Egļu mizgraužu bojājumu detektēšanas rezultāti no Sentinel-2 datiem

Spruce bark beetle damage detection by Sentinel-2 data

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ERAF projekts “**Uz tālizpēti balstīta meža riska faktoru uzraudzības sistēma** (Forest Risk)” Nr. 1.1.1.1/21/A/40
Projekta zinātniskais vadītājs Dr.sc.comp. **Ints Mednieks** (ints.mednieks@edi.lv)

NACIONĀLAIS ATTĪSTĪBAS PLĀNS 2020

EIROPAS SAVIENĪBA
Eiropas Reģionālās attīstības fonds

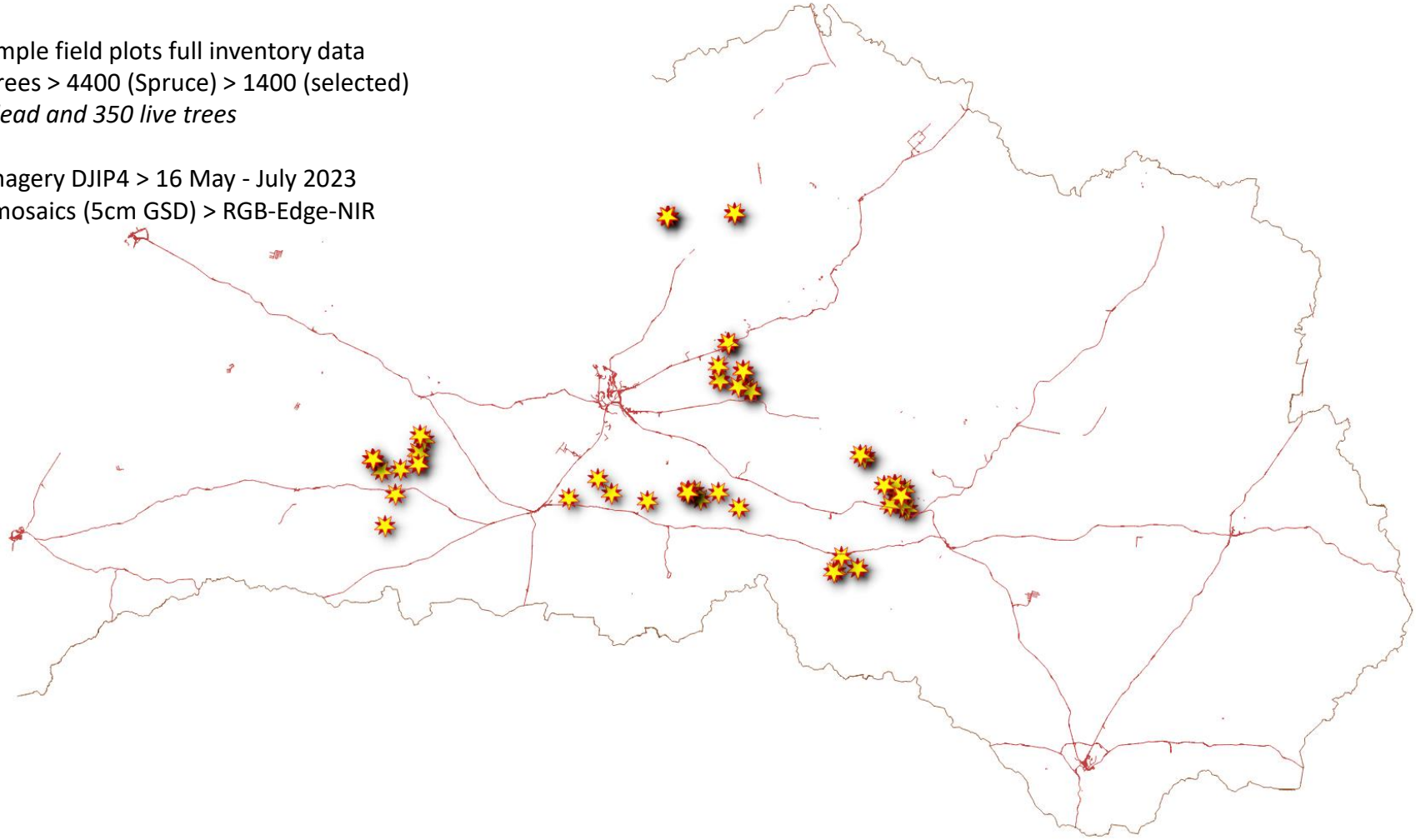
IEGULDĪJUMS TAVĀ NĀKOTNĒ

ELEKTRONIKAS UN DATORZINĀTŅU INSTITŪTS
INSTITUTE OF ELECTRONICS AND COMPUTER SCIENCE

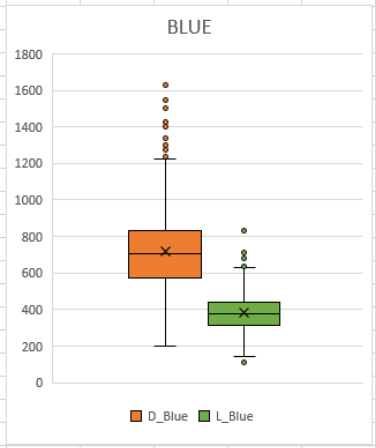
1. Reference from UAV data

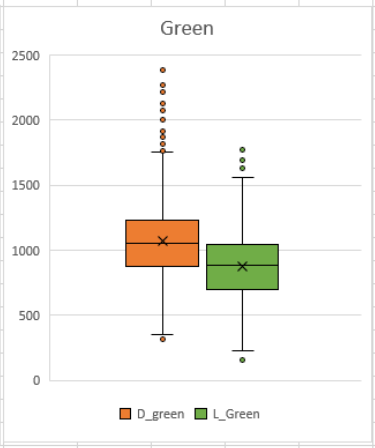
52 sample field plots full inventory data
5000 trees > 4400 (Spruce) > 1400 (selected)
1000 dead and 350 live trees

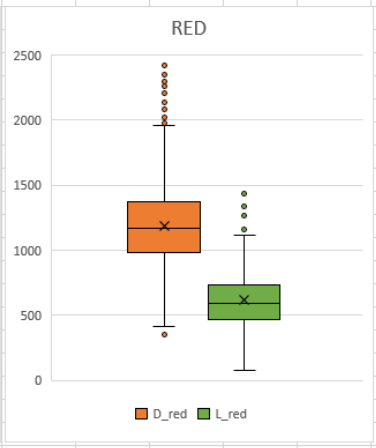
UAV imagery DJIP4 > 16 May - July 2023
Orthomosaics (5cm GSD) > RGB-Edge-NIR

