

Assessment of Environmental Radioactivity in Natural Food Products from Northern Norway



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1. Introduction

The issue of environmental radioactivity is of special concern to the Arctic region due to numerous existing and potential sources of radioactive pollution in the immediate and adjacent areas.

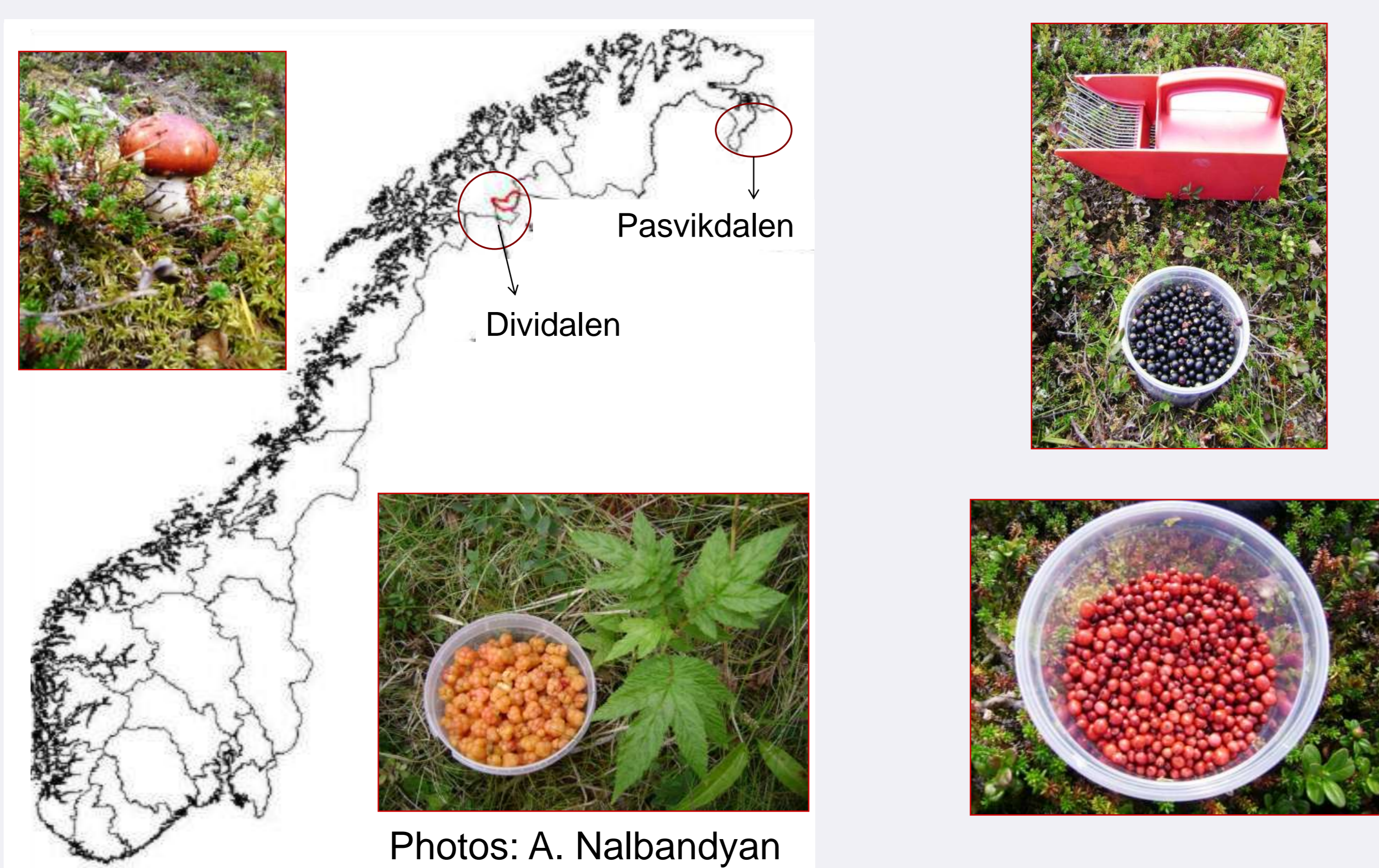
Sub-Arctic and Arctic food chains can be short, providing a potentially quick uptake route for radionuclides to biota and man. Thus, it is important to conduct comprehensive environmental radioactivity monitoring programmes, especially in the areas widely used by population for collection of natural food products.

The goal of this research is to assess current radioactivity levels in the terrestrial environment in the Northern part of Norway, on the territory of **Dividalen National Park** and **Pasvik National Park**.

The main focus was to analyse natural products such as berries, mushrooms and freshwater water fish.

2. Background

Øvre Dividalen national park covers an area of 750 km² in the eastern part of Troms along the Swedish border. The park represents a typical northern Norwegian inland mountain landscape with steep high mountains of up to 1700 m, deep ravines, open plateaus, pine and birch forest, bogs and lakes.



