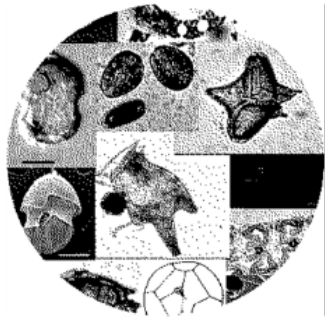
unesco
Intergovernmental
Oceanographic
Commission



IPI

INTERNATIONAL PHYTOPLANKTON INTERCOMPARISON

OTG@
OceanTeacher Global Academy

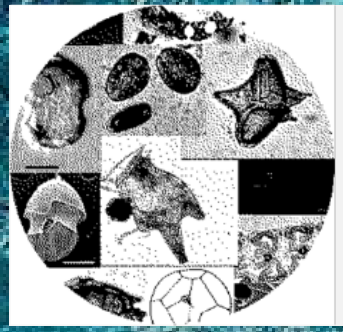
International phytoplankton intercomparison (IPI) exercises in the abundance and composition of marine microalgae

Rafael Salas*[1] , Jacob Larsen[2], Henrik Enevoldsen[2]
[1]. *Corresponding author. rafaelsalasipi@gmail.com
[2] IOC UNESCO, IOC Science and Communication Centre on Harmful Algae, c/o University of Copenhagen,

IPHAB-17 Seventeenth Session of the IOC-FAO Intergovernmental Panel on Harmful Algal Blooms.
Paris, France. 18-20th March 2025.

unesco

Intergovernmental Oceanographic Commission



IPI

INTERNATIONAL PHYTOPLANKTON INTERCOMPARISON

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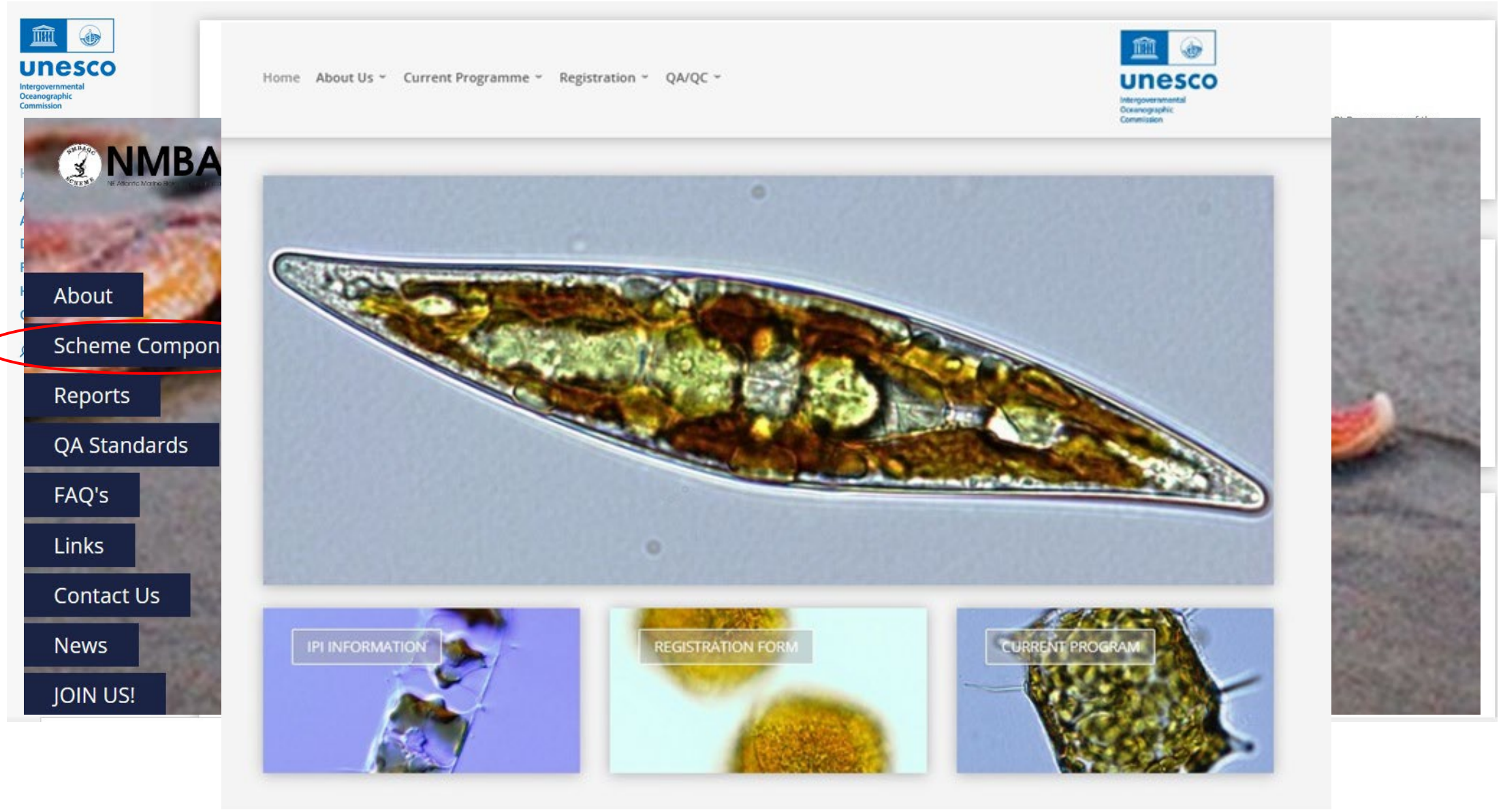
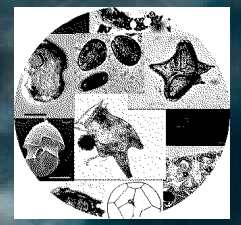
Who are we?

We are a Proficiency testing scheme which provide ongoing competency to phytoplankton analysts in marine laboratories working on the identification and quantification of marine microalgae to a quality standard.



https://hab.ioc-unesco.org/ipi-home/



Why are we doing this?

Any marine biological measurements and observations which impacts on the decisions we make about our environment should carry a measure of reliability.

Bacl

92.....

1992 OSPAR Convention

ANNEX IV

ON THE ASSESSMENT OF THE QUALITY OF THE MARINE ENVIRONMENT

ARTICLE 1

1. For the purposes of this Annex "monitoring" means the repeated measurement of:
   (a) the quality of the marine environment and each of its compartments, that is, water, sediments and biota;
   (b) activities or natural and anthropogenic inputs which may affect the quality of the marine environment;

ARTICLE 2

For the purposes of this Annex, the Contracting Parties shall:

(a) cooperate in carrying out monitoring programmes and submit the resulting data to the Commission;

(b) comply with quality assurance prescriptions and participate in intercalibration exercises;

(c) use and develop, individually or preferably jointly, other duly validated scientific assessment tools, such as modelling, remote sensing and progressive risk assessment strategies;

(d) carry out, individually or preferably jointly, research which is considered necessary to assess the quality of the marine environment, and to increase knowledge and scientific understanding of the marine environment and, in particular, of the relationship between inputs, concentration and effects;

(e) take into account scientific progress which is considered to be useful for such assessment purposes and which has been made elsewhere either on the initiative of individual researchers and research institutions, or through other national and international research programmes or under the auspices of the European Economic Community or other regional economic integration organisations.

For the purposes of this Annex, it shall, *inter alia*, be the duty of the Commission:

(a) to define and implement programmes of collaborative monitoring and assessment-related research, to draw up codes of practice for the guidance of participants in carrying out these monitoring programmes and to approve the presentation and interpretation of their results;

(b) to carry out assessments taking into account the results of relevant monitoring and research and the data relating to inputs of substances or energy into the maritime area which are provided by virtue of other Annexes to the Convention, as well as other relevant information;

(c) to seek, where appropriate, the advice or services of competent regional organisations and other competent international organisations and competent bodies with a view to incorporating the latest results of scientific research;

(d) to cooperate with competent regional organisations and other competent international organisations in carrying out quality status assessments.

26

Text as amended on 24 July 1998, updated 9 May 2002,7 February 2005 and 18 May 2006.
Amendments to Annexes II and III adopted at OSPAR 2007

