*Indicator Fact Sheet*

# (WEU14) Phytoplankton algae in transitional and coastal waters

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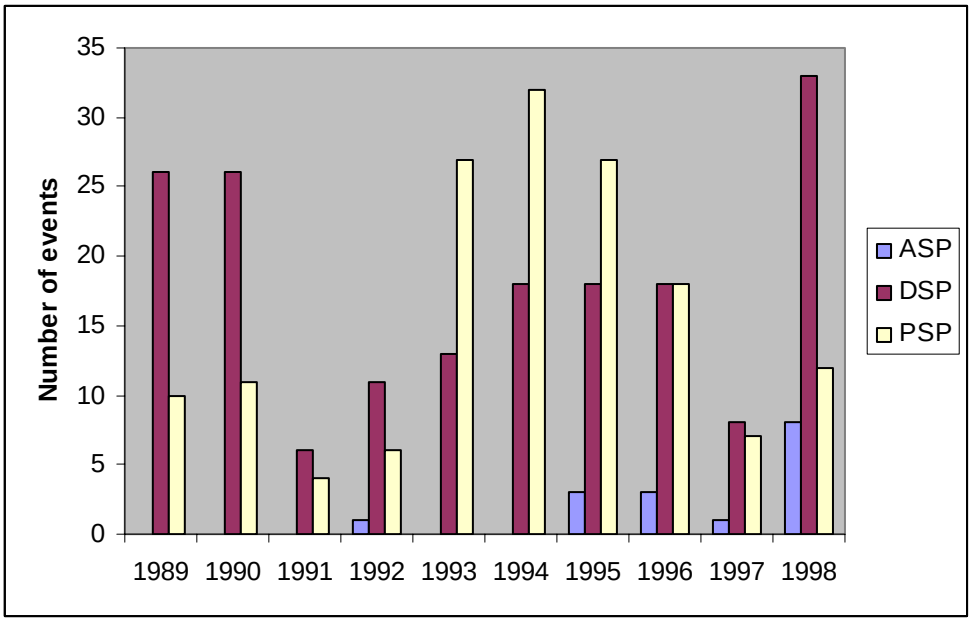
**Key message**

☹ Since the 1970s, the harmful algae phenomenon has increased throughout the world. There is no clear trend in shellfish poisoning events in European waters for diarrheic shellfish poisoning (DSP), and paralytic shellfish poisoning (PSP). Amnesic shellfish poisoning (ASP) occurrences seem to occur more frequently than in the past.

**Figure 1:** Shellfish poisoning events in European waters




Sources: ICES-IOC HAEDAT (Harmful Algae Event Data Base)

Note: Sum of the number of reported events. Not all the European countries are regularly reporting (see table 1).

**Results and assessment**

Policy relevance:

Among the numerous (over 6000) phytoplankton species existing all over the world, several toxic or harmful species have been recorded. Among toxic species, some of them produce toxins directly toxic to marine fauna, and other produce toxins, which accumulate in shellfish,

fish, etc. They may subsequently be transmitted to humans, and through consumption of contaminated seafood become a serious health threat. So, toxins are searched in shellfish with the aim to protect consumers.

Five human syndromes are presently recognised to be caused by consumption of contaminated seafood:

- Amnesic shellfish poisoning (ASP),
- Ciguatera fish poisoning (CFP),
- Diarrheic shellfish poisoning (DSP),
- Neurotoxic shellfish poisoning (NSP),
- Paralytic shellfish poisoning (PSP).

European countries are only concerned by three of them: ASP, DSP, and PSP. Regulations are in place to reduce the risk of serious seafood poisoning, intensive monitoring of the species composition of the phytoplankton is required in the harvesting areas in connection with bioassays and/or chemical analyses of the seafood products.

