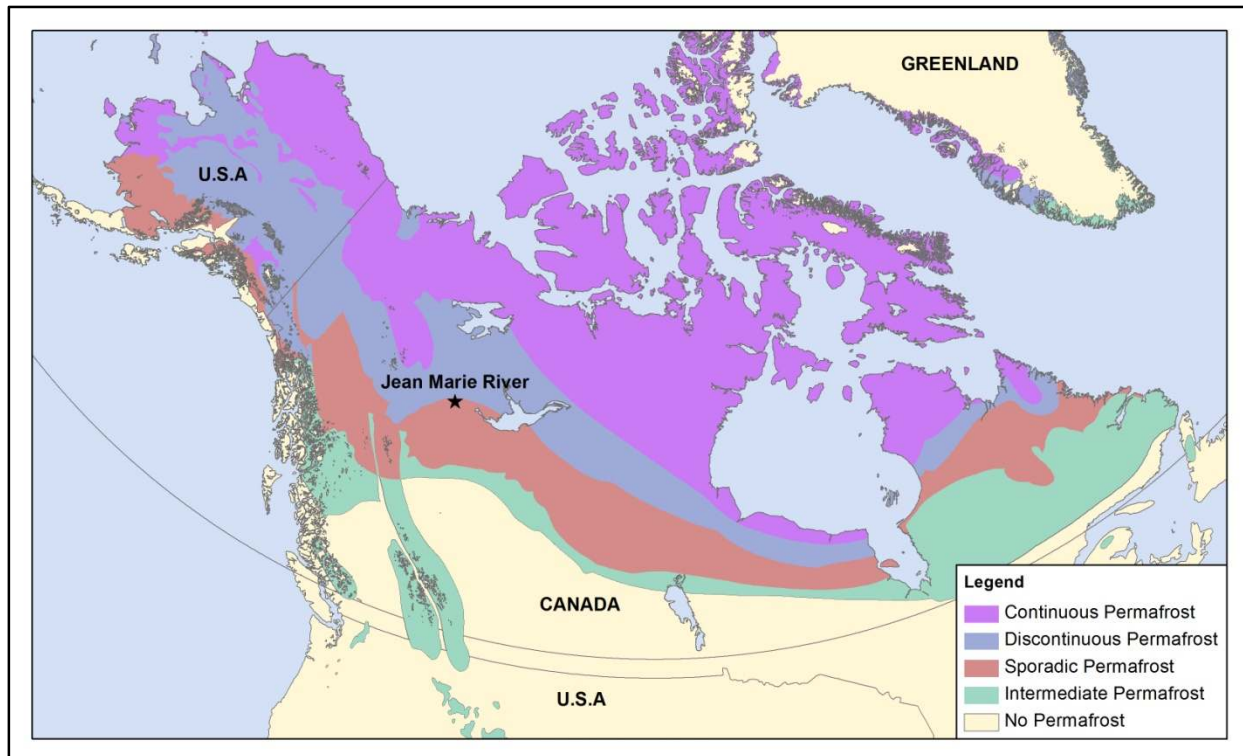


4.4. Permafrost

The area where JMR is located is approximately where sporadic and discontinuous permafrost zones meet. Most members of our community do not know exactly where every permafrost zone is located, including within or in close proximity to JMR. However, there are geographic features, such as permafrost heaves that are quite large and are home to a number of different animal species, particularly smaller furbearers. These permafrost heaves are important places for hunting, trapping, camping, and as landmarks for those familiar with the area.

Map 2: Permafrost Areas in Canada



Data source: National Snow and Ice Data Center, 2001

With warming temperatures in the last 15-20 years there are some observable impacts to some permafrost areas. Riverbanks in these areas are especially susceptible to erosion, as this has become an increasingly common sight along rivers and creeks. Another common observation in permafrost areas is that certain species of trees (e.g. pine and tamarack) are dying and collapsing (a.k.a. drunken trees) because the permafrost that these trees are rooted in is melting and then drying up; making the soil unstable for these trees, causing them to die and collapse.

In certain areas the collapse of trees has completely blocked access to trails. Harvesters in our community have also observed dramatic changes to the landscape where permafrost heaves have melted and flattened out completely. These areas have become even swampier and the animals that depend on these permafrost heaves as part of their habitat are declining in numbers. Further, community members who rely on these permafrost heaves to harvest animals report that it can be quite disorienting when a permafrost heave disappears. Some older harvesters expressed concern that these changes may cause younger harvesters to become lost if these landmarks keep disappearing.

