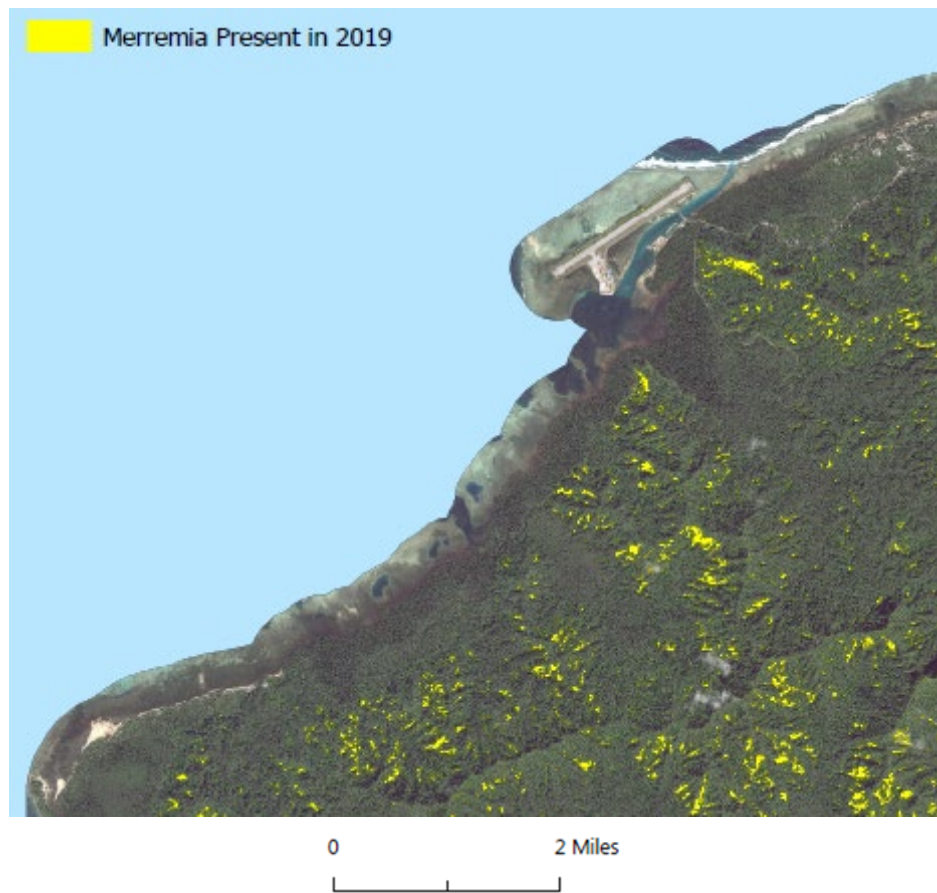


# Mapping Merremia in Kosrae

## Using a random forest classifier

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Cover image: Merremia mapped from a single 2019 WorldView scene. USDA Forest Service map by Micha Salomon.

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## Contents

Mapping Merremia in Kosrae .....	i
Summary .....	1
Methods.....	1
Results.....	1
Figure 1 .....	2
Figure 2 .....	3
References.....	4

## Summary

Merremia was mapped from a single 2019 source image using a random forest image classifier. 3,024 presence/absence samples were used to train and validate the model.

## Methods

A high resolution image was used to collect positive (Merremia) and negative (not Merremia) samples to train the model. The imagery was acquired from Maxar under the U.S. Government's EnhancedView Program

- A Natural Color (red green blue), 0.5-m resolution WorldView-2<sup>1</sup> image collected 24 Dec 2019

Samples were verified in the field where possible. 3,024 sample points were used to train and test the final iteration of the model. Of these 1149 were positive observations of Merremia, the remainder were 'absence' of Merremia collected among all land cover types. Additional field samples were taken after the first iteration of the classification model and used to improve the model output. Field samples for this study were collected from March to June 2021 (Figure1).

