

# NEC Indicators

2019-CCRP-LS\_3 Steering Group Meeting  
15-May 2023, month 41/60



# NEC Indicators

**Pressures:** emissions of  $\text{NH}_3$ ,  $\text{NO}_x$ , VOCs, and formation of tropospheric  $\text{O}_3$

**Policy:** National Emissions Ceilings Directive; Article 9 Monitoring air pollution impacts

**Solutions:** assessment of indicators used to detect the effects of air pollution on terrestrial ecosystems

# WP1 Indicators of air pollution impact

## Milestones and deliverables

- No milestones or deliverables due in this reporting period.

Moss sampling survey completed 2022.

## Awaiting lab results, our own and NEMN

Foliar sampling survey planned for June 2023, lab work in July.

## Soil solution sampling alongside foliage.

## Paper in development

[illegible]

# WP2 PhD1, Ozone effects in ecosystems

## Milestones and deliverables

- No milestones or deliverables due in this reporting period.
- M2.3 (due m 38) Paper accepted MDPI journal “Atmosphere”, special issue “Sources and Transport of Ozone”

## DO3E model inputs ready with PODy calculation under way

[illegible]

# WP2 PhD1, Ozone effects in ecosystems

- Ozone and NO<sub>2</sub> passive samplers
- Ozone biomonitoring experiment

PODy – DO<sub>3</sub>SE model [8 stations in Ireland]

Target vegetation	Critical level (mmol m <sup>2</sup> PLA)	No. of station exceedances
Beech	5.2	8
Scots pine	9.2*	8
Wheat	1.3	3
Grass	10.2	3
Forbes	10.2	7



# WP3 PhD2, Biodiversity impacts of air pollution

## Milestones and deliverables

- No milestones or deliverables due in this reporting period.

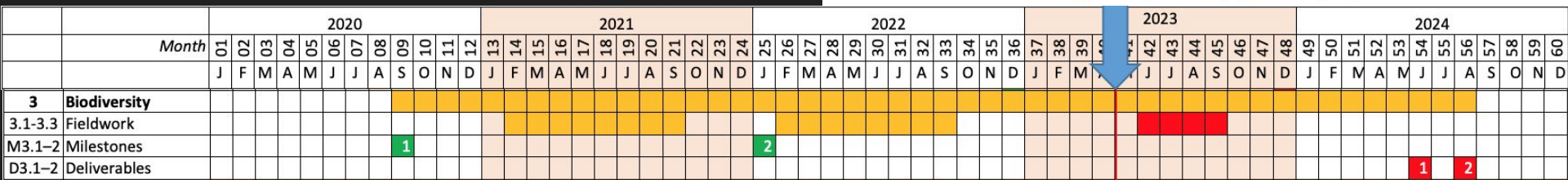
# Community change point indicators

- Presented poster at British Ecological Society conference
- Presented poster at Irish Ecological Association conference
- Progressing towards paper for publication after field work complete

## Normalised Difference Vegetation Index work in progress

[illegible]

NDVI does not seem to work as an indicator in this context



# WP4 Management

No milestones or deliverables due in this reporting period.

Project meetings continuing.

[illegible]

# WP5 Communication & Communication

<https://nemn.ucd.ie/indicators>

## Milestones and deliverables

- **D5.5** Two-page summary & infographic for EPA website (month 25)
- **M5.3** Network recommendations first draft (month 24)
- Publications (1 refereed paper, 2 posters, 1 course content)

[illegible]

## Air pollution effects on ecosystems

### Indicators



Foliar nutrient ratios  
Future surveys



Phytotoxic ozone dose above a threshold: PODy



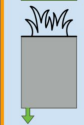
Botanical community change points



Topsoil ratio of nonacid cations to aluminium  
Future surveys



Topsoil ratio of carbon to nitrogen  
Survey underway



Indicator:  $\text{NO}_3^-$  flux in drainage  
Historic data from forests, and future surveys

A new National Ecosystems Monitoring Network (NEMN) required under the EU National Emissions reduction Commitments directive, and operated by Ireland's EPA will apply indicators of air pollution effects in natural, semi-natural, and forest/terrestrial ecosystems as well as freshwater aquatic ecosystems. This project "NEC Indicators" is reviewing and evaluating indicators.

## Air pollution effects on ecosystems

Thomas Cummins, Keelan McHugh and Lorna Marcham  
UCD School of Agriculture and Food Science

EU National Emission reduction Commitments directive



t: @NEC\_indicators

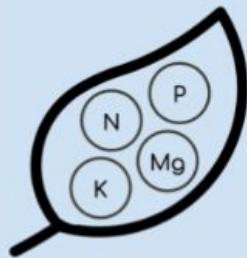


Environmental Protection Agency  
At Dublinhouse or Dún Deirge, Carlow

<https://nemn.ucd.ie/>

# Air pollution effects on ecosystems

## Indicators



Foliar nutrient  
ratios

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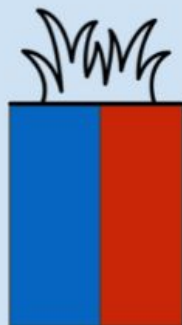
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Botanical



Botanical  
community  
change points



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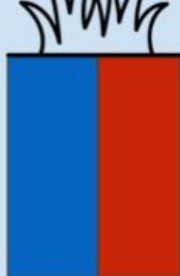
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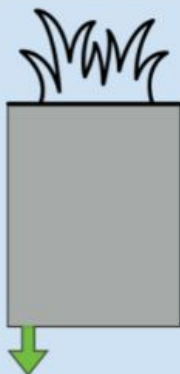
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Graphics modified from Nature.com

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UCD School of Agriculture and Food Science

EU National Emission reduction Commitments directive



Environmental Protection Agency  
*An Ghníomhaireacht um Chaomhnú Comhshaoil*

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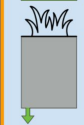
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Risks realized and Contingencies applied

# Overall and Outlook from the project team

WP1 Data and drafting active

WP2 Ozone work progressing

- Paper 1 on long-term trends published

- PODy modelling active

WP3 Landcover modelling underway

- moss & soil lab analysis in progress, initial results received

- foliar survey planned for summer 2023

WP4 Management continuing

WP5 Front-end drafts developing (data upload, metadata table)