Policy context:

Regulation texts: the Council Directive 91/492/EEC on the 15th of July 1991, modified by the Directive of council 97/61/EEC on the 20th of October 1997, fixes the health conditions for the production and the placing on the market of live bivalve molluscs. The main phycotoxins observed in Europe are PSP toxins (food safety maximum level 80µg equivalent STX[1] per 100 g of flesh), ASP toxins (food safety maximum level 20µg of domoïc acid per g of flesh), DSP toxins (food safety criteria: no positive reaction to biological test). A more ancient Directive (the "shelfish water directive" 79/923/CEE) mentioned toxic phytoplankton, but without specific thresholds.

Additional Commission Decisions of 15 March 2002 (2002/225/EC and 2002/226/EC) give detailed rules of implementation of the Directive 91/492/EEC and establish special health checks for harvesting and processing certain bivalve (ASP only).

As this indicator is used in the context of eutrophication, the corresponding policies are also relevant: Nitrate Directive, Urban Waste Water Directive, Water Framework Directive, OSPAR strategy to combat eutrophication, etc.

Environmental context:

Anderson (1995) noticed that since the 70's, the harmful algae phenomenon has increased throughout the world, due to several causes, including nutrient enrichment from increasing inputs originated by human activity. It is mainly the modification of the nitrogen, phosphorus and silicon ratios, which could lead to modifications of species composition, particularly enhancing flagellates species, including the main toxic species (Dinophysis, Alexandrium, Gymnodinium).

Monitoring programmes of phytoplankton and phycotoxins are running in many European countries, mainly focussed on human health by the counting of toxic species. Some of them extend their measurements to the whole phytoplankton population. No general phytoplankton indicator linked to eutrophication based on species abundance and composition is presently available.

Assessment:

Occurrence of harmful algae, which are widely distributed in marine and coastal waters, does not necessary means poisoning events. Understanding of interactions between physical and biological processes leading to harmful blooms presently is an active field of research. In addition to that, monitoring of poisoning events used to be focussed on shellfish production areas. This is important to keep in mind when assessing the results, and specially through maps as presented below.

Levels and trends (figure 1) of shellfish poisoning events are presented in figure 1. The data come from the HAEDAT database, which includes extensive additional information about the poisoning events. The data are updated by the international Working Group on Harmful Algal Bloom Dynamics (WGHABD), under the joint responsibility of the International Council for the

