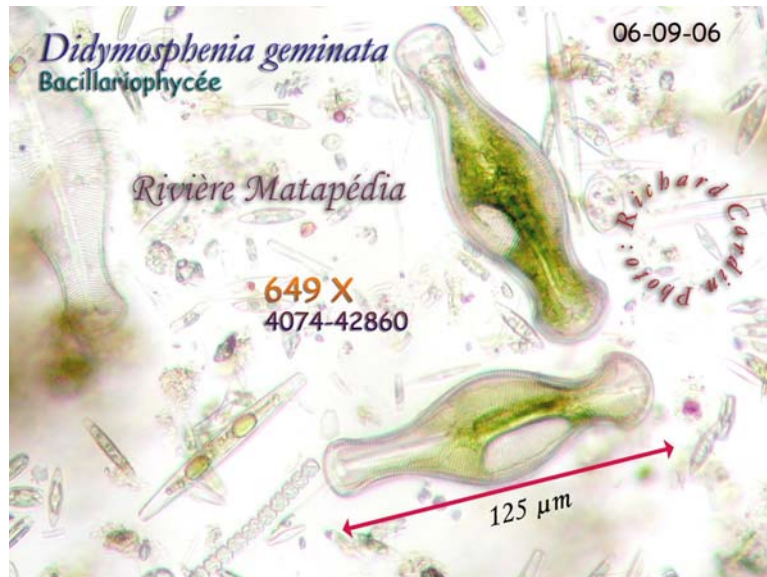


## What Is Didymo and How Can We Prevent It From Spreading In Our Rivers?



March 2007

**Photograph of cells of *Didymosphenia geminata*.**

**Source: Centre d'expertise en analyse environnementale du Québec, September 2006.**

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## WHAT IS DIDYMO AND HOW CAN WE PREVENT IT FROM SPREADING IN OUR RIVERS?

Reference: MDDEP-MRNF Scientific Advisory Committee on *Didymosphenia geminata*, 2007. *What Is Didymo and How Can We Prevent It From Spreading In Our Rivers?*, Québec, ministère du Développement durable, de l'Environnement et des Parcs et ministère des Ressources naturelles et de la Faune, ISBN: 978-2-550-49391-4 (PDF), 10 p.

### 1. Background

The first *Didymosphenia geminata* bloom in Québec occurred in the summer of 2006 in the Matapedia River in the Lower St. Lawrence region. The alga, commonly known as didymo, is a relatively rare species and is native to rivers and lakes in boreal and montane regions of the Northern Hemisphere. Since the mid-1980s, didymo has been reported in a number of countries. In Canada, didymo blooms have been observed in British Columbia, particularly in several central Vancouver Island rivers, in the Bulkley, South Thompson, Kettle, Columbia and Kootenay rivers, and east of the Rockies in the Bow, Red Deer and Old Man river basins in Alberta. A number of western U.S. states, including Montana, Dakota, Colorado and Utah, have also reported didymo blooms. In Europe, blooms have been confirmed in Hungary, Ireland, Iceland, Finland, Poland and Romania. The rivers of the South Island of New Zealand have also been seriously affected by didymo blooms, where it has been officially declared an unwanted organism.

The excessive algal blooms reported in certain rivers of New Zealand are an isolated occurrence and, at this time, there is no reason to believe that the algae will spread to the same extent in Québec salmon rivers. Québec's climate is very different from that of either the Southern Hemisphere or the west coast of Canada. In addition, the situation in certain rivers on Vancouver Island, which have been invaded by didymo in recent years, has improved considerably. The decline in didymo populations could be tied to the rivers' natural control mechanisms, which have not yet been identified. However, didymo blooms are still occurring in other Vancouver Island rivers.

