WKINWA 2017 REPORT

STEERING GROUP ON INTEGRATED ECOSYSTEM ASSESSMENTS

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Report of the Workshop on IEA in the Northwest Atlantic

23-24 May 2017

Woods Hole, USA

ICES International Council for the Exploration of the Sea

CIEM Conseil International pour l'Exploration de la Mer

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Executive summary

The Workshop on IEA in the Northwest Atlantic (WKINWA) was an outcome of the 2015 meeting of the Working Group on Maritime Systems (WGMARS, 30 Novemver–4 December 2015, Copenhagen, DK) and of the Workshop on Activity Planning of the Strategic Initiative on the Human Dimension (WKAPSIHD, 12-13 January 2016, IJmuiden, NL). WKINWA's concrete task was defined as "Demonstrating to SCICOM/ACOM/Council the development of an IEA using WGNARS (Working Group on the Northwest Atlantic Regional Sea) as a case study; use graphics, simple language to communicate efficiently with the target groups." WKINWA was developed to complete this task, and Christine Röckmann from WGMARS and Geret DePiper from WGNARS were appointed co-Chairs of WKINWA. The focus of WKINWA was to review and analyse the IEA work in the Northwest Atlantic; particularly with regards to the process employed.

WKINWA was designed with two distinct phases. The morning of day one was focused on reviewing the IEA work in the Northwest Atlantic with managers from the two primary clients which currently receive products developed through the IEA, the New England Fishery Management Council and the Mid-Atlantic Fishery Management Council. In the afternoon of day one and on day two, the focus shifted to the North Sea, where the utility of the process employed by WGNARS was explored for the relevant Regional Sea working group (the Working Group on IEAs in the North Sea (WGINOSE)).

For all IEA groups, some general lessons learned from the conceptual modelling exercise were apparent. First, objectives embedded within the conceptual model as done by WGNARS can be a good way to set the context for the IEA and acknowledge the needs of stakeholders. In discussion with stakeholders, looking at trade-offs is important, and including the objectives is a good entry point into that discussion. Second, there is a clear need to have feedback loops explicitly incorporated into the modelling process in order to understand relationships between system components. WGMARS analyses and synthesis of the WGNARS IEA process has stimulated WGINOSE to also engage in a more inter- and transdisciplinary IEA approach.

1 WKINWA workshop report

WKINWA was a two-day stakeholder workshop embedded within WGMARS. Day 1 consisted of an overview of activities of two ICES IEA groups (WGNARS and WGINOSE) as well as a review of the needs of US regional fisheries managers with respect to Ecosystem Based Management. Day 2 consisted of a group exercise including WGNARS, WGINOSE, and WGMARS members constructing a conceptual model of the North Sea, starting with a foodweb model developed by WGINOSE and a set of management objectives derived from EU policy and legislation. Here we report the key outcomes of each day of the workshop, as well as overall lessons learned.

Comparison of the two ICES IEA groups, and review of US fishery management views of Ecosystem Based Management (EBM) provided insight into the range of scientific achievements, gaps, and further needs for developing IEAs. Overviews of WGNARS and WGINOSE demonstrate different approaches and ideas about IEA.

WGNARS has been focused on the Levin *et al.* 2009 IEA process, and providing insight into best practices for each component of this process. WGNARS has incorporated social scientists as members since its second year (2011), and has evolved from working on separate IEA components to working in a more interdisciplinary fashion on joint products. WGNARS spent substantial effort deriving example management objectives from polices, legislation, etc. for use in the IEA process, which have been used in initial dialogue with regional fishery managers and to structure the most recent ecosystem reports delivered to these managers.

WGINOSE has assembled substantial empirical data, analysed in space and time, from physical through biological aspects of the ecosystem. WGINOSE initially focused on state changes using empirical analyses based on the assembled data, and has recently focused more on processes and functions. The current focus is on assessment and modelling for management advice - however, the WGINOSE chair explained it was difficult to focus the assessment outputs without having clear management objectives, a situation likened to a "ship without a rudder". Current products include conceptual models of system processes, and more recently, foodwebs including fisheries based on the assembled data and expertise.