cluding 12 work

Work areas

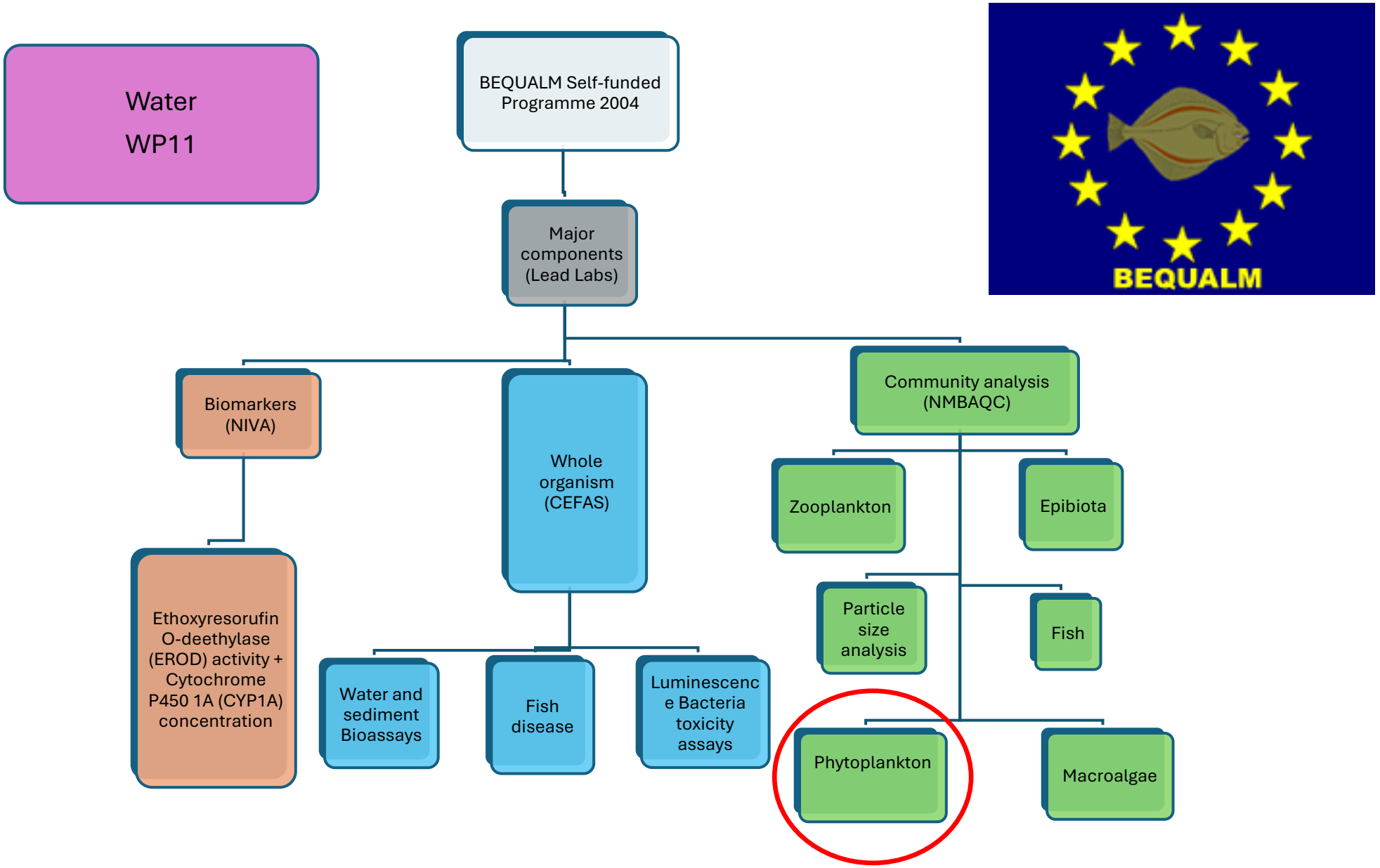
Land

ediments

Biota

OSPAR COMMISSION

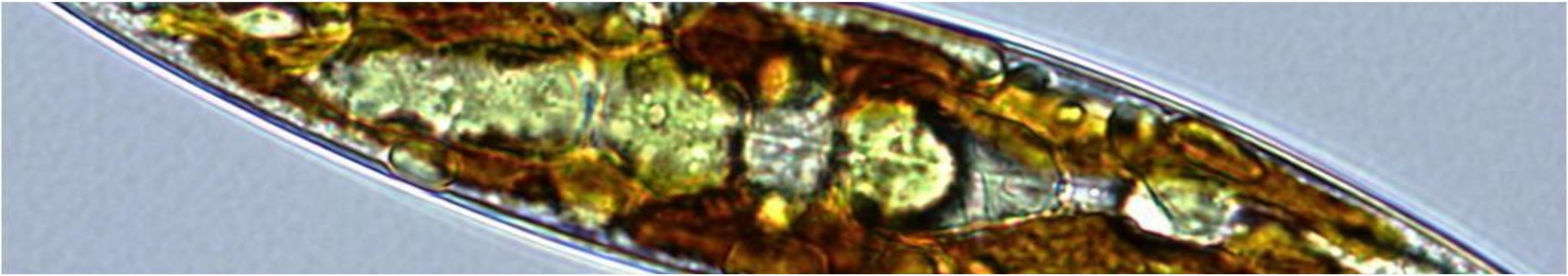
Protecting and conserving the North-East Atlantic and its res


Water
WP11
BEQUALM Self-funded Programme 2004
Major components (Lead Labs)
Biomarkers (NIVA)
Ethoxyresorufin O-deethylase (EROD) activity + Cytochrome P450 1A (CYP1A) concentration
Whole organism (CEFAS)
Water and sediment Bioassays
Fish disease
Luminescence Bacteria toxicity assays
Community analysis (NMBAQC)
Zooplankton
Epibiota
Particle size analysis
Fish
Phytoplankton
Macroalgae
BEQUALM

Main reasons:

- There is a legislative requirement that the data provided by scientists meets certain quality standards
- Contributes to OSPAR-JAMP guidelines to obtain defined standards on biological measurements.
- Quality assured data that meets a required standard gives a measure of confidence in the results that are used to make decisions.
- Demonstrates that laboratories and analysts use fit for purpose methodologies.
- This PT offers the opportunity to test and evaluate how proficient analysts are and how their results compare among their peers and how they compare across laboratories, water bodies, continents and at a global scale.

IPI Programme



Phytoplankton analysis

Analysis of marine phytoplankton in water samples, their statistical significance and the laboratory performance of the participants

Ocean Teacher online taxonomy assessment

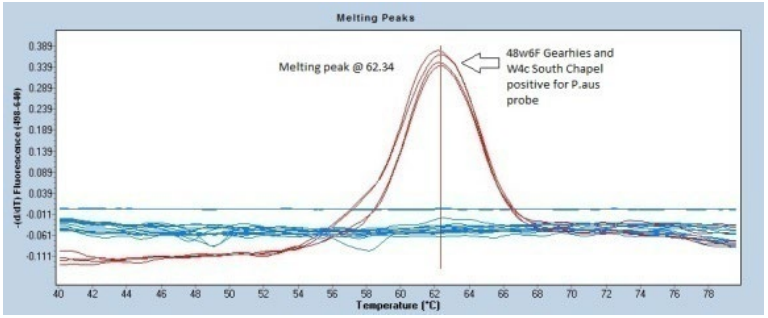
A phytoplankton taxonomy assessment of HAB quiz in the ‘Ocean teacher’ web platform

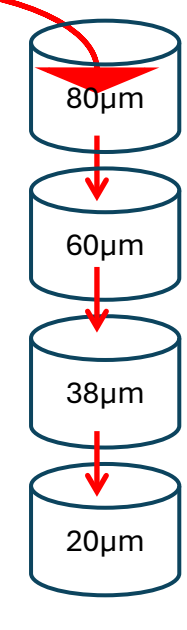
Workshop

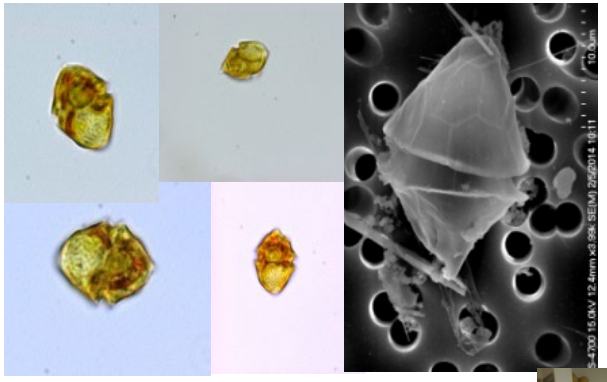
Annual 3 day workshop, includes live cultures and fully equip room with microscopes and AV equipment for presentations.

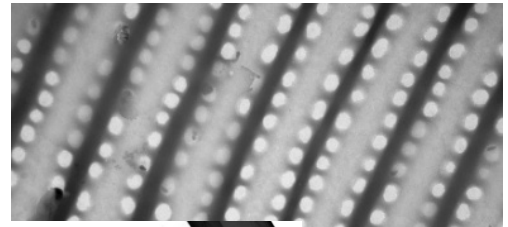
Preparation of reference materials

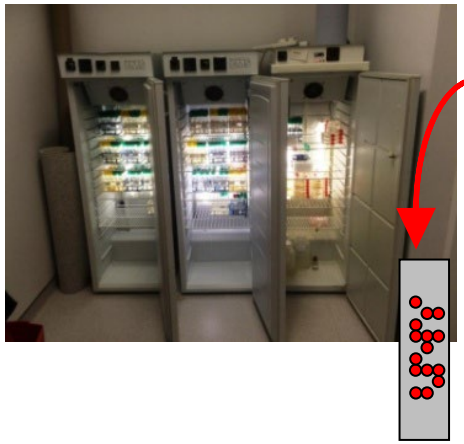
- Requires sampling effort
- Taxonomic characterisation by Microscopy
- Sometimes confirmation via TEM/SEM or qPCR