Photos: A. Nalbandyan

The soil types could vary from acidic and nutrient-poor to nutrient-rich. The area can be divided into 3 zones: boreal forest, low-alpine and middle- to high-alpine. Dividalen has a rich variety of animal life with most large mammals present in Norway. It is an important habitat for Lynx.

Øvre Pasvik National Park covers an area of 119 km² in the eastern part of Finnmark. The park is located in the Pasvik Valley, carved by the Pasvik / Paatsjoki River that lays between Russia and Finland. The landscape is flat, with low forested hills interspersed with lakes and bogs. The soil is of high heterogeneity with mainly alkali and nutrient poor soil types due to post-glacier marine sediment deposits. This national park contains Norway's biggest northern old-growth forest with pines representing the north-western end of the Siberian taiga. The park is home to a wide variety of species, ranging from eastern species of birds to brown bears and elks.

3. Methods

Natural food products were collected from Dividalen in 2010 and Pasvikdalen in 2011. Samples of edible wild berries and mushrooms were collected from 14 sites in Dividalen and 7 sites in Pasvikdalen. Freshwater fish were collected from 1 location in Dividalen and 2 locations in Pasvikdalen. All samples were analysed on HPGe detectors. Activity concentrations of ¹³⁷Cs in berries and mushrooms are reported in dry weight, whereas those for fish are in fresh weight.

4. Results and conclusions

Figures 1-3 show mean (\pm SD) ¹³⁷Cs activity concentrations in berries, mushrooms and freshwater fish from Pasvikdalen and Dividalen. Values for ¹³⁷Cs in cowberry and mushroom species from Pasvikdalen are based on single measurements of pooled samples and are given with their associated uncertainty ($\pm 1\sigma$). Large variations in activity concentrations of ¹³⁷Cs exist between species and sampling areas. In the berries from species collected in both Pasvikdalen and Dividalen activity concentrations of ¹³⁷Cs were higher in the Pasvikdalen area.

