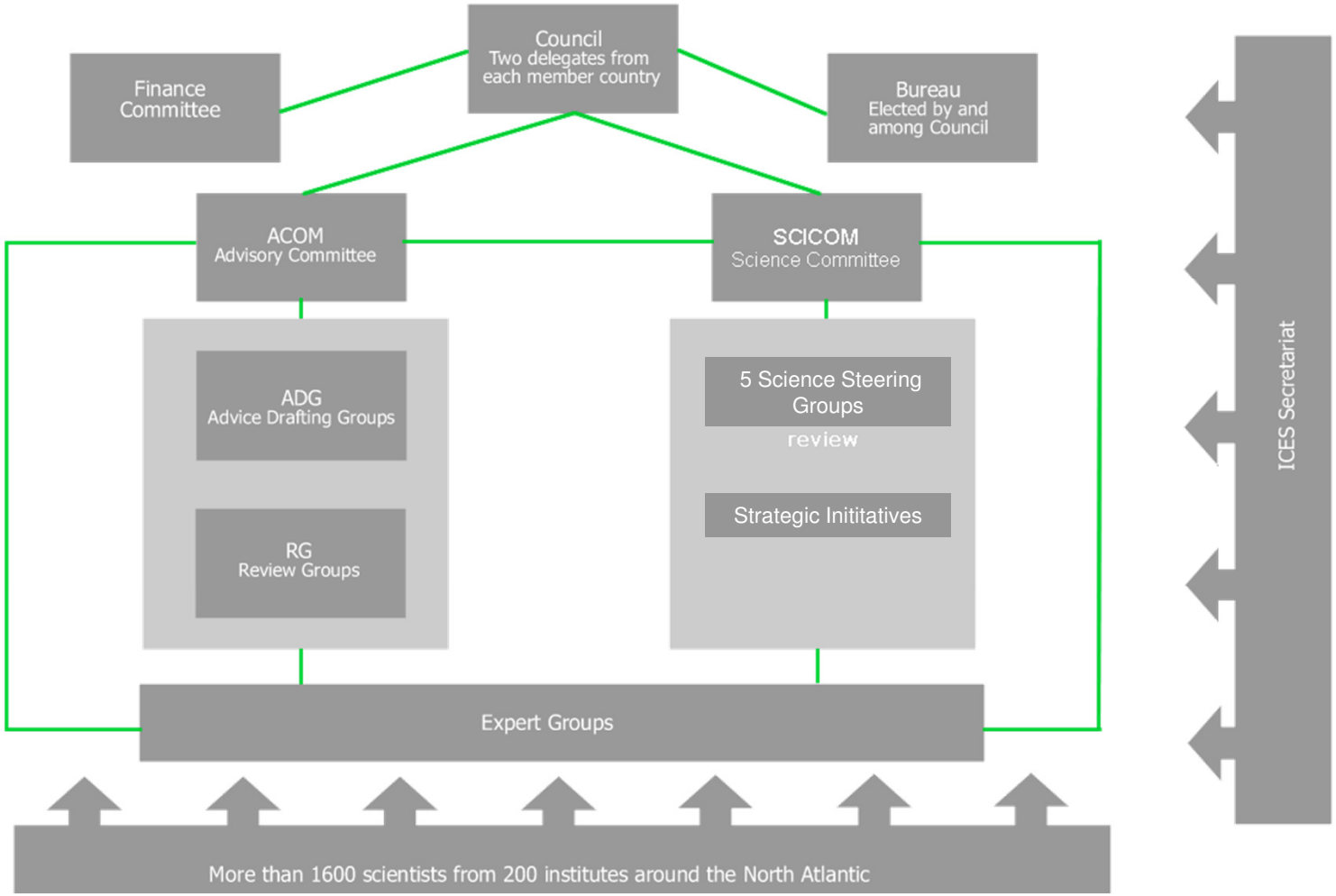
Sveriges lantbruksuniversitet
Swedish University of Agricultural Sciences

Integrated Ecosystem assessments

– a possible framework to support Ecosystem Based Management and the MSFD implementation