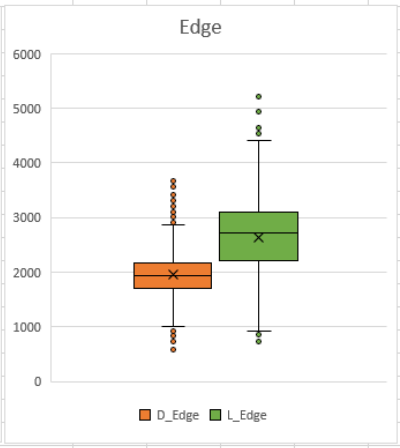


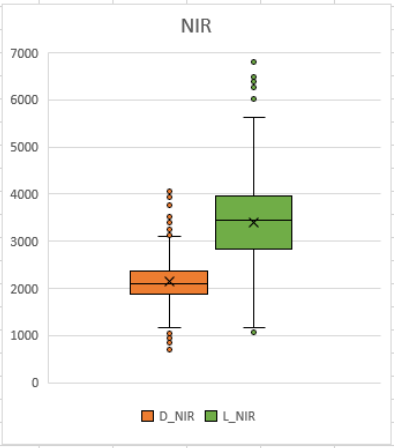
2. UAV-imagery spectral Vegetation Index (VI) thresholding







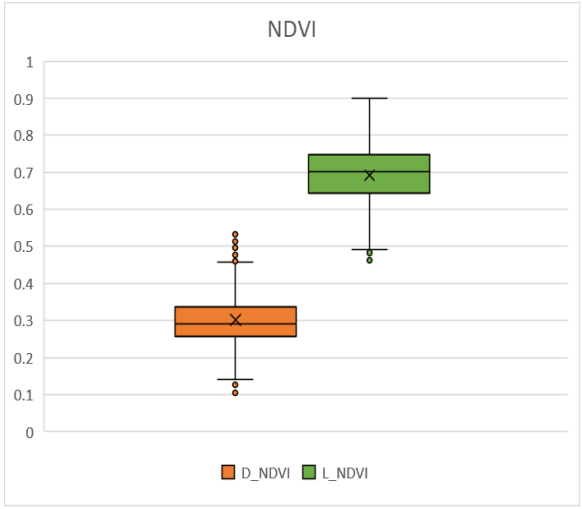


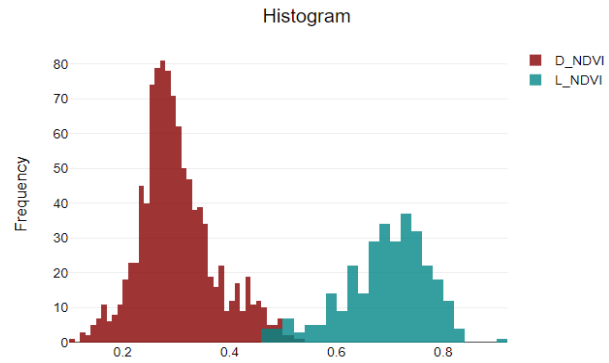


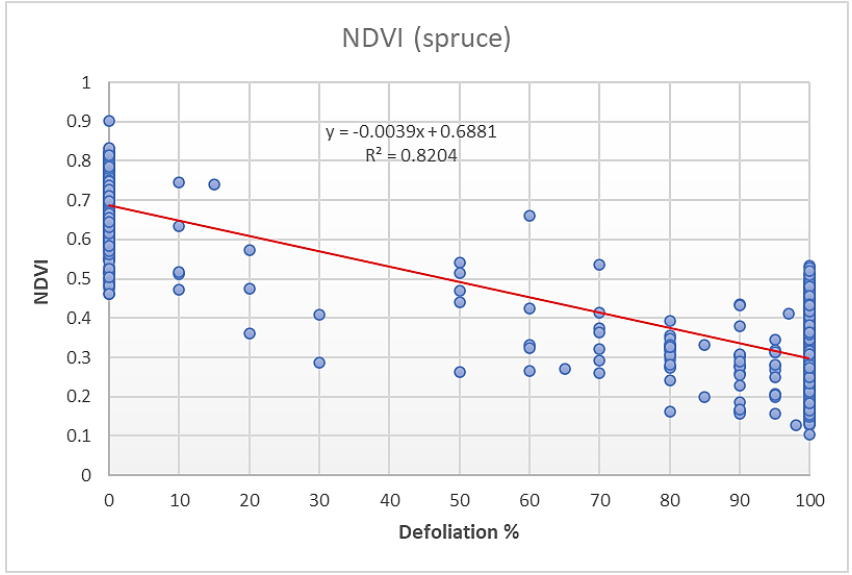
62 sample field plots across Latvia
1000 dead (90-100% defoliation)
350 live (0-10% defoliation) spruce trees

2. UAV-imagery spectral Vegetation Index (VI) thresholding

(NDVI,GNDVI,BNDVI,RB-NDVI,RVI,NGRDI,VARI,EVI…)



