



## Biodiversity science from an ICES view



**ICES**

International Council for  
the Exploration of the Sea

**CIEM**

Conseil International pour  
l'Exploration de la Mer

... The Organization

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## Biodiversity science from an ICES view

### *The International Council for the Exploration of the Sea*

#### What is ICES?

- Founded in 1902 to bring marine scientists together
- A UN acknowledged international organization, devoted to promote marine science in the North Atlantic
- Inspired by concern about fish stock depletion and research duplication in Europe, goal was synergies
- Inspired by the big picture missing of what is going on in the sea (today called ecosystem approach to management to which ICES is still committed)





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### *International Council for the Exploration of the Sea*

ICES is:

A science community of more than **1600** marine scientists from **20** member states and six **affiliated** countries worldwide

Bottom-up science is organized under eight science and one advisory committee

ICES promotes and coordinates marine **science** in the North Atlantic and produces unbiased **advice** to governments and commissions





## Biodiversity science from an ICES view

*ICES and Biodiversity - what is biodiversity science anyway?*

*Biodiversity stands for the diversity of **life**: species richness, genetic variability, multitude of habitats*

*US NRC defines it as “**collection of genomes, species, ecosystems**”*

*Biodiversity **integrates** structure and function in an ecosystem*

*Biodiversity **integrates** taxonomy and genetics sciences  
- if we manage to find appropriate indices!*



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*Biodiversity Convention – it is a political term coined in the context of the **Biodiv Convention***

*There it is used synonymously with **resources**, it is related to human **use** and **exploitation** and includes a mandate for sharing the benefits*

*The practical problem for implementing the Convention turned out to be lack of **science** needed on the spot*

*Marine Biodiversity? **Poorly** developed for the **oceans**, including its implementation!*



## Biodiversity science from an ICES view

*It is common belief among scientists that **biodiversity** is related to*

- ***effective** and **complex** food-webs where the energy flow in the ecosystem is **stable***
- *high **stability** and **resilience** of ecosystems corresponding to fast **recovery** of exploited systems*
- ***high productivity** of ecosystems which can be exploited by e.g. fisheries*
- *providing a **wealth** of genetic potential for adaptations to changing environments*



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*consequently, **loss** in biodiversity results in*

- *less effective and simplified food-webs where the energy flow in the ecosystem has been severely disturbed*
- *less resilience causing slow recovery of over-exploited systems*
- *less stability in the ecosystem*
- *loss of fisheries productivity, e.g. through adverse genetic change*

*The **EU Biodiversity Action Plan** (2001) for Fisheries is based on the above assumptions*



# Biodiversity science from an ICES view

## Climate and biodiversity

Climate induced ocean changes **affect** distribution and biodiversity

Marine ecosystems respond more **lasting** than terrestrial systems, changes do not reverse rapidly

How can we **discriminate** between these and man-made changes in biodiversity patterns?

**MORGENAVISEN Jyllands-Posten**  
 Fredag den 16. januar 2004 · Uge 3  
 Danmarks internationale avis  
 www.jp.dk

**Tropéfisk i danske farvande**  
 Stigende temperaturer i fald gang med at ændre havet omkring Danmark. Tropiske fisk nærmer sig snart tockers og mulligvis også radspættens er på vej væk.

**KLIMAFORANDRINGER I LÅB FIK**  
 Tropiske fisk og glasier har set kære med Danmark og resten af verden. Et stort antal af de tropiske fisk er på vej væk fra Danmark og mod nord. Et andet stort antal af de tropiske fisk er på vej væk fra Danmark og mod syd. Et stort antal af de tropiske fisk er på vej væk fra Danmark og mod vest. Et stort antal af de tropiske fisk er på vej væk fra Danmark og mod øst.

**Dyrest og billigst**  
 Danmarks og USA bliver snart i distributionen "Bakkehuset" i Skotland. Danmarks og USA bliver snart i distributionen "Bakkehuset" i Skotland.

**KLIMAFORANDRINGER**  
**Tropiske fisk på vej nordpå**  
 I 1980'erne blev tropiske fisk registreret i danske farvande. I 1990'erne blev de registreret i danske farvande. I 2000'erne blev de registreret i danske farvande.