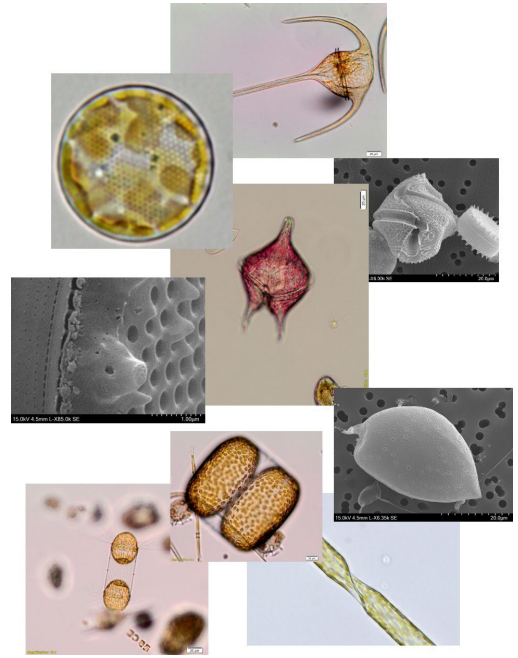


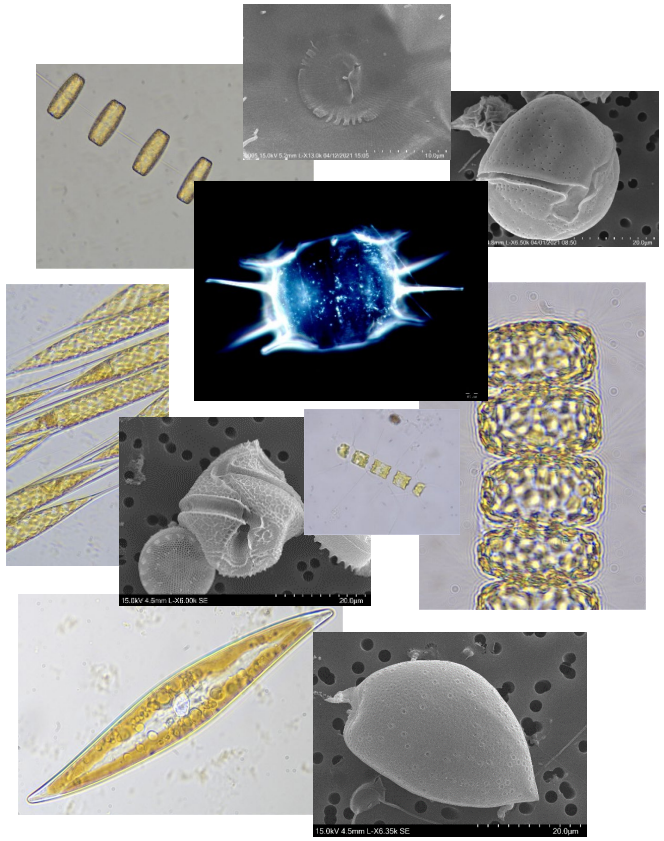




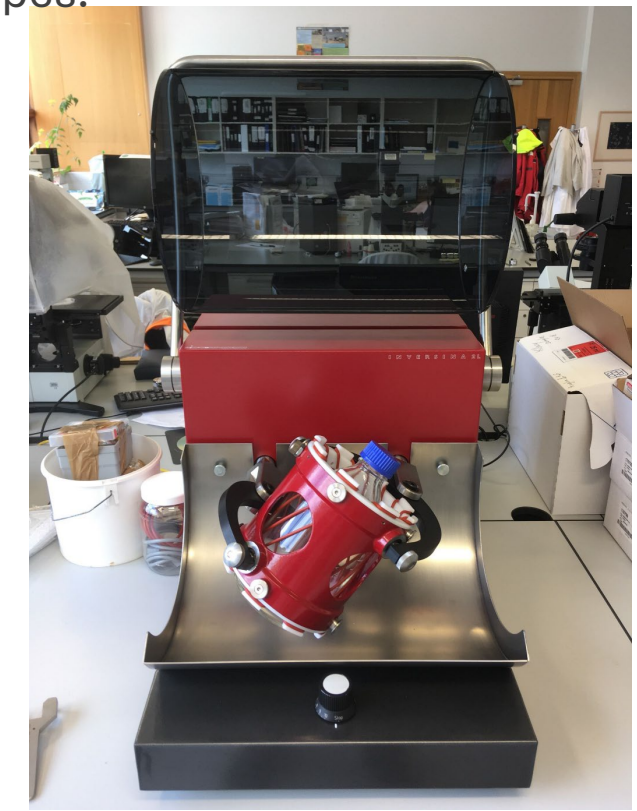




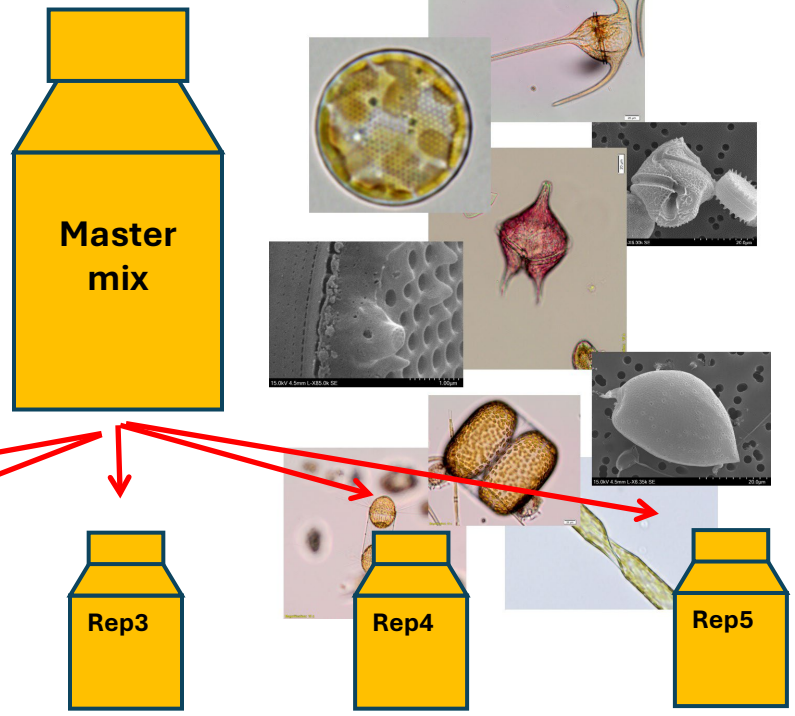




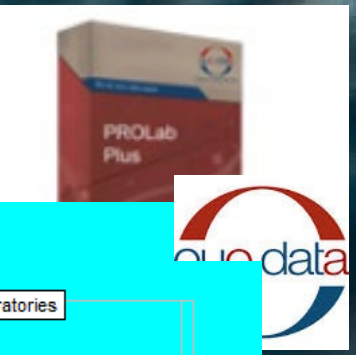
- > 20-30 cultures
- Check cultures for stability under preservation and morphological integrity
- Check for similarity between species
- Look at diversity of groups: Diatoms, dinoflagellates, single cell or chains, toxic versus non toxic
- Check for culture condition, contamination irregular shapes.

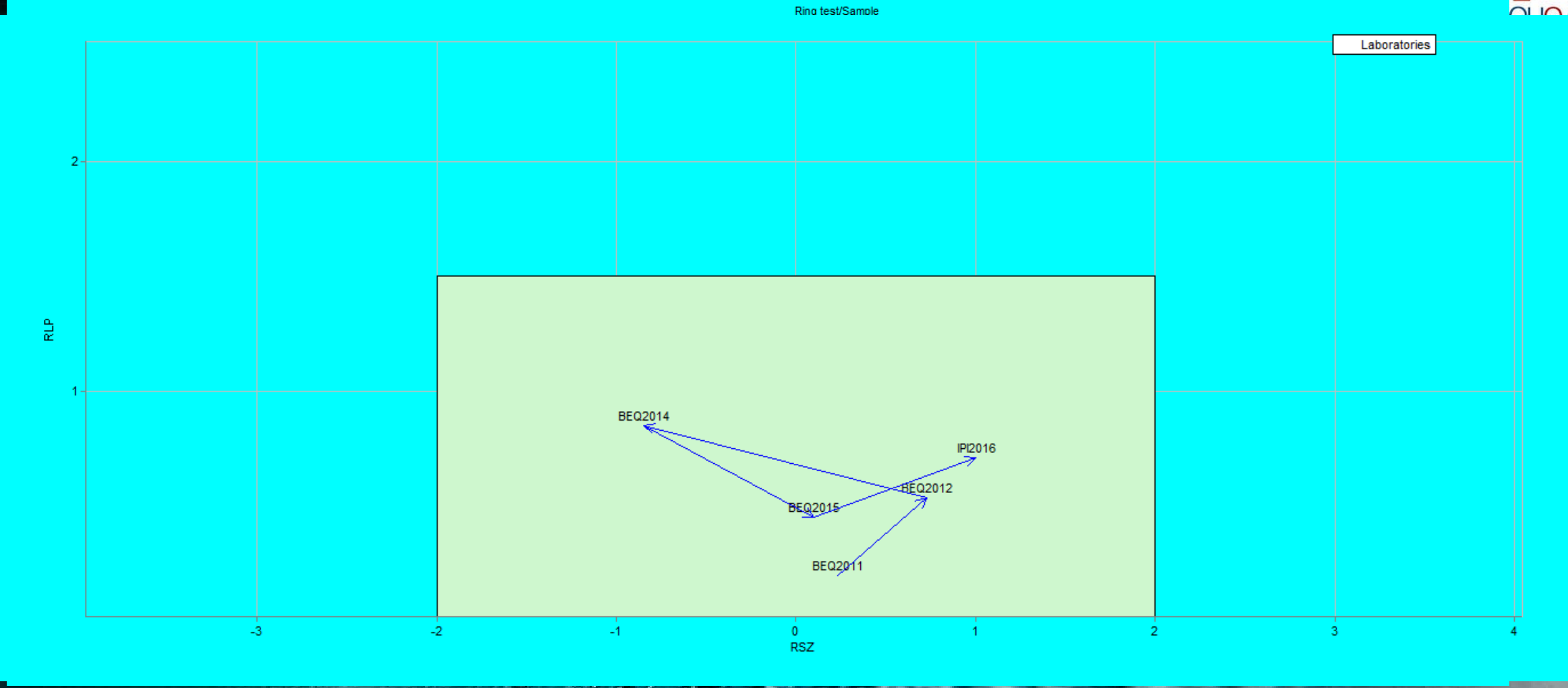


- Uses the Paul-Schatz motion
- Provides replicable constant motion
- Facilitates homogenisation of up to 2L schott bottles
- It helps characterise homogeneity and stability of the materials using an instrument.

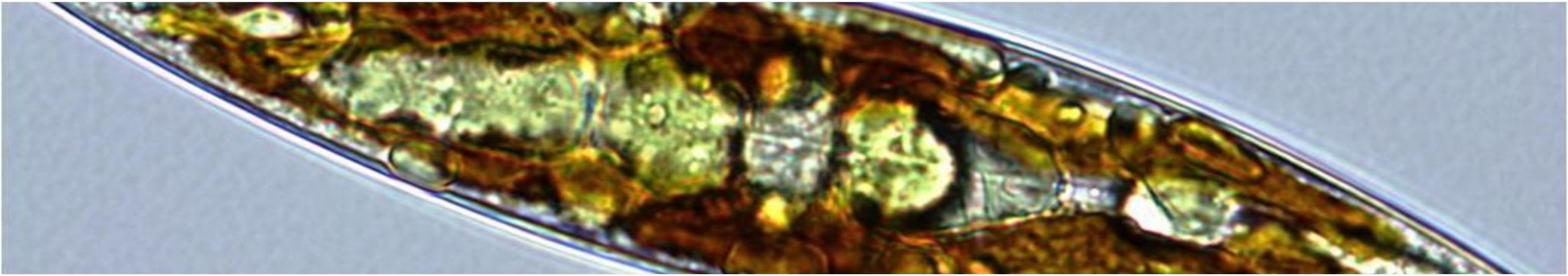

Master mix
Rep1
Rep2
Rep3
Rep4
Rep5

PROLab Plus Statistical software





IPI Programme



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Ocean Teacher taxonomy assessment

International Oceanographic Data and Information Exchange

OceanTeacher Global Academy

You are not logged in. (Log in)

Scientific Knowledge and Research

Course topics include Research data management, OBIS, HAB

Sustainable Use of Marine Resources

Course topics include Marine Biodiversity Data Management

Marine Spatial Planning

Course topics include Marine spatial planning, GIS applications for ICZM.

Marine and Coastal Ecosystems

Course topics include Marine GIS applications, Coastal mapping & monitoring.

Disaster Risk Reduction

Course topics include Tsunami awareness, Storm surge forecasting.

Implementing International Marine Law

Course topics include Marine Scientific Research under the UNCLOS.

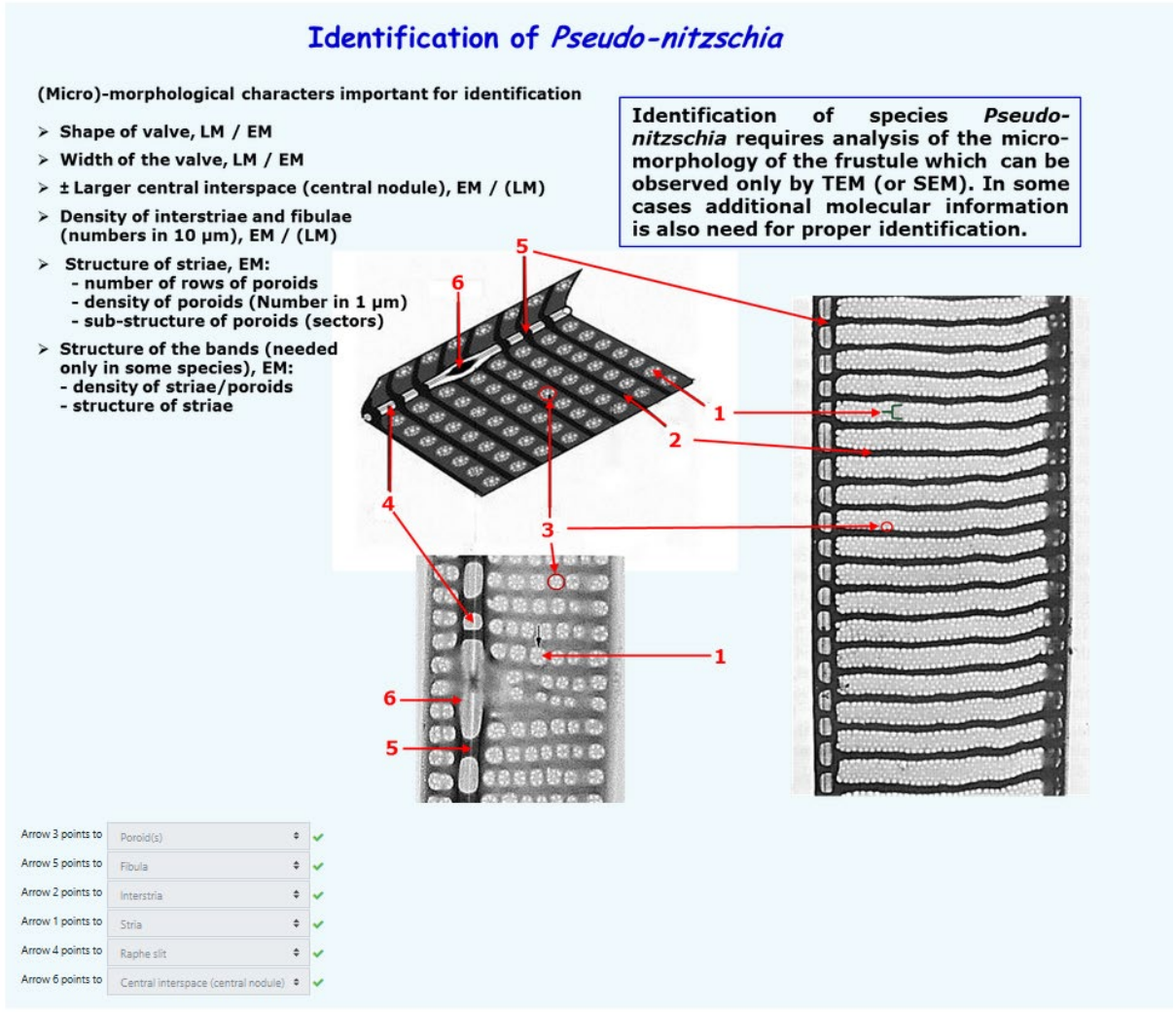
Ocean Acidification

Course topics include Impacts of ocean acidification.