Invited WKINWA stakeholders (representatives of US Fishery Management Councils) described the US fishery management system as a co-management system with regional councils comprised of stakeholders involved in decision-making and considerable scientific support from NOAA. The two regions that overlap with the US portion of WGNARS include the Mid-Atlantic and New England Fishery Management Councils (Figure 1.1.1). Both Councils are working on EBFM in one way or another; although using different names and approaches. The Mid-Atlantic Council engaged in an extensive stakeholder process ("visioning") to develop a strategic plan addressing stakeholder concerns. Considering ecosystem processes was a high priority across all stakeholder groups. The Mid-Atlantic Council has developed policy guidance for Ecosystem Approach to Fishery Management that includes IEA components such as risk assessment, conceptual models, and MSE (Figure 1.2). The New England Council was described as a fairly contentious environment with many conflicting views, but one where there is an interest in Ecosystem Based Fishery Management as evolution rather than revolution. Both Councils appreciated the alignment of objectives and indicators in the recent state of the ecosystem report, also having human dimensions first in the

report, not last (results of WGNARS process). This has resulted in improved engagement and communication with some potential users of IEAs in the US portion of the WGNARS region.

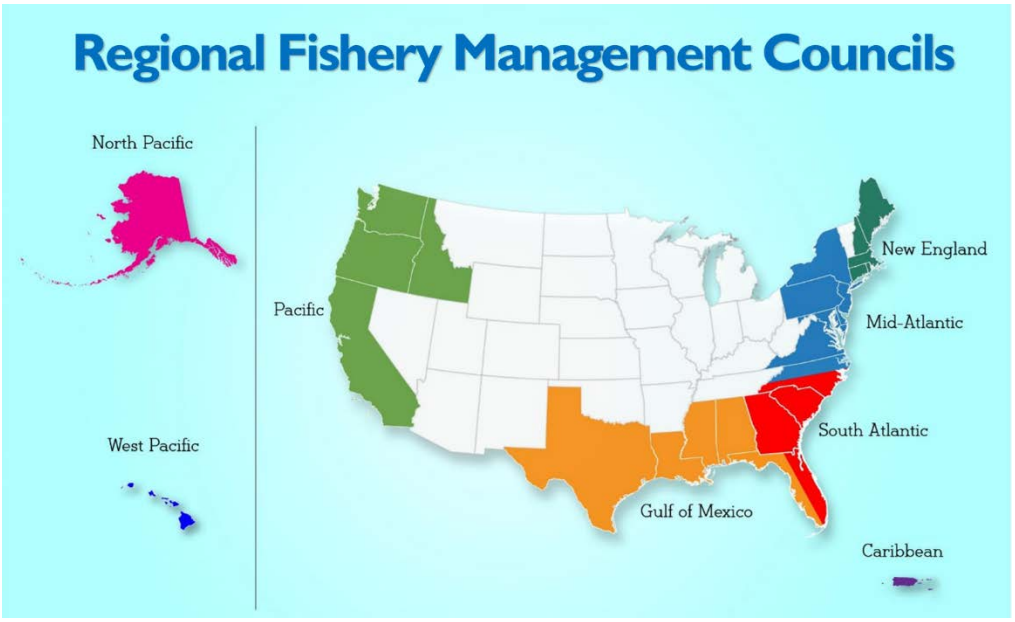

Figure 1.1. Map of jurisdiction for US regional fishery management councils. WGNARS overlaps the New England and Mid-Atlantic Councils' jurisdictions