[1] STX = Saxitoxin

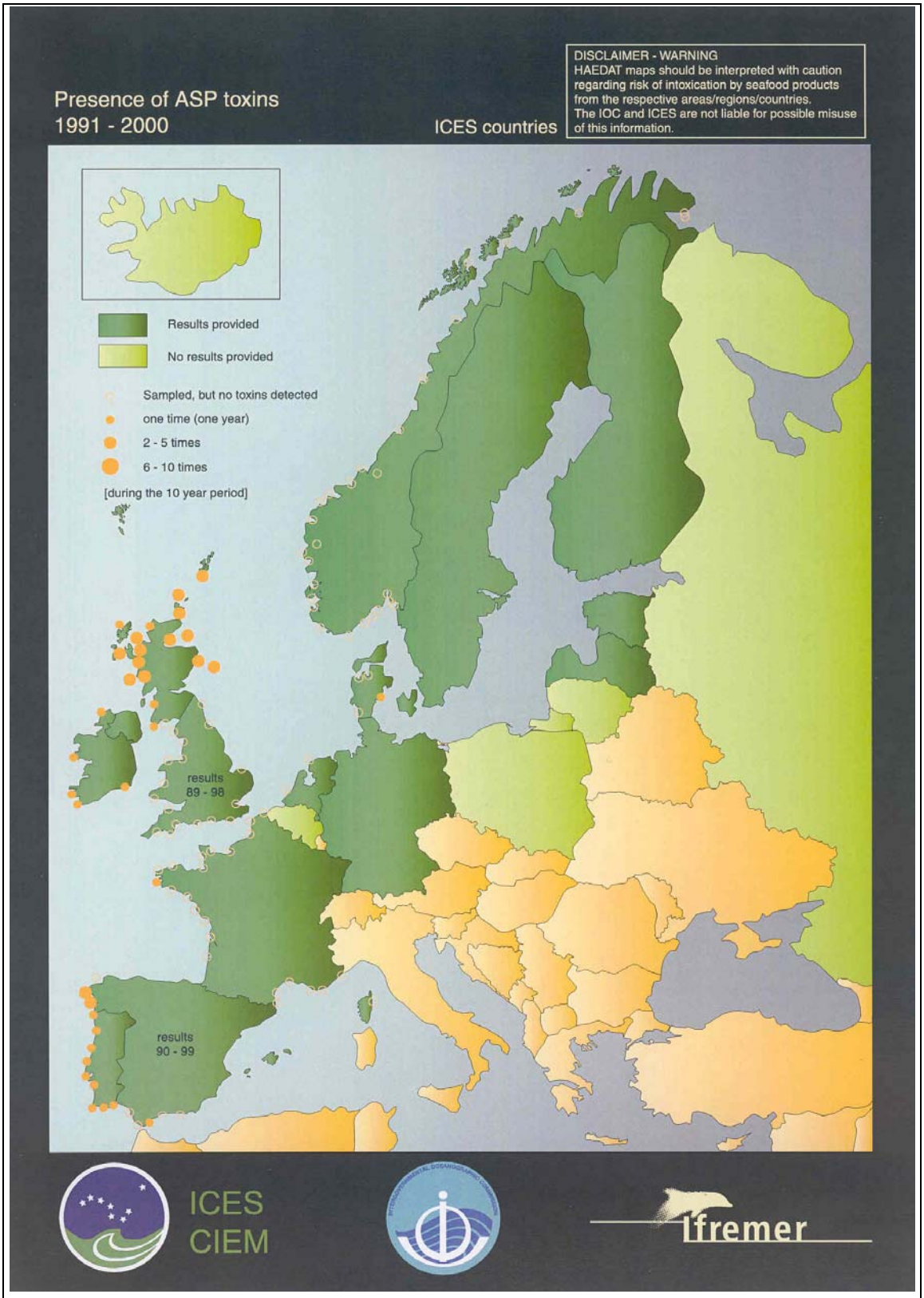
Exploration of the Sea (ICES) and the Intergovernmental Oceanographic Commission (IOC) of UNESCO.

Over the 1989 to 1998 period for Europe, ASP events are the less frequent with only five years of occurrence and one peak of more than 5 events (in 1998). Recent indications tend to show that ASP poisoning is increasing. Events have been recorded in France in 2000, which was never the case before. PSP events are regularly observed. Their numbers were particularly high over the 1993-1996 period. DSP is the most common type of poisoning observed with a number of events always over five.

## Sub-indicators

☹ Poisoning events occurred throughout European waters during the 1990s.