Marine Pollution

Course topics include Prevention and reduction of marine pollution.

Question 2
Correct
Mark 1.00 out of 1.00
Flag question



The correct answer is: Arrow 3 points to → Poroid(s), Arrow 5 points to → Fibula, Arrow 2 points to → Interstria, Arrow 1 points to → Stria, Arrow 4 points to → Raphe slit, Arrow 6 points to → Central interspace (central nodule)

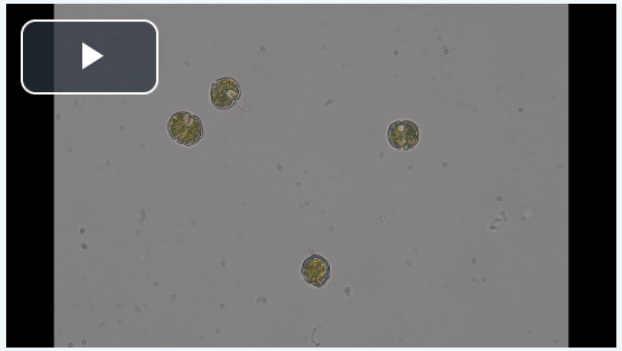
Q2	Model response	Actual response	Partial credit	Count	Frequency
2771	Arrow 1 points to Stria	Stria	16.67%	109	96.46%
2771	Arrow 1 points to Valvocopula	Valvocopula	0.00%	3	2.65%
2771	Arrow 1 points to Poroid(s)	Poroid(s)	0.00%	1	0.88%
2772	Arrow 2 points to Interstria	Interstria	16.67%	112	99.12%
2772	Arrow 2 points to Stria	Stria	0.00%	1	0.88%
2773	Arrow 3 points to Poroid(s)	Poroid(s)	16.67%	112	99.12%
2773	Arrow 3 points to Foramen	Foramen	0.00%	1	0.88%
2774	Arrow 4 points to Raphe slit	Raphe slit	16.67%	109	96.46%
2774	Arrow 4 points to Fibula	Fibula	0.00%	2	1.77%
2774	Arrow 4 points to Frustule	Frustule	0.00%	1	0.88%
2774	Arrow 4 points to Open bands	Open bands	0.00%	1	0.88%
2775	Arrow 5 points to Fibula	Fibula	16.67%	110	97.35%
2775	Arrow 5 points to Raphe slit	Raphe slit	0.00%	1	0.88%
2775	Arrow 5 points to Pseudoseptum	Pseudoseptum	0.00%	1	0.88%
2775	Arrow 5 points to Frustule	Frustule	0.00%	1	0.88%
2776	Arrow 6 points to Central interspace	Central interspace	16.67%	113	100.00%

Question **20**

Correct

Mark 1.00 out of 1.00

Flag question



Enumerate all the *Alexandrium* cells in this video clip transect using a Sedgewick-Rafter counting chamber. Please remember that you can use the full screen menu to watch this video and adjust the playback rate if necessary (to x 0.5) or simply pause the video.

Please note the following rules regarding enumeration:

Do not count any empty theca

Do not count any partially visible cells on the left hand side of the transect

Do count any partially visible cells on the right hand side of the transect

Do count any cells partially obscured by the Sedgewick-Rafter lines going across the transect

Tolerance = +/- 1 cell

The answer must be numerical. Do not use full stops after your answer! or text!

Answer: 51

The correct answer is: 51

Q20	Actual response	Partial credit	Count	Frequency
50-52	51	100.00%	75	66.37%
50-52	52	100.00%	19	16.81%
50-52	50	100.00%	1	0.88%
[Did not match any answer]	48	0.00%	3	2.65%
[Did not match any answer]	45	0.00%	1	0.88%
[Did not match any answer]	42	0.00%	4	3.54%
[Did not match any answer]	49	0.00%	2	1.77%
[Did not match any answer]	47	0.00%	3	2.65%
[Did not match any answer]	43	0.00%	1	0.88%
[Did not match any answer]	53	0.00%	3	2.65%
[Did not match any answer]	46	0.00%	1	0.88%

Question 11
Correct
Mark 1.00 out of 1.00
Flag question

The following plate shows images of the marine dinoflagellate genus '*Tripos*'. Choose the right species name from the answers provided in the dropdown list.

Images supplied by Urban Tillmann (copyright)

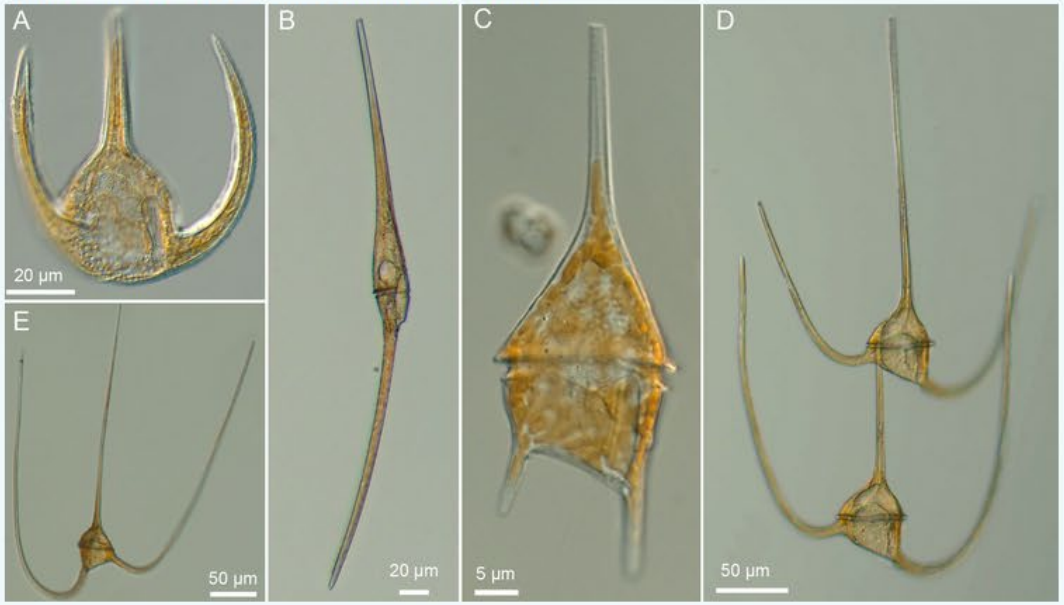


Image A Tripos azoricus ✔

Image B Tripos fusus ✔

Image C Tripos lineatus ✔

image D Tripos massiliensis ✔

Image E Tripos macroceros ✔

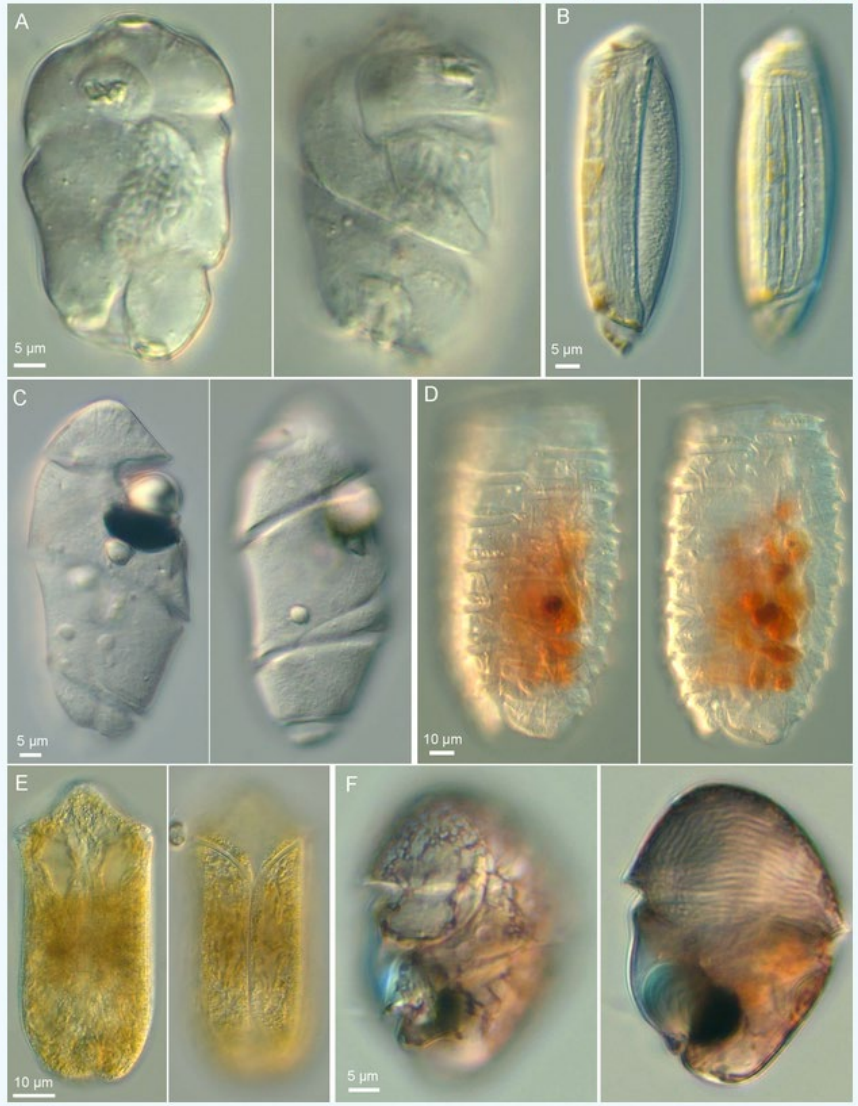
Your answer is correct.