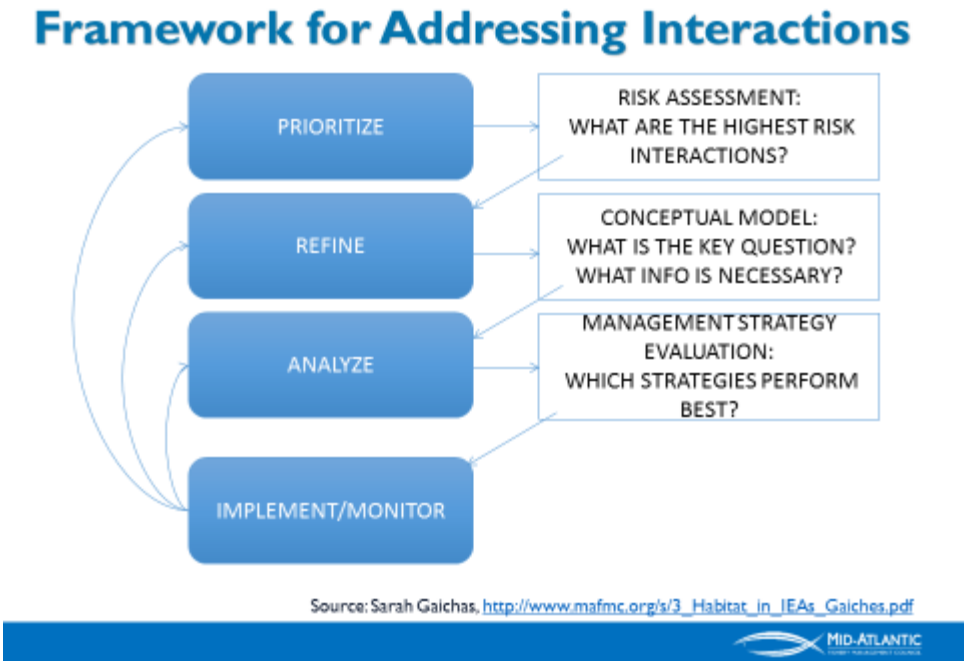

Figure 1.2. Mid-Atlantic guidance document outlines and incorporates components of the IEA process

After having learned about the WGNARS experiences in the Northwest Atlantic, the interdisciplinary and international group shifted focus to the North Sea. The group carried out a conceptual modelling exercise (Figure 1.4) focused on integrating human dimensions and management objectives with the North Sea foodweb model developed by WGINOSE (Figure 1.3). Key outcomes of this exercise were first, that learning by doing is very effective; the process itself is valuable. For example, the group worked

together on taking objectives from policy statements as a starting point for discussion; this generated improved clarity on what the outputs of an IEA can relate to. In addition, the process of creating a conceptual model was useful. The group learned that constructing conceptual models can serve multiple purposes. First, conceptual models are excellent tools to help diverse scientists work together on an interdisciplinary product that is important to scope an IEA. Each discipline can see where their own knowledge feeds into the larger model of the system, and learns about how information from other disciplines may actually change the behaviour of the system, especially when conceptual models are perturbed. Conceptual models can also be a good way to work with stakeholders and incorporate their knowledge in IEAs.

