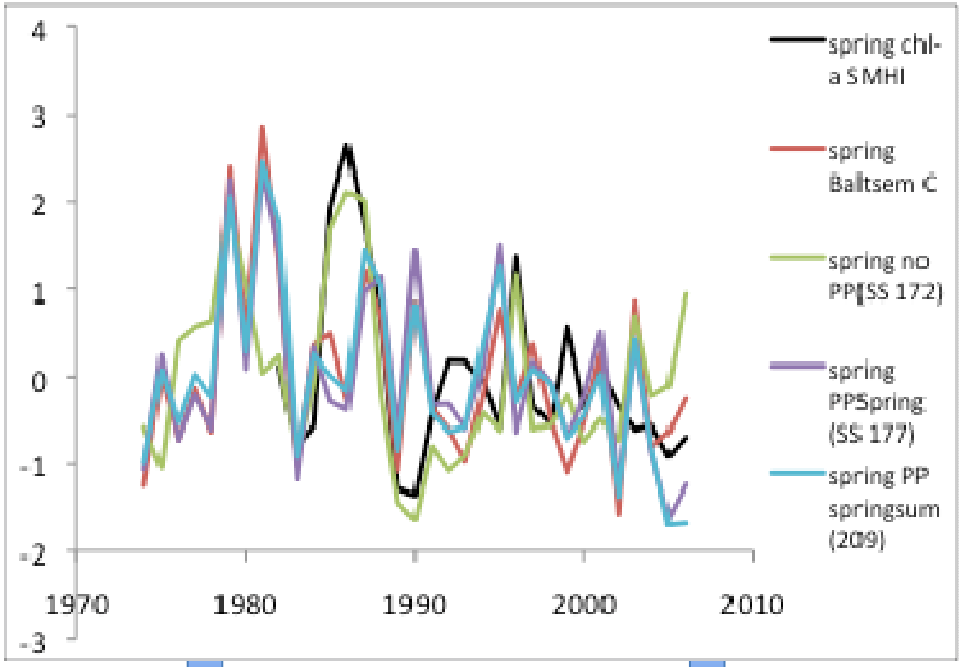

FISHERY
C cod
C her
C spr
ENVIRONMENT
RV
T (Aug)
T (spring)
hypoxia
seals
cod
adult
1,2,3
0 yr
larvae
herring
adult
0,1,2 yrs
sprat
adult
0,1 yrs
mysids
macro-zoobenthos
meiozoo-benthos
micro ZP
Acartia sp.
Temora sp.
other ZP
Pseudocal sp.
detritus(s)
cyano-bacteria
spring pp
summer pp
detritus(w)
PP BALTSEM

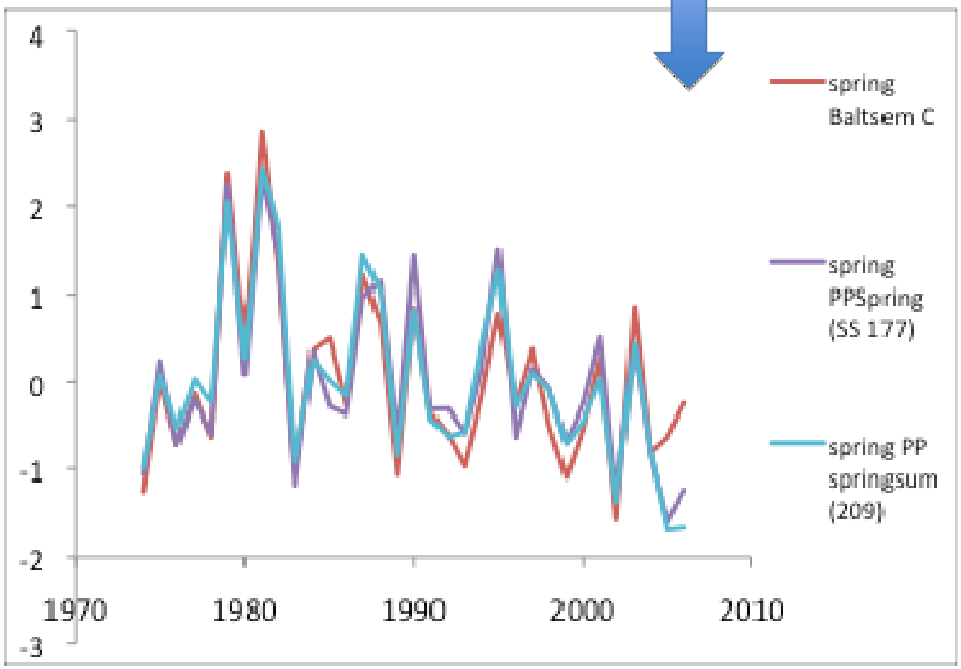
ankton biomass (converted into ww)

