

Mycofilter Ecological Risk Assessment

Mycofiltration

When assessing risk you must consider the probable severity of the hazard to cause ecological damage and the likelihood of the occurrence, with existing control measures in place, to give you the residual risk which can be classified as: Low (L), Medium (M) or High (H).

Low = Insignificant effect / unlikely or infrequent occurrence; **Medium** = Significant impact / likely occurrence; **High** = Major impact / frequent or very likely occurrence.

Mycofiltration of polluted stream water	Size of intervention: Small scale pilot project	Generic – small streams brooks, ditches, and culverts
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Brief description of Location/Site/ Activity/Task: Myceliated sacs from a native species of basidiomycete wood decay fungi fixed in streams, culverts and brooks to act as a mycofilters.		

Ref	What is the ecological hazard?	Likely ecological impact?	Preventative measures to reduce likelihood and reduce severity and biological rationale.	Risk Rating
1	Naturally occurring stream bacteria, protists and algae from upstream of mycofilter being filtered out by the mycofilter.	Mycofilter could have an ecological effect on the populations of benign bacterial, protist and algal species within the water.	The low impact nature of the mycofilter is that it is not positioned as a barrier or dam, but instead it is positioned so that water can percolate in-between and over sacs of myceliated substrate, thereby allowing some natural un-filtered flow of water past and around the mycofilter sacs. Not all water is thereby filtered. This means that enough endemic water-borne microbes from the stream's natural ecology would continue their way downstream to repopulate the downstream water courses to original levels. Downstream repopulation rates would be high due to these microbes remaining in their natural habitat. Overall impact of mycofiltration on endemic naturally occurring bacteria, protist and algae would thereby be negligible.	LOW
2	Some enteropathogenic bacteria of the intestinal tract may not be filtered out by the mycofilter and make their way downstream.	Less impact than if there were no mycofilter present and no enterobacteria were removed through mycofiltration.	The low impact nature of the mycofilter is not designed to remove all bacteria (designed instead to significantly reduce levels) since it is positioned to allow water to percolate through, along and between sacs without a dam or barrier. This means that some water does not get filtered, leaving some potentially pathogenic entero-bacteria to exit the mycofilter and make their way downstream. If this occurs, the enterobacteria downstream of the mycofilter would be in a hostile environment being outside of their normal conditions of the intestinal tract, and would therefore not reproduce quickly or re-populate and therefore would remain at a reduced concentration when compared with no mycofiltration treatment. The overall impact would be	LOW

			negligeable. There would be an overall improvement in water quality with a reduced concentration of potentially pathogenic entero-bacteria.	
3	Fragments of mycelium or yeasts break free of the mycofilter and enter the watercourse at the site of mycofiltration.	Mycelial fragments or yeasts could be washed onto mud, and dead wood at the side of the water course downstream of the mycofilter. These could establish new mycelia.	<p>Making sure that mycelium is highly integrated into the bio-char and substrate fragments and that the mycelium has spread over the surface of outer hessian sacking before installing the mycofilter. The more ramified the mycelial network into all areas of its substrate, the less chance of dislodgement of mycelial fragments. Care taken when removing mycofilters from water courses by lifting from underneath to ensure that few if any mycelial fragments are left behind. When removing used mycofilters positioning a net downstream to catch any fragments of substrate or biochar would reduce this risk further.</p> <p>The choice of a native strain of an endemic wood-decay fungus species eliminates the risk of introducing a new species since the fungus is already part of the local fungal community. This means that even if myceliation were to occur from a yeast or hyphal fragment when being washed onto some wood at the side of the water course downstream of the mycofilter, the ecological impact of this mycelium taking up residence within the dead wood, would be negligible and no greater than similar probability from the background spore rain of this species when fruiting in nearby woodland.</p>	LOW
4	Fragments of biochar breaking free from the mycofilter and being washed downstream	Small quantities of small fragments of charcoal may become dislodged from the mycofilter and be carried downstream.	<p>Making sure that mycelium is highly integrated through the bio-char fragments and substrate materials and that the mycelium has spread over the surface of outer hessian sacking before installing the mycofilter. This would minimise the chance of biochar fragments from being dislodged. Care taken when removing mycofilters from water courses by lifting from underneath to ensure that few if any bio char fragments are left behind. When removing used mycofilters positioning a net downstream to catch any fragments of substrate or biochar would reduce this risk further.</p> <p>Since charcoal is widely used as a way of improving water quality due to the tiny xylem tubes which it consists of that filter water and trap suspended sediment, bacteria, and protists, it is thought that the addition of small amounts of carbon to the water course downstream of the mycofilter would have no deleterious effect. The overall effect would most likely be to improve water quality in the stream due to reduced suspended sediment.</p>	LOW
5	Fragments of substrate (sawdust, and straw) being washed downstream of the mycofilter	Small fragments of partially digested sawdust and straw may become dislodged and add to the organic detritus within the streambed.	Making sure that the mycofilter mycelium is highly integrated through the bio-char fragments and other substrate materials (sawdust and straw) and that the mycelium has spread over the surface of outer hessian sacking before installing the mycofilter. This will minimise the chance of substrate fragments from being dislodged. Care to be taken when removing old mycofilters from water courses by lifting from underneath to ensure that few if any substrate fragments are left behind. When removing used mycofilters positioning a net downstream to catch any fragments of substrate would reduce this risk further.	LOW

			<p>The small-scale size of the mycofilter means that any addition of organic material making up the mycofilter substrate to the water course would be less than the natural rate of organic material deposition from leaf fall, as well as branches and twigs from nearby trees that over-hang the bank of the water course. The overall effect of the addition of some residual fragments of mycofilter substrate such as pieces of sawdust or straw into the water course downstream of the mycofilter would be negligible.</p>	
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