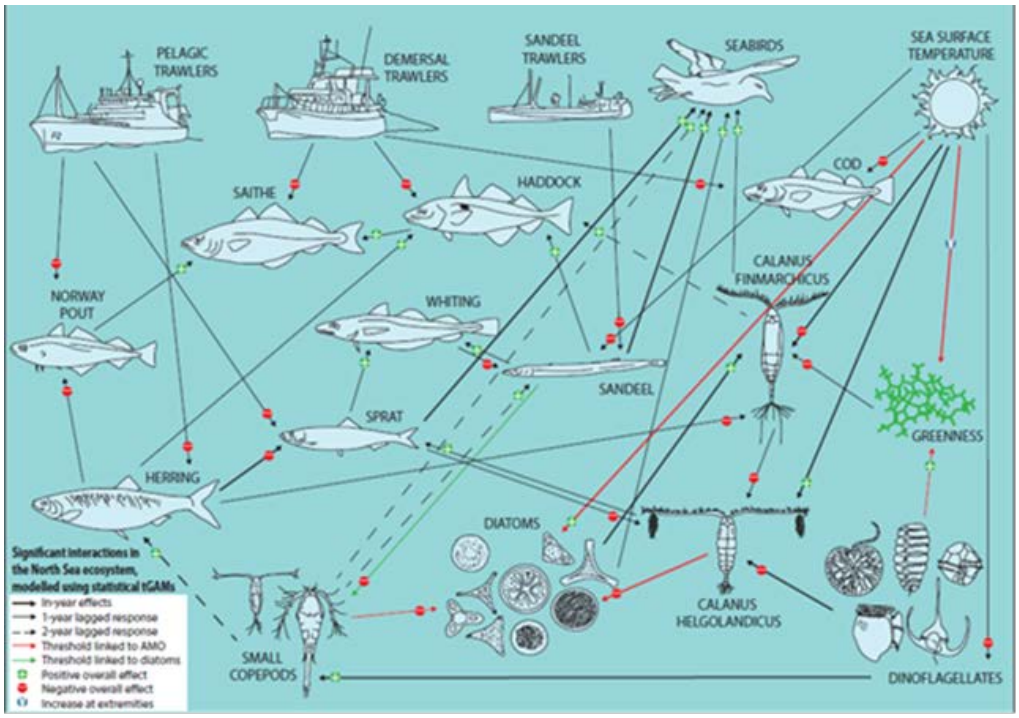

Figure 1.3. Foodweb of the North Sea ecosystem developed by WGINOSE using tGAM analysis, which served as the basis of the conceptual model developed during WKINWA (Bayliss-Brown and Lynam 2013)[1].

[1] An interactive PDF of the food web model that also shows the trends over time in the connections is available at: http://www.ices.dk/community/Documents/Expert%20Groups/Lynam_tGAM-model_key_mov.pdf.

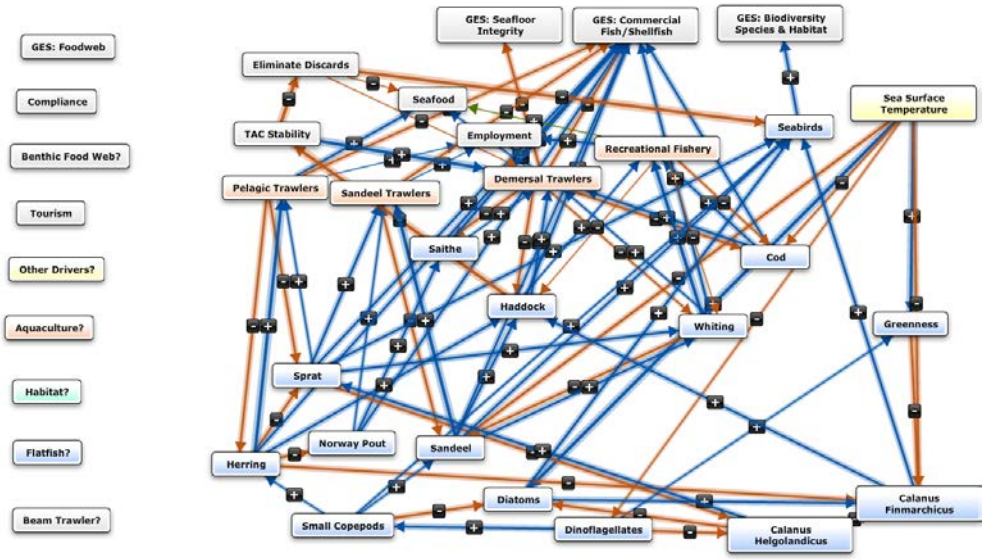

Figure 1.4. Preliminary conceptual model of the North Sea system, including management objectives, developed during WKINWA and based on a foodweb model developed by WGINOSE

For IEA groups, some general lessons learned from the conceptual modelling exercise were apparent. First, objectives embedded within the conceptual model as done by WGNARS can be a good way to acknowledge the needs of stakeholders and to identify management priorities, where science can contribute advice.

In discussion with stakeholders, looking at trade-offs is important, and including the objectives is a good entry point into that discussion. Second, there is a clear need to have feedback loops explicitly incorporated into the modelling process in order to understand relationships between system components. For this, multiple tools in the form of qualitative/conceptual modelling frameworks (e.g. WGNARS is currently employing Mental Modeler and Qpress) are valuable once in the simulation/perturbation phase (Figure 1.5).