The correct answer is: **Image A** → Tripos azoricus, **Image B** → Tripos fusus, **Image C** → Tripos lineatus, **image D** → Tripos massiliensis, **Image E** → Tripos macroceros

Q11	Model response	Actual response	Partial credit	Count	Frequency
1207	IMAGE A Tripos azoricus	Tripos azoricus	20.00%	102	90.27%
1207	IMAGE A Tripos muellerii	Tripos muellerii	0.00%	8	7.08%
1207	IMAGE A Tripos arietinus	Tripos arietinus	0.00%	3	2.65%
1208	IMAGE B Tripos fusus	Tripos fusus	20.00%	113	100.00%
1209	IMAGE C Tripos lineatus	Tripos lineatus	20.00%	108	95.58%
1209	IMAGE C Tripos furca	Tripos furca	0.00%	5	4.42%
1210	IMAGE D Tripos massiliensis	Tripos massiliensis	20.00%	89	78.76%
1210	IMAGE D Tripos macroceros	Tripos macroceros	0.00%	13	11.50%
1210	IMAGE D Tripos longipes	Tripos longipes	0.00%	11	9.73%
1211	IMAGE E Tripos massiliensis	Tripos massiliensis	0.00%	10	8.85%
1211	IMAGE E Tripos macroceros	Tripos macroceros	20.00%	99	87.61%
1211	IMAGE E Tripos longipes	Tripos longipes	0.00%	3	2.65%
1211	IMAGE E Tripos muellerii	Tripos muellerii	0.00%	1	0.88%

Question 13
Correct
Mark 1.00 out of 1.00
Flag question

A small number of dinoflagellates are characterised by having a complex light sensing organelle called 'Ocellus'. C



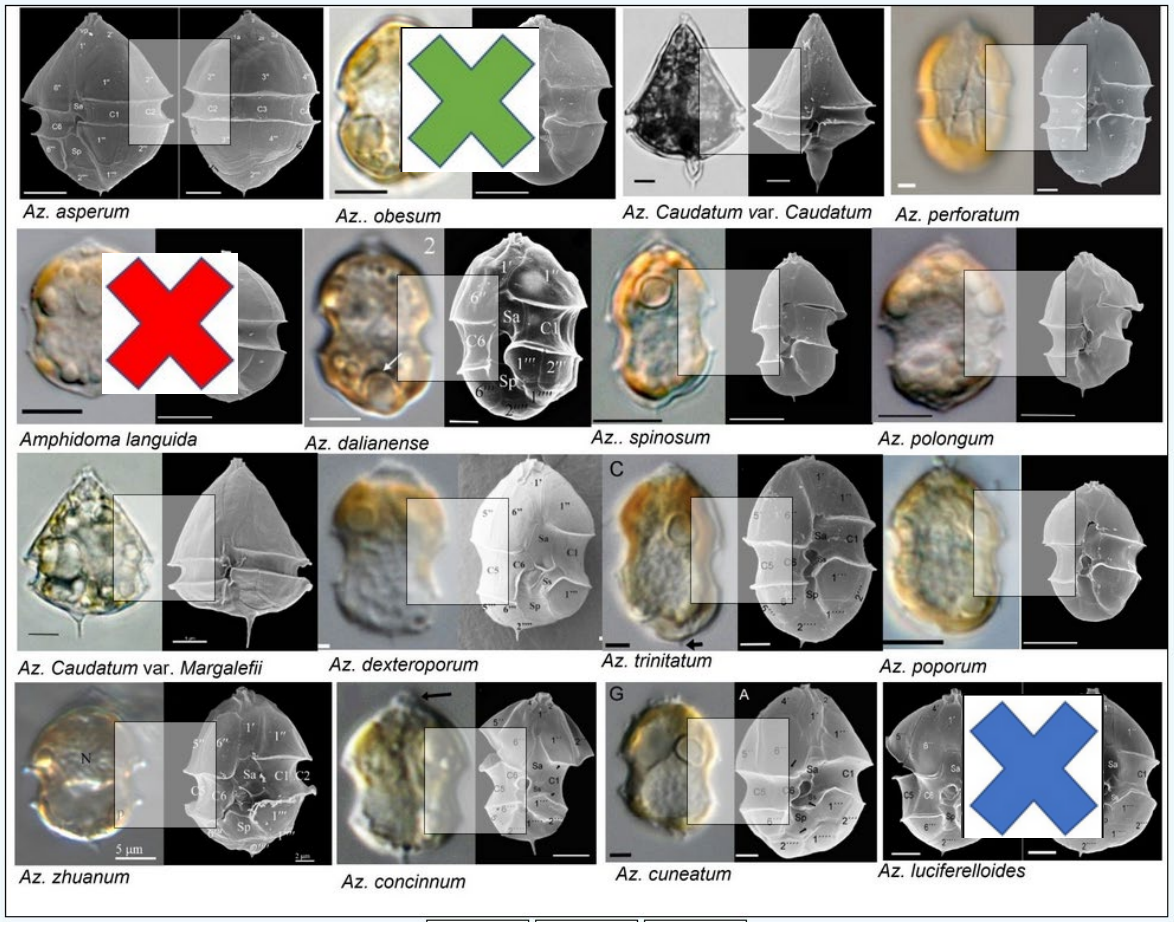
Select one or more:

- a. **Image A**
- b. **Image B**
- c. **Image C**
- d. **Image D**
- e. **Image E**
- f. **Image F**

Your answer is correct.

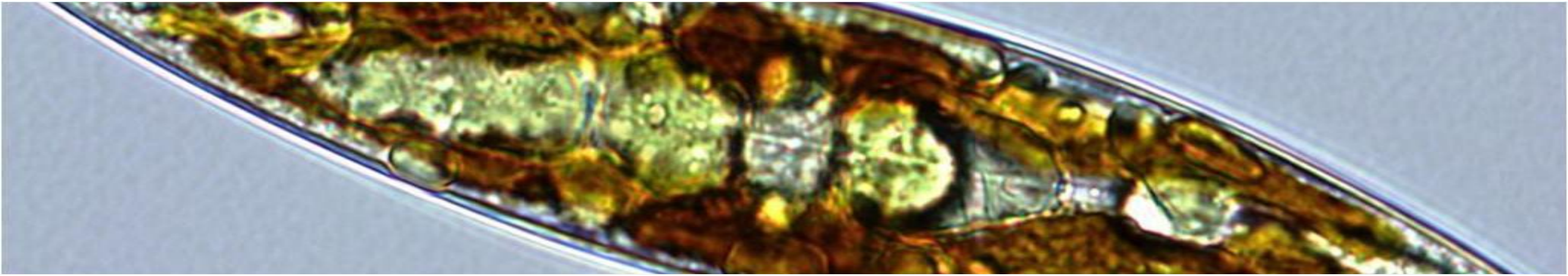
The correct answers are: **Image C**, **Image F**

Q13	Response	Partial credit	Count	Frequency
3295	IMAGE A	-25.00%	16	14.16%
3296	IMAGE B	-25.00%	1	0.88%
3297	IMAGE C	50.00%	113	100.00%
3298	IMAGE D	-25.00%	8	7.08%
3299	IMAGE E	-25.00%	0	0.00%
3300	IMAGE F	50.00%	111	98.23%



Q16	Model response	Partial credit	Count	Frequency
Am. Languida	1. Toxic	100.00%	112	99.12%
Am. Languida	3. Non-Toxic	0.00%	1	0.88%
Az. spinosum	1. Toxic	100.00%	111	98.23%
Az. spinosum	2. Unknown	0.00%	1	0.88%
Az. spinosum	3. Non-Toxic	0.00%	1	0.88%
Az.dexteroporum	1. Toxic	100.00%	111	98.23%
Az.dexteroporum	2. Unknown	0.00%	1	0.88%
Az.dexteroporum	3. Non-Toxic	0.00%	1	0.88%
Az.poporum	1. Toxic	100.00%	112	99.12%
Az.poporum	3. Non-Toxic	0.00%	1	0.88%
Az.asperum	2. Unknown	100.00%	102	90.27%
Az.asperum	3. Non-Toxic	0.00%	11	9.73%
Az. luciferelloides	2. Unknown	100.00%	109	96.46%
Az. luciferelloides	3. Non-Toxic	0.00%	3	2.65%
Az. luciferelloides	1. Toxic	0.00%	1	0.88%
Az. obesum	3. Non-Toxic	100.00%	101	89.38%
Az. obesum	2. Unknown	0.00%	11	9.73%
Az. obesum	[No response]	0.00%	1	0.88%
Az.caudatum var. caudatum	3. Non-Toxic	100.00%	102	90.27%
Az.caudatum var. caudatum	2. Unknown	0.00%	11	9.73%
Az. perforatum	3. Non-Toxic	100.00%	105	92.92%
Az. perforatum	2. Unknown	0.00%	7	6.19%
Az. perforatum	1. Toxic	0.00%	1	0.88%
Az.dalianense	3. Non-Toxic	100.00%	104	92.04%
Az.dalianense	2. Unknown	0.00%	9	7.96%
Az.polongum	3. Non-Toxic	100.00%	105	92.92%
Az.polongum	2. Unknown	0.00%	7	6.19%
Az.polongum	1. Toxic	0.00%	1	0.88%
Az.caudatum var. margalefii	3. Non-Toxic	100.00%	104	92.04%
Az.caudatum var. margalefii	2. Unknown	0.00%	5	4.42%
Az.caudatum var. margalefii	1. Toxic	0.00%	3	2.65%
Az.caudatum var. margalefii	[No response]	0.00%	1	0.88%
Az. trinitatum	3. Non-Toxic	100.00%	75	66.37%
Az. trinitatum	2. Unknown	0.00%	32	28.32%
Az. trinitatum	1. Toxic	0.00%	6	5.31%
Az. zhuanum	3. Non-Toxic	100.00%	29	25.66%
Az. zhuanum	2. Unknown	0.00%	83	73.45%
Az. zhuanum	1. Toxic	0.00%	1	0.88%
Az. concinnum	3. Non-Toxic	100.00%	102	90.27%
Az. concinnum	2. Unknown	0.00%	9	7.96%
Az. concinnum	1. Toxic	0.00%	2	1.77%
Az. cuneatum	3. Non-Toxic	100.00%	105	92.92%
Az. Cuneatum	2. Unknown	0.00%	6	5.31%
Az. cuneatum	1. Toxic	0.00%	2	1.77%

IPI Programme



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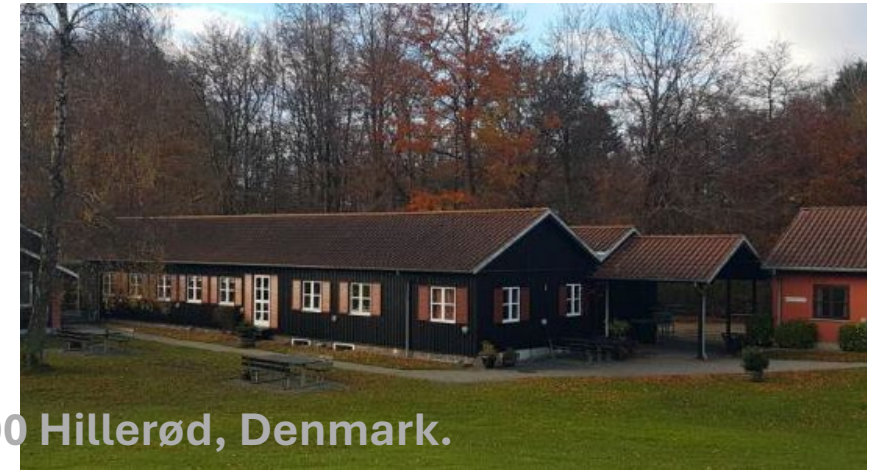
Workshop

Annual 3 day workshop, includes live cultures and fully equip room with microscopes and AV equipment for presentations.