***Yvonne Walther**, (Swedish University of Agricultural Sciences)*

Structure of ICES, ACOM and SCICOM



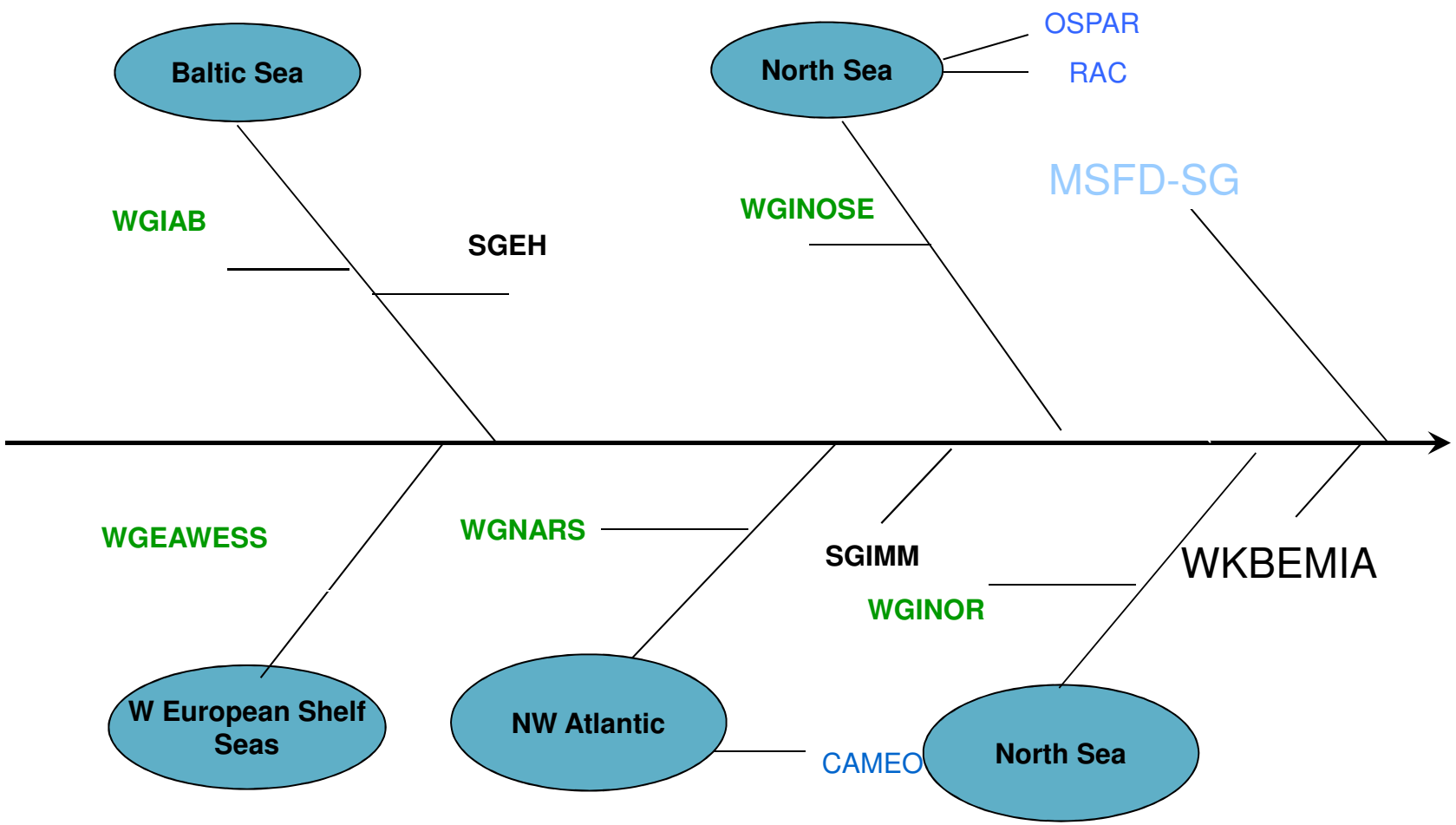
SCIENCE STEERING GROUP Regional SEA PROGRAMMES

Chair: Yvonne Walther, Sweden

Implementing ICES SCIENCE PLAN

Overseeing Expert Groups with a vision toidentify real world application of science with a special interest at Regional Sea level

SCIENCE STEERING GROUP Regional SEA PROGRAMMES



Each oval represents a regional programme and its attached Expert Groups. The blue acronymes attached to the Regional Programme are affiliated organisations or structures. A few EGs are outside the Regions as they have a more overarching function.

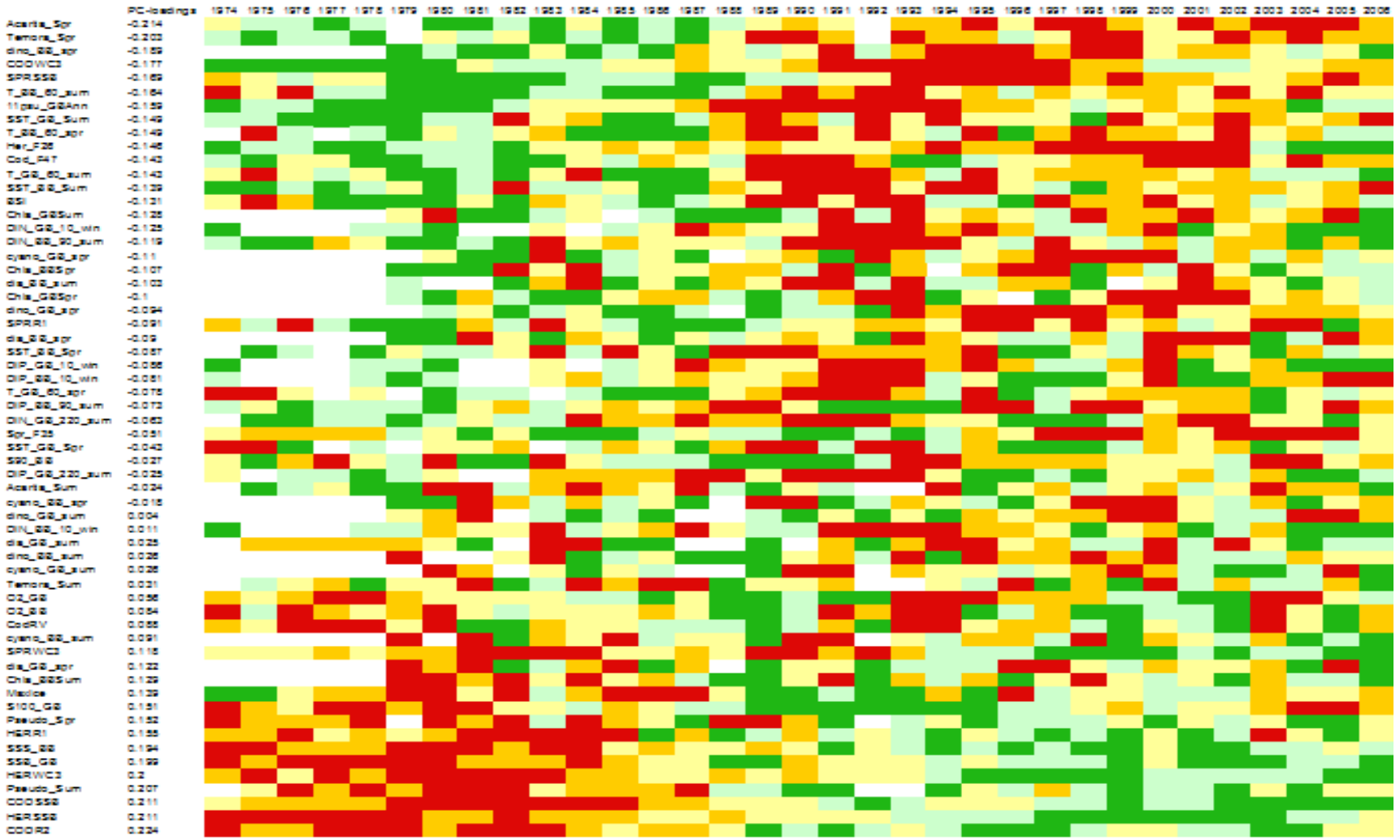
ICES/HELCOM WGIAB
The Working Group on Integrated Assessments of the Baltic Sea

