

ANNEX 8

MAPPING OF FISH AND SHELLFISH DISEASES IN ICES MEMBER COUNTRIES

The purpose of mapping the spatial distributions and temporal trends of fish and shellfish diseases is to give people, e.g., scientists, managers, laypersons and politicians, having interest in or needing information on this field the possibility of obtaining a rapid overview. The work was carried out through the Working Group on Pathology and Diseases of Marine Organisms (WGPDMO) and the material is based on national reports provided by the WGPDMO members. The data were processed by W. Wosniok (Germany), T. Lang (Germany), and S. Møllgaard (Denmark).

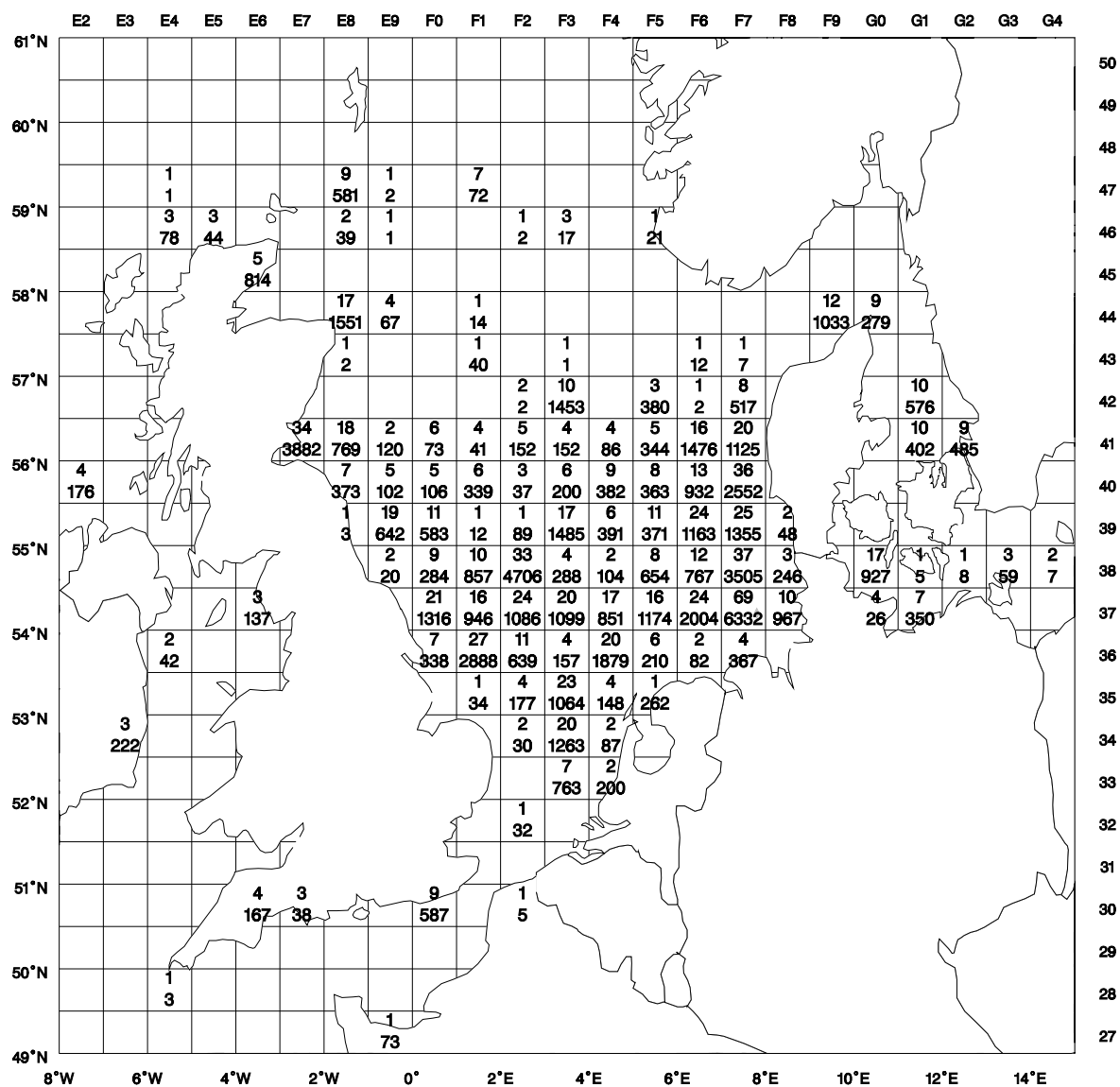
The mollusc diseases presented on the following maps were selected because they constitute some of the most important diseases in oyster culture.

The maps showing the distribution of marine Viral Haemorrhagic Septicaemia (VHS)-like virus maps were presented because this virus may constitute a threat to marine aquaculture. In future, it is the intention to further expand these illustrations to include other diseases of fish and shellfish.