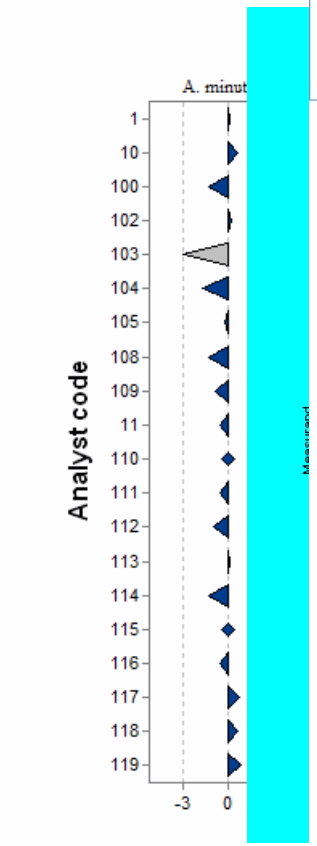
- Full 3 day workshop
- Fully equipped room with AV equipment
- Live specimens from culture collection
- One microscope per person
- Taxonomy lectures
- Intercomparison results and statistics
- Price include Full board for duration
- Maximum 20 attendants



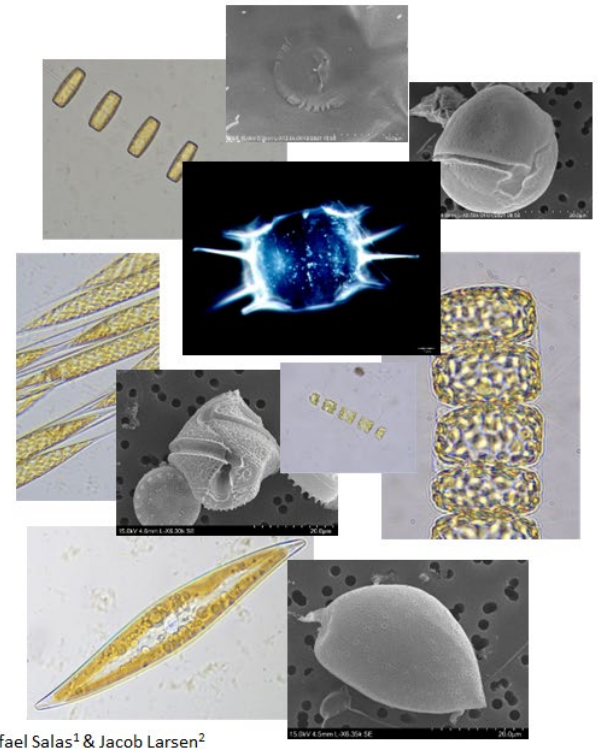
Danhostel, Lejrskolevej 4, 3400 Hillerød, Denmark.

What do we provide?

- A Proficiency t
- F
- F
- F
- F
- Certification to

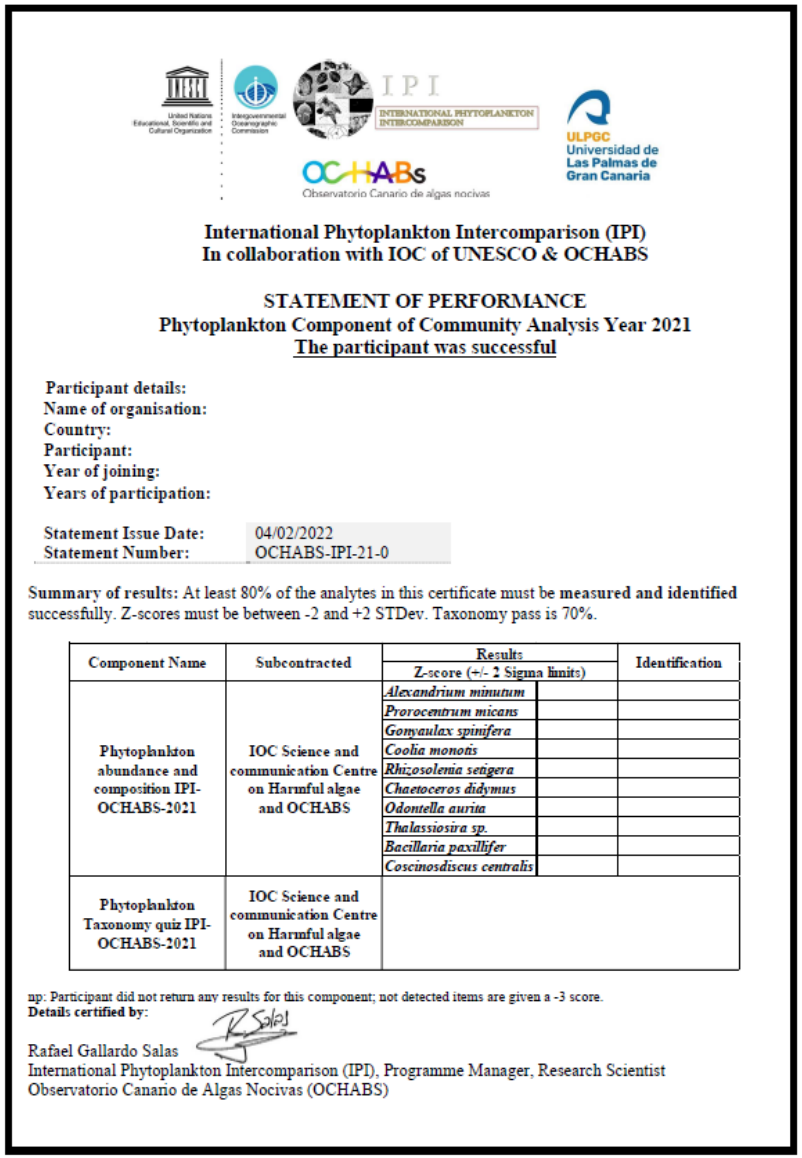


INTERNATIONAL PHYTOPLANKTON INTERCOMPARISON (IPI)
Proficiency testing in the abundance and composition of marine microalgae 2021 report



Rafael Salas[1] & Jacob Larsen[2]

[1] Observatorio Canario de Algas Nocivas (OCHABS), Calle Miramar 121, 35214, Taliarte, Las Palmas de Gran Canaria, Islas Canarias, Spain.
[2] IOC Science and Communication center on harmful algae. Department of Biology, University of Copenhagen, Øster Farimagsgade 2D, 1353 Copenhagen K. Denmark



International Phytoplankton Intercomparison (IPI)
In collaboration with IOC of UNESCO & OCHABS

STATEMENT OF PERFORMANCE
Phytoplankton Component of Community Analysis Year 2021
The participant was successful

Participant details:
Name of organisation:
Country:
Participant:
Year of joining:
Years of participation:

Statement Issue Date: 04/02/2022
Statement Number: OCHABS-IPI-21-0

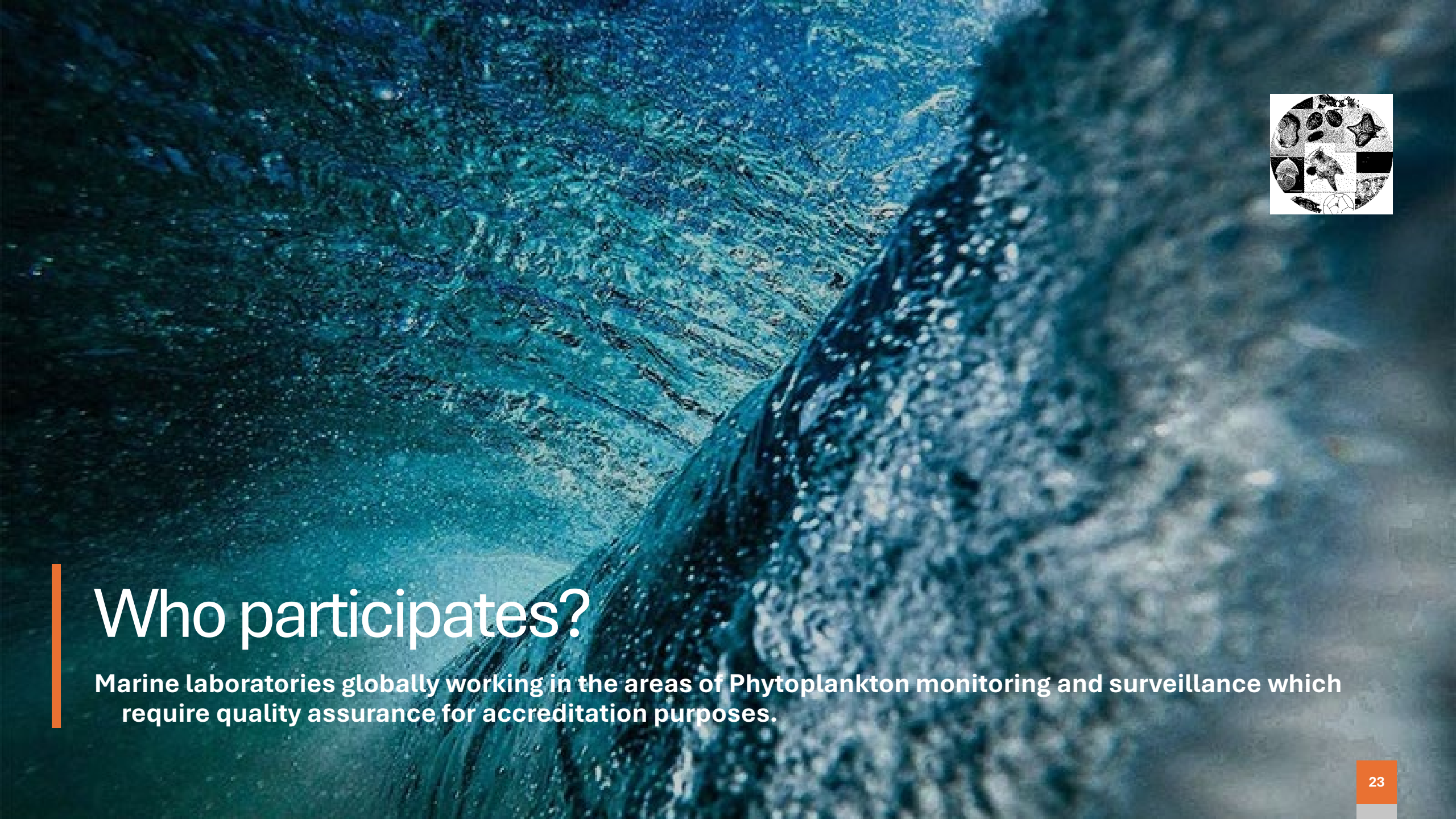
Summary of results: At least 80% of the analytes in this certificate must be **measured and identified** successfully. Z-scores must be between -2 and +2 STDev. Taxonomy pass is 70%.

