



Ecosystem Approach for Sustainable Aquaculture

ECASA Introduction

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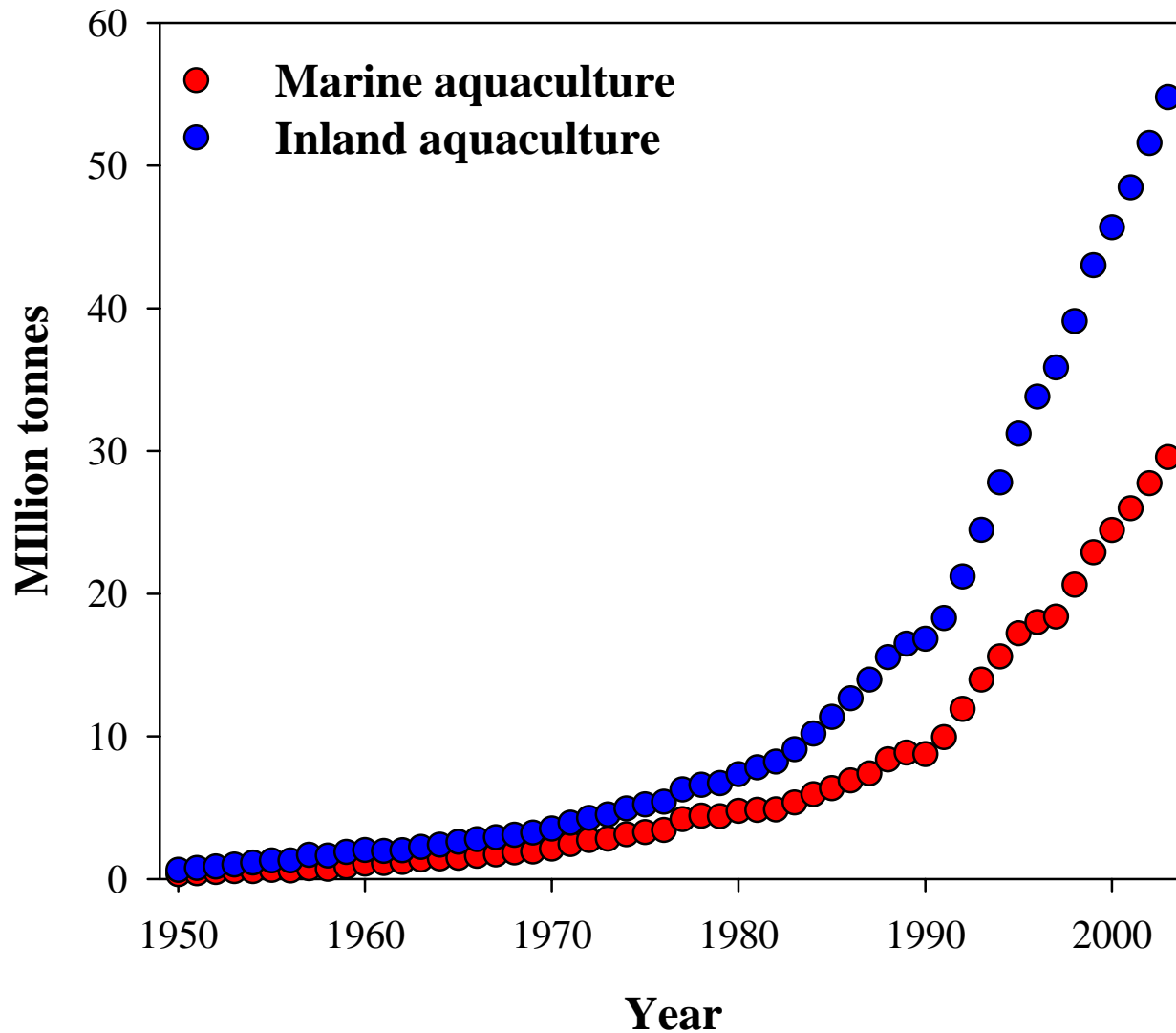
SCOTTISH
ASSOCIATION
for MARINE
SCIENCE