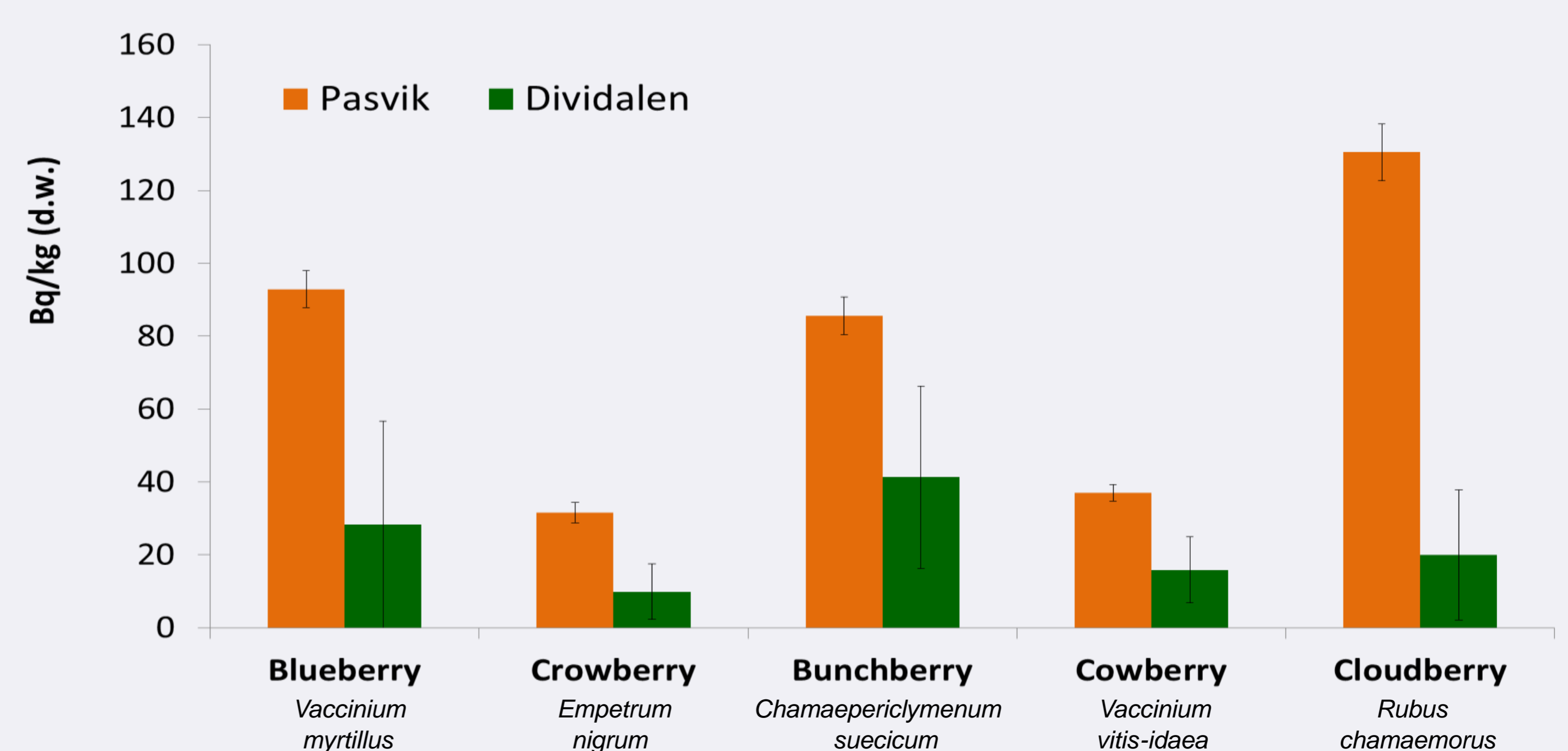


Fig. 1. ¹³⁷Cs in berries from Pasvikdalen and Dividalen.

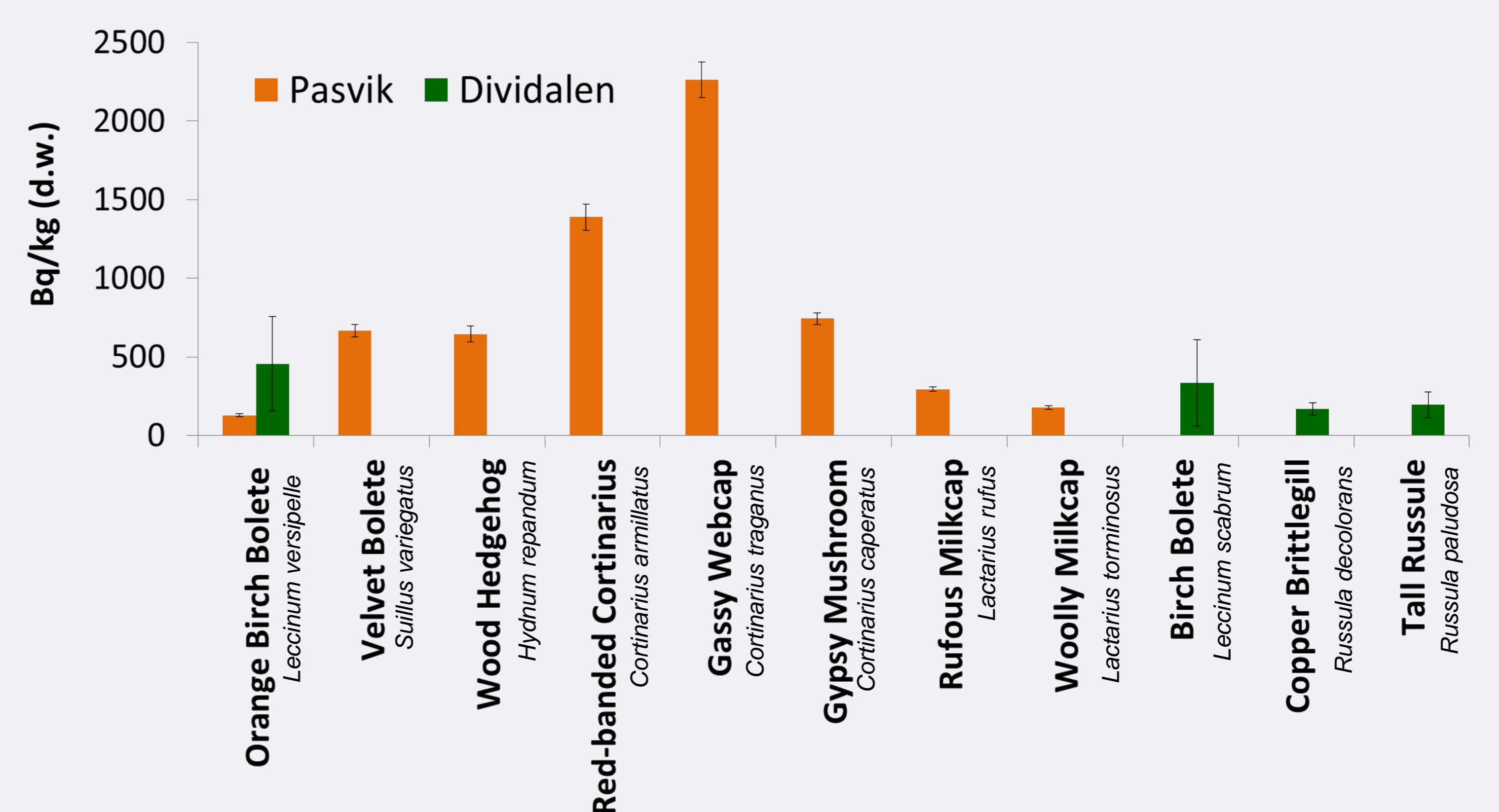


Fig. 2. ¹³⁷Cs in mushrooms from Pasvikdalen and Dividalen.