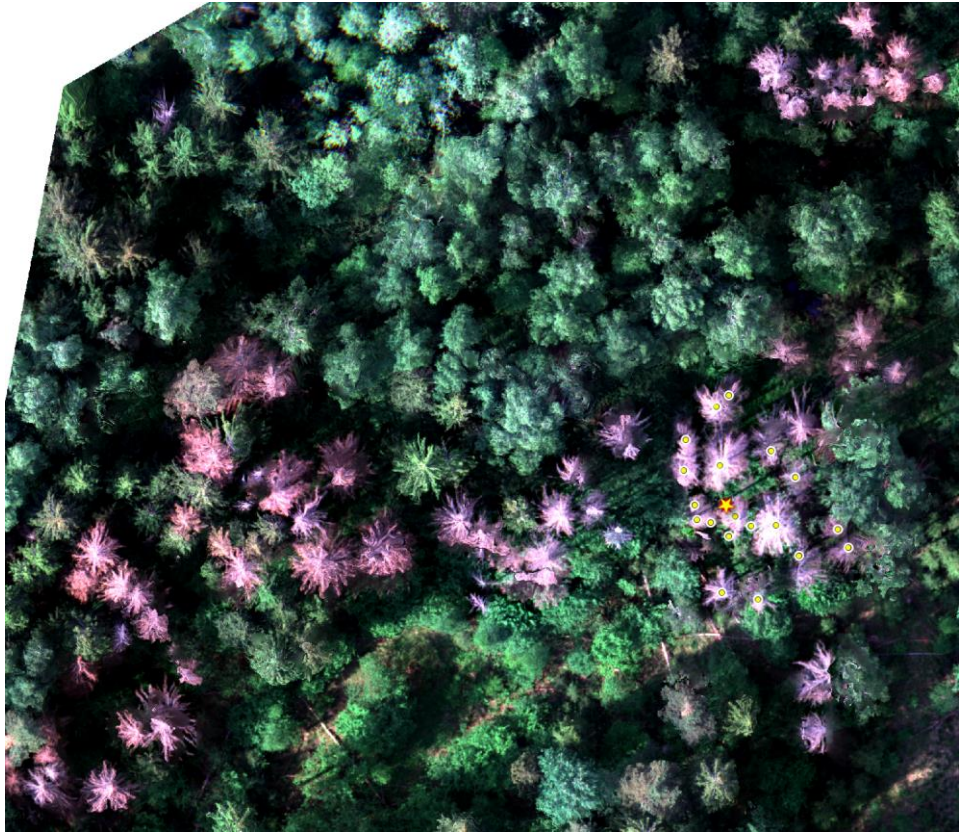


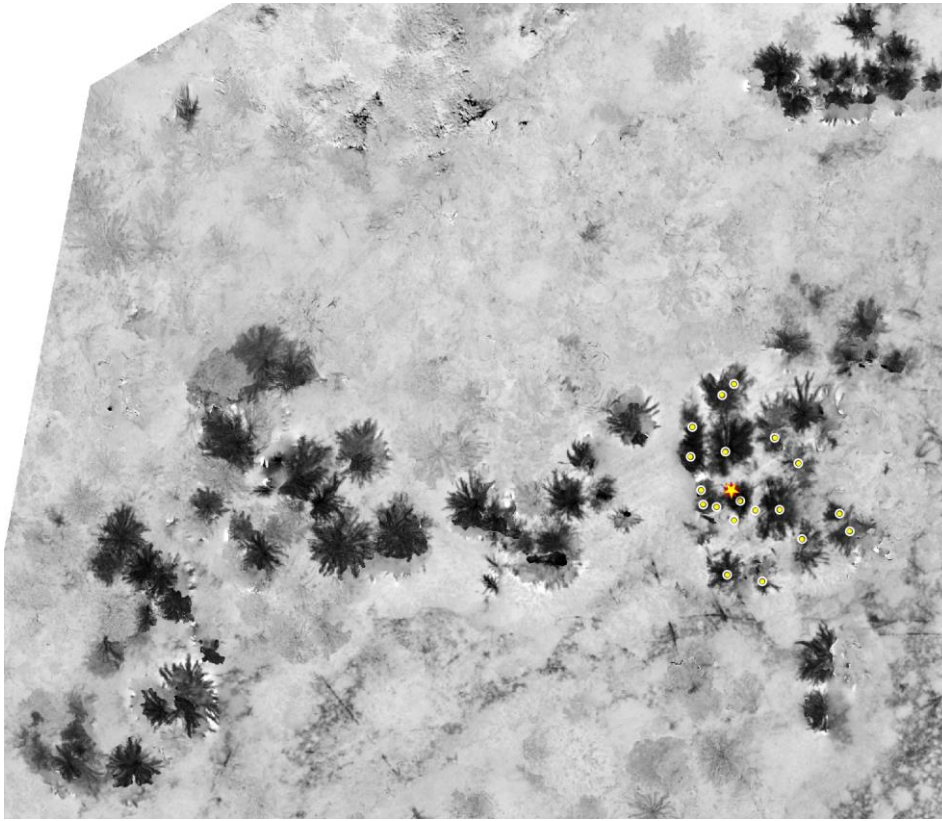


52 sample field plots across Latvia

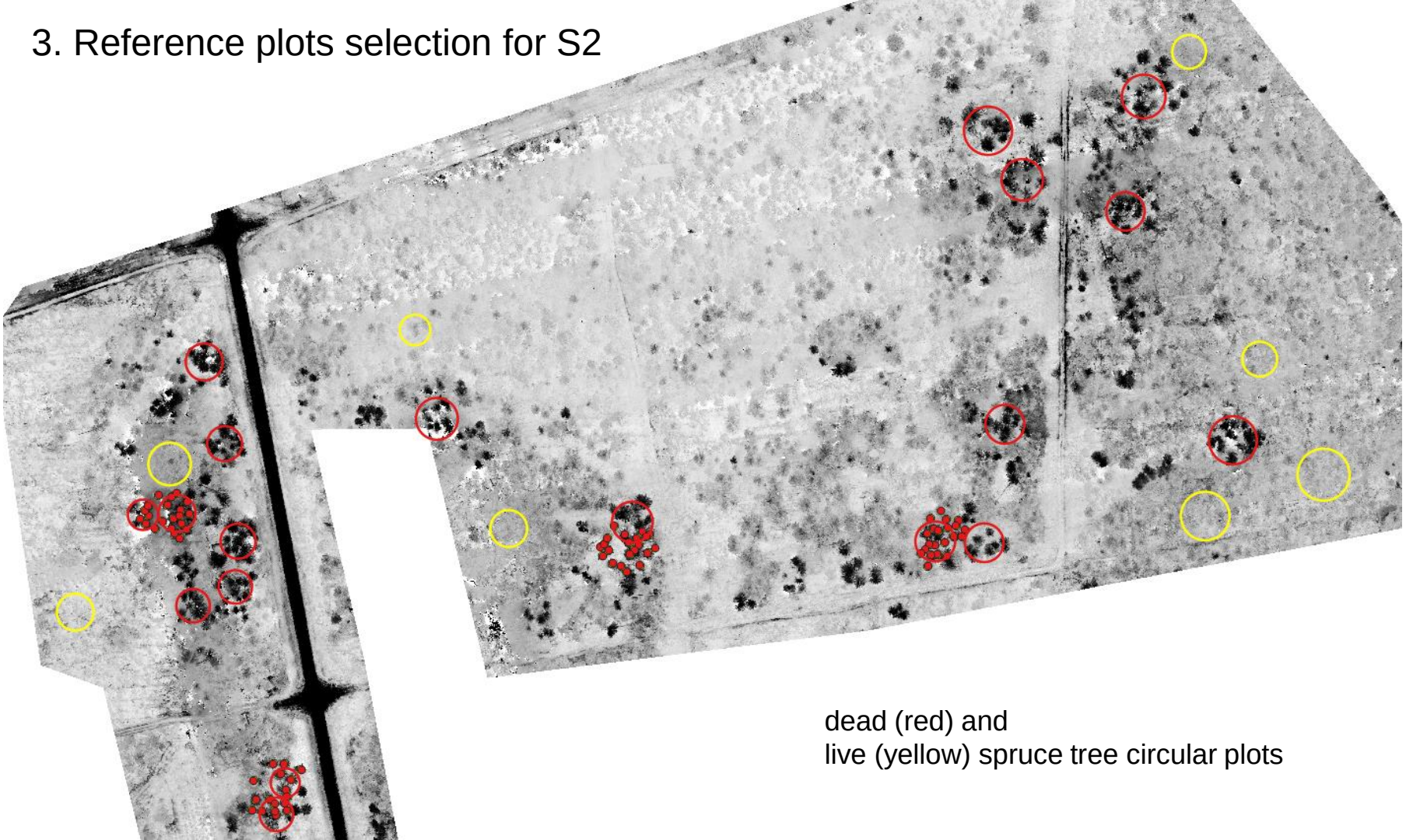
1000 dead (90-100% defoliation)

