

New Information Calls Didymo's "Invasive" Status Into Question

Posted on [January 14, 2016](#) by [anrwsmdblog](#)

For years, *Didymosphenia geminata* (Didymo) has been on many states' high-priority aquatic invasive species list. Didymo, a freshwater diatom, has the potential to bloom, forming [dense mats](#) on stream and river bottoms making recreational activities difficult and giving affected waterways an unsightly appearance. Didymo blooms began in Canada in the late 1980s, and have since occurred around the globe in places like New Zealand, Chile, and across the northern hemisphere. Didymo first began to appear in several Northeastern states including Vermont in the mid-2000s.

Since the appearance of Didymo blooms around the world, some national and U.S. state governments have implemented regulations aimed at curbing the spread of this species. [Early research](#) into the cause of Didymo blooms implicated fishermen as the primary vector. This research suggested that Didymo was picked up on the boots of fishermen and brought to places such as western Canada and New Zealand. Felt-bottomed boots, which have a porous and difficult to dry sole, were considered the main transport culprit. In response, seven states including Vermont banned the use of felt-soled wading boots, and numerous other states have considered adopting similar regulation.



A biologist holds part of a Didymo mat. Photo Credit: Vermont DEC

However, new research suggests that the previous assumptions about Didymo and its spread may be incorrect. This “correction” comes from the same researcher, Dr. Max Bothwell, who cited fishermen and wading boots as the main cause for the recent Didymo blooms. A few months ago, Dr. Bothwell presented his research to a regional group of biologists and managers in Montpelier. Employed by Environment Canada in British Columbia, Dr. Bothwell has extensively studied Didymo since its appearance in British Columbia in 1989. He has conducted research in New Zealand, South America, and throughout North America.

Dr. Bothwell’s presentation focused on his most [recent study](#), in which he refutes the notion that Didymo is a non-native, invasive species. Bothwell suggests that Didymo can be found globally, and has evidence that Didymo cells existed in British Columbia and New Zealand rivers long before nuisance blooms ever appeared. His research also demonstrates that Didymo cells exist in many places worldwide where no bloom has ever been recorded. Instead, Bothwell asserts that blooms are caused by a rather simple environmental condition – a lack of available phosphorus.

Yes, you read that correctly. Problematic Didymo blooms are caused by phosphorus levels that are *too low*, says Bothwell. To a crowd of water quality professionals from the Northeast, this concept raised quite a few eyebrows, as that notion seemed counterintuitive. As is widely known, phosphorus is the cause of many water quality issues throughout Vermont, leading to [countless remediation projects](#).

What is now understood about Didymo cells is that they thrive and reproduce as long as phosphorus concentrations are above a certain level. Under usual circumstances, Didymo cells are abundant, invisible to the naked eye, and never have any discernible nuisance effect. Bothwell insists that this has always been the case in many systems around the world for millennia. However, when phosphorus falls below an extremely low minimum threshold, so low that it is otherwise undetectable using typical scientific methods, Didymo cells begin to grow “extracellular stalks.” Production of these long stalks gives the Didymo cells more access to phosphorus by lifting the Didymo cells off the river bottom further up into the water. Think of the stalks like trunks on a tree, pushing energy-producing leaves closer to the sunlight. Nuisance blooms, such as the one shown [here](#), are actually Didymo with exceptionally long stalks. It’s the growth of these excessive stalks that makes this otherwise typically benign organism become a nuisance.



A Didymo bloom in the Battenkill river in New York. Photo Credit: Vermont DEC

There are still several questions that remain to be answered. Because of the difficulty in detecting Didymo even with modern methods, there is great uncertainty about where the diatom currently exists. If the locations where blooms occur represent only a fraction of the worldwide range, then we have little information concerning the extent of the species. The potential still exists for Didymo to be transferred from one water body to another. In theory, if viable Didymo cells were brought into a stream with extremely low phosphorus levels, then a nuisance bloom could pop up. It does seem clear, though, that the threat of overland transport was initially exaggerated, as Didymo exists naturally in many systems where no blooms have ever been documented.

Despite new information on Didymo, felt-soled wader bans around the country and in Vermont remain intact. This is due in part to the uncertainty that still swirls around Didymo. Largely, these bans persist mainly because of other aquatic invaders such as [New Zealand Mudsnaails](#) and the parasite that causes [Whirling Disease](#). Research has shown that, like Didymo, these organisms become trapped and persist in the porous spaces in felt, and therefore could be carried from one waterbody to another. Whirling disease has caused losses to trout and salmon populations in states surrounding Vermont. New Zealand Mudsnaails have (not coincidentally) appeared in some of the most heavily fished streams in the country, both in the West and [much closer to Vermont](#). While Didymo may not be non-native or invasive, these and [countless others](#) species, which can be carried by felt-soled waders, definitely are.

[Vermont Agency of Natural Resources](#)
[1 National Life Drive, Main 2](#)
[Watershed Management Division](#)
[Montpelier, VT 05620-3522](#) 802-828-1535

anr.wsmdblog@vermont.gov