DISCLAIMER – WARNING

It should be noted that these illustrations of the spatial distribution and the temporal trends are gross overviews and will not allow for detailed interpretations on a local scale.

Diseases of Dab (*Limanda limanda*): ICES Data Inventory



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Figure A8.1. ICES Data Inventory.

Background. Data used for the statistical analysis of trends in the prevalence of externally visible diseases of the common dab (*Limanda limanda*) have been extracted from the fish disease database of the ICES Environmental Data Centre. The fish disease database consists of data on the prevalence of diseases in wild fish submitted by ICES Member Countries conducting fish disease monitoring programmes.

All steps involved in the practical work during fish disease surveys (sampling strategies, inspection of fish for target diseases, disease diagnosis) as well as reporting and validation of data submitted to the ICES Environmental Data Centre are done according to ICES standard quality assurance procedures. Coordination of these activities is within the long-term remit of the Working Group on Pathology and Diseases of Marine Organisms (WGPDMO).

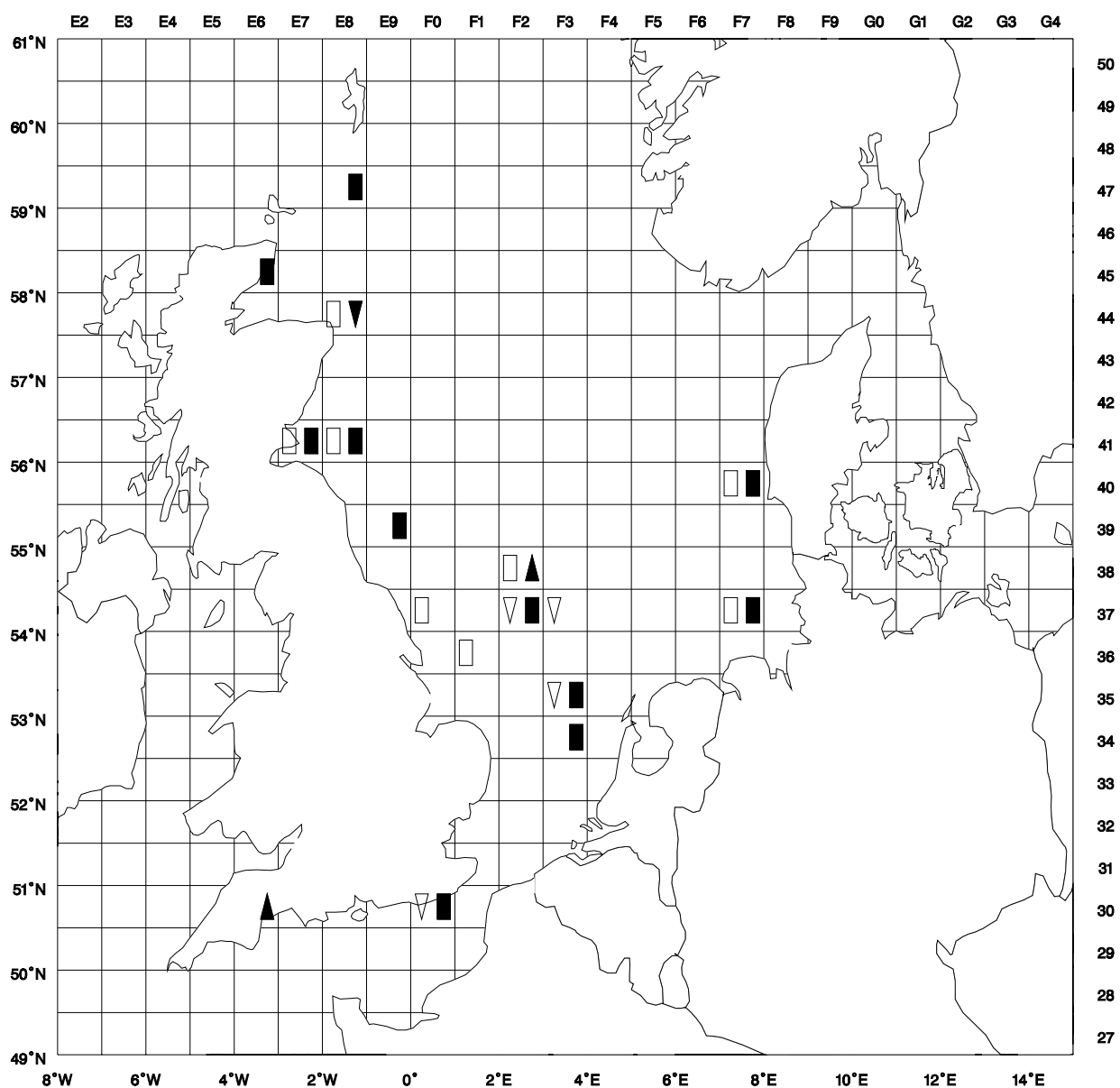
Content of Figure A8.1. For each ICES statistical rectangle (0.5° latitude, 1.0° longitude), the map provides information on the number of observations (sampling dates) in the period 1981–1997 (upper number) and on the number of fish examined and incorporated in the statistical analysis (lower number).