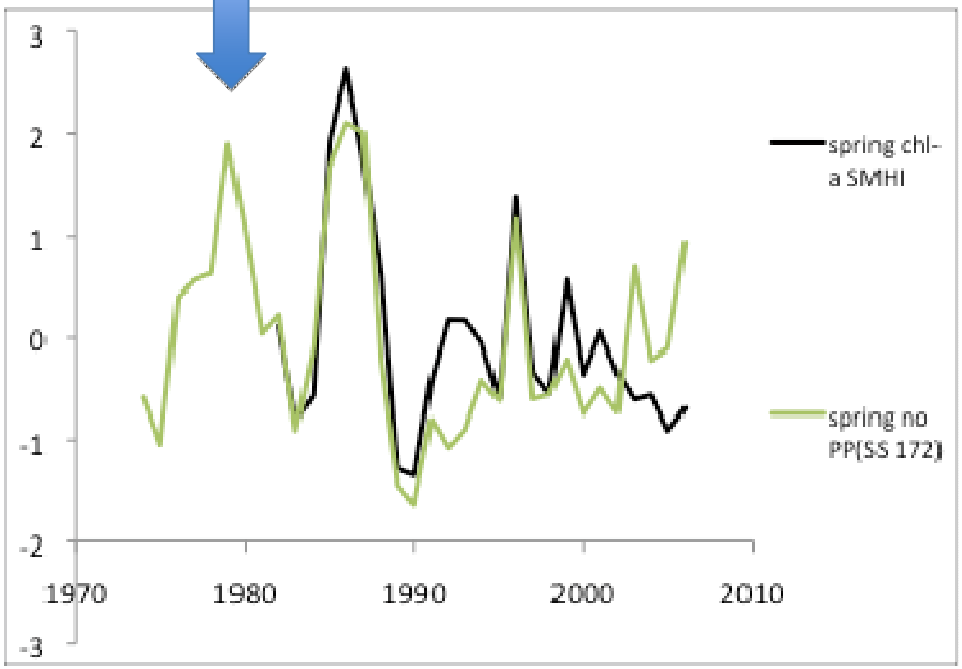


- Differences between BALTSEM and food web model:
  - Grazing
  - Nutrient recycling in BALTSEM → summer phytoplankton

