

## Climate-related Change in Marine Ecosystems

### 4) Consequences of Climate Change for Marine Ecology - Summary



Fig. 1: In the rocky northern Baltic coasts, the Bladder wrack is the canopy forming macroscopic alga that supports biodiversity. Most of the northern Baltic Sea animal species utilise it during some part of their life cycle. It is an important feeding ground of littoral fish because of crustaceans and molluscs living on the alga. Eutrophication of the Baltic Sea has caused local disappearance of these algal belts with subsequent decline of biodiversity. Photo: Jukka Nurminen.



Fig. 2: In Baltic Sea, soft sediment bottom plants may form underwater meadows. Here, a marine medusa (*Aurelia aurita*) is swaying over a freshwater weed (*Myriophyllum sp.*). Photo: Jukka Nurminen



Fig. 3 and 4: Decreasing winter ice extent is expected in the Baltic Sea due to warmer winters as a consequence of climate change. Photos: Janne Gröning, (<http://www.saaristomeri2006.fi/>)

#### Increase of Temperature

- May affect convection in late winter
- Causes higher metabolic rates
- Impacts on acclimation capacity
- Reduces the general fitness
- Reduces enzyme activities
- Causes shifts in species composition
- Enhances cyanobacteria blooms
- Causes reductions in sea ice and consequently mammal survival
- Affects birds in several ways, e.g. phenology

#### Increase in Precipitation

- Causes higher river runoff
- Causes a decrease in salinity
- Causes increased nutrient inputs, and
- Increased eutrophication in near coastal areas

#### Decrease in Salinity

- Causes osmotic stress
- Causes shifts in species composition (e.e. phyto- and zooplankton, benthos, and fish)
- Affects egg survival
- Affects food quality for fish (growth rate)
- Affects distribution of benthos organisms
- Causes a reduction of fitness
- Allows invasion of new species



Fig. 5: Beaches dominate the southern coasts, where most of the Baltic Sea population lives. Photos: Janne Gröning, (<http://www.saaristomeri2006.fi/>)



Fig. 6 and 7: About 85 million people populate the Baltic Sea runoff area, and the sea itself is a resource for commercial and recreational fishing and boating. Photos: Fig. 6: Janne Gröning (<http://www.saaristomeri2006.fi/>), Fig. 7: Juha Käärää.



Fig. 8: Soft bottoms in sheltered river mouths create typical reed beds in the Southern Baltic Coasts. Photos: Janne Gröning, (<http://www.saaristomeri2006.fi/>)