

Effective Method for Detecting Potential Woodland Vernal Pools Using High-Resolution LIDAR Data and Aerial Imagery

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Introduction

Vernal pools are important terrestrial ecosystem regulators because they provide significant nutrients and habitat for to micro-vertebrate.

Vernal pools are temporary pools or ponds of water that provide a rich ecosystem for organisms.

However, there are many challenges in locating and identifying the areal extent of vernal pools. Remote sensing offers a unique opportunity to analyze aerial imagery to aid in locating vernal pools Wu et. Al. (2014) used high resolution 1-ft CIR Imagery and Digital elevation models (DEMs) derived from light detection and ranging (Lidar) to locate vernal pools in NH. Normalized difference water Index (NDWI) creates reflection in infrared radiation that gives positive values to water features and zero values to vegetation, or negative values (mcfeeters, 1996). Normalized difference vegetation index determines if the pixel contains live vegetation (1) or not (-1) from (Townshend and justice, 1986). Therefore, the primary objective of this study is to determine if NDWI and NDVI can identify the location and areal extend of potential Vernal Pools.

Conclusions

It appears that low, negative NDWI values are likely to be indicative of potential vernal pools. These methods could be reproduced elsewhere using these values to identify other vernal pool locations. Vernal pools are temporary pools or ponds of water that provide a rich ecosystem for organisms.

Questions

Can digital imagery be used to identify the location and areal extent of potential vernal pools?

Methods

2006 1-ft CIR Imagery was clipped to the project area. Normalized Difference Water Index (NDWI) was used to delineate changes related to water content in water boundaries 2006 1-ft Imagery (eq 1).

[eq 1]

Normalized Difference Vegetation Index (NDVI) was calculated to determine if the pixel contains live vegetation (1) or not (-1) from 2006 1-ft Imagery (eq 2).

[eq 2]

Results

The NDWI values for known vernal pool locations, from the National Wetland Inventory, ranged from 0.15 - -0.75.

Data & Sources

McFeeters, S. K. (1996). The use of the Normalized Difference Water Index (NDWI) in the delineation of open water features. *International journal of remote sensing*, 17(7), 1425-1432.

Townshend, J. R., & Justice, C. O. (1986). Analysis of the dynamics of African vegetation using the normalized difference vegetation index. *International Journal of Remote Sensing*, 7(11), 1435-1445.

Wu, Q., Lane, C., & Liu, H. (2014). An effective method for detecting vernal pools using high-resolution LiDAR data and aerial imagery. *Remote Sensing*, 6(11), 11444-11467.

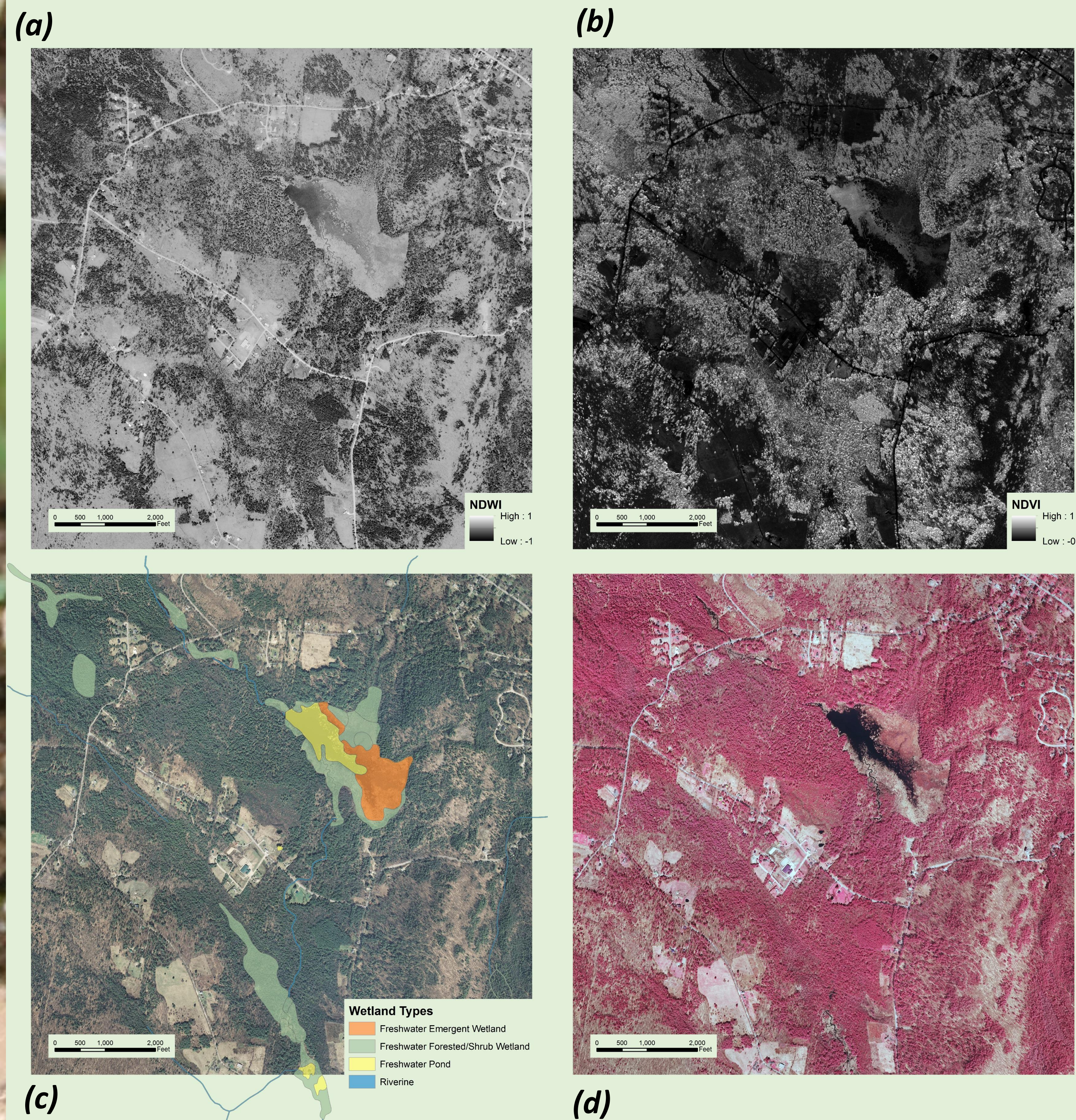


Figure 1: NDWI created from the green and NIR band (a); NDVI created from the NIR and R band (b); a natural color composite image with the National Wetlands Inventory (c); and a false-color composite image (d).