**Danske fiskearter på vej væk**  
 Nye arter i danske farvande

**John Dory SIGNATUR**





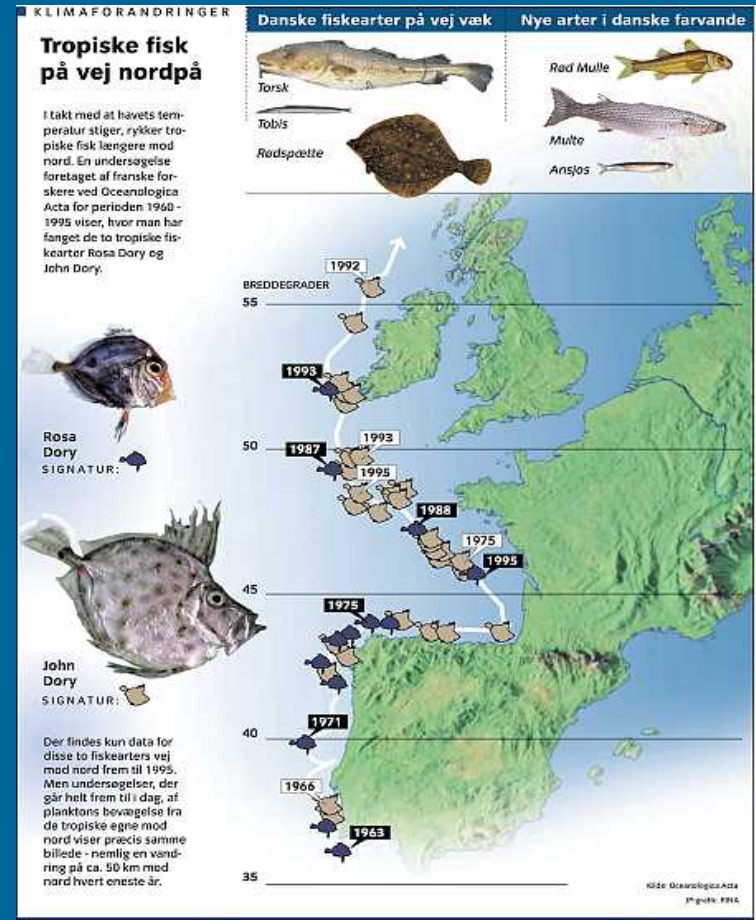
# Biodiversity science from an ICES view

Rapid spread of **subtropical** species along the continental slope, should we say: “the ecosystem is **changing**” or “the ecosystem is **moving**”?

Should we be concerned about the conservation of particular species in “**traditional**” locations or is it OK if they have moved elsewhere?

What about the conservation of ecosystem **functions**? Is that allowed to move too? If fish production is affected, should we be **managing** differently?

New chances for **invasive** species!





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### *Concepts for protection*

*The concept of biodiversity focuses on **structures***

*But how about the ecosystem **processes**? Trophic energy flows, reproduction, migrations, recruitment?*

*Conservation efforts purely focused on structures will **fail** to protect the key **processes** and to maintain the biodiversity of a given ocean area*



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*Some issues for the science*

*Biodiversity is a **proxy/indicator** for stability and functionality in ecosystems – or not?*

*Biodiversity can be related to the **goods** and **services** and can be translated into economical terms – or not?*

*Marine Conservation Areas (e.g. NATURA 2000, SSAs) will have to be large enough to cover structural **and** functional aspects (objects **and** processes), how to **develop the appropriate procedure**?*

*We need a new generation of **taxonomists**! Names will matter...*

*We need more work on genetic **variability**! Responses and adaptations will matter...*





## Biodiversity science from an ICES view

### ***What can ICES contribute to Biodiversity science? Some examples***

***SGBIODIV: exploring the potential from the contributions of the expert groups***

***SGFIAC: Study Group on Fisheries Induced Adaptive Changes***

***WGAGFM: Working Group on the Application of Genetics in Fisheries and Mariculture***

***WGMHM: Working Group on Marine Habitat Mapping***

***All ICES “Ecology Groups” – WGZE, WGSE, BEWG, WGFE, WGMME, WGDEC, WGEF etc. including work on taxonomy and ecological processes***



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### ***What can ICES contribute to Biodiversity science? Some examples***

***WGITMO: following-up on introduced (invasive) non-native species***

***WGBOSV: following-up on non-intentionally introduced non-natives***

***WGECO: Impacts of fisheries on the marine environment***

***WKFMMPA: concepts for regulating the fisheries in NATURA 2000  
MPAs***

***All ICES “Planning and Survey (monitoring) Groups” – IBTSWG,  
PGHERS, PGEGGS, PGAAM, PGNAPES etc. including work on  
distribution and life history processes***



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### *What can ICES contribute to Biodiversity science? The example of SGFIAC*

#### *Study Group on Fisheries Induced Adaptive Changes*

“There is a growing body of scientific evidence indicating that fisheries can cause evolutionary responses over time periods as short as 10–20 years, in particular in traits such as the **onset of maturation**. As these changes will most likely result in a **reduction of the productivity** of a fish stock, management objectives and (precautionary) reference points for sustainable exploitation need to be re-defined, and new objectives and reference points for **managing** fisheries-induced evolution need to be developed.



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[www.ices.dk](http://www.ices.dk)