In order to enable a regional comparison of trends, information is only presented for female dab of the size group 20–24 cm total length. These criteria have been selected because:

- *fish of this size are generally abundant in the study area;*
- *variation in age in this size group is smaller than in larger fish;*
- *female fish are more abundant than male fish;*
- *sex-specific variations in disease prevalence occur and data for females and males should, therefore, not be combined;*
- *the selection criteria correspond to those applied in other monitoring programmes, e.g., chemical monitoring within the OSPAR Coordinated Environmental Monitoring Programme (CEMP).*

Conclusions from Figure A8.1. Data on the occurrence of externally visible diseases in dab (females, size group 20–24 cm) are available for many ICES statistical rectangles. However, the number of observations (sampling dates) and the number of fish examined differ considerably between rectangles. That means that temporal trends cannot be calculated for all of these rectangles.

Diseases of Dab (*Limanda limanda*): Trends 1993–1997 for Lymphocystis



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Figure A8.2. Temporal trends in the prevalence of lymphocystis in common dab (*Limanda limanda*) in the period 1993–1997.

Background. Since the intention of the ICES Environmental Status Report is to provide current information on the quality of the marine environment, Figure A8.2 shows trends in the prevalence of lymphocystis in dab for the period 1993–1997, calculated from the most recent data available in the ICES Environmental Data Centre.

Trends have been identified using statistical procedures based on logistic regression analysis. More details on the method are provided elsewhere.

Content of Figure A8.2. Current temporal trends for the estimated prevalence of lymphocystis in female dab, size group 20–24 cm (see Figure A8.1 for sampling information), are presented as upward or downward arrows or as rectangles, representing respectively significantly increasing, decreasing, or “stable” prevalences in the period 1993–1997.

Since seasonal effects on the prevalence have been observed and bias due to combining data from different seasons should be avoided, data are shown for two seasons:

Season 1: April–September, filled symbols;

Season 2: October–March, empty symbols.

Trends are shown only for those rectangles for which the data available meet the following criteria:

- prevalence data must be available for a minimum of four out of the five years considered;
- these data must originate either from Season 1 or Season 2 or from both.

Conclusions from Figure A8.2. Only for nine rectangles were sufficient data available for trend calculation for both seasons. With the exception of only two rectangles (30E6, 38F2), prevalences of lymphocystis were either decreasing or did not show a trend in the period 1993–1997.

Diseases of Dab (*Limanda limanda*): Trends 1993–1997 for Epidermal Hyperplasia/Papilloma