A scientific forum for developing and combining ecosystem-based management efforts for the Baltic Sea

ICES International Council for the Exploration of the Sea
CIEM Conseil International pour l'Exploration de la Mer

HELCOM

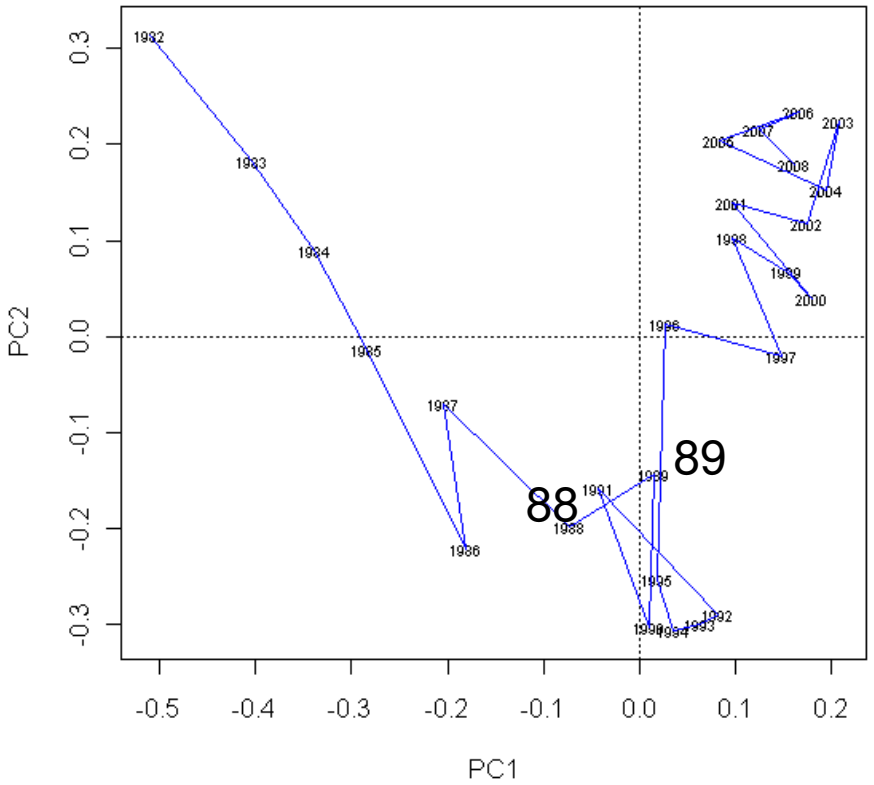
Traffic-lights – CBS

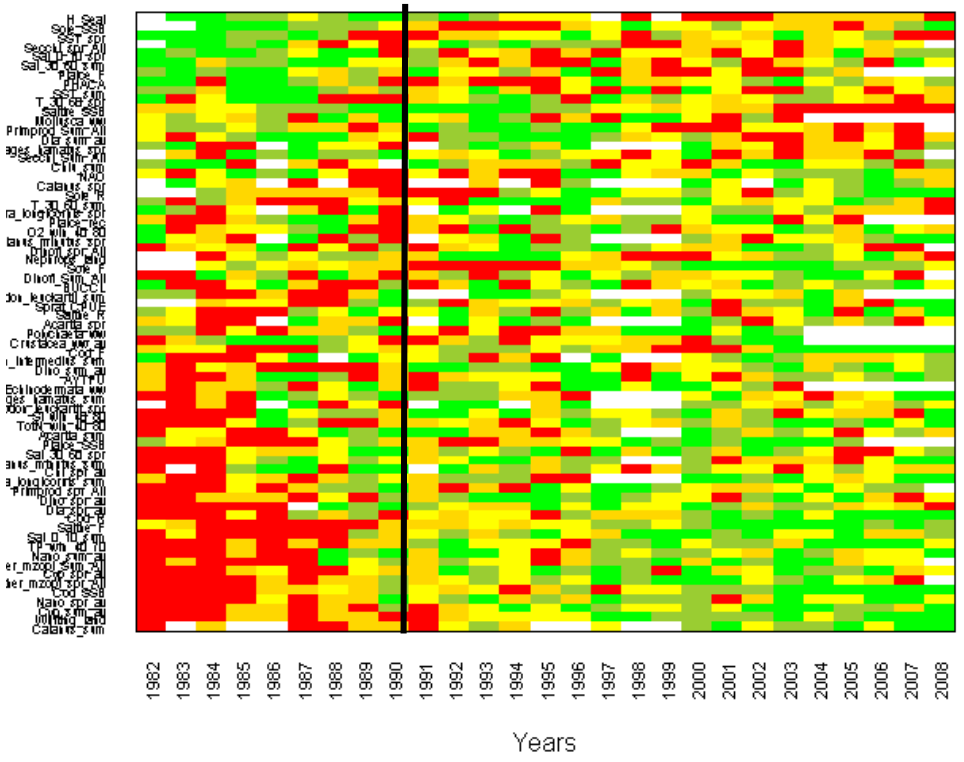


(1) Examples from the 2010 meeting

New sub-system: Kattegat

- Time series from 1982-2008