Component Name	Subcontracted	Results Z-score (+/- 2 Sigma limits)		Identification
Phytoplankton abundance and composition IPI-OCHABS-2021	IOC Science and communication Centre on Harmful algae and OCHABS	*Alexandrium minutum*		
		Prorocentrum micans		
		Gonyaulax spinifera		
		Coolia monotis		
		Rhizosolenia setigera		
		Chaetoceros didymus		
		Odontella aurita		
		Thalassiosira sp.		
		Bacillaria paxillifer		
		Coscinosdiscus centralis		
Phytoplankton Taxonomy quiz IPI-OCHABS-2021	IOC Science and communication Centre on Harmful algae and OCHABS			

np: Participant did not return any results for this component; not detected items are given a -3 score.
Details certified by:

Rafael Gallardo Salas
International Phytoplankton Intercomparison (IPI), Programme Manager, Research Scientist
Observatorio Canario de Algas Nocivas (OCHABS)

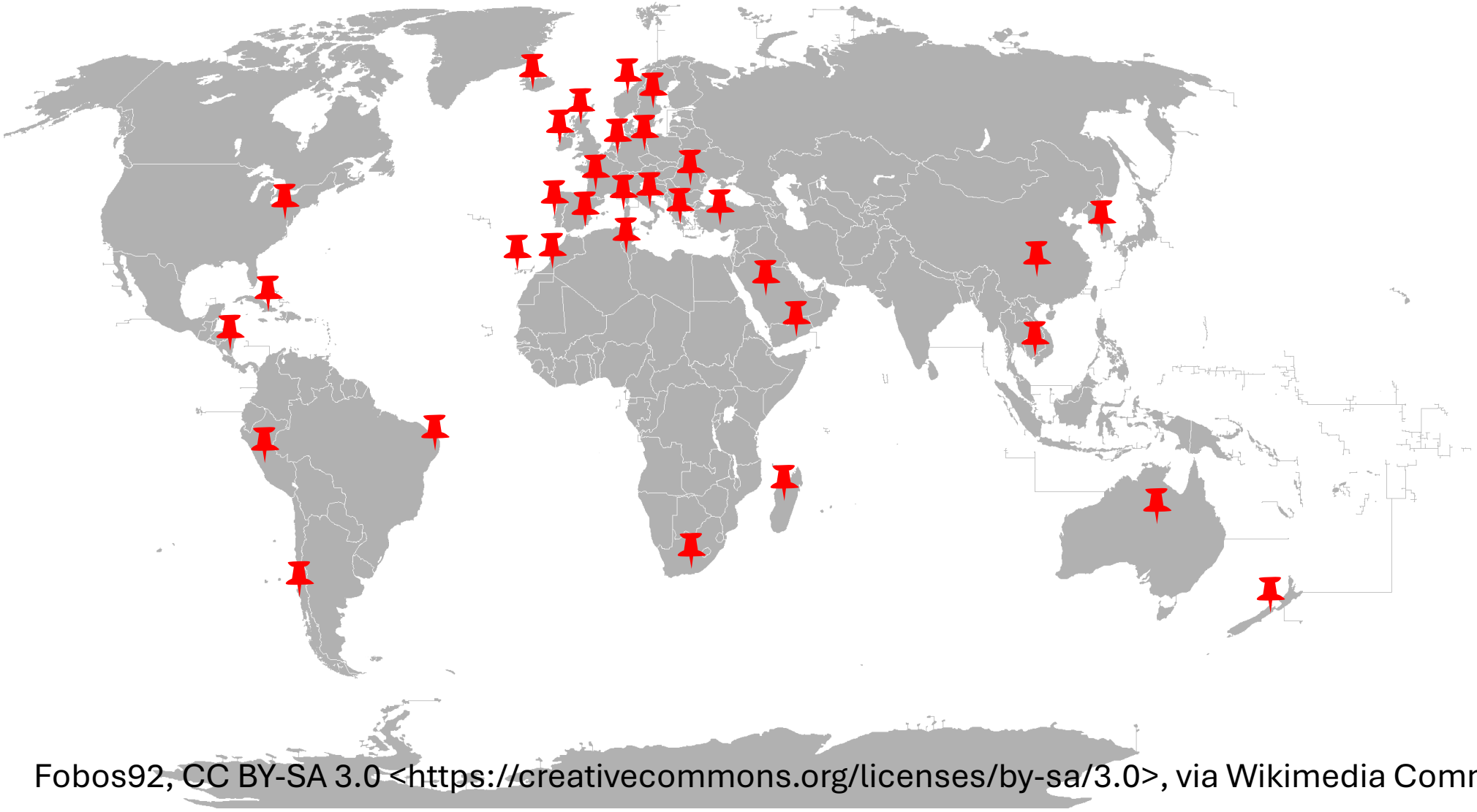
ring test.



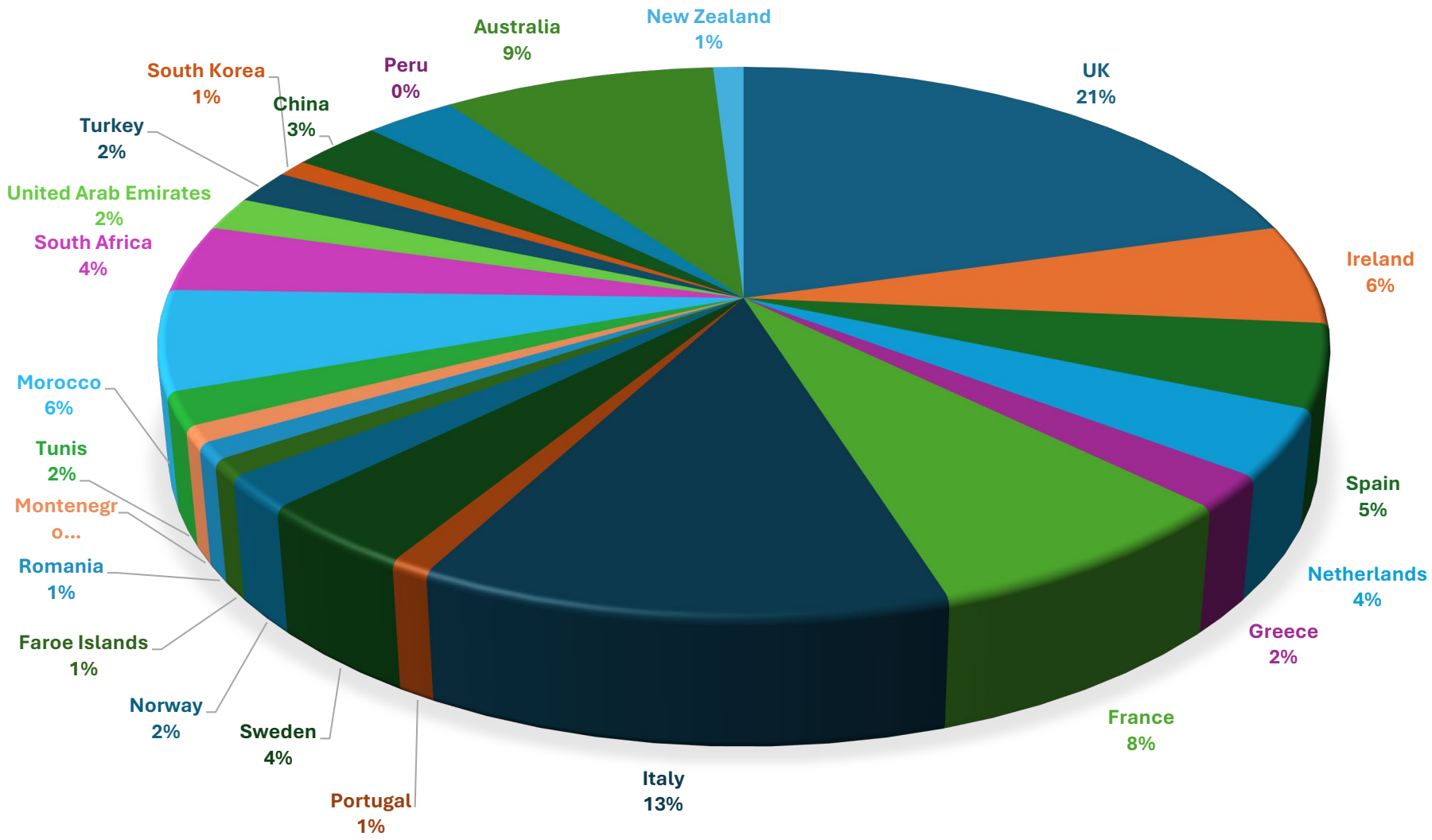
Who participates?

Marine laboratories globally working in the areas of Phytoplankton monitoring and surveillance which require quality assurance for accreditation purposes.

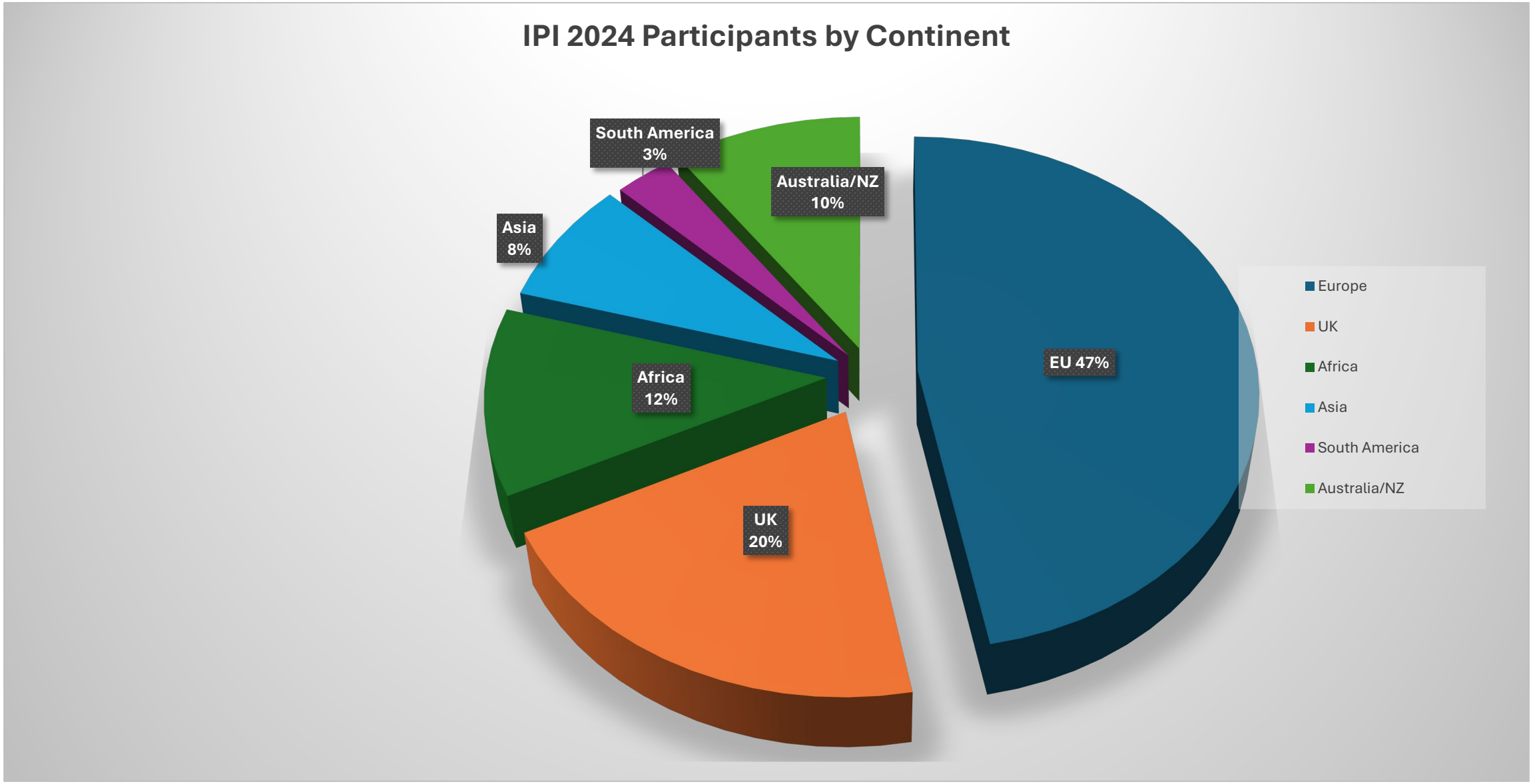
IPI is a global PT scheme



IPI 2024 PARTICIPANTS BY COUNTRY



426 different participants since 2005 have attempted the IPI test from over 130 laboratories and more than 50 countries around the world!