### 2. Description

*Didymosphenia geminata* is a single-celled, microscopic, freshwater diatom, measuring approximately 100 x 30 micrometres. Its external cell wall, called a frustule, is composed of silica. Didymo produces a mucilaginous stalk by which the live cells attach to rocks and vegetation. During blooms, the stalks form mats that cover the stream bed. Only the cells of didymo are living; the stalks are formed of non-photosynthetic mucopolysaccharides and range in colour from **brownish yellow to white**. The algae can also be observed along the edges of lakes with rocky substrates exposed to wave action. To the touch, the algae **feel like wet cotton wool**.

Didymo occurs in shallow waters. When the river level falls, mats of dried algae on rocks can be mistaken for strands of toilet paper or parchment paper, causing concerns about possible sewage discharges. In contrast to cyanobacteria (blue-green algae) in southern Québec, didymo blooms are not caused by pollution or excessive phosphorus in streams. To the contrary, didymo thrives in oligotrophic, or low-nutrient, waters.

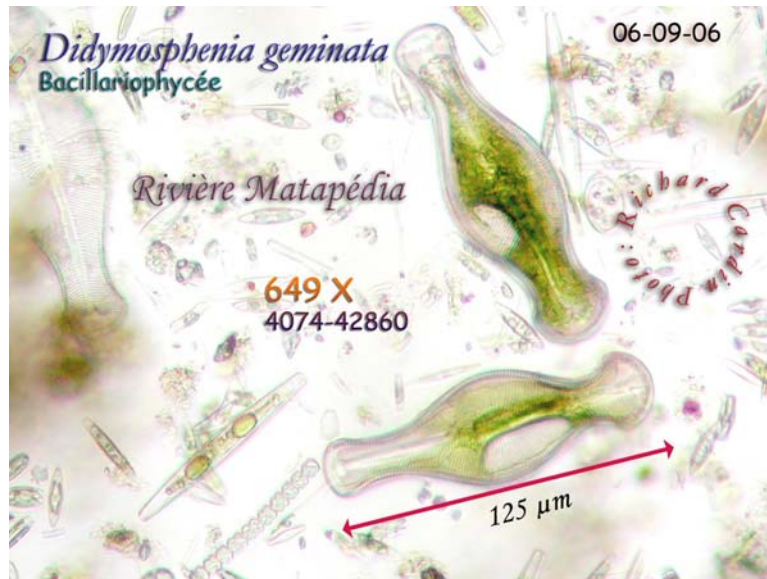


Photo of *Didymosphenia geminata* cells.

Source: Centre d'expertise en analyse environnementale du Québec, September 2006.

### 3. Characteristics of rivers affected by *Didymosphenia geminata*

The common characteristics of rivers affected by didymo blooms are:

- a stable rocky substrate;
- high light exposure;
- clear, low-nutrient waters;
- significant fishing pressure;
- easy access.

### 4. Human health impacts

According to the available data, didymo does not render water unfit for consumption and it is not toxic. However, people swimming in waters downstream from areas containing high concentrations of didymo have complained of eye irritations, which may be caused by the silica of the frustules.

## 5. Potential impacts on habitat

In extreme cases, didymo blooms are believed to impact stream food webs by reducing algal diversity and altering the species composition of invertebrate communities. There are reportedly more snails, midges and tubifex worms, but fewer caddisflies and mayflies. In addition, a higher density of organisms is typically observed, but their average size is smaller.

If extensive, recurrent growths of didymo were to occur in Québec rivers, there is reason to believe that the alteration of the physical habitat and benthic invertebrate communities composition could potentially affect the quality, quantity and size of preys available to fish. Large mats of algae covering river beds could also cause changes in streamflow.



Mats of *Didymosphenia geminata* on a stone collected in the Matapedia River, in Portes de l'Enfer. Source: Matapedia River Watershed Council (CBVRM), October 2006.

