WP3 Impact on the Foodweb



WP3: Impact on the foodweb (including fish – cod, herring, sprat)

3.1 Process validation of foodweb models – simulation results 1961-2004 available month 24; skill assessment month 30; regime shift analyes month 30

3.2 Scenario simulations of the food web - Month 33

3.3 Quantification of uncertainty of future food web projections - Month 33



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Activities:

-further development of all fish models – Ecopath, SMS, Balmar, etc.

-preliminary analyses of hindcasted NPZD model data outputs – temperature, rep. vol.

-workshop re. dataformats, analyses, Charlottenlund, Sept. 13 -updated data request table presented later in presentation

WP3 Paper Topics

Methodological development:

BEMA I – ensemble averaging methodology; interpolated time slices

Validations of key NPZD output variables for fish and foodweb modelling (RV, temp.) -1970s-present; methodology

NPZD model outputs as predictors of fish recruitment (cod, sprat) 1970s-present ; methodology

Weighted ensemble avg. based on past performance – cod; comparison of various weighting options (methodology)

WP3 Paper Topics

Process understanding and/or management oriented

BEMA II – investigation of processes affecting future biomass development (cod, herring, sprat)

Top-down effects on foodweb (e.g., water column transparency) – Ecopath

Ecopath biomass and foodweb reconstructions – early 1900s-2000s (time slices)

Effects of future climate extremes on cod – based on 30-year sliding windows of future climate projections

Estimation of F-msy for 3 fish species under future climate and nutrient loadings

Bio-climatic model of blue mussel distribution based on hindcasted modelled pH (requires input from Baltic-C) and blue mussel zoobenthos monitoring data

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T3.1: Process validation of food web models (1-30) (BNI, TMBL, DTU, IOPAS)

<u>Objective</u>: To analyse the predictive skills of the EwE food web model, statistical and process-oriented fish models, and BEMs for key species in the BS during the high data quality period 1961-2004

<u>Deliverables:</u> -unified validation data sets (9), -food web model and BEM simulation results 1961-2004 (24), -detailed assessment of model skills (30), -analysis of regime-shifts in the food web (30)

Milestones and expected results:

-Validated models for climate and nutrient load change scenarios; -delineation of the impact of historically changing drivers on dynamics (life-histories, distributions and phenologies) of key species (e.g., cod)



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T3.2: Scenario simulations of the food web (19-33) (BNI, TMBL, DTU, IOW, IOPAS)

<u>Objective</u>: Estimate development of key species and food web structure and functioning under various scenarios of future eutrophication, climate change and fisheries exploitation

Deliverables:

-food web and fish population model simulations for 1960-2100 (33), -calculated envelopes for resilience of species in future climate (33), -cause-and-effect studies of simulated changes and analysis of scenarios (33)

Milestones and expected results:

-to discover changes in the food web due to future climatic changes and address questions such as whether cod or blue mussels can survive in the future BS

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T3.3: Quantification of uncertainty of future food web projections (25-36) (BNI, TMBL, DTU, IOW, IOPAS)

Objective: To assess uncertainty of future development of food webs and fish populations using ensemble simulations 1960-2100

Deliverable:

Probabilistic uncertainty assessments of biological responses (e.g., populations, food web structure) to model structure and forcing scenarios (33)

Milestones and expected results:

Estimates of future development of populations and food webs in response to future scenarios of eutrophication, climate change and exploitation

	Time series	unit	Time res.	depth	Spatial res.
forcing calibratio comparison	spring phytoplankton prod.	g ww m²yr-1	March-May total	entire water column	TBD
	other phytoplankton prod.	g ww m²yr-1	annual total	entire water column	TBD
	cyanobacteria prod.	g ww m²yr-1	annual total	entire water column	TBD
	salinity	psu	annual mean	mean 0-10 m	TBD
	salinity	psu	annual mean	mean 80-100 m	Gotland B.
	temperature	С	March-May mean	mean 0-50 m	TBD
	temperature	С	August mean	mean 0-10 m	TBD
	Cod reproductive volume (O²>2 ml l-¹, sal>11psu)	m³	annual max/mean TBD		Gotland B. Bornholm B.
	hypoxic (<2ml l ⁻¹) area	m ²	Annual max	bottom	Baltic Prop.
	anoxic area	m ²	Annual max	bottom	Baltic Prop.

	Time series	unit	Time res.	depth	Spatial res.
comparison	spring phytoplankton B	g ww m²	March-May mean	entire water column	TBD
	other phytoplankton B	g ww m ²	Annual mean	entire water column	TBD
	cyanobacteria B	g ww m ²	Annual mean	entire water column	TBD
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	Time series	unit	Time res.	depth	Spatial res.
comparison	secondary prod. (zoopl.)	g ww m²yr-1	annual total	entire water column	TBD
	zooplankton B (Ergom)	g ww m²	annual mean	entire water column	TBD
	amount of sed. material	g ww m²yr-1	annual total	bottom	TBD
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Modelled Zooplankton Data

-species specific modelled zooplankton data:
-which years available for?
-when will they be available?
-which zooplankton species?
-validation and comparison with field data?