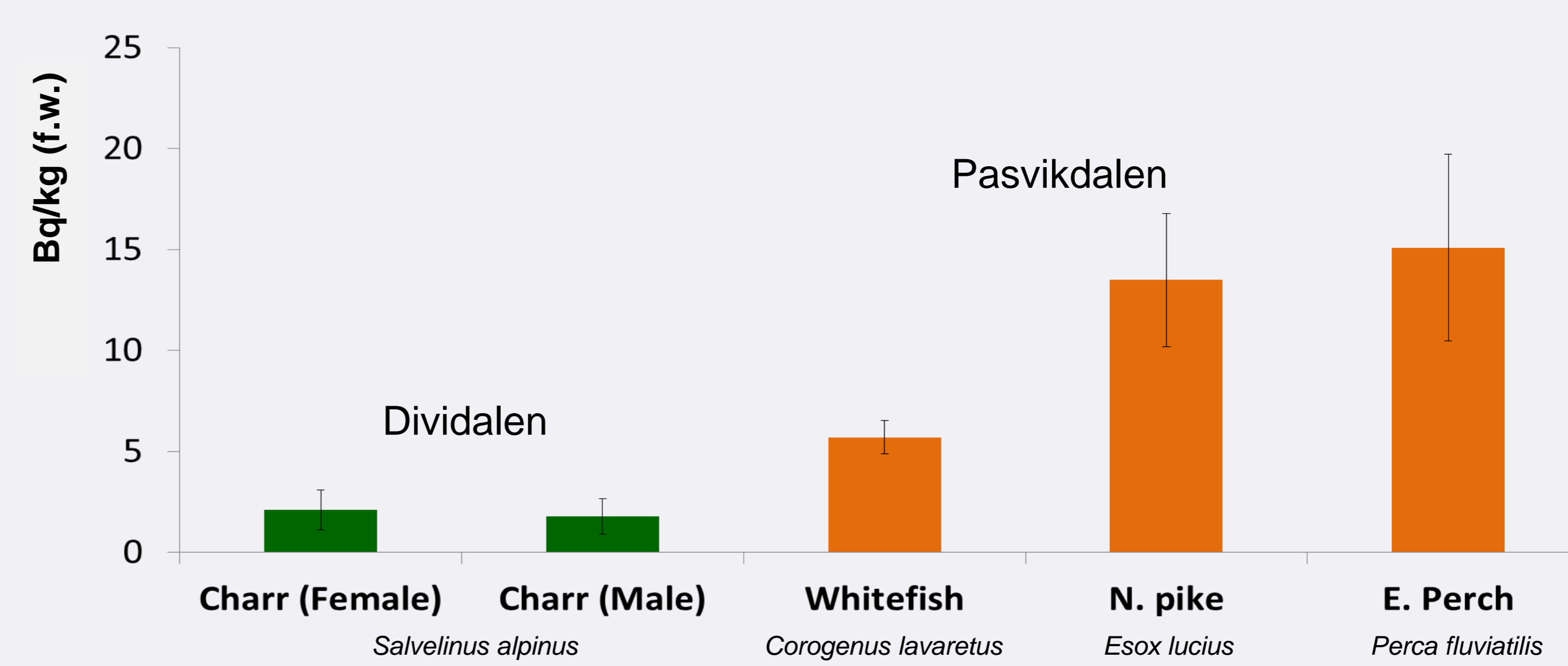


Fig. 3. ¹³⁷Cs in freshwater fish from Dividalen and Pasvikdalen.

Deposition levels of ¹³⁷Cs would be expected to be comparable between the 2 areas. A similar trend is shown for activity concentrations of ¹³⁷Cs in mushrooms, though this is probably a reflection of species specific differences, as is likely to be the case for the situation regarding activity concentrations of ¹³⁷Cs in freshwater fish from the 2 areas. Activity concentrations of ¹³⁷Cs in all berries were below the national limit of 600 Bq/kg set for commercial retail. Although some dry weight activity concentrations of ¹³⁷Cs in mushrooms were over this limit, their corresponding fresh weight values (d.w./f.w. ratios for mushrooms are typically around 0.1) would have been below the national limit of 600 Bq/kg. Activity concentrations of ¹³⁷Cs in all freshwater fish were well below the national limit of 3000 Bq/kg set for commercial retail.

5. Acknowledgment

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