**Map 1**: Occurrence of ASP poisoning events

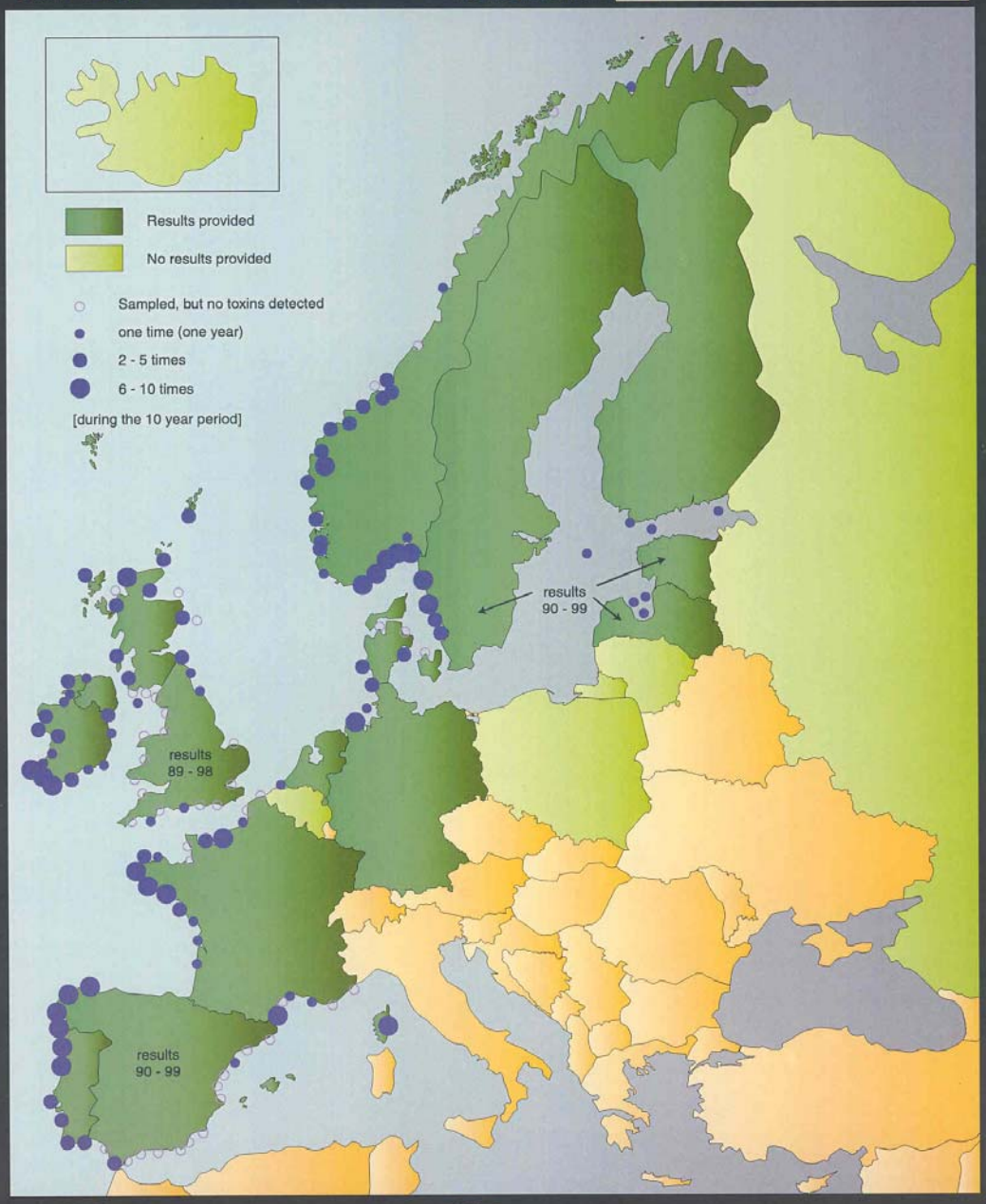



**Map 2**: Occurrence of DSP poisoning events

# Presence of DSP toxins
## 1991 - 2000

ICES countries

DISCLAIMER - WARNING
HAEDAT maps should be interpreted with caution regarding risk of intoxication by seafood products from the respective areas/regions/countries.
The IOC and ICES are not liable for possible misuse of this information.