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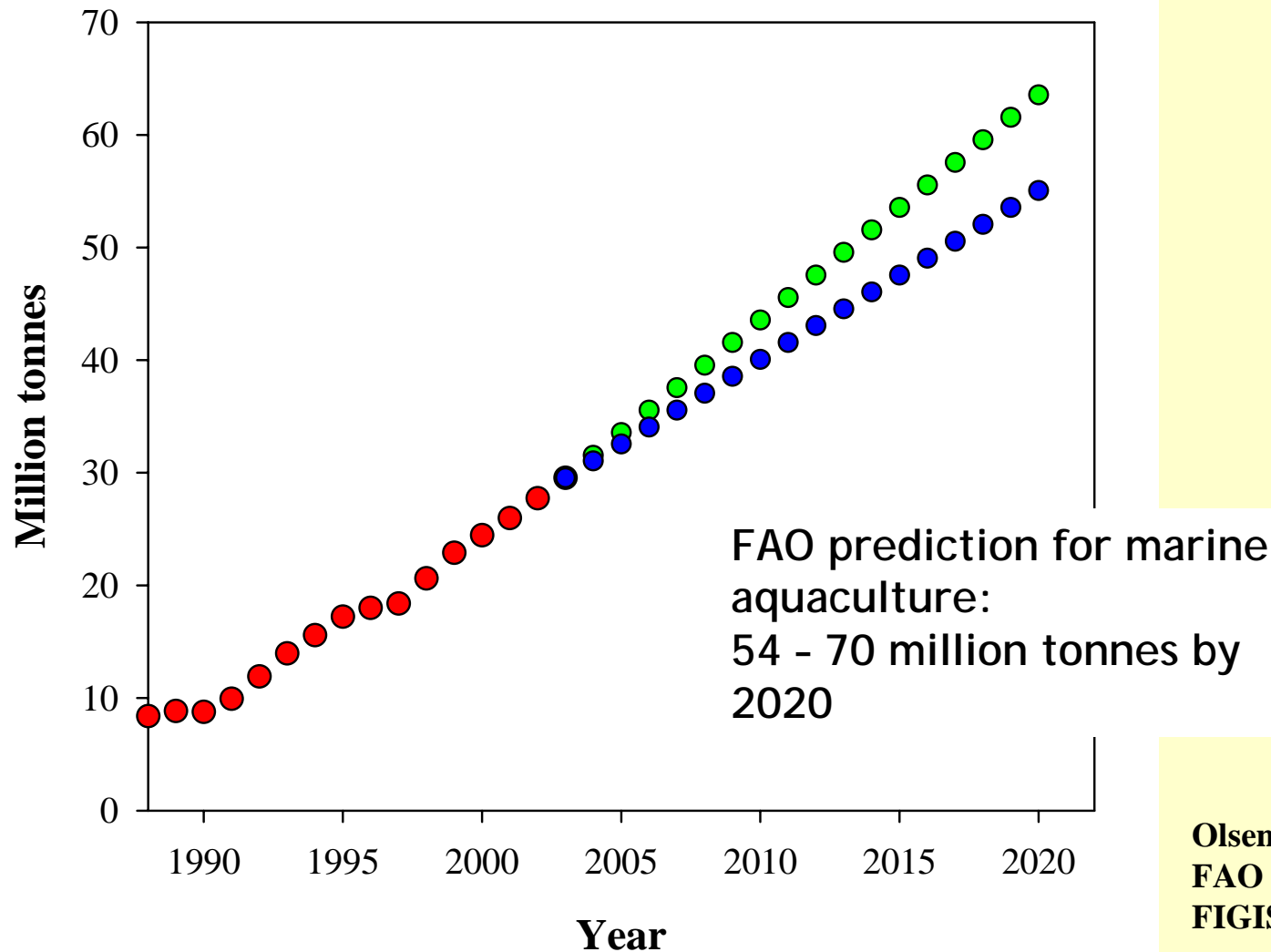


Marine and inland aquaculture



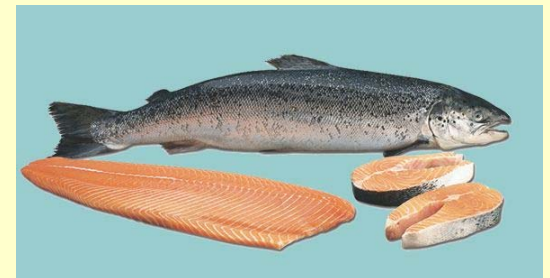
Olsen
FAO statistics
FIGIS

Predictions made based on historical trends





- By about 2030, aquaculture will replace fisheries as the dominant mechanism by which humans acquire marine food products (FAO)
- Only a century earlier, many scientists believed that the supply of food from the sea through fisheries was effectively unlimited