- 67 variables of which 54 are response variables (primary production/phytoplankton, zooplankton, zoobenthos, fish, birds, seals)





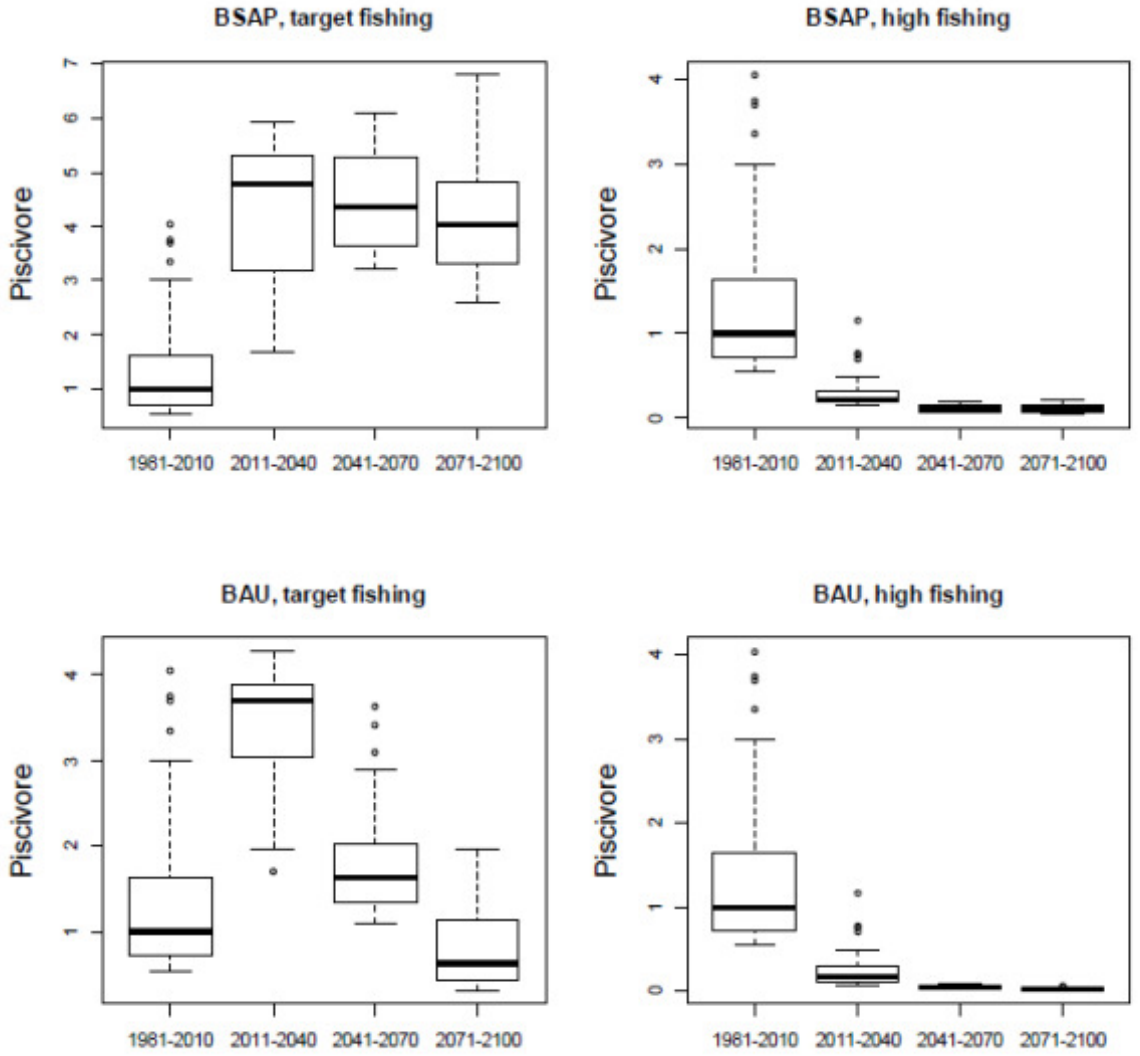
1. Evaluate the current state of WGIAB data and models based on the IEA loop (*sensu* Levin 2009), in relation to the MSFD, and identify possible future contributions from the group

– *Apply models to identify thresholds and analyze trade-offs with respect to D1, D3 and D4 indicators*

