

# Evidence

## A literature review of the potential health effects of marine microalgae and macroalgae

### Project summary S1

Marine scientists have published the findings of a review of the literature, carried out to assess the potential risks to human health in UK bathing waters posed by marine microalgae, cyanobacteria and macroalgae. There are three possible exposure routes:

- dermal contact;
- ingestion (aspiration) of water or scum;
- exposure through inhalation.

The Environment Agency maintains a list of notifiable toxic marine microalgae and cyanobacteria for which it carries out monitoring for the EC Bathing Water Directive Monitoring Programme, in relation to incidents and for local investigations. It monitors the occurrence of nuisance blooms of algae such as *Noctiluca* and *Phaeocystis* and harmful algal blooms such as *Karenia*. The review concentrated on the marine microalgae but also considered the evidence for possible harmful effects on human health of freshwater cyanobacteria (affecting inland bathing waters) and marine macroalgae (seaweeds).

The objectives of the literature review were to:

- review existing scientific knowledge of marine macroalgae and microalgae, and the potential health risks posed by direct contact in relation to bathing waters and recreation;
- identify serious gaps in existing knowledge which would compromise the Environment Agency's ability to comply with Articles 8 and 9 of the revised Bathing Water Directive 2006/7/EC;
- outline the work necessary to rectify any such gaps.

The review did not include evaluation of the aesthetic impacts of algal blooms at bathing waters.

The review examined the evidence in the scientific literature for health impacts from:

- non-toxic phytoplankton blooms;
- toxic phytoplankton;
- ingestion of water containing toxic phytoplankton;
- dispersal of microalgae and their toxins as aerosols or airborne particles;
- freshwater cyanobacterial blooms;
- macroalgae.

The report identifies those algal species posing potential health hazards in UK bathing waters. Some algae give rise to health problems in other parts of the world and are not at present found in UK waters.

The risks to human health due to short-term contact, ingestion or inhalation (of aerosols or dry particles) with marine phytoplankton that currently occur in UK waters are considered to be generally low, as is contact with seaweeds. There will, however, always be sensitive individuals who display reactions even to innocuous algae.

However, the risks to human health (via contact, aspiration or inhalation) presented by blooms of freshwater cyanobacteria are assessed to be high. The report indicates research requirements as regards human exposure to cyanobacteria in recreational and other waters as identified by the international scientific community.

Climate change may mean that new genera or species of algae – some potentially harmful to human health – may become established and bloom as the seas around the UK become warmer. Adaptive measures will therefore be required.

The review's findings will assist the Environment Agency and others to implement the requirements of Article 8 'Cyanobacterial risks' and Article 9 'Other parameters' of the revised Bathing Water Directive. They will also inform guidance on the health hazards of blooms of cyanobacteria and phytoplankton and the need for further research into the risks to human health from marine algae.

This summary relates to information reported in detail in the following output(s):

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