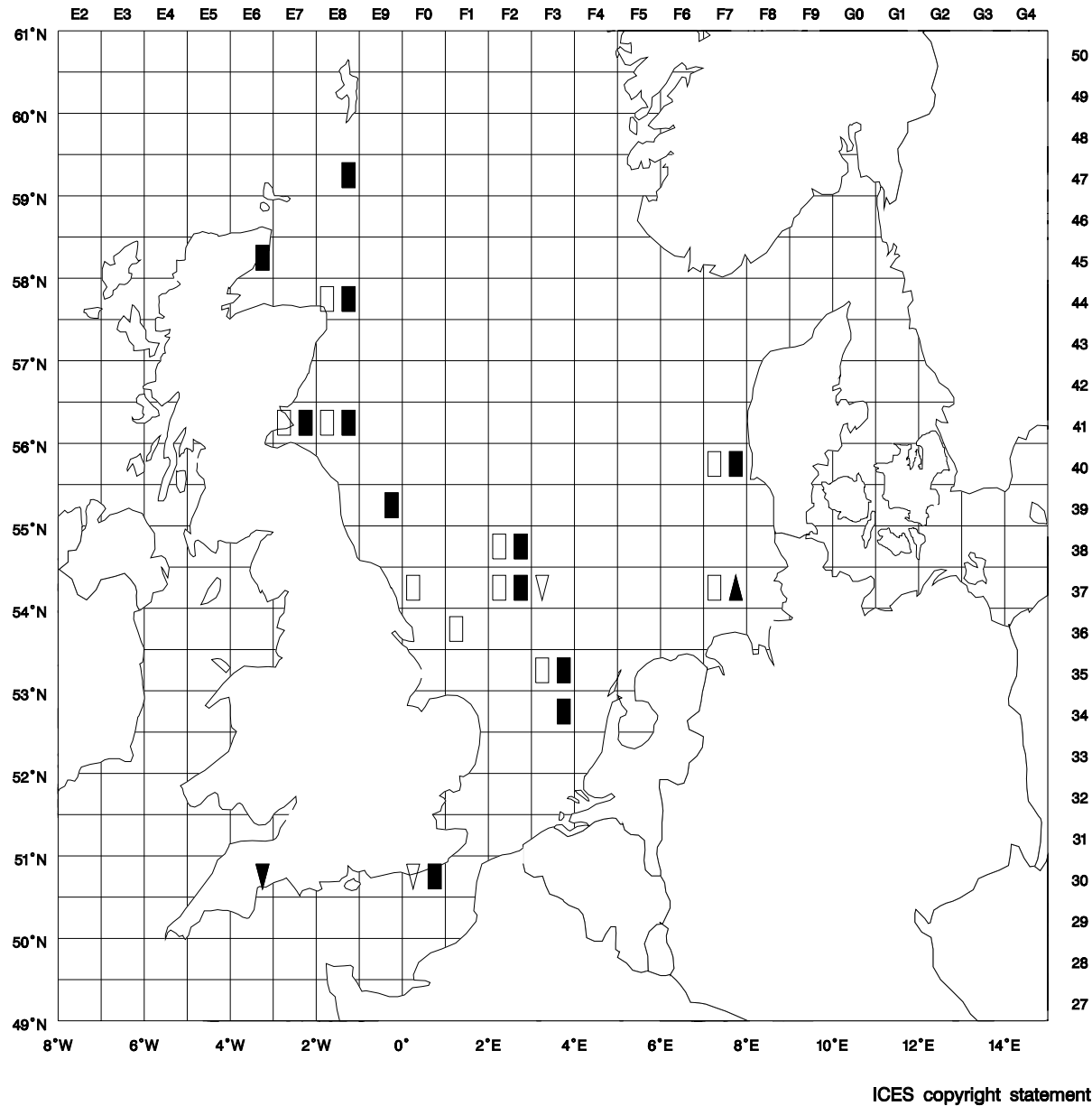


Figure A8.3. Temporal trends in the prevalence of epidermal hyperplasia/papilloma in common dab (*Limanda limanda*) in the period 1993–1997.

Background. Since the intention of the ICES Environmental Status Report is to provide current information on the quality of the marine environment, Figure A8.3 shows trends in the prevalence of epidermal hyperplasia/papilloma in dab for the period 1993–1997, calculated from the most recent data available in the ICES Environmental Data Centre.

Trends have been identified using statistical procedures based on logistic regression analysis. More details on the method are provided elsewhere.

Content of Figure A8.3. Current temporal trends for the estimated prevalence of epidermal hyperplasia/papilloma in female dab, size group 20–24 cm (see Figure A8.1 for sampling information), are presented as upward or downward arrows or as rectangles, representing respectively significantly increasing, decreasing, or “stable” prevalences in the period 1993–1997.

Since seasonal effects on the prevalence have been observed and bias due to combining data from different seasons should be avoided, data are shown for two seasons:

Season 1: April–September, filled symbols;