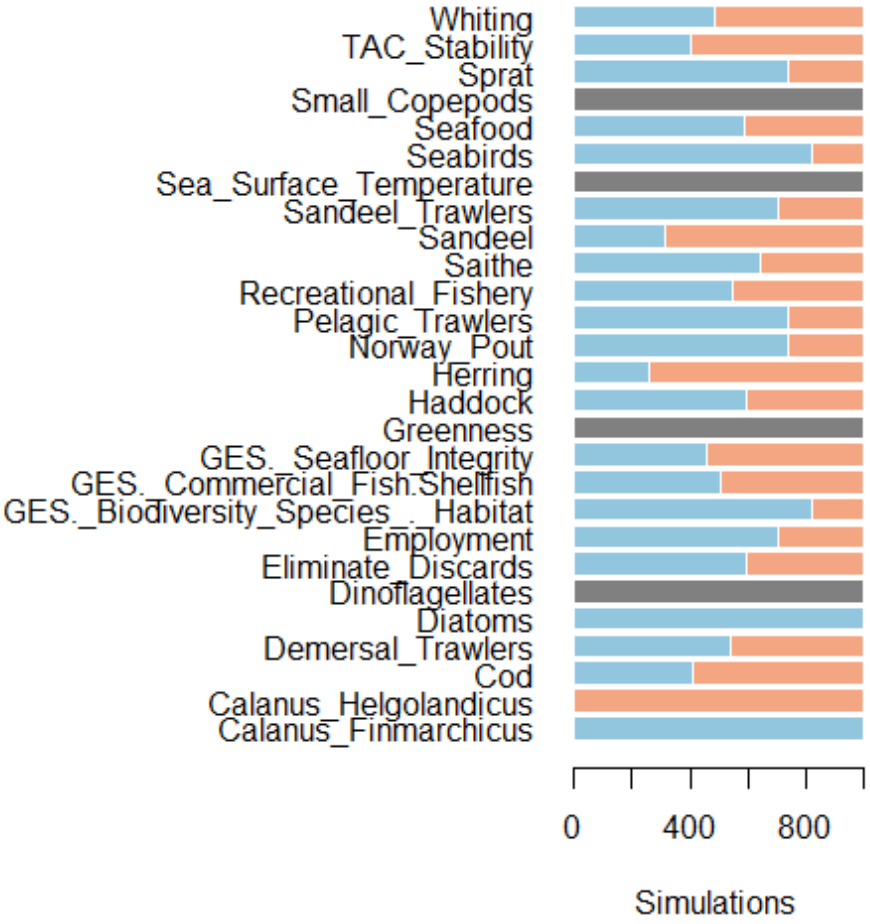

Figure 1.5. Results of 1000 stochastic simulations for the scenario "decreases in Sprat availability", employing the Qpress software package in R (blue = negative, grey = neutral, red = positive)

Overall, the group came to several conclusions about working between the natural and social sciences on IEAs, and why it is important and useful to get beyond disciplinary comfort zones. First, there is a trade-off between excessive focus on precision in one discipline with broader engagement and a look at the big picture; more effective management can potentially come from looking at the big picture. Also, it is important to address uncertainty through multimodel inference; that is, development and concurrent use of alternatively structured models and/or analytical methods. Multimodel inference can be a way to formalize multiple (uncertain) viewpoints, which need to be formally considered. Overall the main question for IEA groups can be, "How can we show the value of an IEA process to stakeholders/managers?" An iterative process incorporating dialogue is important. Learning about communication (multi, cross, inter, trans disciplinary) can be a way to help IEA groups move beyond comfort zones and produce increasingly valuable products for ecosystem based management.

The IEA knowledge exchange mutually benefitted both IEA groups. The Northwest Atlantic IEA approach has been focused on fisheries. In contrast, for the North Sea, a cross-sectoral Cumulative Effects Assessment (CEA) has been developed, which is a scientifically grounded, formal approach to evaluate effects of human (economic and social) activities on the ecosystem, considering all marine/maritime sectors, pressures

and ecosystem components. A CEA can be included in the scoping step of an IEA process. The CEA's iterative approach facilitates the identification of knowledge gaps and the gradual incorporation of the best available information.

The CEA's iterative approach is very comparable to the WGNARS IEA approach, but the approaches differ in how and what they integrate. WGNARS has already reached interdisciplinary integration and is currently working on transdisciplinary approaches, but has not integrated other maritime sectors than fisheries. The North Sea CEA integrates the different maritime sectors, but WGINOSE and the CEA need to improve on inter- and transdisciplinary integration levels.

The presentation and discussion of the WGNARS IEA process has stimulated the Working Group on IEAs in the North Sea (WGINOSE) to also follow a more inter- and transdisciplinary IEA approach. In particular, WGINOSE needs to involve social science in their IEA approach and start discussions on management objectives with stakeholders. As a first step, WGMARS proposes an embedded WGMARS-WGINOSE workshop with a focus on IEA in the North Sea during its 2018 annual meeting, scheduled during the week of 19–23 February 2018 in The Hague, Netherlands. The workshop's objective is to conduct a scoping process to frame the subsequent WGINOSE IEA modelling/ecosystem submodels that will be used with relevant stakeholders during the WGINOSE 2018 annual meeting (16–20 April 2018).