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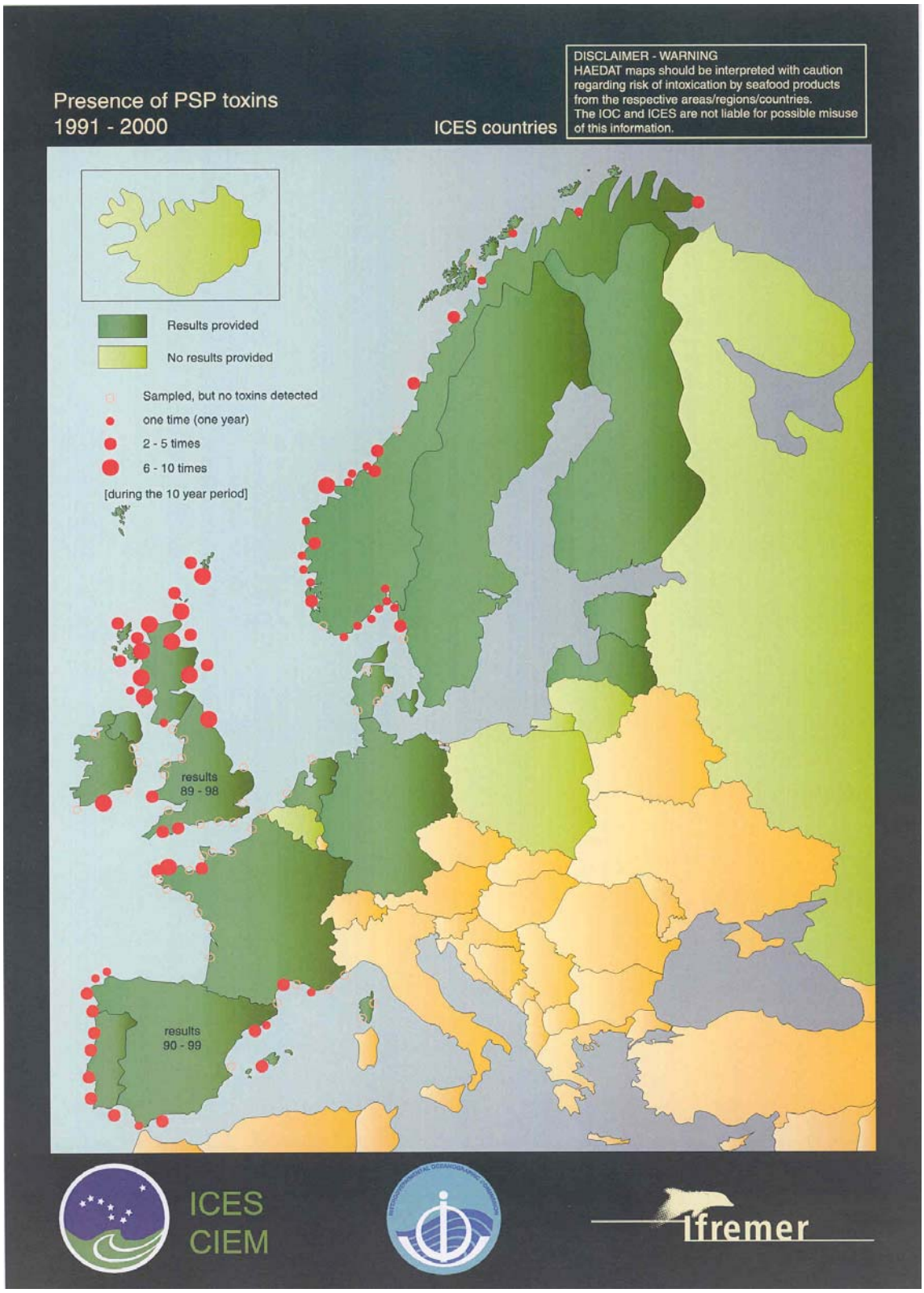
**Map 3**: Occurrence of PSP poisoning events




**Assessment of the sub-indicator**

Data on shellfish poisoning events are updated by the international Working Group on Harmful Algal Bloom Dynamics (WGHABD), under the joint responsibility of the International Council for the Exploration of the Sea (ICES) and the Intergovernmental Oceanographic Commission (IOC) of UNESCO.

Within the same framework, maps on decadal periods are available (maps 1 to 3 are presented here as an example). Representatives of the different member countries of the WGHABD provide aggregated data, and the French Institute for Marine Research and Exploitation (Ifremer) ensures coordination and cartographic services. The maps are updated annually for the preceding ten-year period.

**References**

HAEDAT (ICES-IOC Harmful Algae Event Data Base) : http://ioc.unesco.org/hab/data33.htm

Anderson D. M. 1995. Toxic red tides and harmful algal blooms : a practical challenge in coastal oceanography. Rev. Geophys., 33 Suppl. 28 p.