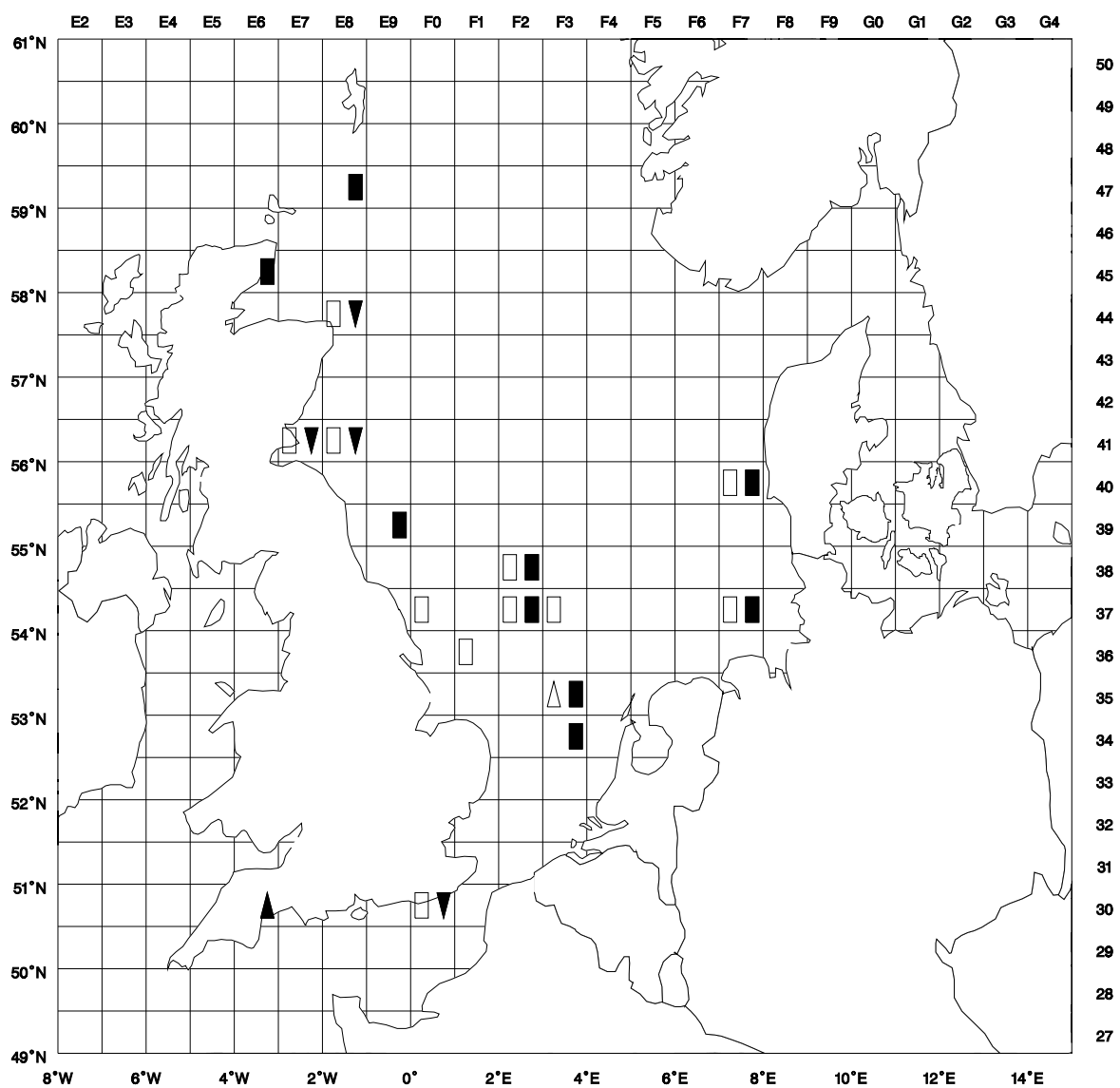
Season 2: October–March, empty symbols.

Trends are shown only for those rectangles for which the data available meet the following criteria:

- prevalence data must be available for a minimum of four out of the five years considered;
- these data must originate either from Season 1 or Season 2 or from both.

Conclusions from Figure A8.3. Only for nine rectangles were sufficient data available for trend calculation for both seasons. With the exception of only one rectangle (37F7), prevalences of epidermal hyperplasia/papilloma were either decreasing or did not show a trend in the period 1993–1997.

Diseases of Dab (*Limanda limanda*): Trends 1993–1997 for Acute/Healing Skin Ulcerations



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Figure A8.4. Temporal trends in the prevalence of acute/healing skin ulcerations in common dab (*Limanda limanda*) in the period 1993–1997.

Background. Since the intention of the ICES Environmental Status Report is to provide current information on the quality of the marine environment, Figure A8.4 shows trends in the prevalence of acute/healing skin ulcerations in dab for the period 1993–1997, calculated from the most recent data available in the ICES Environmental Data Centre.

Trends have been identified using statistical procedures based on logistic regression analysis. More details on the method are provided elsewhere.

Content of Figure A8.4. Current temporal trends for the estimated prevalence of acute/healing skin ulcerations in female dab, size group 20–24 cm (see Figure A8.1 for sampling information), are presented as upward or downward arrows or as rectangles, representing respectively significantly increasing, decreasing, or “stable” prevalences in the period 1993–1997.

Since seasonal effects on the prevalence have been observed and bias due to combining data from different seasons should be avoided, data are shown for two seasons:

Season 1: April–September, filled symbols;

Season 2: October–March, empty symbols.

Trends are shown only for those rectangles for which the data available meet the following criteria:

- prevalence data must be available for a minimum of four out of the five years considered;
- these data must originate either from Season 1 or Season 2 or from both.

Conclusions from Figure A8.4. Only for nine rectangles were sufficient data available for trend calculation for both seasons. With the exception of only two rectangles (30E6, 35F3), prevalences of acute/healing skin ulcerations were either decreasing or did not show a trend in the period 1993–1997.

The geographical distribution of *Bonamia ostreae*.