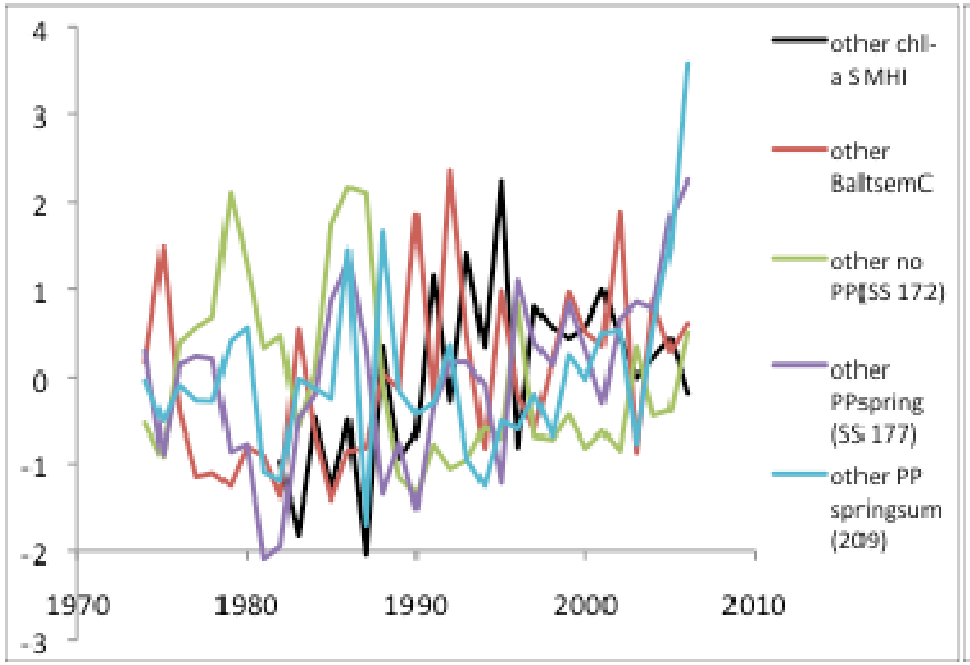
plankton
alies
ıg

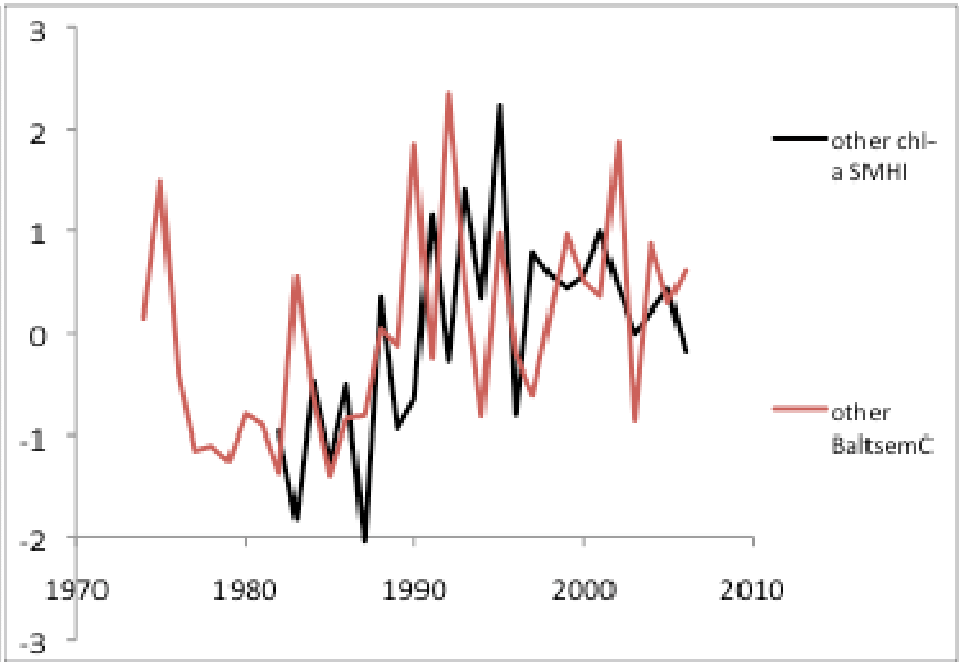




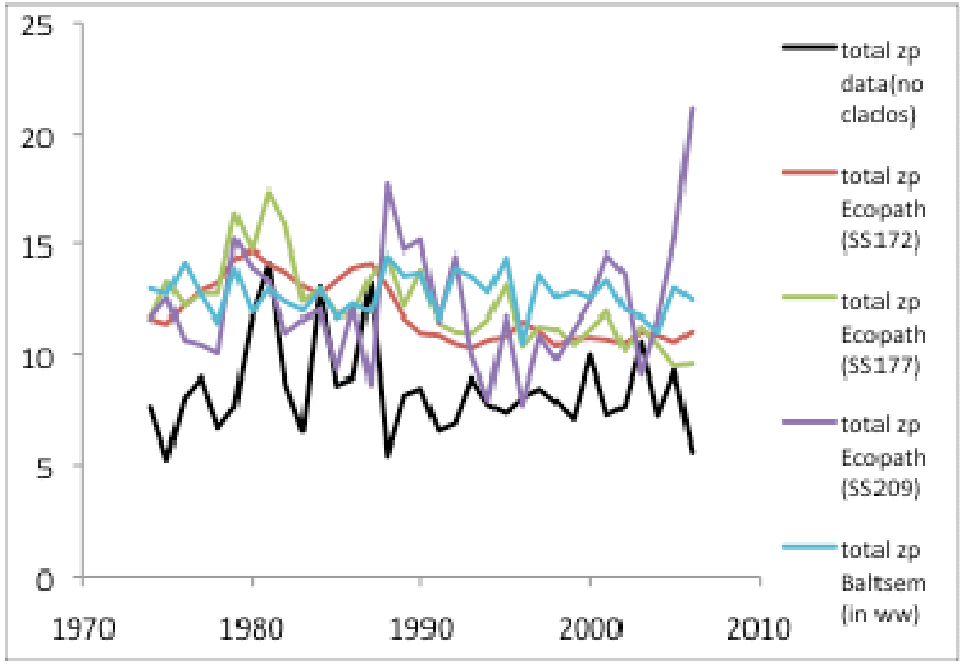


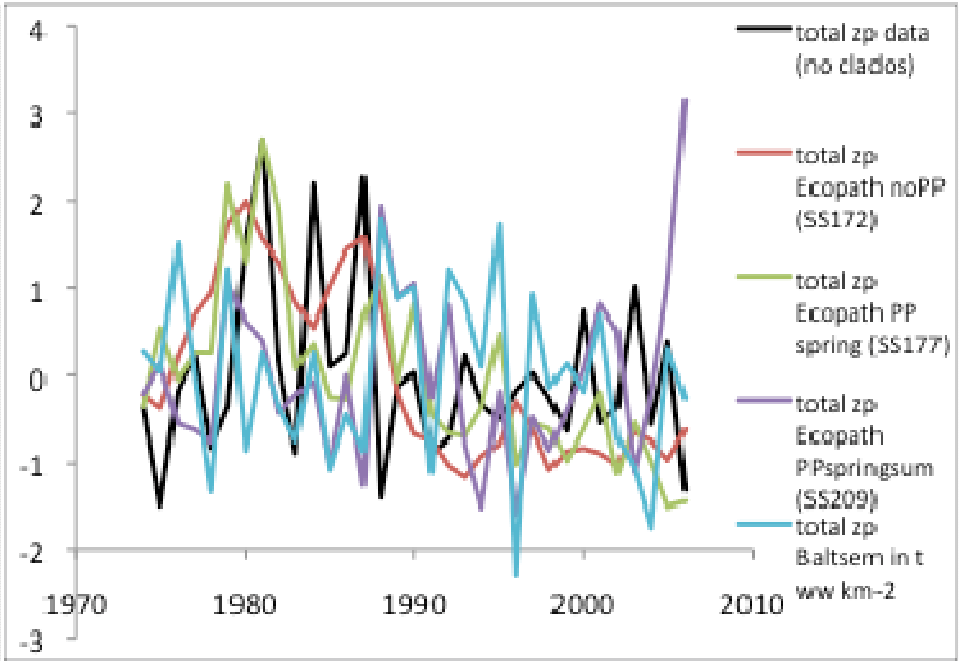
ankton anomalies – summer/other

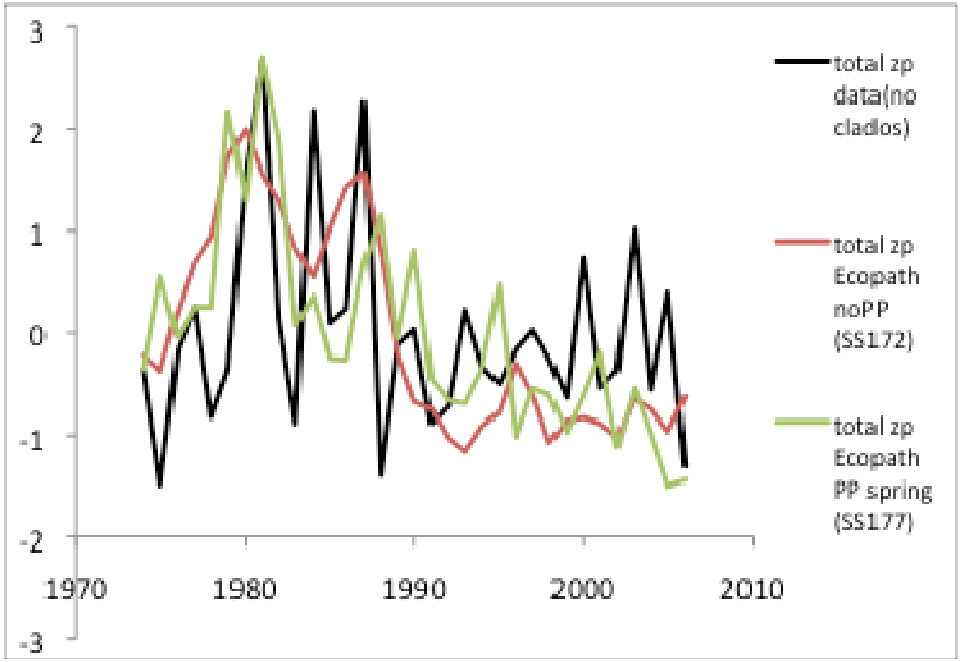


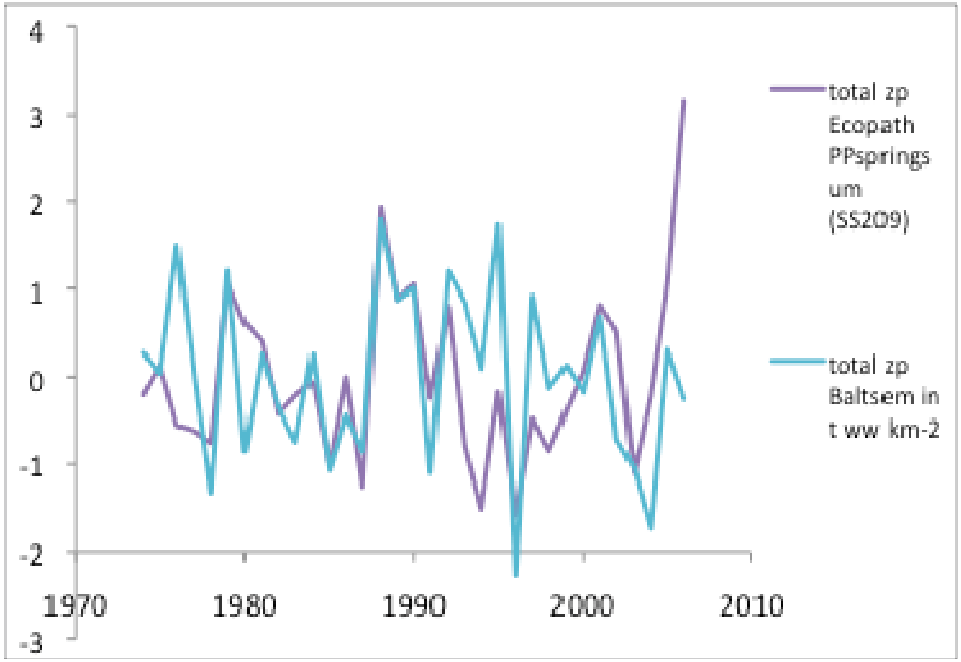


ton biomass (converted to ww) – annual mean









ɛps

- Evaluating the food web model accordingly to biogeochemical models

ɜps

- Evaluating the food web model accordingly to biogeochemical models
- Analysing model performance based on 1974-2006 biogeochemical forcing (30 yr statistics)

	Time series	unit	Time res.	depth	Spatial res.
comparison	spring phytoplankton prod.	g ww m^2yr^{-1}	March-May total	entire water column	TBD
	other phytoplankton prod.	g ww m^2yr^{-1}	annual total	entire water column	TBD
	cyanobacteria prod.	g ww m^2yr^{-1}	annual total	entire water column	TBD
	salinity	psu	annual mean	mean 0-10 m	TBD
calibration	salinity	psu	annual mean	mean 80-100 m	Gotland B.
	temperature	C	March-May mean	mean 0-50 m	TBD
	temperature	C	August mean	mean 0-10 m	TBD
	cod reproductive volume (O^2>2 ml l^{-1}, sal>11psu)	m^3	annual max/mean TBD		Gotland B. Bornholm B.
forcing	hypoxic (<2ml l^{-1}) area	m^2	Annual max	bottom	Baltic Prop.
	anoxic area	m^2	Annual max	bottom	Baltic Prop.

ɜps

- Evaluating the food web model accordingly to biogeochemical models
- Analysing model performance based on 1974-2006 biogeochemical forcing (30 yr statistics)
- First transient runs April 2011