## 6. Potential impacts on salmon and other salmonids

In early September 2006, the ministère des Ressources naturelles et de la Faune (MRNF) carried out an electric fishing survey at sites in the Matapedia River where a significant quantity of didymo had been observed and at other sites where a small quantity of the algae had been reported. The results of the study did not show that the algae had a measurable impact on the abundance of juvenile salmon (parr).

MRNF also contacted several European government agencies, through the North Atlantic Salmon Conservation Organization. Fisheries experts and managers from France, Iceland, Ireland, Scotland, Finland and Norway described the situation in their respective countries and provided relevant information on the alga and its impacts on salmon.

Although the presence and spatial coverage of this alga have increased in recent years in some European countries, particularly Iceland, all authorities contacted agreed that no impacts had been observed or even suspected to date on Atlantic salmon, either adults or juveniles, or other salmonid species.

None of the government agencies contacted by MRNF has implemented any special decontamination procedure for didymo. Despite the fact that it is spreading in some areas, its presence does not appear to have an impact on the fishery or the maintenance of Atlantic salmon populations in the countries in which the agencies are located. However, Iceland requires mandatory cleaning of fishing equipment at its international airport and at ports of entry. This measure is designed to eliminate a parasite, *Gyrodactylus salaris*, which can result in mortality in juvenile Atlantic salmon.

## **7. Potential impacts on infrastructure and recreational activities**

Growing mats of *Didymosphenia* or algal material from sloughing mats drifting in the current can sometimes clog water intakes. The equipment of fishers, kayakers, canoeists or other recreational users of rivers can also be made foul with didymo mats. The mats can affect the aesthetic quality of rivers, making them look as though they were polluted.

## **8. Vectors for the spread of didymo**

The most likely explanation for the appearance of didymo algae in the Matapedia River is human transfer by users of the river. In British Columbia, it has been shown that the appearance of didymo coincided with the introduction of felt-soled waders on the market. Because didymo cells can survive for up to 30 days in wet felt soles, they can be transported from river to river. Migratory birds, pets and wildlife can also be vectors for the introduction and spread of the alga, as well as boats, diving equipment and any other equipment used in lakes and rivers.

## **9. Local and governmental action**

The Centre de contrôle environnemental du Québec (CCEQ) of the ministère du Développement durable, de l'Environnement et des Parcs (MDDEP), in the Lower St. Lawrence, was informed of an algal bloom in the Matapedia River in late July 2006 by fishermen and the Corporation de Gestion des Rivières Matapédia et Patapédia (CGRMP). The CCEQ and MRNF conducted monitoring and sampling in the Matapedia River watershed in August and September 2006. The Matapedia River Watershed Council (CBVRM), local stakeholder subsidized by the MDDEP, was also contacted by CGRMP to find out about the origin of the algal bloom. CBVRM investigations allowed to discover that the mats consisted of *Didymosphenia geminata*. This identification was later confirmed in late August 2006 by Dr. Max Bothwell, an Environment Canada researcher from British Columbia and a didymo expert.

In early September 2006, an ad hoc working group was formed, composed of representatives of MDDEP, MRNF, CGRMP and CBVRM.

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From November 7 to 17, 2006, the regional office of MDDEP carried out sampling in three rivers in the Lower St. Lawrence (Rimouski, Mitis and Matane rivers) and eight rivers in the Gaspé Peninsula (Nouvelle, Grande Cascapédia, Petite Cascapédia, Bonaventure, Saint-Jean, York, Dartmouth and Sainte-Anne rivers) aimed at detecting the presence of didymo (see map). These salmon rivers were selected because they may have been visited by the same users as those who frequented the Matapedia River in the summer of 2006.

Sampling results confirmed the presence of didymo cells in the Petite Cascapédia, Cascapédia, Nouvelle, Sainte-Anne and Bonaventure rivers in the Gaspé Peninsula. In the Lower St. Lawrence, the results revealed that the Matane River, in addition to the Matapedia River, was affected. However, the presence of didymo does not mean that blooms similar to those observed in the Matapedia River will necessarily occur in these rivers. They will be monitored over the following summer.