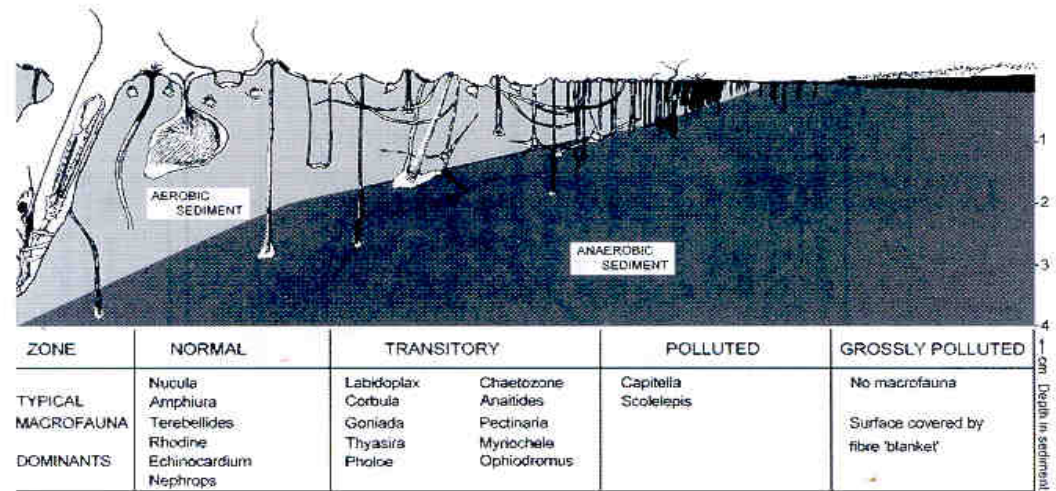




Max Troell

Impacts

- Organic wastes
 - Sediments, benthos
- Waste nutrients
 - hyper-nutrification
- Escapes
 - genetic/ecological effects
- Medicines and chemicals
- Parasites, diseases
- Society
 - Food security
 - Employment
 - Landscape
 - Other resource users



Ecosystem Approach (CBD)

- A strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way
- Helps to reach a balance between: conservation, sustainable use and the fair and equitable sharing of the benefits arising from resource use
- Based on the application of appropriate scientific methods focused on levels of biological organization, which encompass the essential structure, processes, functions and interactions among organisms and their environment
- It recognises that humans, with their cultural diversity, are an integral component of many ecosystems

Definition and principles

(FAO - from Mallorca workshop)

- “An Ecosystem Approach for Aquaculture is a strategy for the integration of the activity within the wider ecosystem such that it promotes sustainable development, equity, and resilience of interlinked social-ecological systems” .

The EAA is guided by 3 main principles:

- 1. Aquaculture should be developed in the context of ecosystem functions and services (including biodiversity) with no degradation of these beyond their resilience
- 2. Aquaculture should improve human-well being and equity for all stakeholders
- 3. Aquaculture should be developed in the context of other sectors, policies and goals