HELCOM PROPOSED CORE INDICATOR	Data	EwE	SMS	BALMAR
Populations (D1.2)				
Effects of hazardous substances on marine mammals	0			
Abundance of waterbirds in the breeding season	1	1	0	0
Abundance of key fish species	2	2	2	2
By-catch of mammals and waterbirds	1	1	0	0
Proportion of waterbirds being oiled annually	0			
Abundance of salmon spawners and smolt	0			
Abundance of sea trout spawners and parr	0			
Communities and habitats (D1.4)				
Distribution and extent of benthic biotopes	0			
State of macrozoobenthic communities (BQI, etc.)	1			
Population structure of long-lived macrozoobenthic species	1			
Lower depth distribution of macrophyte species	0			
Phytoplankton diversity	1	0	0	0

2. Provide a quantitative example on management strategy evaluation, with outputs for different scenarios

- Simulate effects of reductions in fishing and nutrient load, with climate change
- Effects on species biomasses and on ecosystem services
- Figure shows ECOSIM /ECOPATH output for piscivore biomass



Early Detection of Ecosystem Regime Shifts: A Multiple Method Evaluation for Management Application

Martin Lindegren[1,2]*, Vasilis Dakos[3], Joachim P. Gröger[4,5], Anna Gårdmark[6], Georgs Kornilovs[7], Saskia A. Otto[8], Christian Möllmann[8]

Trend analysis indicated potential early-warning signals given by a significant decreasing and increasing trend for Pseudocalansu acuspes and Acartia spp prior to the regime shift in the Baltic Sea.

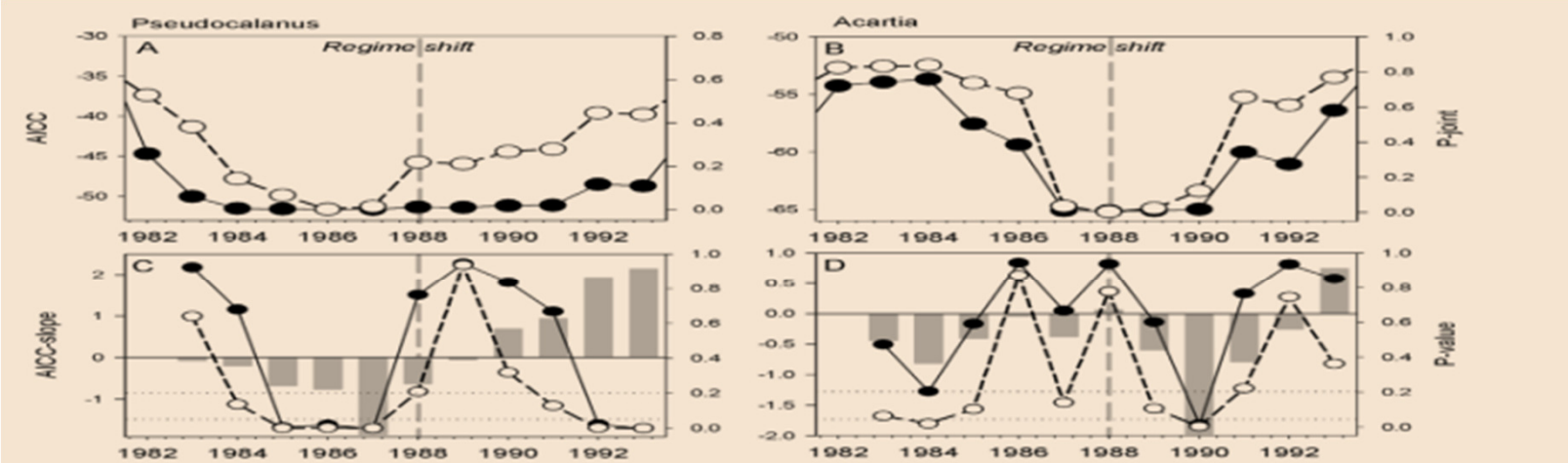
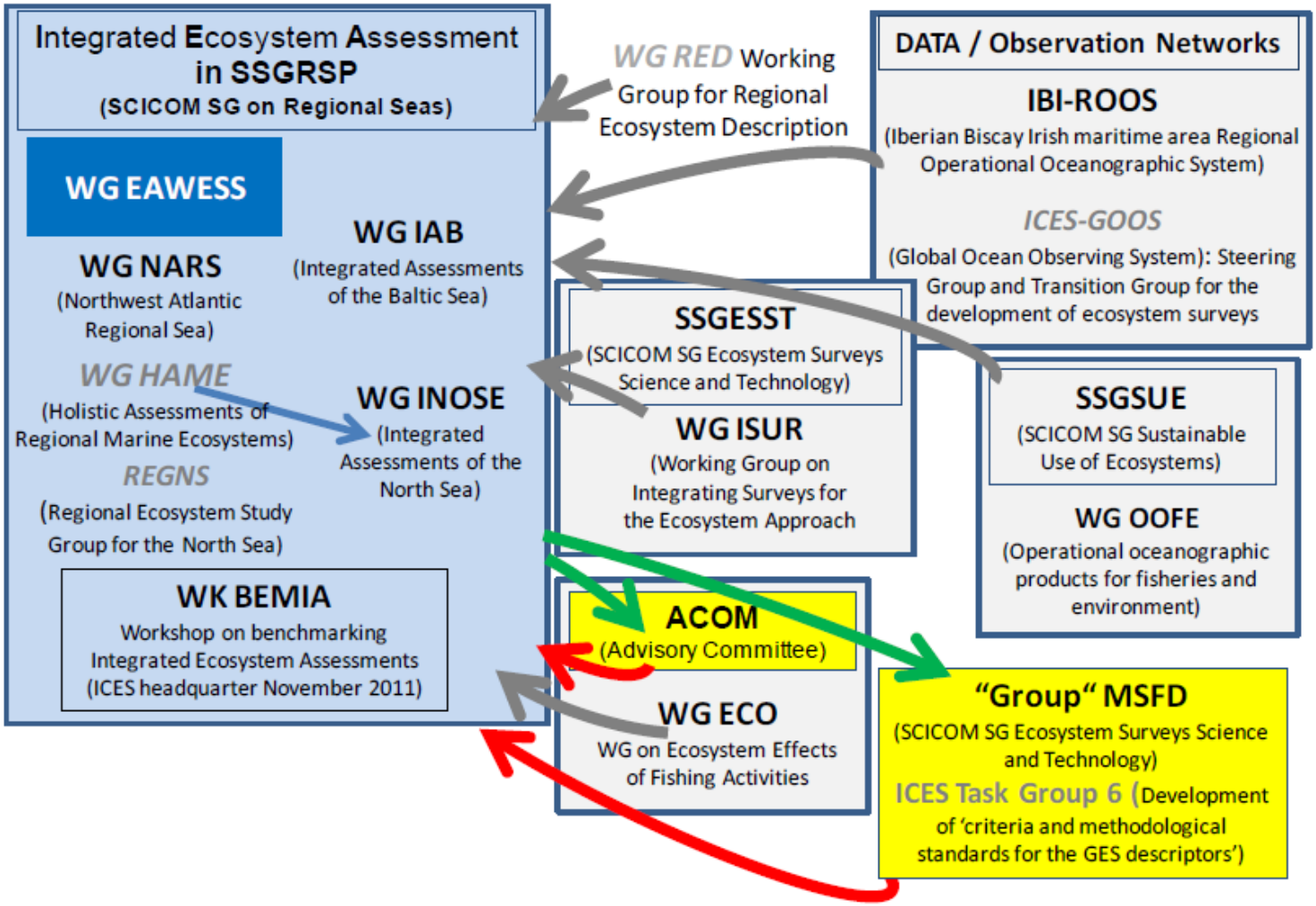