350 live (90-100% defoliation) spruce trees

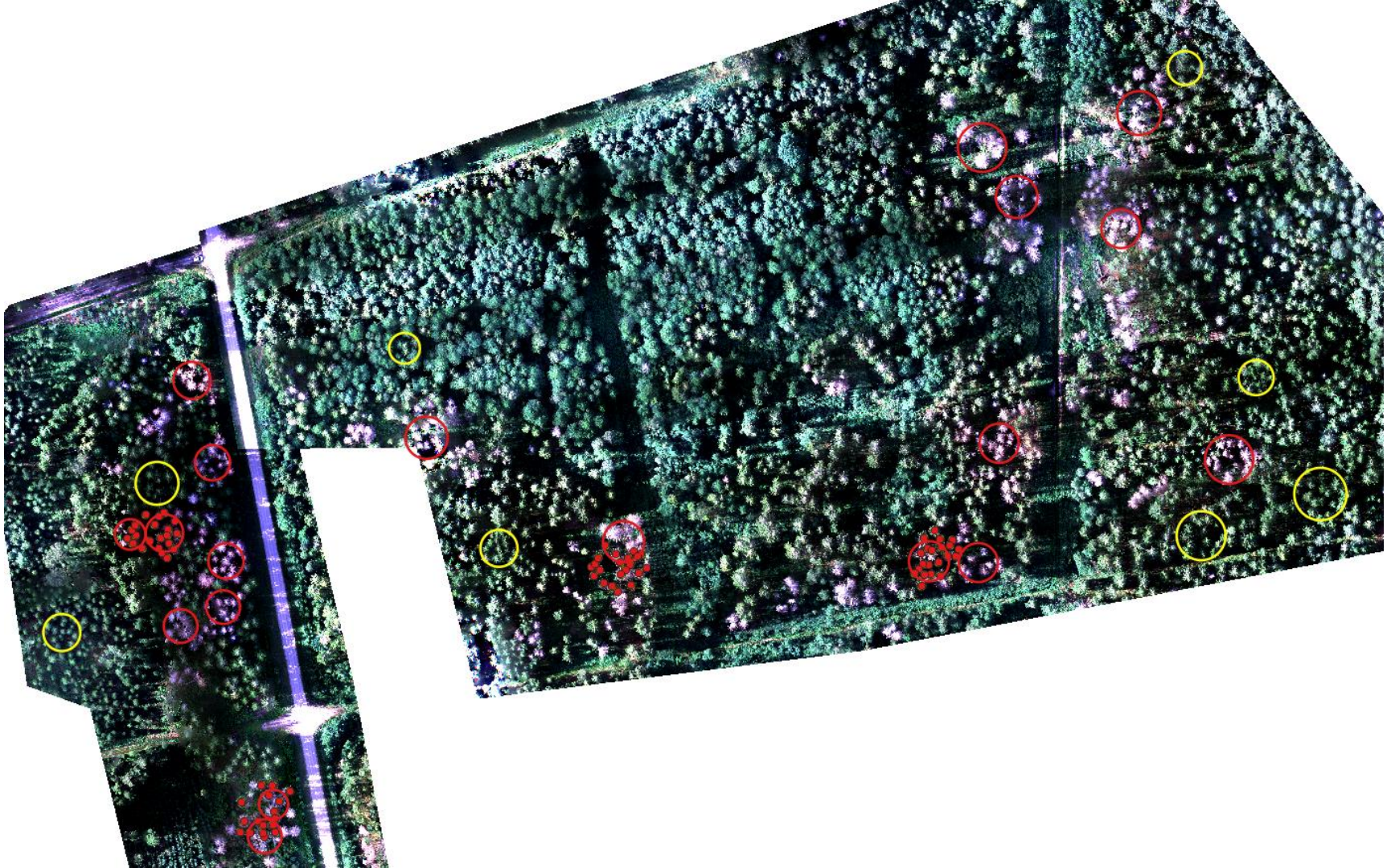




3. Reference plots selection for S2

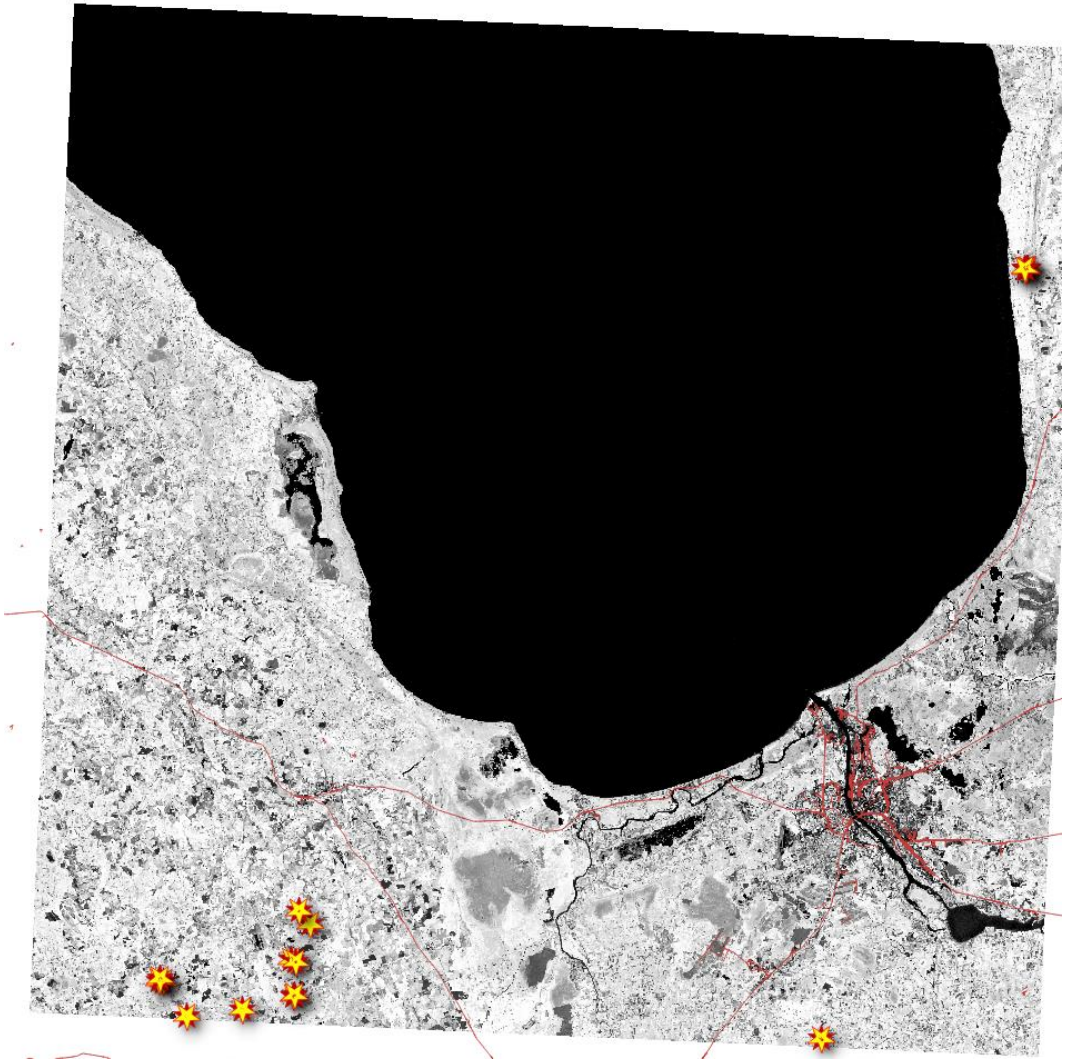


