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## The Story of Formula 409©

By Bob Wiltshire

I recently spent time with a lot of guides, outfitters and fly shop owners from around the country and one of the most common responses to the invasive species problem I heard was some variation of how they are making sure to be clean by using Formula 409© to disinfect their boots and gear. Many of these fly fishing professionals are very dedicated in their use of Formula 409© and several business owners told me that they require all of their guides to carry spray bottles of the disinfectant.

While it was really great to see the commitment that these people have to protecting the resource, the problem is they are wasting their time. The use of Formula 409© is what I consider to be a fly fishing urban legend. That is, a story that is continually spread and carries enough significance that it motivates the fishing community to preserve and propagate it. We all want to believe that there is a chemical spray we can use on our gear to prevent the spread of invasives and Formula 409© has firmly established itself in many people's minds as being just that. Unfortunately, it is just not true.

So, how did we get to this point where many people believe and preach an action that is not effective? The answer is simple. It starts with a basis in scientific discovery followed by misinterpretation by a concerned and vocal fishing community who aggressively spread the false information in the belief that they are helping to protect the resource. Let's take a closer look at how we ever got onto Formula 409© as a gear disinfectant.

The study that brought public attention to the use of Formula 409© was conducted in 2005 by the California Department of Fish and Game (CDFG). At that time, New Zealand mud snails (NZMS) were a relatively new invader spreading rapidly across the West and were first being reported in California. It was suspected that NZMS would cause a significant ecological damage and would likely impact on trout population levels.

In order to reduce the chances that the fishermen were spreading and the CDFG conducted both lab and field studies to determine if there were ways to disinfect waders that were exposed to the snails. They tested a variety of chemicals and determined that a 50% concentration of Formula 409© was one of the best choices for killing snails on waders and boots. The full details of their study were presented in a report titled *Controlling the Spread of New Zealand Mud Snails on Wading Gear*  
[http://www.flyline.com/\\_images/nzms\\_final\\_report.pdf](http://www.flyline.com/_images/nzms_final_report.pdf).

The news that Formula 409© would disinfect wading gear spread rapidly through the fishing community. Many anglers began to carry spray bottles and have become religious about cleaning their boots with Formula 409© after each trip. Unfortunately, from the

very beginning, anglers failed to understand the measures that were needed to disinfect their boots using Formula 409© went far beyond just spraying the boots .

The first problem for the average angler is that the methods that were used in the CDFG experiments were never adequately communicated by the fishing community. The CDFG Formula 409© experiments were conducted by taking boots and sealing them in a waterproof bag along with 2 – 2 1/2 gallons of 50% Formula 409©. The bag was then sealed and vigorously shaken to make sure all boot parts were soaked. The boots were then soaked in the chemical solution for a full five minutes. Only when thoroughly soaked for at least five minutes did the 50% Formula 409© prove to be effective at killing NZMS.

A second misunderstanding that many anglers experienced was that the 409 compound used by the researchers was a completely different formulation than that which is sold in spray bottles. Formula 409© is made by Clorox Company and they actually make five or six different chemical combinations that they market as varieties of Formula 409© . The Formula 409© used by the CDFG researchers was a commercial degreaser formula that is not commonly available.

As word spread that Formula 409© was an effective disinfectant the Colorado Division of Wildlife (CDOW) determined that they needed additional information before they could recommend its use. Consequently, they conducted a second series of experiments using Formula 409©. Their research was published in a peer-reviewed article published in *North American Journal of Fisheries Management* magazine titled *Application of Household Disinfectants to Control New Zealand Mudsnails*  
<http://wildlife.state.co.us/NR/rdonlyres/19E0D61A-D589-4D9B-9542-4D80DD471E7C/0/Mudsnails.pdf>.

The CDOW researchers compared the efficacy of treating with Formula 409© to treatments with the disinfectant Sparquat, a disinfectant not commonly available to the public that is used by some agencies to disinfect their equipment. In the CDOW study the researchers discovered that Formula 409© was only effective in killing mud snails when used at 100% strength in a soak for a minimum of 10 minutes. These researchers were critical of the California claim that a five minute soak in a 50% concentration was adequate to kill the snails as their work showed 100% for 10 minutes was actually required.

Well, it's not just anglers that can get confused about the use of chemicals with invasive species. It turns out that the researchers in Colorado were using the commonly available formula of Formula 409© which is sold in most stores in spray bottles. They were totally unaware that the California study had been performed using the commercial grade formula. Consequently, we should not dismiss the California results as being flawed. Rather, we should recognize that the Colorado results are more indicative of what the average angler would experience.

Therefore, using the CDOW information, we can see that it would be difficult for the average fisherman to soak his boots and waders in a 100% solution of Formula 409© for a minimum of 10 minutes. While there may be some dedicated anglers who would take the necessary actions, this is not practical for most fishermen.

So, two different studies have shown that Formula 409© can kill NZMS if properly used. However, simply carrying a spray bottle and spraying our gear is nowhere near adequate to do what it takes. This was highlighted in both the California and Colorado studies which both pointedly noted that spraying with Formula 409© is totally ineffective and will not sterilize the gear.

Using Formula 409© to Kill New Zealand Mud Snails		
	CDFG Study	CDOW Study
Type of Formula 409©	Commercial Degreaser	Consumer Antibacterial
Concentration	50%	100%
Treatment Type	Full Soak	Full Soak
Length of Soak	5 minutes	10 minutes
Both studies note that spraying is not effective		

There is another consideration here which also makes Formula 409© a bad choice for us to use on our waders. That is the simple fact Formula 409© has only been shown to be lethal for New Zealand mud snails and has not been tested for the myriad of other invasive species that we are seriously concerned about. However, interviews with anglers has shown that most believe that Formula 409© is a universal disinfectant that is killing all invasives.

The Formula 409© story illustrates how easy it is for people to misunderstand the information about application of chemicals. Most anglers who believe they are disinfecting their boots by spraying them with Formula 409© also believe that they are fully decontaminating their boots for all species by doing the same. They do not understand that Formula 409© was a species specific solution. There is no universal chemical disinfectant that will work for controlling aquatic invasive species.

So there you have it, the true story of how a misconception got started. I'm really sorry to be the one to tell people that spraying their boots with Formula 409© does not make a difference. However, that is the simple truth. I am always excited to meet people who care enough about the resource that they take action to try to protect it every time they go fishing. We need to find a way to teach people the proper techniques to inspect clean and dry. We would all love to see that magic spray that really would disinfect our boots and other gear. However, until it arrives, all we can do is follow the basic premise of inspect clean and dry.

The political comedian Bill Maher once had a special on HBO titled "Be More Skeptical", which is my advice to you. When it comes to methods of gear disinfection I urge you to follow that advice. Be more skeptical, ask more questions. If you hear from

anyone that there is a recommended procedure for disinfecting your gear check it out before you adopt it as your personal practice. If you ever have any questions, contact the folks at the Center for Aquatic Nuisance Species and they will be happy to talk to you about any aspect of gear cleaning and disinfection. For those of you who are using Formula 409© I guess it's time to make the kitchen and bathroom sparkle as much as your boots have since you began using Formula 409©.