Figure 5. Shiftogram analysis of indicator time series. The shiftograms show the transition towards a local minimum in the AICC (black) and p-joint (white) for *Pseudocalanus acuspes* (A) and *Acartia* spp. (B). In panel (C, D), an alertogram demonstrates the AICC slopes (vertical bars), the estimated probabilities (p-values) of false warnings (white) and false no warnings (i.e., the beta error, black) over a 5-year period before and after the regime shift. The two dotted horizontal lines represent the significance level ($p = 0.05$) and the upper tolerance limits with regard to the probabilities of false detections (i.e., false alarm limit).
doi:10.1371/journal.pone.0038410.g005

The shiftogram approach appeared to be promising in detecting structural breakpoints well in advance before the regime shift.

The research is a contribution to Working Group on Integrated Assessment in the Baltic Sea [WGIAB]

Regional assessment groups under ICES organization, ICES working groups and regional/ecosystem assessment process.



Ecosystem-Based Management: A Framework for the Sustainable Delivery of Ecosystem Services

Marine Ecosystems are Subject to a Wide Spectrum of Threats and Impacts

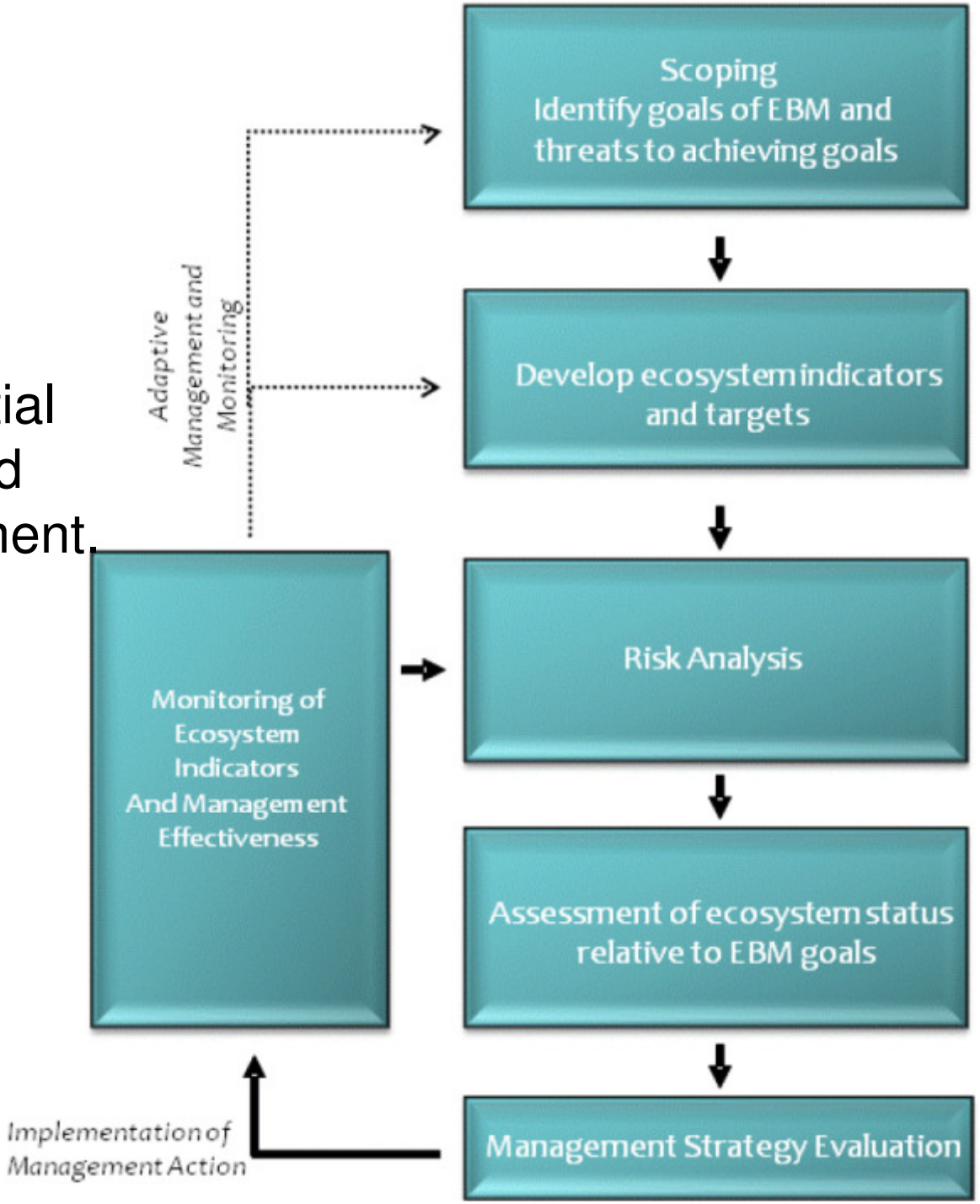
NEFSC Ecosystem Monitoring and Observing Program Elements