dead (red) and
live (yellow) spruce tree circular plots

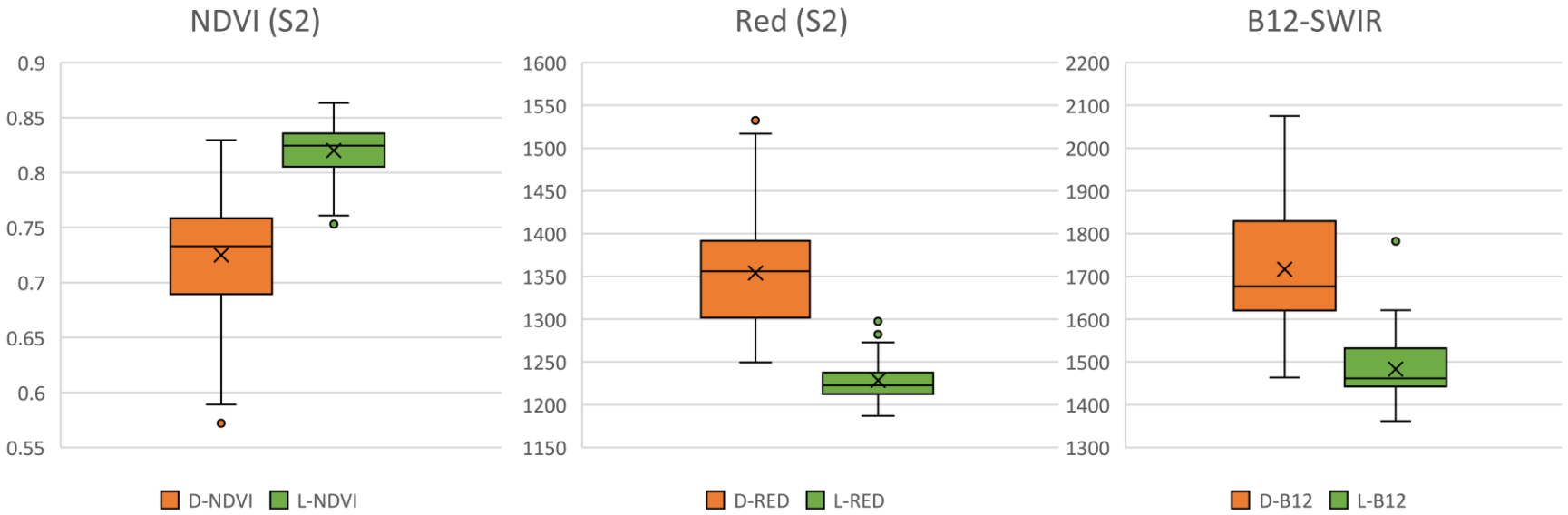


Reference plots selection for T34VFJ
08-June-23 S2-2A:

69 dead (red) and
60 live (yellow) spruce tree circular plots



4. Sentinel-2 spectral bands and VI thresholding

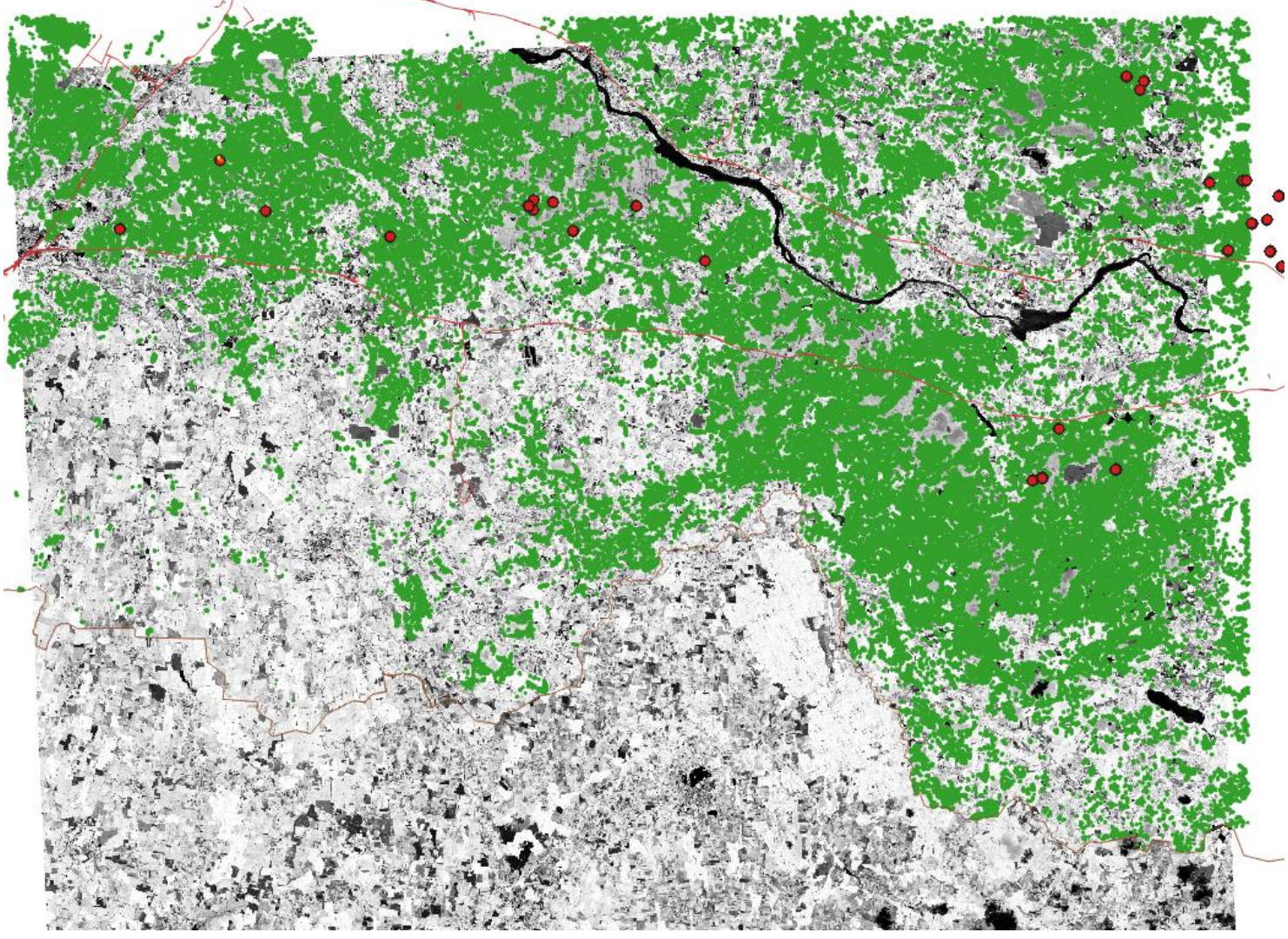


T34VFJ 08-June-23
69 dead (red) and
60 live (yellow) spruce tree circular plots

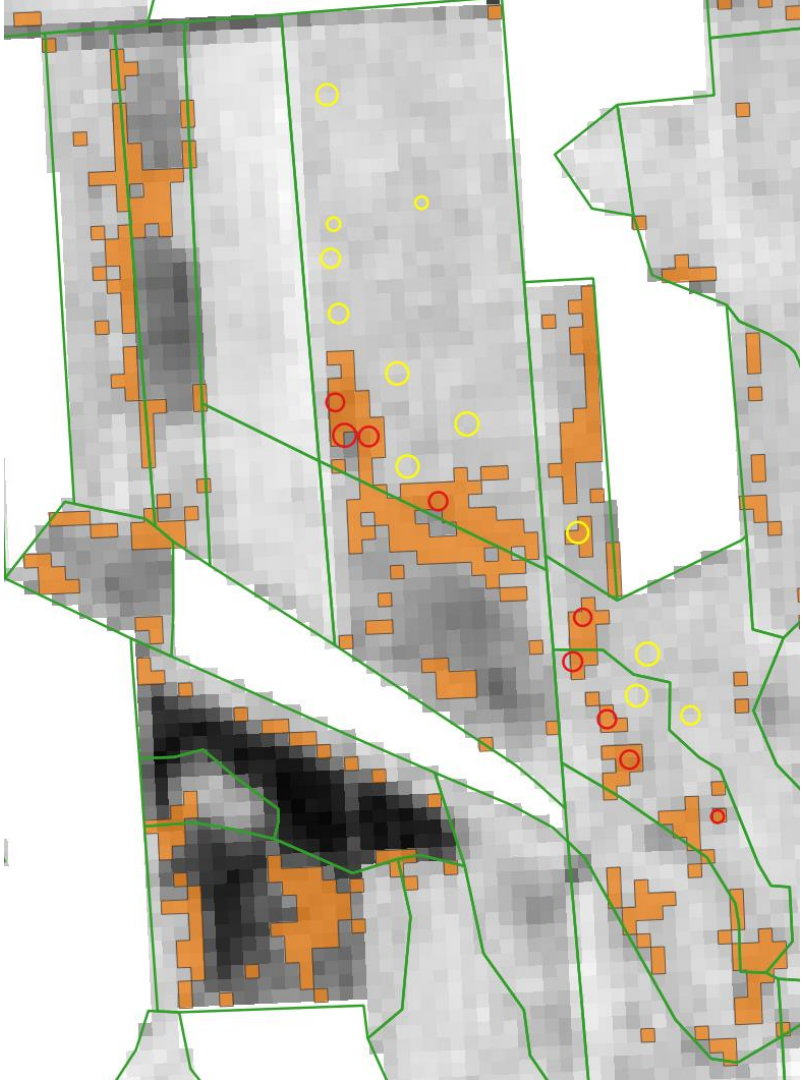
NDVI accuracy check:
08-Jun-23 T35VLC

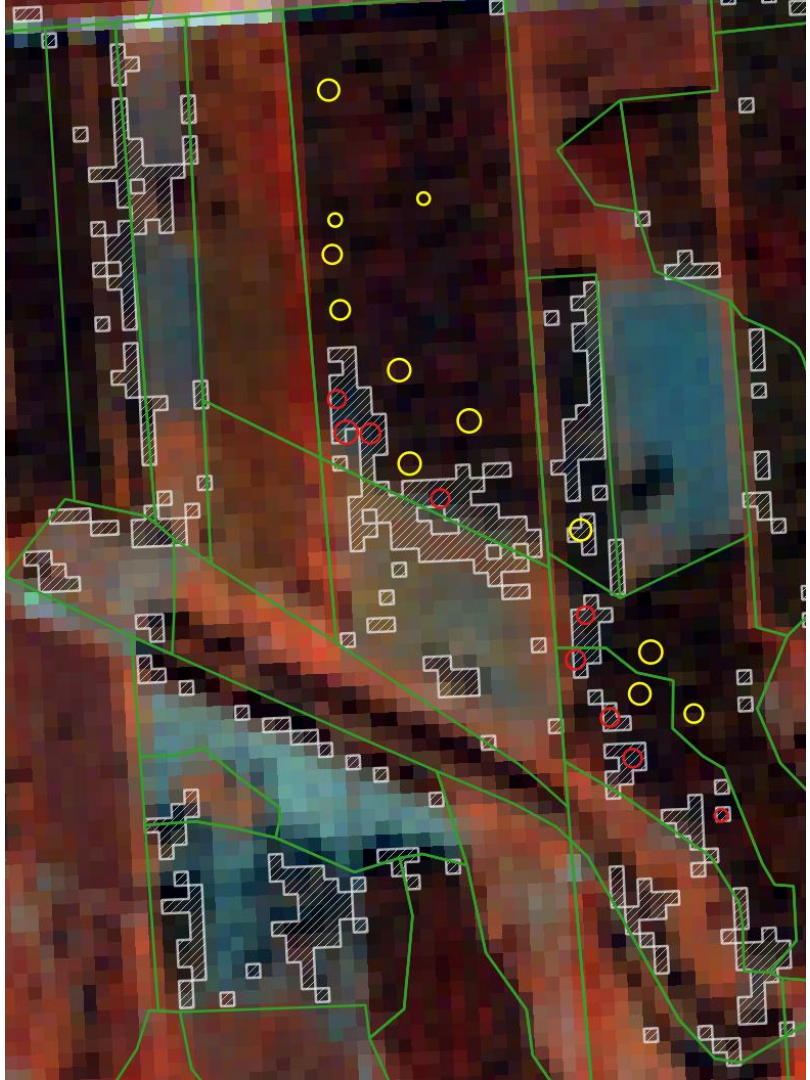
Red dots – check
UAV-NDVI-based
60 dead and
64 live spruce tree
circular plots