New laboratories from South Africa and Romania have joined the IPI family in 2024


Marine Institute
Foras na Mara


WAGENINGEN
UNIVERSITY & RESEARCH


STAZIONE ZOOLOGICA ANTON DOHRN
SZN


afbi
Agri-Food and Biosciences Institute


Bureau Waardenburg
Ecologie & Landschap
www.buwa.nl


ISTITUTO ZOOPROFILATTICO
SPERIMENTALE DELLA SARDEGNA
"G. PEGREFFI"


IOCAS
中国科学院海洋研究所
INSTITUTE OF OCEANOLOGY, CHINESE ACADEMY OF SCIENCES


SAMS


SASQAP


ARPAM
AGENZIA REGIONALE PER LA PROTEZIONE AMBIENTALE DELLE MARCHE


PLANCTON ANDINO


SMHI


marbec
marine biodiversity
exploitation & conservation


INRH
المعهد الوطني للبحث في الصيد البحري
Institut National de Recherche Halieutique


Institut National Des Sciences
Et Technologies De La Mer
INSTM


dalcon
environmental


phytobs


Department of the
Environment


MEDINS
HAVS OCH VATTENMYNDIGHETER


microalgal services
phytoplankton monitoring and identification


Sydney
WATER


Ifremer


ARISTOTLE
UNIVERSITY OF
THESSALONIKI


INSTITUTE OF MARINE RESEARCH
HAVFORSKNINGSINSTITUTTET


INSTITUT ZA
BIOLOGIJU
MORA


AWI


epa
Environmental Protection Agency


IRTA
RESEARCH & TECHNOLOGY
FOOD & AGRICULTURE


arpae
agenzia
prevenzione
ambiente energia
emilia-romagna


IRB


ORBICON
wsp


NIB
NATIONAL INSTITUTE OF BIOLOGY


POSEIDON
Etudes et Recherche en Environnement Littoral


Istituto Zooprofilattico
Sperimentale delle Venezie


Tasmanian
Government


Cefas


THE
MARINE
BIOLOGICAL
ASSOCIATION


SANIPES
Organismo Nacional de
Sanidad Pesquera


NIVA
Norsk institutt for vannforskning
Norwegian Institute for Water Research


Agencia de Gestión Agraria y Pesquera de Andalucía
CONSEJERÍA DE AGRICULTURA, GANADERÍA,
PESCA Y DESARROLLO SOSTENIBLE


CERPER
CERTIFICACIONES DEL PERU S.A.


Ministry of Ocean Economy, Marine Resources,
Fisheries, Shipping and Outer Island


IFOP
INSTITUTO DE
FOMENTO
PESQUERO


ARPA PUGLIA


intecmar
INSTITUTO TECNOLOXICO
PARA O CONTROL DO
MEDIO MARIÑO DE GALICIA


BUREAU
VERITAS


FITOTAX


ARPAL
Agenzia regionale per la protezione dell'ambiente ligure


ARPA FVG
Agenzia Regionale per la Protezione
dell'Ambiente del Friuli Venezia Giulia


CORE
LABORATORY

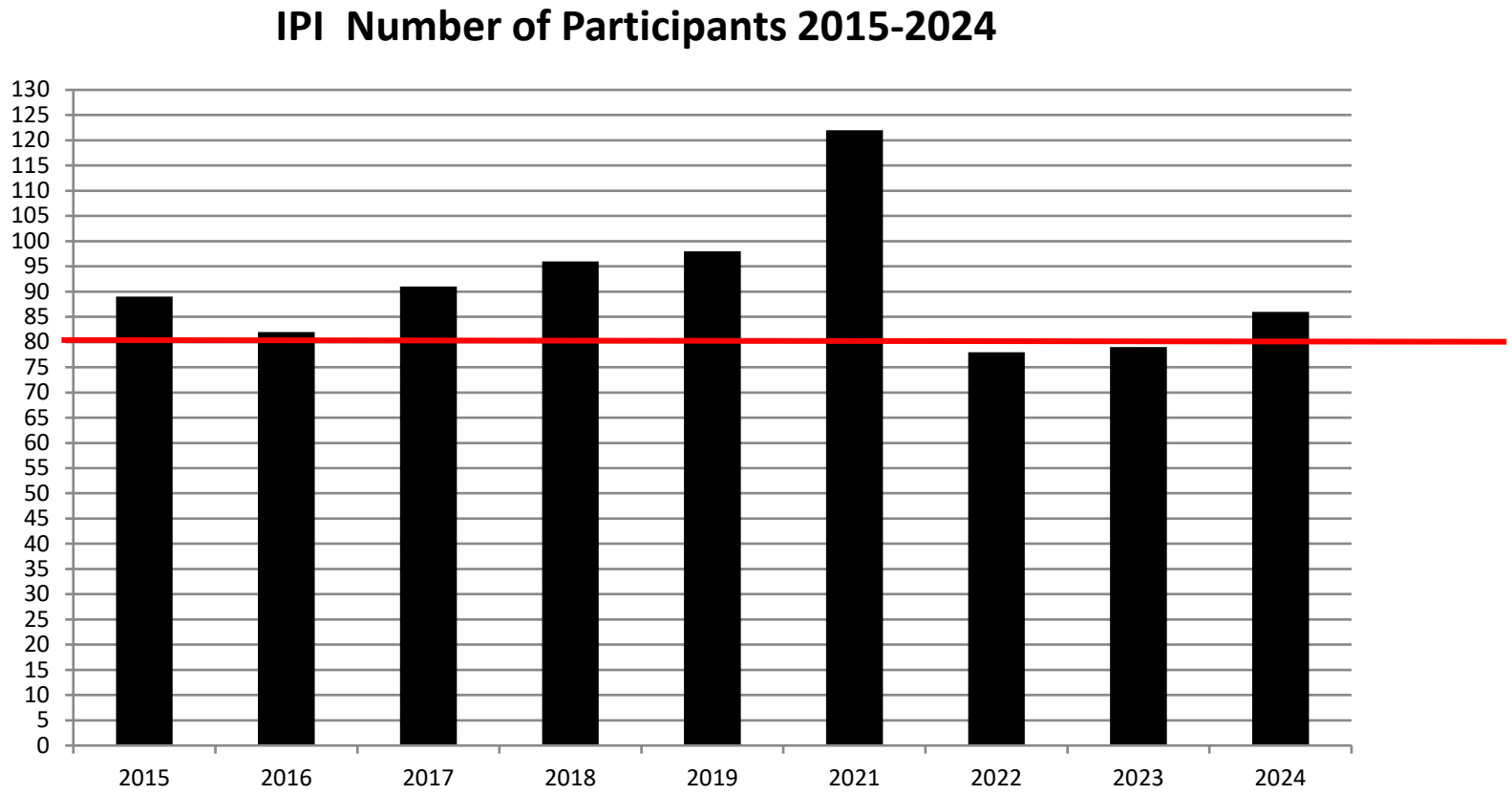

UACh
SEDE PUERTO MONTT


Scottish Government
Riaghaltas na h-Alba
gov.scot


ARPALAZIO


暨南大學
JINAN UNIVERSITY


CENTRO RICERCHE MARINE
Cesenatico - Cervia


IPI Number of Participants 2015-2024
130
125
120
115
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
2015
2016
2017
2018
2019
2021
2022
2023
2024

Where next?

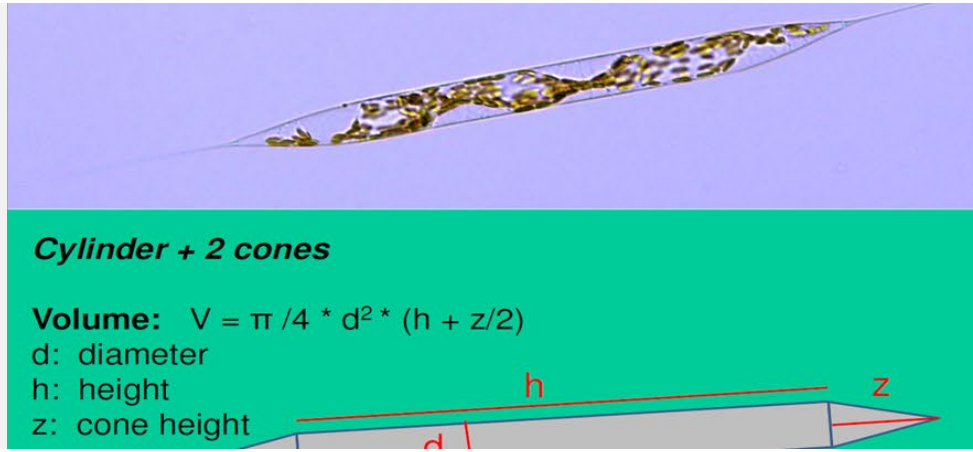
INTERNATIONAL STANDARD

ISO/IEC 17043

First edition
2010-02-01

Conformity assessment — General requirements for proficiency testing

Évaluation de la conformité — Exigences générales concernant les essais d'aptitude



IPI is looking for a new host institution

Accreditation of the IPI under ISO17043

Production of reference materials and their uncertainty

Include Biovolume measurements for laboratories

Summary

The IPI scheme provides certification of taxonomic expertise in marine microalgae.

It is a global scheme that promotes education and awareness of Harmful algae

The scheme is accepted internationally by the expert laboratories in this area and the scheme continues to grow in numbers.

Reliable taxonomic identification is a pre-requisite to any other ecological, biodiversity and climate change studies.

The IOC and Ocean teacher provides an excellent platform for capacity building of this expertise.

The scheme of practical, theoretical exercises plus a 3 day workshop provides a good blue-print for other schemes in community analysis.

THANK YOU