A convolutional neural network pixel-based classification algorithm was used to create a binary raster of merremia presence/absence. A value of 1 was assigned to the output raster where merremia was detected, and value of 0 where merremia was not detected. Google Earth Engine's implementation of the random forest image classifier<sup>2</sup> was used to classify the image using the samples collected, and a raster stack derived from the WorldView-2 image. 1000 decision trees were used as the GEE parameter. Four spectral bands and two derived Gray-Level Co-Occurrence Matrix (GLCM) rasters were the image inputs to the classifier,. A 1.9-m resolution raster stack, was used, the native resolution of orthorectified WorldView-2 image. The 6 layer (band) raster stack used includes:

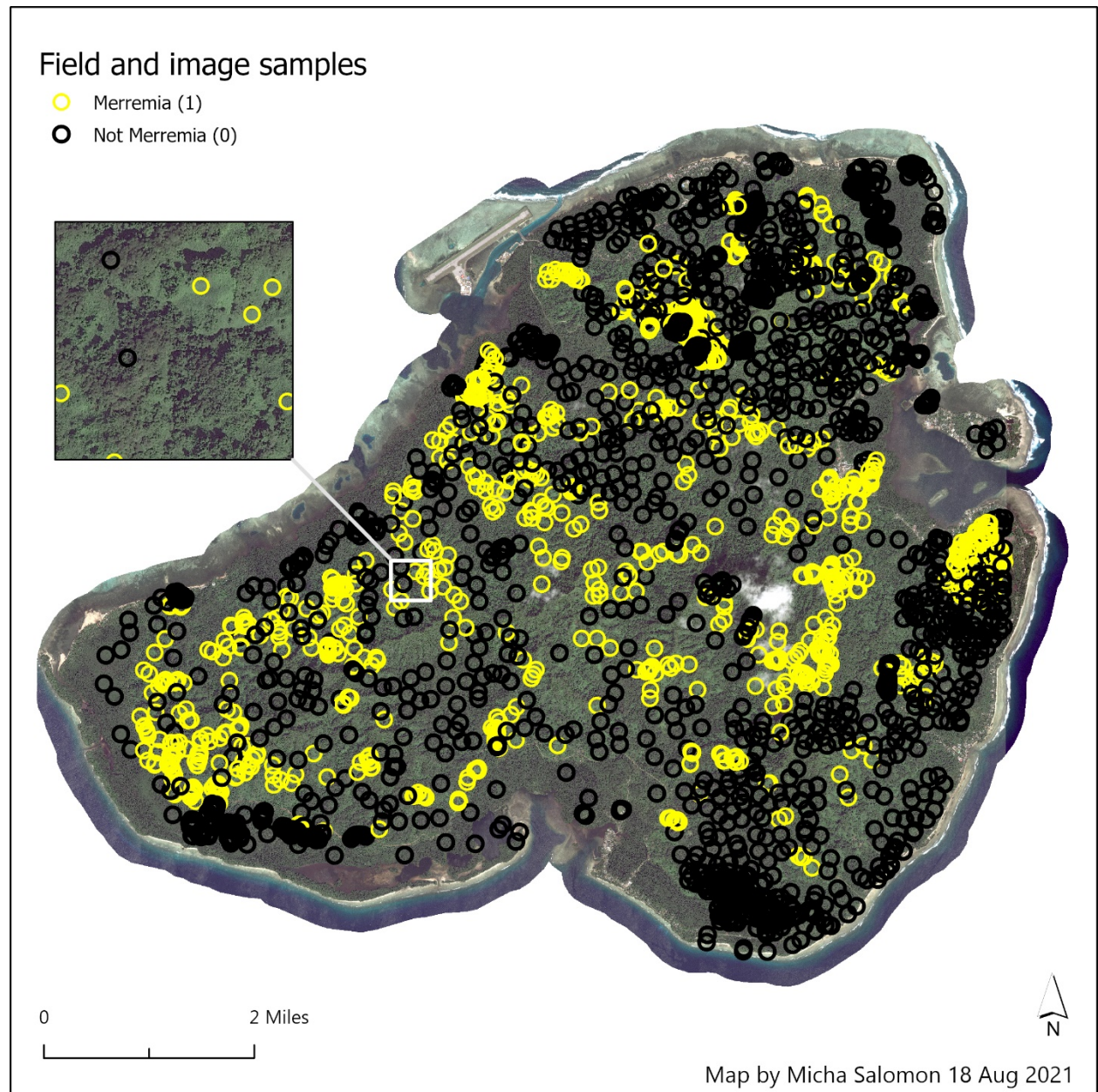
- b1: WorldView-2 green (510 – 580 nm)
- b2: WorldView-2 yellow (585 – 625 nm)
- b3: WorldView-2 red edge (705 – 745 nm)
- b4: WorldView-2 NIR1 (770 – 895 nm)
- b5: GLCM homogeneity of visible brightness. Calculated from WorldView-2 RGB bands
- b6: GLCM entropy of visible brightness. Calculated from WorldView-2 RGB bands

## Results

Model results indicate merremia was detected on a total of 1,800 acres or 2.8 square miles, or 6.6% of the total area of the island (Figure 2).