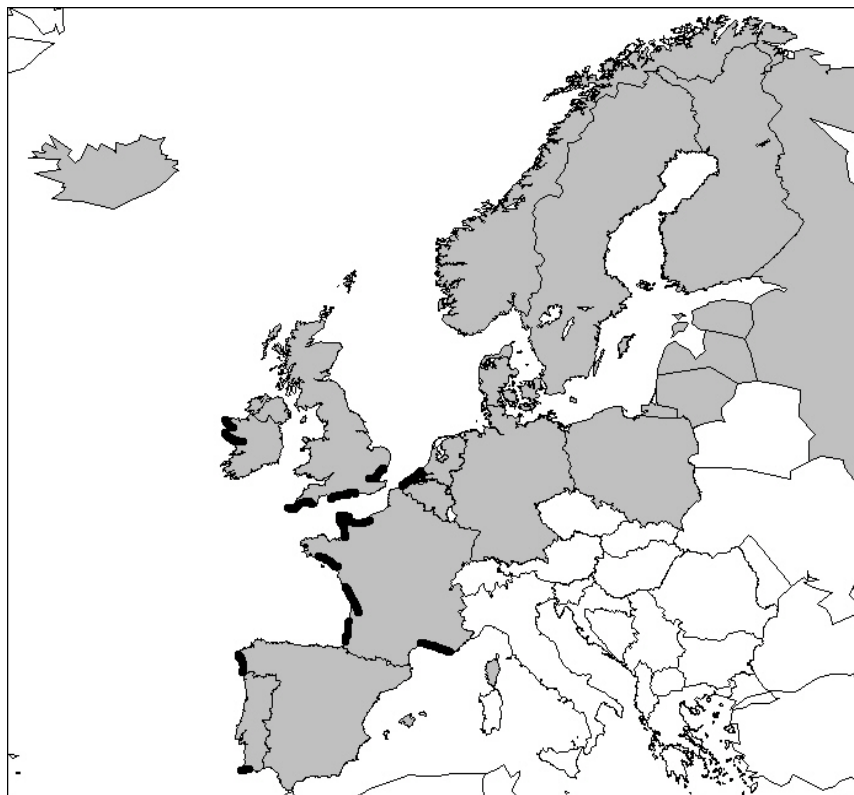


Figure A8.5. The geographical distribution of *Bonamia ostreae*.

Introduction. *Bonamia ostreae* is an intracellular parasite (2–4 µm) affecting the haemocytes of the flat oyster, *Ostrea edulis*. The parasite was observed for the first time in Normandy, France in 1979 and has since spread to other European countries associated with transfers of oysters. In affected areas, it is not economically feasible to produce flat oysters due to high mortalities (40–60 %). In the USA, the *Bonamia* situation seems to be at an endemic level without causing significant mortality.

Although many infected oysters appear normal, others may have yellow discolouration and/or extensive lesions (i.e., perforated ulcers) on the gills and mantle. Actual pathology appears correlated to haemocyte destruction and haemocytic infiltration of the connective tissue due to proliferation of *B. ostreae*. Lesions occur in the connective tissues of the gills, mantle, and digestive gland. Although some flat oysters die with light infections, others succumb to much heavier infections. Heavily infected oysters tend to be in poorer condition than uninfected oysters.

Content of the map. The map illustrates the geographical distribution of *Bonamia ostreae* (heavy black line).

Source of the data. WGPDMO members.

The geographical distribution of *Marteilia refringens*.