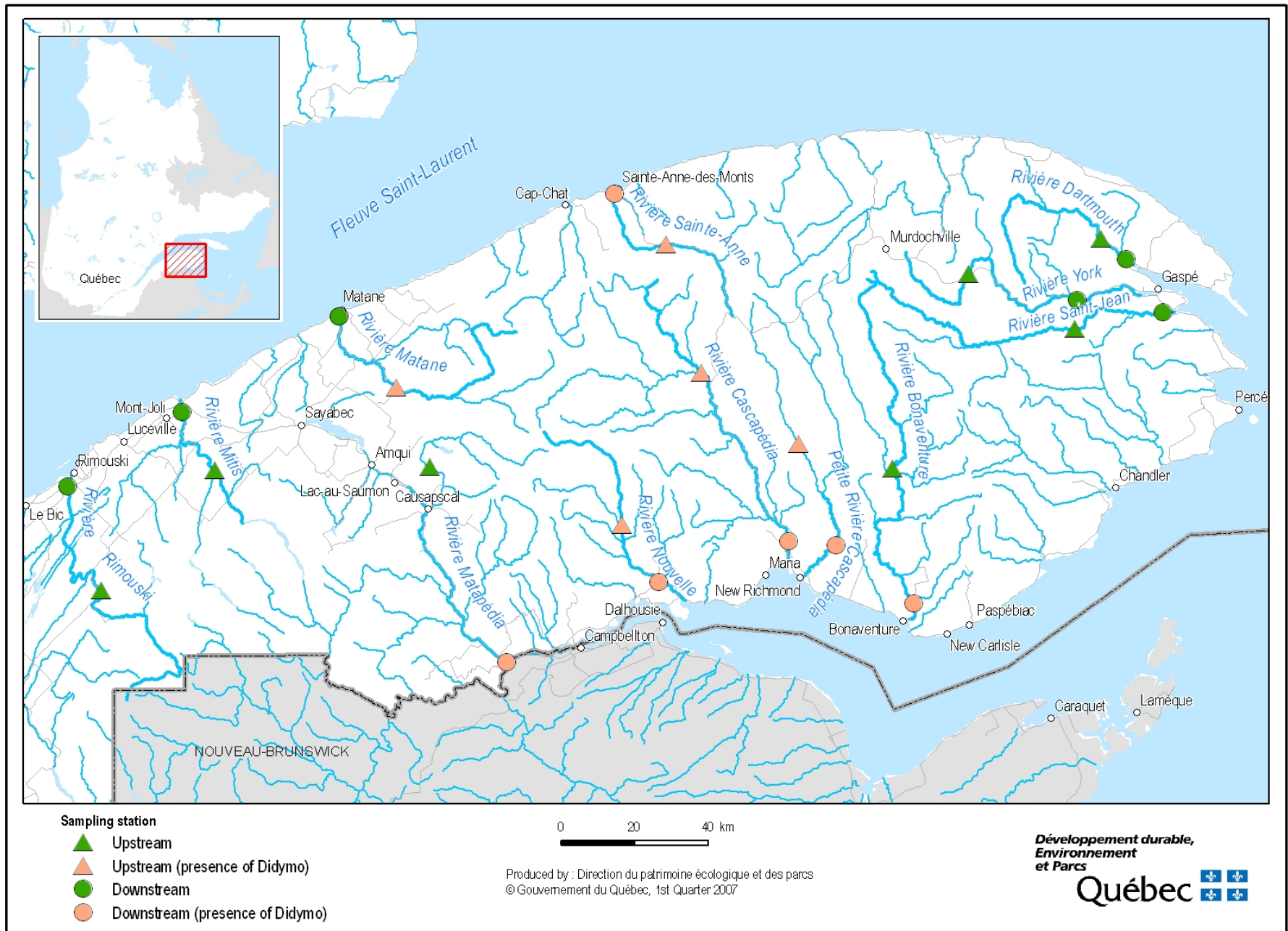
A steering committee and a scientific committee composed of representatives of MDDEP and MRNF are currently working on defining, in collaboration with the main regional partners, an action plan aimed at preventing the introduction of didymo to other rivers or streams, and limiting its impacts and expansion.