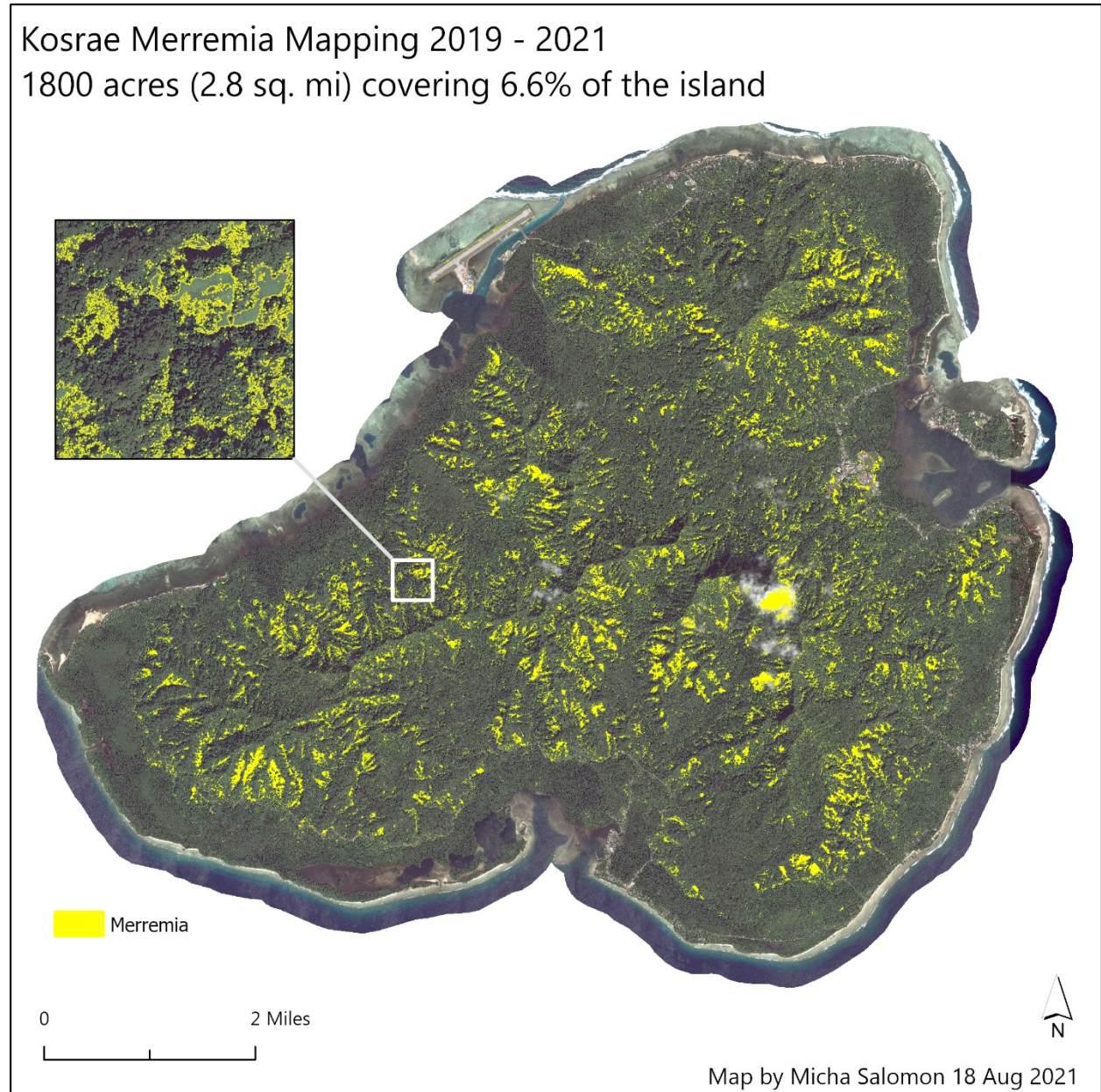
# Figure 1

## Sample Locations



## Figure 2

Merremia mapped from 2019 WorldView imagery and validation samples



## References

1. <https://www.maxar.com/constellation>
2. <https://developers.google.com/earth-engine/guides/classification>

For more information on this project, including access to scripts and data please contact [micha.salomon@usda.gov](mailto:micha.salomon@usda.gov)