“... at times when we were out beaver hunting there’s a lot of permafrost heaves and there’s – you know, sometimes we sit on top of it. Some of them are about 20 feet high, and they are just like an island, there is some moss on there, there are trees, there is black spruce and there’s feeding are for caribous, and a lot of dens for martens and minks.

(One of these permafrost heaves)... flattened out, and there is a – the only thing that’s sticking out of there is a big birch. You get big birch, they’re the only ones you see, half of the way out... so the landscape has changed quite a bit.” (*Ernest Hardisty, September 2010; parenthesis added*).

“There are many changes that have occurred. People are talking about climate change. They are right – there are changes that are occurring, which is causing differences in the landscape. When I was young I used to go with my father on his trap line. What we call frost heaves, which are usually big and round. He had trapped among these heaves. During those days there were no martens in the area, but there were lots of mink and their habitat were among the heaves. To this day my older brother Douglas and I are still using the trail. Birch trees used to grow on these heaves and now the frost heaves are no longer there, all you can see are the tips of the birch trees in the water. There were many of these frost heaves and now the land in that area is almost smooth.” (*Billy Norwegian, September 2010; translated by Margaret Ireland*).

Although not mentioned by many of the interviewees, there is also the question of how much contaminants are being released into lakes and rivers when permafrost melts. It is well documented that melting permafrost can leach contaminants, such as heavy metals into groundwater, lakes, and rivers; which then becomes more concentrated as it passes up the food chain (Furgal and Prowse, 2008:80,98; Berner et al., 2005; 891; Wrona et al., 2005:379,430). Moreover, many interviewees mentioned that they were told by scientists to eat only a limited amount of certain fish species per week from certain lakes fished frequently by members of our community because of the increase mercury levels being found in these lakes. Scientists told our community that the increased mercury levels are happening naturally, but no explanation was provided by the scientists of what this natural process is, how it works, and why it is happening.

Table 3: Climate Change Observations and Impacts Associated with Permafrost

Theme	Observations	Impacts	Relation to Health	Vulnerability Ranking	Magnitude	Duration	Ability to Adjust
Permafrost	<ul style="list-style-type: none"> Ground is softer all year round 	<ul style="list-style-type: none"> Hinders travelling over the land on foot, ATV, and snowmobiles Increased risk of heavy metals leaching into groundwater and into lakes and rivers (e.g. mercury) 	<ul style="list-style-type: none"> Reduced availability of country foods in the community resulting in more dependence on store bought foods 	Medium	Medium	Intermediate	Easy
			<ul style="list-style-type: none"> Increased risk of exposure to contaminants indirectly through eating certain country foods (e.g. fish and moose organs) 	High	Strong	Intermediate	Moderate
	<ul style="list-style-type: none"> Permafrost heaves flattening out More erosion of riverbanks More dead and dying trees because soil has become unstable (e.g. drunken trees) 	<ul style="list-style-type: none"> Dramatic changes to landscape/terrain Some traditional travel routes have become blocked or otherwise inaccessible and landmarks are disappearing (e.g. old mail trail to Fort Simpson) Reduced access to country foods and culturally important areas 	<ul style="list-style-type: none"> Erosion of traditional knowledge about the local areas that have changed 	High	Medium	Intermediate	Moderate
			<ul style="list-style-type: none"> Increased risk of becoming disoriented and lost when out on the land. 	High	Medium	Short	Easy
			<ul style="list-style-type: none"> Reduced availability of country foods in the community resulting in more dependence on store bought foods 	Medium	Weak	Intermediate	Medium
			<ul style="list-style-type: none"> Road closures in spring block access to the nearest medical facilities and grocery store in Fort Simpson 	High	Strong	Short	Moderate
	<ul style="list-style-type: none"> High water table in the ground spring; however, water is quickly absorbed into the ground 	<ul style="list-style-type: none"> Flooding along roadsides during spring run-off More frequent road maintenance and possible road closures and community air strip 	<ul style="list-style-type: none"> Expenditure of community resources to maintain roads 	High	Medium	Intermediate	Moderate