## 10. Prevention strategy

To prevent the introduction or spread of *Didymosphenia geminata* or any other aquatic invasive species, it is generally recommended to restrict the use of equipment, boats, clothing and other items to a single waterway wherever possible.

If you have to move from one waterway to another, equipment, boats, clothing and other items should be cleaned in accordance with certain guidelines, in order to prevent the spread of didymo. The following methods, developed and tested by New Zealand authorities (Biosecurity New Zealand), have proven effective in controlling the spread of didymo.

- **Check:** Before leaving the river, check your boat and equipment carefully and remove all obvious clumps of algae, taking care to look for hidden clumps. Leave clumps at the affected site. After leaving the affected area, if you find any clumps, do not wash them down the drain, but rather throw them in a garbage can. Treat your equipment as described below.
- **Clean:** Soak and scrub all items for **at least one minute** in one of the following solutions:
  - hot (60°C ) water;
  - a 2% solution of bleach (200 ml and water added to make 10 litres);
  - a 5% solution of salt (500 ml or 2 cups and water added to make 10 litres);
  - a 5% solution of antiseptic hand cleaner (500 ml or 2 cups and water added to make 10 litres);
  - a 5% solution of dishwashing liquid (500 ml or 2 cups and water added to make 10 litres).



Location of didymo sampling stations in the Lower St. Lawrence and Gaspé regions

- **Dry:** If equipment cannot be cleaned adequately, dry it completely and then allow it to dry for an additional 48 hours before using it in another lake or river.

When applying these decontamination methods, it is recommended that you:

- use biodegradable products;
- do not dispose of cleaning wastes in lakes or rivers;
- use a cleaning solution recommended above that will not alter your equipment;
- follow the product manufacturers' safety recommendations.

Additional precautions must be taken for the following items.

- **Motor boats:** Clean boats, both inside and outside, as well as mechanical parts (including propellers), various compartments and trailers with one of the above cleaning solutions.
- **Kayaks, canoes and dinghies:** Scrub the exterior of the craft vigorously with one of the recommended cleaning solutions for at least one minute, then fill the interior of the craft with the same solution and place all equipment, gear and clothing used in the boating activity into the boat. Immerse the equipment completely and stir the solution for at least one minute, then rinse with tap water.
- **ATVs:** Carefully examine vehicles to remove all clumps of algae that may be attached. Thoroughly clean the underside of vehicles, tires and parts that come into contact with the water with the cleaning solution. Leave the solution on for at least one minute. Commercial car washes with an underside spray are suitable for this purpose.
- **Fishing equipment:** Clean all rods, reels, fishing lines, flies, tackle boxes and waders and rinse with tap water. If it is not feasible to clean fishing equipment using the suggested method, fishers can choose to restrict the use of their equipment to a single lake or river.
- **Pets:** Wash pets for at least one minute with an animal shampoo or disinfectant. If they cannot be washed, they should be held in an area away from waterways for at least 48 hours.
- **Users and their clothing:** Wash yourself with soap or shampoo and dry yourself completely before entering another lake or river. Potentially contaminated clothing must be washed with laundry detergent and dried thoroughly before being reused. Shoes must be scrubbed or sprayed with one of the suggested cleaning solutions for at least one minute.

**To report a didymo bloom, contact the nearest MDDEP regional office (see link below).**

[http://www.mddep.gouv.qc.ca/ministere/rejoindr/adr\\_reg.htm](http://www.mddep.gouv.qc.ca/ministere/rejoindr/adr_reg.htm)

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