Making aquaculture sustainable: Delivering the Ecosystem Approach

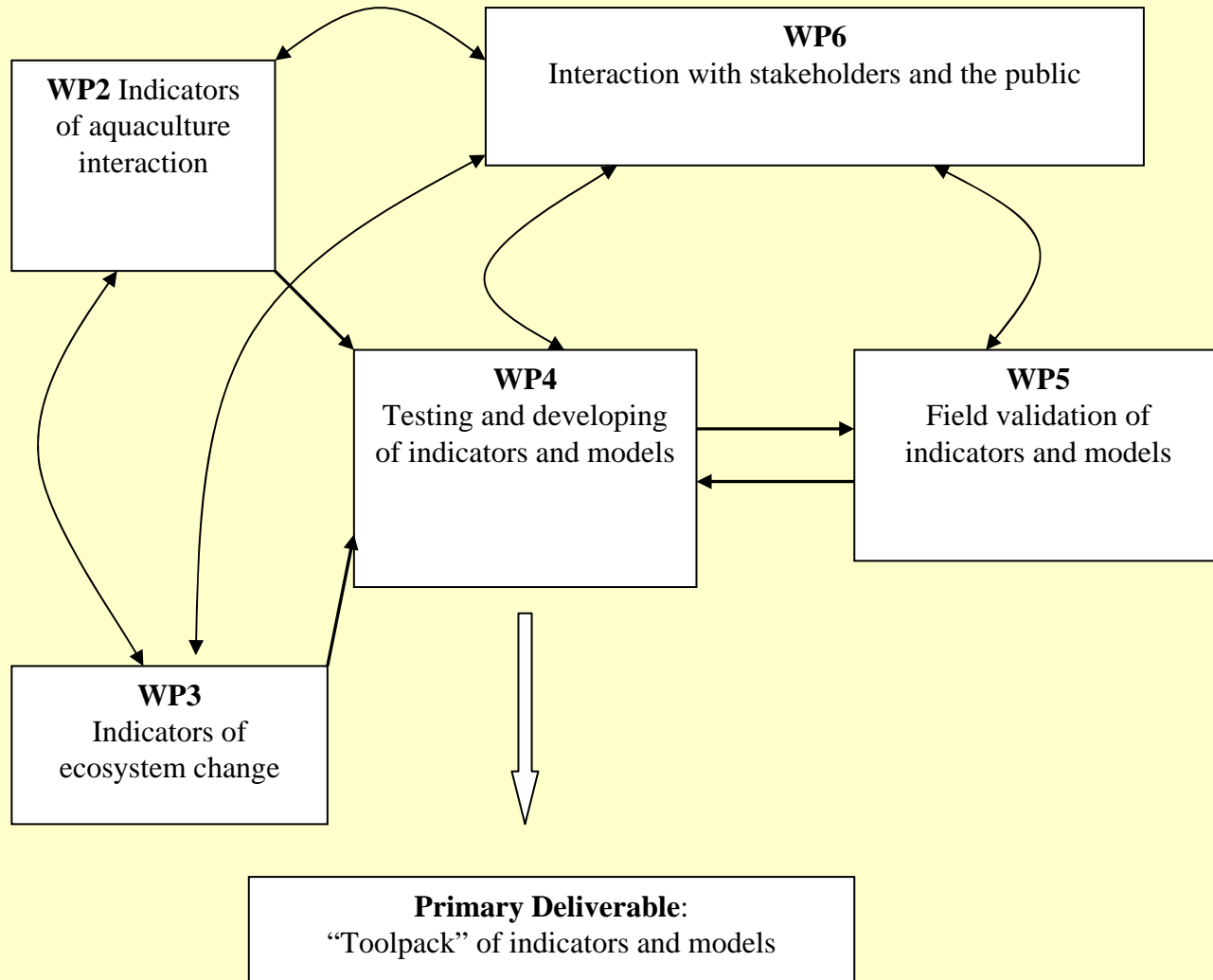
- Optimal Site Selection (industry)
- Transparent EIA (planners, public)
- Effective monitoring (regulators)
- Based on robust science (researchers)
- Good inter-communication (stakeholders)
- Building public confidence

Partners

	Partner		Country
1	Scottish Association for Marine Science	SAMS	UK
2	Centre for the Economics and Management of Aquatic Resources	UOP	UK
3	Napier University	NNUE	UK
4	National Institute of Biology	NIB	Slovenia
5	Leibniz-Institute of Marine Science	IFM-GEOMAR	Germany
6	Akvaplan Niva	Akvaplan	Norway
7	University of Haifa	HAIFA	Israel
8	University of Crete	UOC	Greece
9	Plymouth Marine Laboratory	PML	UK
10	Institute of Marine Research	IMAR	Portugal
11	Central Institute for Marine Research	ICRAM	Italy
12	Institut Français de Recherche pour l'Exploitation de la Mer	IFREMER	France
13	Instituto Tecnológico Pesquero y Alimentario	AZTI	Spain
14	University of Venice	DCF_UNIVE	Italy
15	Rudjer Boskovic Institute	RBI	Croatia
16	University of Göteborg	UGOT	Sweden

Project Objectives

- To identify quantitative and qualitative indicators of the effects of aquaculture on the environment and vice-versa, and to assess their applicability
- To develop operational tools, including models, to establish and describe the relationship between environmental conditions and aquaculture activities over a range of ecosystems and aquaculture production systems
- To develop effective environmental impact assessment and site selection methods for coastal area management
- Thus, to contribute to the sustainable development of aquaculture in Europe



WP2 Identifying indicators

- **Objectives**

- A workable definition of indicators
- To identify the most relevant indicators of the impacts of aquaculture on ecosystems
- To identify indicators of socio-economics impact of aquaculture on coastal areas
- To classify the different indicators
- To assess the interactions between aquaculture and other major uses of the coastal zone (fisheries, tourism & recreation, shipping etc)

