

GPS Precision and Customized Georeferenced Maps on Handheld devices: Educational Modules at Black Rock Forest

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Studies show that the use of maps in the field enhances geo-spatial awareness in students. The purpose of this project is to test the accuracy of handheld GPS receivers in complicated topography, dense vegetation cover and to investigate how customized maps on hand-held devices can increase geo-spatial learning. First the precision of GPS receivers was tested in harsh conditions within Black Rock Forest and then the location of various environmental characteristics were determined and incorporated into a geo-referenced map. Trials of coordinate readings were taken in densely covered areas of Black Rock Forest and then compiled on Cartesian plots, spatially depicting 5m, 10m, and 15m of precision from each device's average reading. The Garmin 12XL was the most precise in all seven locations. The iPhone and android devices can produce coordinate readings within $\pm 0.464\text{m}$ to $\pm 8.960\text{m}$ of precision within Black Rock Forest. Lastly, a geo-referenced map of Black Rock Forest was developed and can be viewed on mobile map viewing applications. Educational exercises for the use of these maps were sketched.