



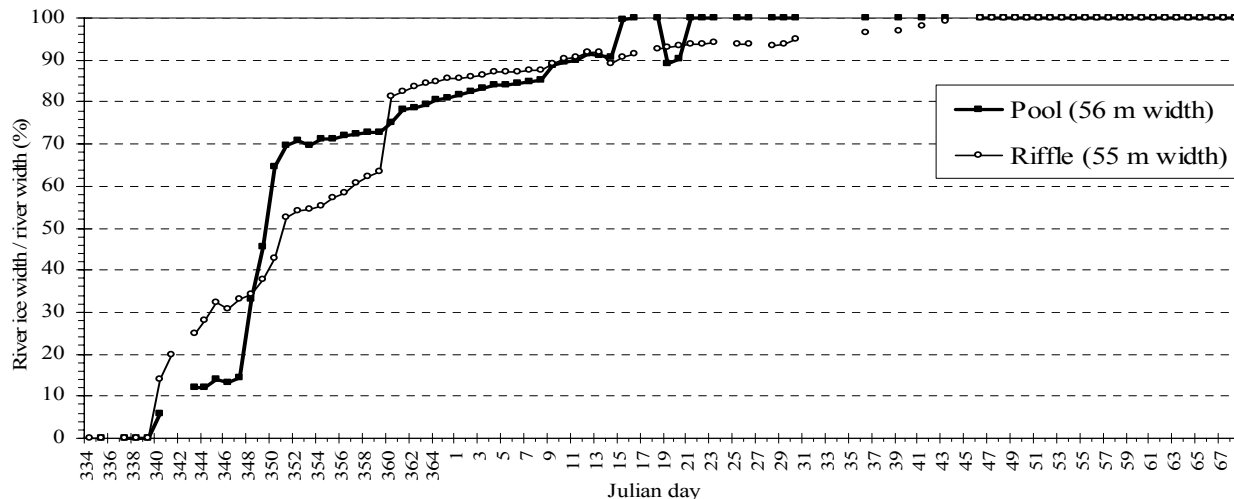
Analysis of the daily growth of an ice cover in a riffle and pool river reach, Rimouski, Québec, Canada.

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Abstract :

In cold regions, the appearance and growth of river ice is determined by a complex set of interactions between the hydroclimatic conditions of the environment and the hydraulic and morphological characteristics of the channel. In rivers where riffles and pools are present, these interactions may potentially have a strong influence on the spatio-temporal growth of the ice cover. However, few data documenting these complex interactions on a daily basis are available. This study aims at analysing on a daily basis the formation and growth of river ice in a riffle and pool sequence. The study was carried out on the Rimouski river (Québec) in a 53-60 m average wide by 600 m long river reach with well developed riffles and pools. From the 30/11/2005 to the 9/03/2006 (100 days), digital photos were taken on a daily basis at 8 locations along the river reach. These shore-based pictures were taken perpendicularly to the river and from the exact same positions.



Air and water temperatures were measured. Water discharge and precipitation data were obtained from a nearby hydrometric station. The time series of numerical images allowed the

computation of daily ice cover growth rates. The ice cover appeared simultaneously in riffles and pools, but the formation process differed strongly within the two units (Figure 1).

In pools, the ice cover was formed by the extension of lateral ice from the side to the center of the channel. In riffles, ice formation was dominated by the presence of protruding boulders on which anchor ice developed and expanded to cover the whole river width. The growth rate time series are also discussed in relation to those of degree-days, precipitation, discharge and frazil ice formation periods. We conclude that morphological characteristics of the channel are important to consider in order to determine the spatial distribution of river ice type during formation. As the ice cover grows, the relative importance of channel morphology diminishes.