Green polygons >
Spruce (>20%)
1st floor forests



NDVI





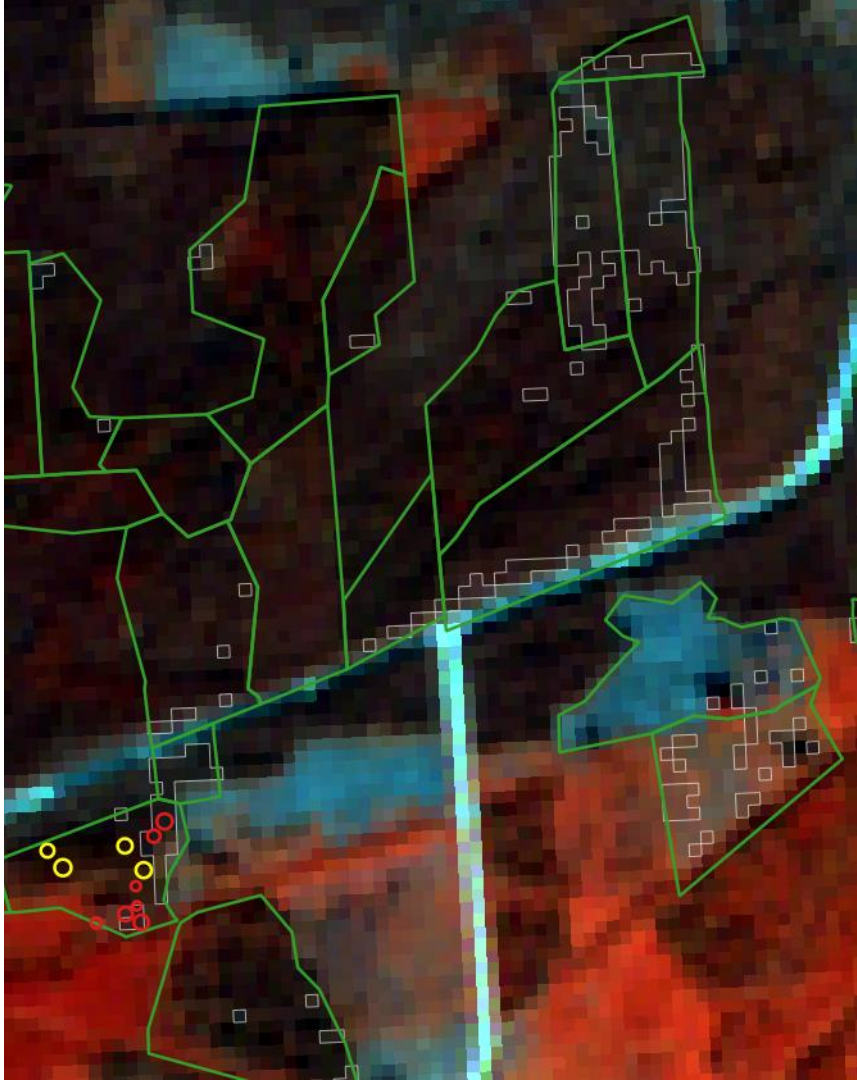
Infra
Red

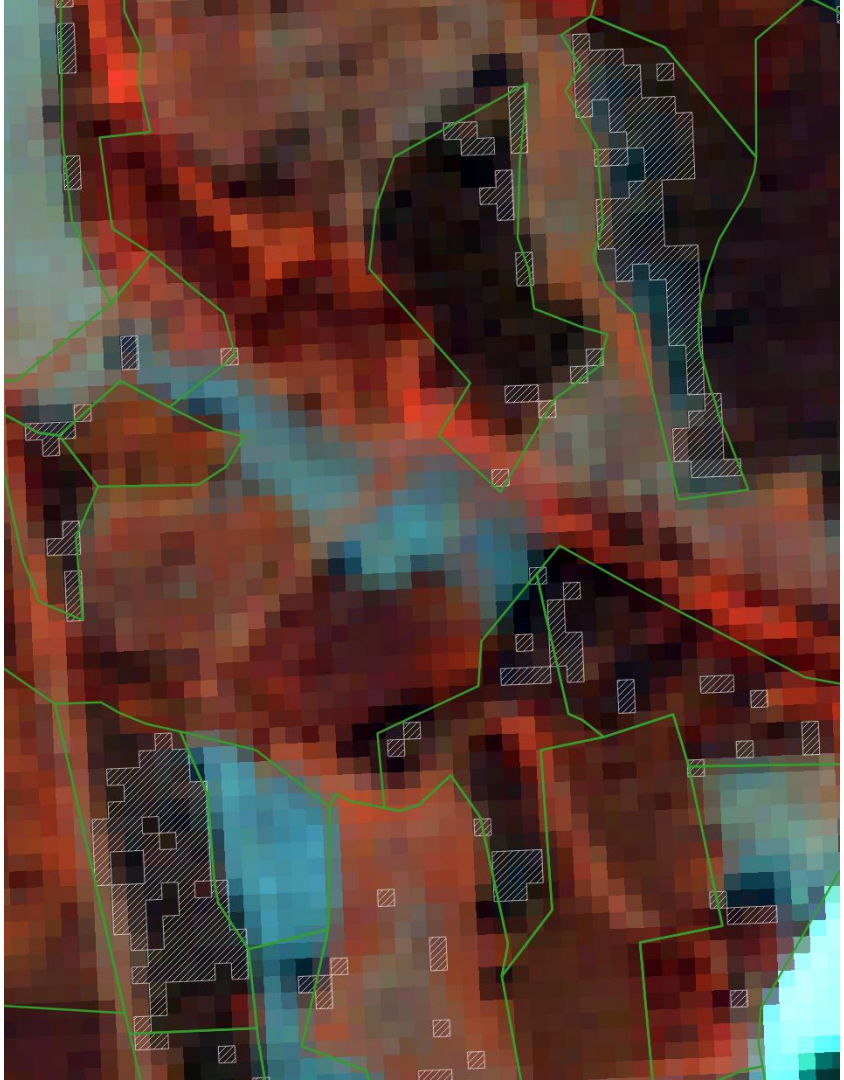
NDVI accuracy check:
08-Jun-23 T35VLC

		Dead	Live
Dead	60	52	8
Live	64	7	57

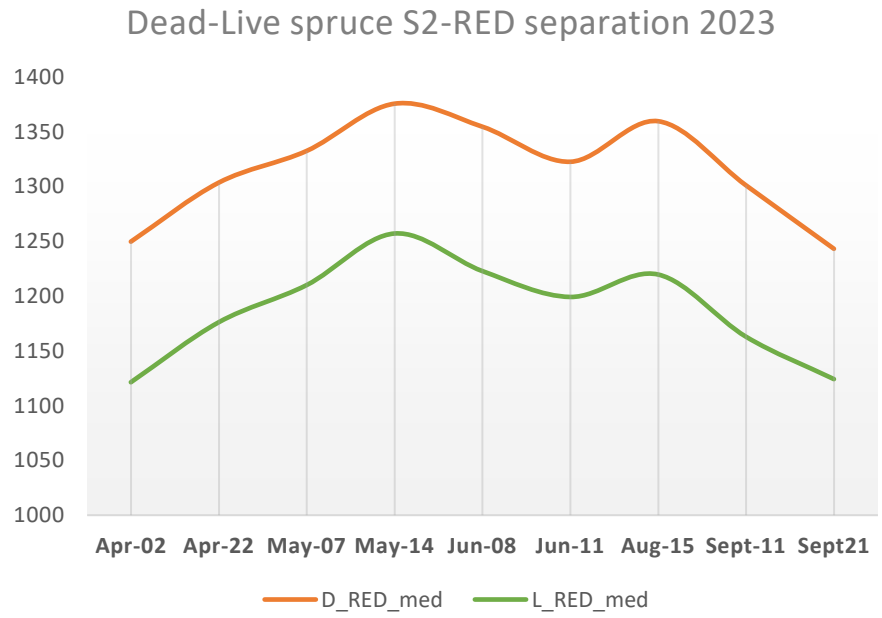
TP	FN
FP	TN

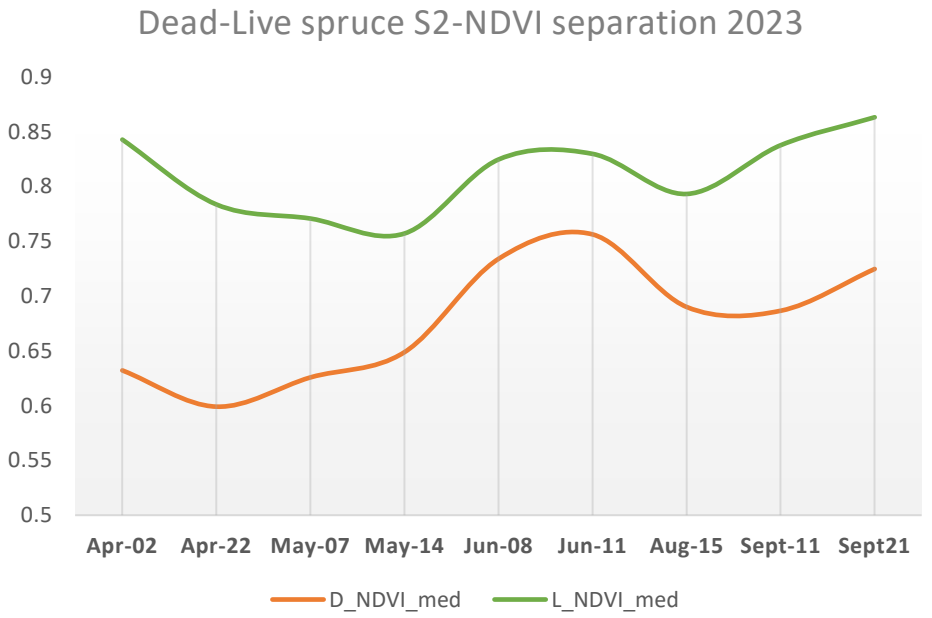
Accuracy (ACC)	0.88
Precision (PPV)	0.88
Recall (TPR)	0.87
F1	0.87





Changes along the 2023 season





Conclusions

LIMITATIONS:

1. Dead Spruce (grey-attack) detection only (?!)
2. Problems with False Positives
3. Correct clear-cutting and spruce forest polygons (masks)
4. Clarifying and updating the Spectral Vegetation Indexes (VI) thresholds along the season
5. What is the dead spruce minimal spatial area extend for S2 success?

POSITIVE:

1. NDVI best spectral VI for thresholding (UAV and Sentinel-2 imagery) with accuracy > 80%
2. Spectral VI-es (NDVI) as a source for machine learning classifiers

Paldies par uzmanību!

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