**Data**

**Spreadsheet filename:** WEU14_HarmfulPhytoplankton_ver3.xls

**Table 1:** Number of events involving ASP, DSP, or PSP toxins, by country 1989 - 1998

| Year | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Belgium | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| Denmark | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| Finland | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| France | 16 | 14 | 5 | 9 | 8 | 2 | 2 | 0 | 2 | 3 | 0 | 0 | 0 |
| Germany | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 2 | 1 | 0 | 0 | 0 |
| Greece | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| Ireland | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 1 | 2 | 0 | 0 | 0 |
| Italy | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| The Netherlands | 3 | 1 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Portugal | 9 | 10 | 0 | 0 | 24 | 29 | 33 | 21 | 1 | 16 | 0 | 0 | 0 |
| Spain | 6 | 6 | 1 | 2 | 3 | 4 | 6 | 3 | 5 | 12 | 0 | 0 | 0 |
| Sweden | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 2 | 1 | 0 | 0 | 0 |
| United Kingdom | 0 | 2 | 3 | 4 | 2 | 6 | 1 | 10 | 1 | 16 | 0 | 0 | 0 |
| Iceland | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Norway | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 3 | 1 | 2 | 0 | 0 | 0 |
| Poland | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| Estonia | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| Latvia | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| | | | | | | | | | | | | | |
| Total ASP | 0 | 0 | 0 | 1 | 0 | 0 | 3 | 3 | 1 | 8 | 0 | 0 | 0 |
| Total DSP | 26 | 26 | 6 | 11 | 13 | 18 | 18 | 18 | 8 | 33 | 0 | 0 | 0 |
| Total PSP | 10 | 11 | 4 | 6 | 27 | 32 | 27 | 18 | 7 | 12 | 0 | 0 | 0 |

n.a.: not available

**Meta data**

Web presentation information

1. Abstract / description / teaser:

Shows shellfish poisoning events in European waters, which is in a direct relationship with harmful algae phenomenon (increasing due to several causes, including nutrient enrichment from inputs by human activity).

2. Policy issue / question:

Is the condition regarding eutrophication of Europe's seas improving?

3. EEA dissemination themes:

Coasts and seas

4. DPSIR:

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Technical information

5. Data sources:ICES-IOC Harmful Algae Event Data Base
6. Description of data: number of ASP, PSP, DSP poisoning events by year by country

original name of the data file (with links): HAEDAT [http : //ioc.unesco.org/hab/data33.htm]

original measure units: no change

original purpose: public health

7. Geographical coverage: IOC area
8. Temporal coverage: 1989-1998
9. Methodology and frequency of data collection: regular monitoring of phytoplankton and phycotoxins
10. Methodology of data manipulation: sum of numbers of events for each year.

Qualitative information

11. Strength and weakness (at data level): available information on individual events varies greatly from event to event or country to country (see disclaimer from ICES on maps)
12. Reliability, accuracy, robustness, uncertainty (at data level): Monitoring intensity, number of monitoring stations, number of sampling, etc varies between countries and therefore there is not a direct proportionality between recorded events and actual occurences of e.g., toxicity in a given region. Furthermore, areas with numerous recorded occurrences of HAEs (Harmful Algal Events), but with an efficient monitoring and management programmes, may present a low risk of intoxications, whereas rare HAEs in other areas may cause severe problems and could present significant health risks. Therefore, the maps should thus be interpreted with caution regarding risk of intoxication by seafood products from the respective areas/regions/countries. IOC and ICES are not liable for any possible misuse of this information.
13. Overall scoring (1=no major problems, 3=major reservations):

Relevancy: 1

Accuracy: 2

Comparability over time: 2

Comparability over space: 2

**Further work required**

Data fluxes to be improved, possibly with a more official support of the activity (the present one is established on a voluntary basis).

Geographical coverage to be expanded.

Indicator on species composition and diversity of phytoplankton to be developed.