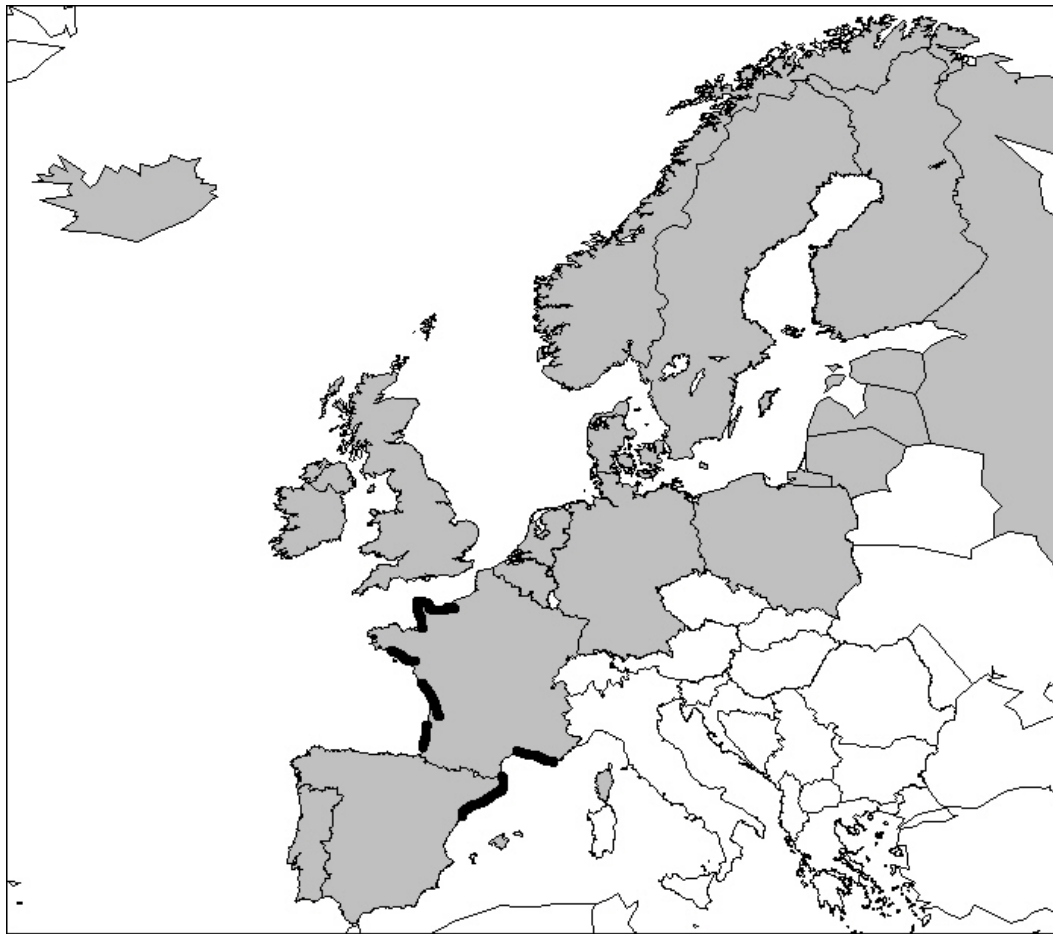


Figure A8.6. The geographical distribution of *Marteilia refringens*.

Introduction. *Marteilia refringens* is a haplosporidium affecting the digestive system of the flat oyster, *Ostrea edulis*. The parasite was observed for the first time in Normandy, France in the beginning of the 1970s and has since spread associated with transfers of oysters.

Affected oysters usually exhibit poor condition index with emaciation, discolouration of the digestive gland, cessation of growth, tissue necrosis, and mortalities. However, *Marteilia* can occur in some oysters without causing disease. The factors triggering a pathogenic host response are not clearly established, but may be related to environmental stresses or stock differences in disease resistance. Mortality appears to be related to the sporulation of the parasite, which occurs in the epithelial cells of the digestive tubules. Earlier stages occur in the epithelia of the digestive ducts and possibly the gills.

Content of the map. The map illustrates the geographical distribution of *Marteilia refringens* (heavy black line).

Source of the data. WGPDMO members.

The geographical distribution of *Perkinsus marinus*.

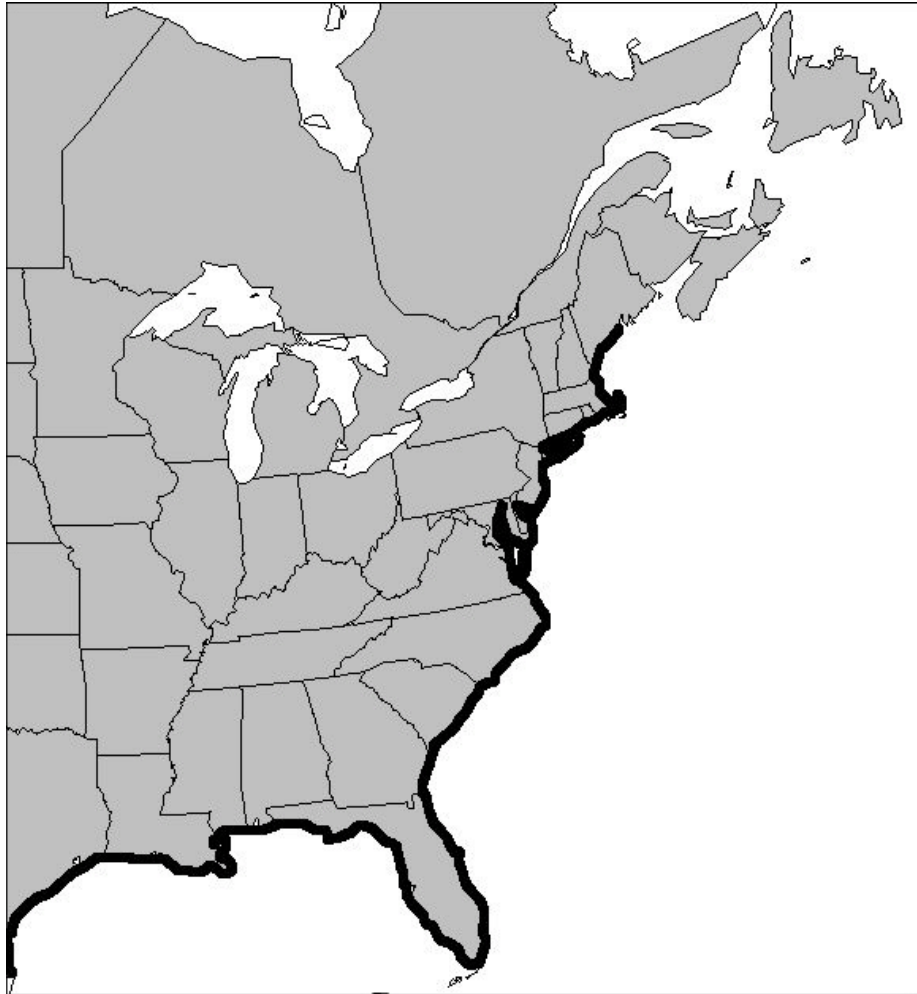


Figure A8.7. The geographical distribution of *Perkinsus marinus*.

