

## **Remote Sensing Team: Multi-source Data Provides Good Foundation for Wetland Classification**

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### **Project Summary**

Circumboreal Canadian bogs and fens distinguished by differences in soils, hydrology, vegetation and morphological features were classified using combinations of Radarsat-2 Synthetic Aperture Radar (SAR) quad-polarization data, Landsat-8 Operational Land Imager (OLI) spectral response patterns, and airborne lidar digital elevation model (DEM) data. Separate classifications were conducted using a traditional pixel-based maximum likelihood classifier and a machine learning algorithm following an object-based image analysis (OBIA). The best classification was the object-based machine learning classification using Radarsat-2, Landsat OLI data and lidar-derived geomorphometric DEM data. A PCA-data fusion product outperformed the individual bands of the Radarsat-2 and Landsat-8 imagery. Greater than 90% producer's accuracy was obtained with a margin of error (MOE) less than 5%.

### **Management Implications and Lessons Learned**

Knowledge of wetland composition and hydrology is necessary to ensure effective management and planning. The remote sensing data used here showed that differences in wetland characteristics and different morphological types of bogs and fens can be mapped for large areas with high accuracy and well-established image analysis procedures. The best approach combined Radarsat, Landsat and DEM data so that maximum information content was available. The data fusion routine and the machine learning algorithm were straightforward and effective.

### **Publication(s)**

Franklin, S. E., E. Skeries, M. Stefanuk, and O. Ahmed. 2018. Wetland Classification using Radarsat-2 SAR Quad- polarization and Landsat-8 OLI Spectral Response Data: a Case Study in the Hudson Bay Lowlands Ecoregion. *International Journal of Remote Sensing*, 39(6): 1615-1627.

Franklin, S.E., and O. Ahmed. 2017. Object-based Wetland Characterization Using Radarsat-2 Quad-Polarimetric SAR Data, Landsat-8 OLI Imagery, and Airborne Lidar- Derived Geomorphometric Variables. *Photogrammetric Engineering and Remote Sensing*, 83(1): 33-42.