- Observer Program
- Cooperative Industry Research
- Fishery Reporting System

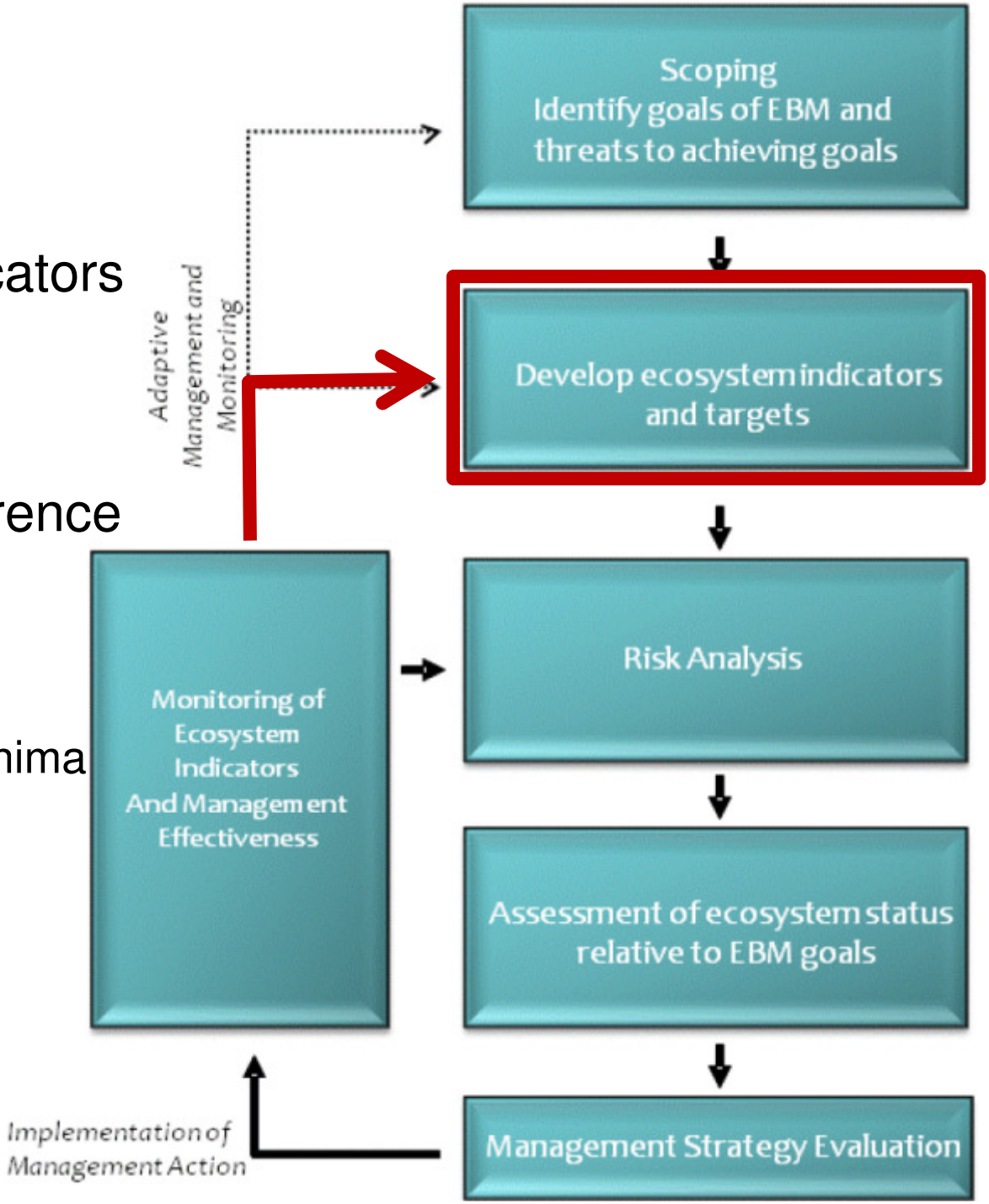
NOAA FSV Henry B. Bigelow

- Satellites
- Oceanographic Buoys
- Standardized Surveys
  - -Trawl & Acoustics
  - -Plankton
  - -Shellfish Dredges
  - -Longlines
  - -Air Craft