WP3 Identifying drivers of ecosystem changes and their environmental indicators

• Objectives

- To identify and assess the role and the relative importance of the different forcing factors: (aquaculture, fisheries, pollution, eutrophication, habitat destruction etc.) and environmental variations affecting the water quality in aquaculture zones
- To suggest the best methods for obtaining reference levels and associated indicators useful to monitor the impact of anthropogenic factors on aquaculture
- To assess indicators of the interactions between aquaculture and other major uses of the coastal zone (fisheries, tourism & recreation, shipping etc)
- To identify potential ways for measuring the additional cost caused by external environmental change
- To identify indicators of incompatibilities between uses and/or minimal distances required to avoid conflicts over environmental issues

WP4 Assessing the applicability of indicators and tools.

- **Objectives**

- To assess the efficiency, cost effectiveness, robustness, reliability, practicality, feasibility, accuracy, and precision of aquaculture-environment interaction indicators identified in WP2 and WP3
- To develop operational tools, especially models, which capture the functional relationship between environment and aquaculture activities, and which embody the chosen indicators. The chosen model set will include stand-alone tools currently fit for purpose, developments of existing models to increase applicability and robustness and hybridisations of existing models to enhance predictive power

WP5 Testing and validating these tools for EIA, monitoring and site selection.

- **Objectives**

- To establish robust site selection criteria to maximise the utility of the work package
- To select suitable study sites for testing of the tools and indicators that are chosen in WP4
- To carry out a series of field sampling campaigns (13) that will generate a database of information that will enable evaluation of the tools and indicators by means of appropriate predictive models

WP6 Dissemination

- **Objectives**
- To ensure effective dissemination of the project through producing effective public and private web-interfaces
- To ensure co-ordination of national meetings between stakeholders and participants and the 2 way flow of information
- To organise a final international meeting of the project between participants and stakeholders including organisations from outside the partner's countries and appropriate international bodies
- To co-ordinate the production of effective dissemination materials including newsletters

EIA

- An assessment of the impact of an industrial installation or activity on the surrounding environment, conducted before work on that activity has commenced
- The original baseline study, a key part of this process, describes the original conditions



EIA

- Evaluating the likely environmental impacts of a development, together with an assessment of how the severity of the impacts could be reduced



EIA

- A process by which the consequences of planned development projects are evaluated as an integral part of planning the project. The analysis of biological, physical, social and economic factors to determine the environmental and social consequences of a proposed development action
- The goal of the EIA is to provide policy makers with the best available information in order to minimize economic costs and maximize benefits associated with a proposed development

Site Selection

- Site selection is the other side of the coin from EIA
- Many of the processes of EIA have to be considered during the site selection process
- The same types of tools, and especially models, that are used for EIA can be applied to screen sites for environmental suitability
- This is common practice in Scottish salmon farming, for example, where the farmer can estimate the production potential of a site on the basis of model predictions

Monitoring

- Monitoring is an intermittent (regular or irregular) series of observations in time, carried out to show the extent of compliance with a formulated standard or degree of deviation from an expected norm



Monitoring

- There are a wide range of different monitoring protocols and currently in use throughout the world and within Europe
- ECASA is an opportunity to consider these and make recommendation on their suitability
- Maximising information while minimising cost

Indicators

- Follow measurable change in some social, economic, or environmental system over time. Generally an indicator focuses on a small, manageable, and telling piece of a system to give people a sense of the bigger picture



Indicators

- A plant or animal whose existence in an area is strongly indicative of specific environmental conditions (indicator species)



Indicators

- Are a subset of monitoring attributes that are particularly information-rich in the sense that their values are somehow indicative of the quality, health, or integrity of the larger ecological system to which they belong



Indicators

- Are a selected subset of the physical, chemical, and biological elements and processes of natural systems that are selected to represent the overall health or condition of the system



Indicators

- Are used to condense complex monitoring data on the ecosystem into simple and understandable information. They are measurable phenomena reflecting the EcoQO statements: indicators are designed to show how the agreed EcoQOs are met



Models

- Numerical computer models which attempt to forecast the state of the environment



Models

- A representation of a system that allows for investigation its properties and prediction of future outcomes