Questions (for internal preparation) include: In view of the stakeholders (and scientists): What should be the purpose of the IEA exercise? What is the question to be 'answered' by the IEA model? What are stakeholders'/ICES groups' expectations for the exercise and the model? What are risks of the exercise?

Annex 1: List of participants

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Annex 2: Agenda

Tuesday 23 May 2017

09:00 am – Welcome and Opening of the Meeting by Susan Gardner (tbc), Deputy Director at the Northeast Fishery Science Center

09:10 am – Introduction round

09:30 am – WGNARS IEA process – introduction + time for questions

10:30 am – Break

11:00 am – overview of the fisheries management councils relevant to WGNARS

11:00-11:30 – Mid-Atlantic Fisheries Management Council

11:30-12:00 – New England Fishery Management Council

12:00 noon – Lunch

01:30 pm – Roundtable Discussion with Managers and wrap up WGNARS lessons learned

02:30 pm –Discussion of North Sea Working Sessions Plan

02:45 pm – North Sea/ WGINOSE

- Andy introduces WGINOSE (history/focus, foodweb, relevant data)
- Christine presents WMR's Cumulative Effects Assessment approach, including an overview of relevant human activities in the North Sea
- Christine presents overview of North Sea management Objectives and Indicators

03:30 pm – Break

04:00 pm – Discussion: What from WGNARS is applicable to the North Sea – and vice versa? Preparation for North Sea "mental modelling" tomorrow.

05:00 pm – Adjourn

Wednesday 24 May 2017

09:00 am –Review and Refinement of WGINOSE North Sea "Scoping"
09:30 am – Breakout for Conceptual Submodels for North Sea IE

10:30 am – Break

11:00 am – Plenary Group Discussion on Submodel Progress

11:30 am – Continue Breakout for Conceptual Submodels

12:30 noon – Lunch

02:00 pm – Model Merging/Scenario Building and Testing

03:30 pm – Break

04:00 pm – Review of Results

04:30 pm – Workshop Close, e.g. future actions?

05:00 pm - Adjourn

Annex 3: WKINWA ToRs

The **Workshop on IEA in the Northwest Atlantic** (WKINWA), chaired by Christine Röckmann, the Netherlands, and Geret DePiper, USA, will be established and will meet in Woods Hole, USA, in May 2017 to:

a) Review and analyse IEA work in the Northwest Atlantic (WGNARS) with key stakeholders with emphasis on:

i) What has been accomplished to date? (WGMARS ToRs a, c)

ii) What is required to further develop the IEA? (WGMARS ToRs d,e)

iii) Who should be involved? (WGMARS ToRs b, e)

iv) How is the IEA integrated in management advice? (WGMARS ToR c)

WKINWA will report by 28 June 2017 for the attention of the SCICOM and ACOM.

Supporting information

Priority	This workshop will be be carried out as part of the WGMARS ToR C "How have IEAs evolved and how should they be integrated in management advice"
Scientific justification	For a better understanding of the implementation of Integrated Ecosystem Assessments (IEA) in ICES we need to analyse how IEAs are implemented in practice. WGNARS, one of the ICES regional seas groups, has extensive experience with IEA and the relationship with marine management. Therefore, this workshop will focus on IEA work in the Northwest Atlantic and the US management system. Key stakeholders from management and science will be invited.
Resource requirements	No specific resource requirements – potentially help to deal with any potentially destructive US politics affecting travel of foreigners.
Participants	Ca 10-15 including WGMARS annual meeting members
Secretariat facilities	None
Financial	The workshop will be embedded in the 2017 WGMARS annual meeting. The workshop will be organized in close collaboration with NOAA.
Linkages to advisory committees	There are links to ACOM and the BSG
Linkages to other committees or groups	There are working relationships with WGNARS, SIHD, and WGINOSE.
Linkages to other organizations	There are linkages to the (integrated) cumulative effects assessment (CEA) that is currently developing at Wageningen Marine Research, the Netherlands, specifically for the Dutch ministry of economic affairs, Rijkswaterstaat, as well as OSPAR.