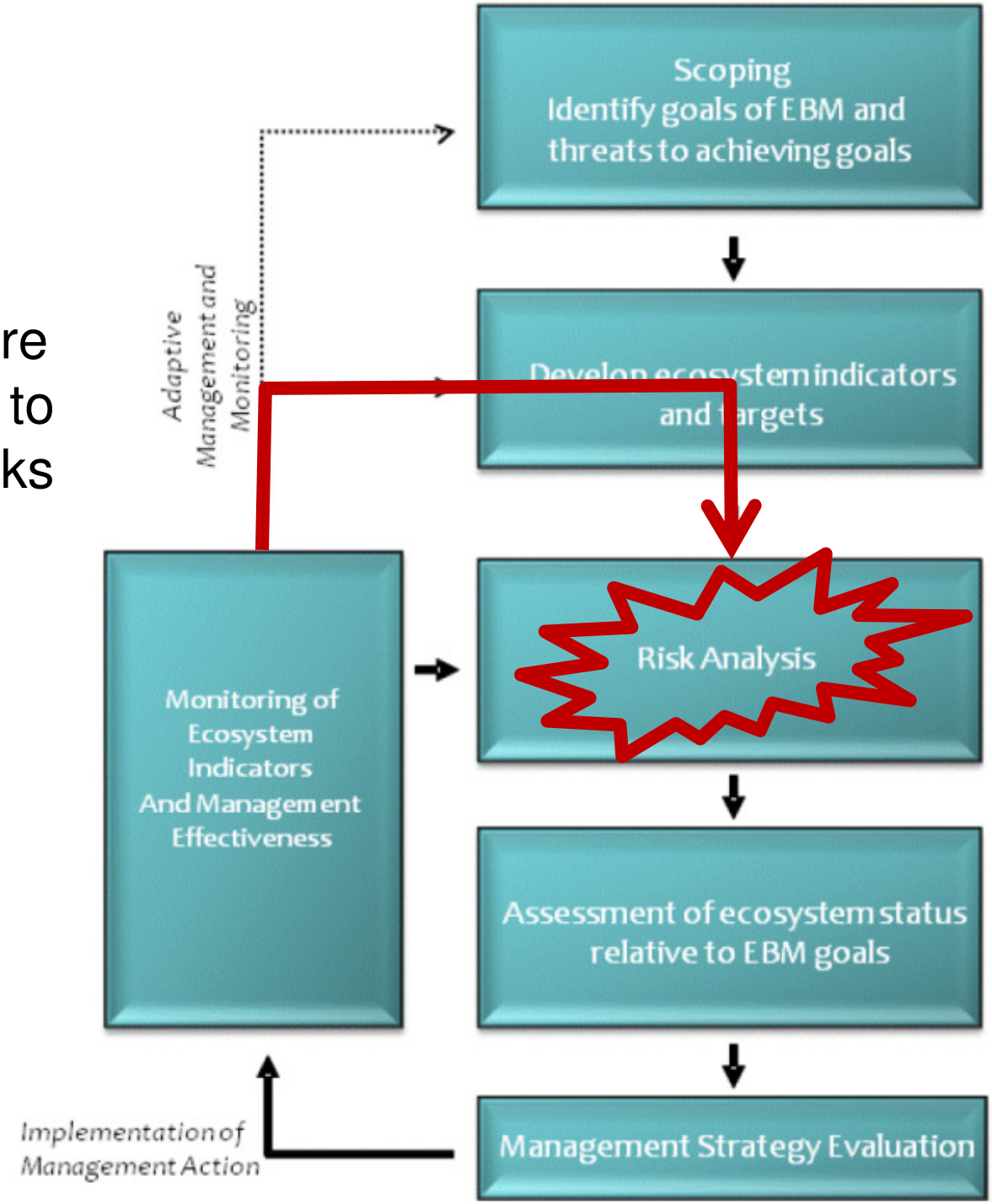
- Levin et al. (2009) proposed a Sequential process of Integrated Ecosystem Assessment.



- Identification of indicators
  - Separate attributes
  - Multivariate attributes
- Identification of reference points
  - Natural thresholds
  - Statistical maxima/minima



- Goals and threats are not specific enough to evaluate utilities, risks and tradeoffs



Creating an example how IEAs can support the development of MSFD and GES.

Produce an approach for monitoring and developing assessment methods for the top three anthropogenic pressures on ecological characteristics described in the national MSFD reports

The integrated ecosystem assessment groups are the key location in ICES for method development and the provision of tools for integrated ecosystem advice.

EU member states have inter alia reported (in Oct 2012) on the (top three) pressures for each ecological characteristic through the MSFD in their initial assessment reports.

The integrated ecosystem assessment groups are requested to prioritise the top three pressures for their regions, based on these reports. After this prioritisation, the integrated assessment groups are asked to develop assessment methods and suggest monitoring for these pressures. The groups should ensure that they take account of and coordinate their work with for existing monitoring and assessment initiatives, for instance carried out by OSPAR and HELCOM.

Workshop on Benchmarking Integrated Ecosystem Assessments (WKBEMIA) 27-29 November 2012

Chairs: Christian Möllmann, Germany and Steve Cadrin, USA