Models



Site Selection



EIA



Governance

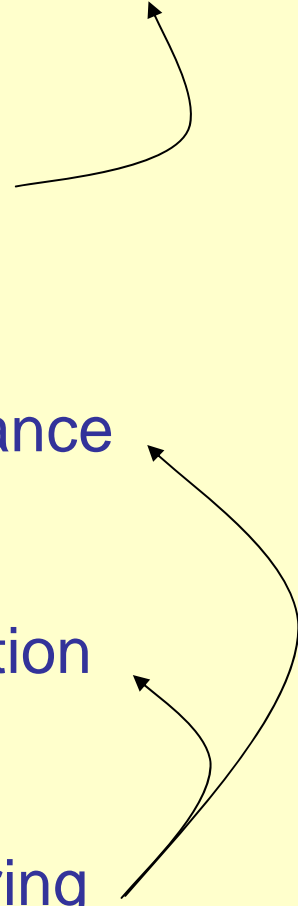


Production



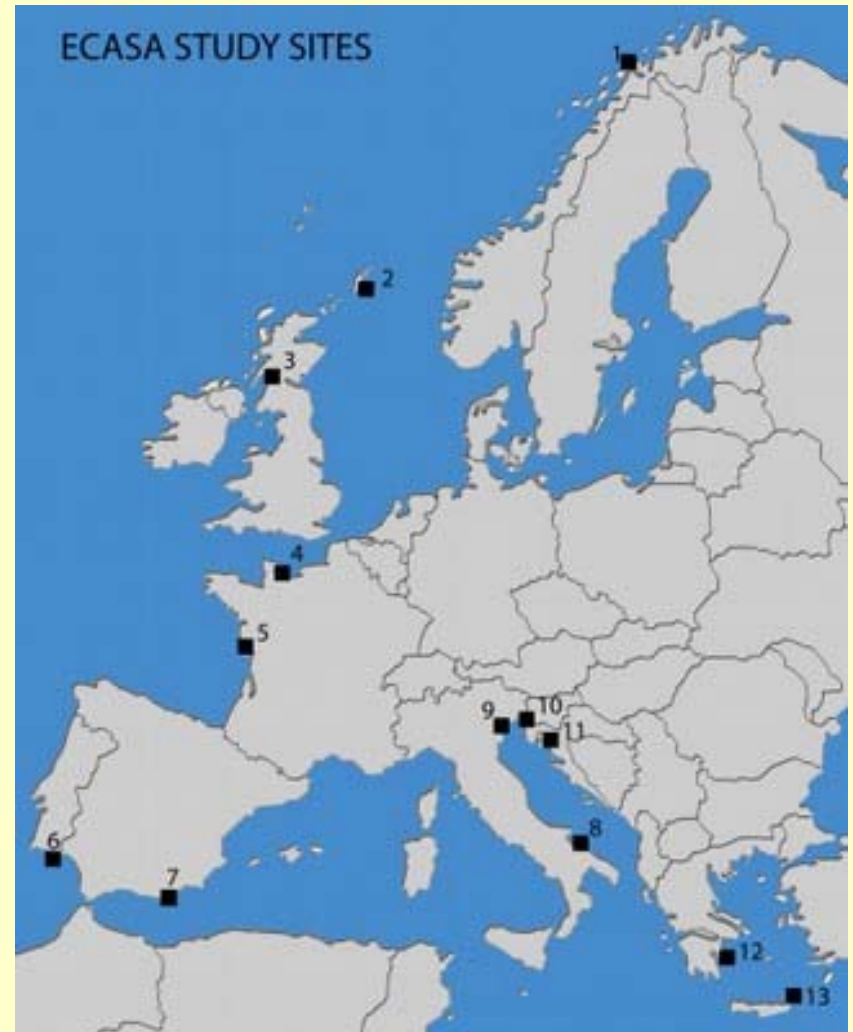
Monitoring

Indicators



EIA/Site Selection/Monitoring

- In ECASA we have applied and assessed the suitability of a wide range of indicators and tools at fish and shellfish farms across Europe
- The outcomes are presented in *Study Site Reports* backed up by Model and Indicator descriptions



Toolbox



ECASA TOOLBOX

USRNM = test

PSWD = test1

Stakeholder Engagement

- The toolbox is intended to be useful to a wide range of stakeholders
- It will achieve that best if we can tailor it to meet stakeholder needs
- During construction of the toolbox, there are opportunities for additions and improvements
- Please give us your views!
- We plan to complete the toolbox by the end of November 2007

Thanks for your attention!

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