Introduction. *Perkinsus marinus* is an intracellular parasite (2–4 µm) infecting the haemocytes of eastern oyster *Crassostrea virginica* and is one of the primary factors that adversely affects the abundance and productivity of this species.

Proliferation of the parasite causes systemic disruption of connective tissue and epithelial cells and is correlated with warm summer water temperatures (higher than 20 °C), when pathogenicity and associated mortalities are highest. Some oysters may survive summer proliferation, but are unable to revive following over-wintering dormancy. Mortalities of up to 95 % have occurred in eastern oysters during the second summer following transfer to disease enzootic areas.

Content of the map. The map illustrates the geographical distribution of *Perkinsus marinus* (heavy black line).

Source of the data. WGPDMO members.

The geographical distribution of marine VHS-like virus.

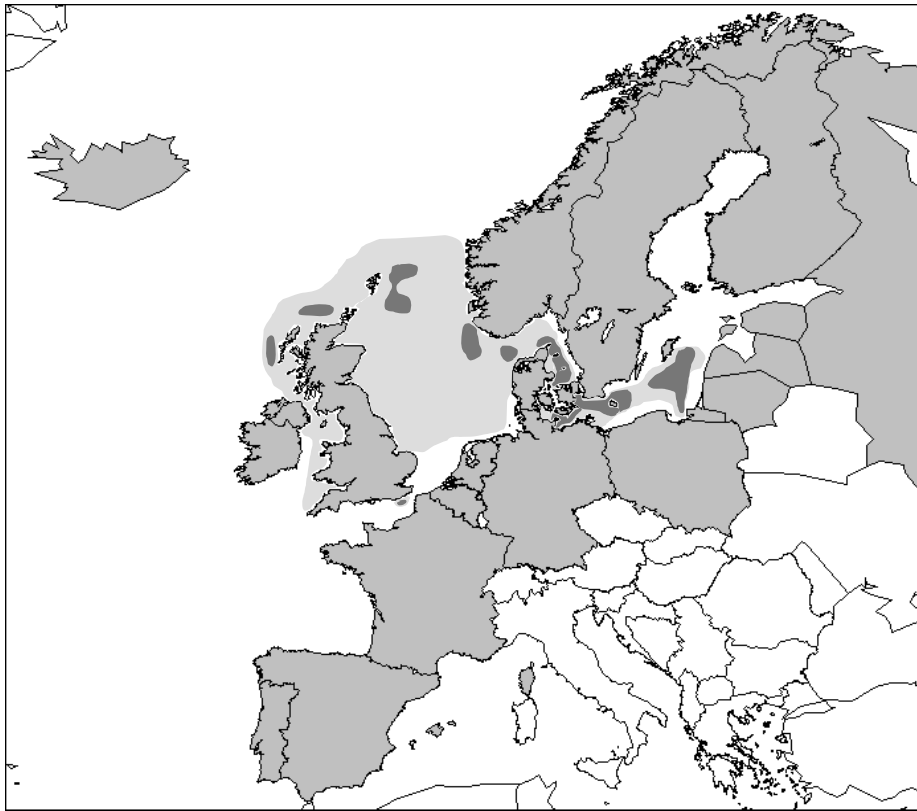


Figure A8.8. The geographical distribution of marine VHS-like virus.

Introduction. Marine Viral Haemorrhagic Septicaemia (VHS) is a disease closely related to VHS known from freshwater rainbow trout farming, in which it causes severe disease outbreaks with high mortality.

In 1988, the VHS virus was isolated for the first time from ascending Pacific salmon species. In contrast to the freshwater VHS, the marine isolates appeared to be apathogenic to rainbow trout. Further classification has revealed that the marine VHS is genetically different from the freshwater type.

The marine VHS has so far been isolated from eight different fish species in the USA and Canadian Pacific waters and in fourteen species in the North Sea and adjacent waters.

Reports from the USA suggest that marine VHS virus may be involved in epizootics in Pacific herring. The European investigations have shown relatively high prevalences of the virus in herring and sprat in the Baltic Sea. Outbreaks of marine VHS have been observed in turbot produced in aquaculture facilities in Europe and the widespread spatial distribution of the virus in the marine environment may constitute a potential threat to the aquaculture industry.

Content of the map. The map illustrates the areas investigated since 1988 for the presence of the marine VHS-like virus (light grey shading) and the areas where VHS-like virus has been isolated (dark grey).

Source of the data. Published literature and EU reports.