

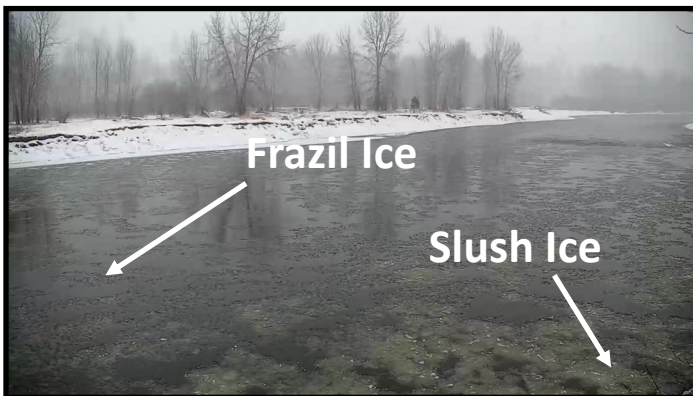
## When the River Freezes

Lake and river ice formation is a complex process that depends on two factors: temperature and turbulence. River turbulence is influenced by the speed and depth of the water, the size and shape of the materials on the bottom and sides of the channel, and surface wind.

One of the best descriptions of the many types of ice and how each is formed is available online at the University of Minnesota's Sea Grant Program (<https://seagrants.umn.edu/>)



The river begins freezing with **Frazil Ice**, that floats on the surface, and **Border Ice** that clings to the shore.



**Frazil Ice** then clumps together to form **Slush Ice** (sometimes called Sludge Ice).



As temperatures drop, the Slush Ice gets thicker and freezes together to cover the entire river in **Sheet Ice**.



# Some Wildlife Cope Well with Frozen Rivers

Wildlife in Montana have evolved to cope with harsh winters. However, climate change is creating new challenges by disrupting normal migration patterns. Warmer, ice -free winters have lured some birds into foregoing their winter migration. When prolonged cold snaps come, and ice forms on all of the lakes and rivers, they become very vulnerable and may not survive.



Mammals can easily cross the river on Sheet Ice.



Waterfowl huddle on beaches where the shoreline has obstacles that break up the Sheet Ice.



Kingfishers that remain in Montana for the winter are entirely dependent on ice-free water for fishing. Long cold snaps that freeze their fishing grounds lessen their odds of surviving.