A machine learning approach to assess the conservation status of all plants

Steven P. Bachman[1] & Malin Rivers[2]

[1]Herbarium, Royal Botanic Gardens, Kew, UK
[2]Botanic Gardens Conservation International, Richmond, UK

s.bachman@kew.org

Royal Botanic Gardens Kew


CONSERVATION
OPTIMISM

GSPC Target 2

An assessment of the conservation status of all known plant species, as far as possible, to guide conservation action

http://www.iucnredlist.org/

+ ~2,000 per year

~6% complete

https://www.bgci.org/threat_search.php

21 - 26% complete

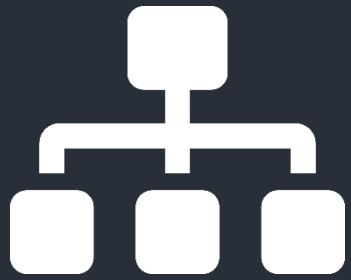
Bachman, S. P., Nic Lughadha, E. M. and Rivers, M. C. (2018), Quantifying progress toward a conservation assessment for all plants. *Conservation Biology*, 32: 516-524. doi:10.1111/cobi.13071

GBIF Global Biodiversity Information Facility

GeoCAT Geospatial Conservation Assessment Tool

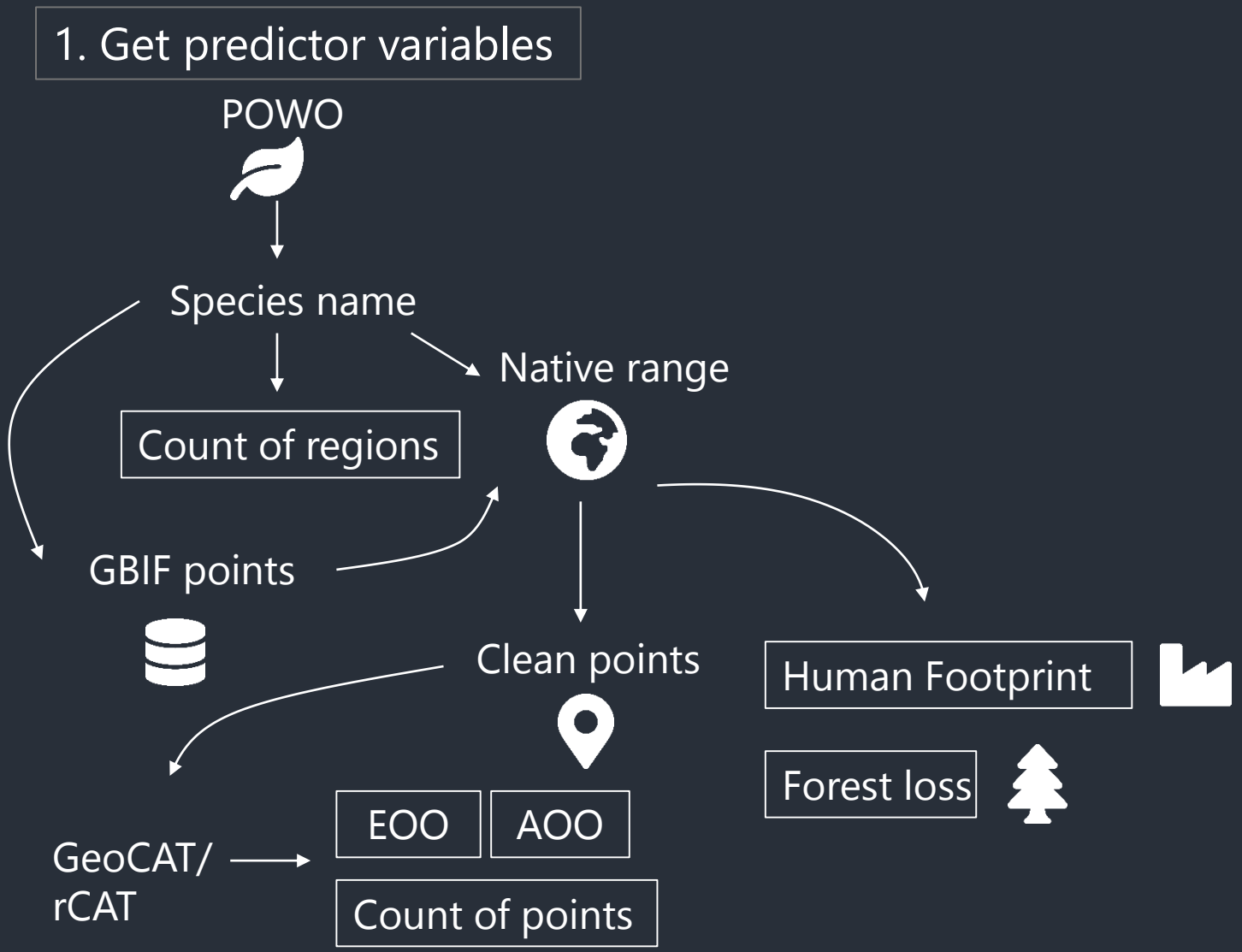
Scale up

Plants of the World online

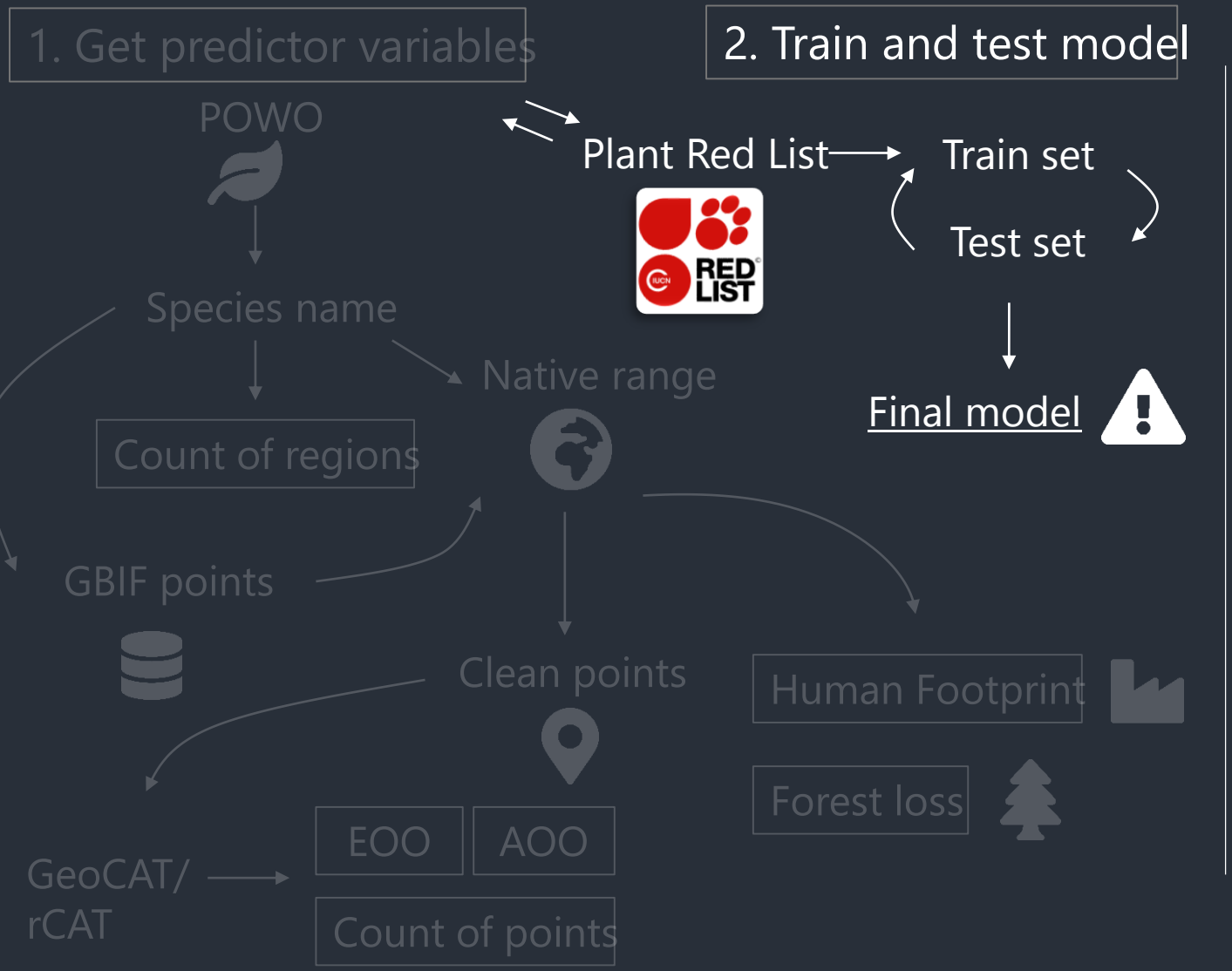


Predictive models

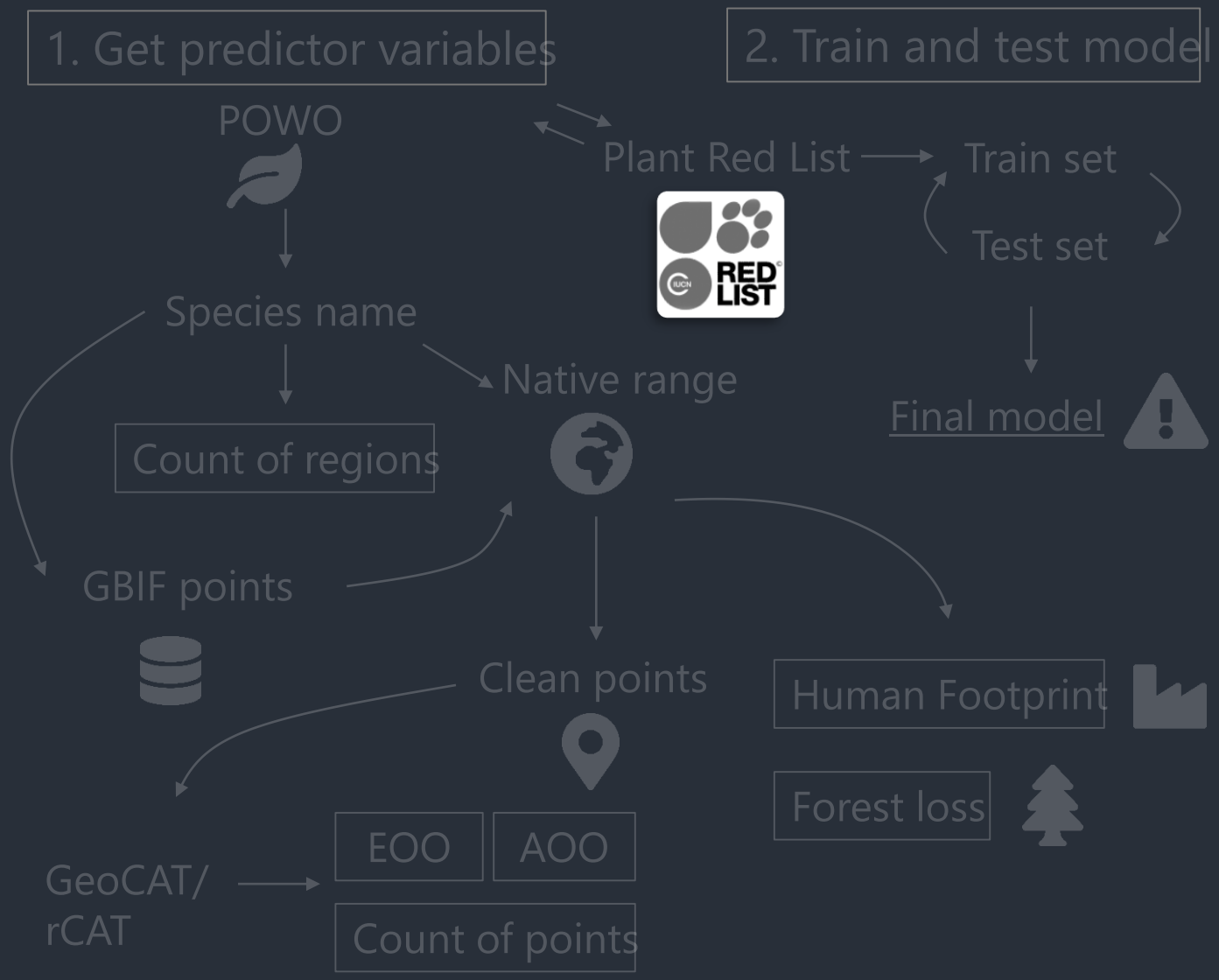
Build a model to predict threat status

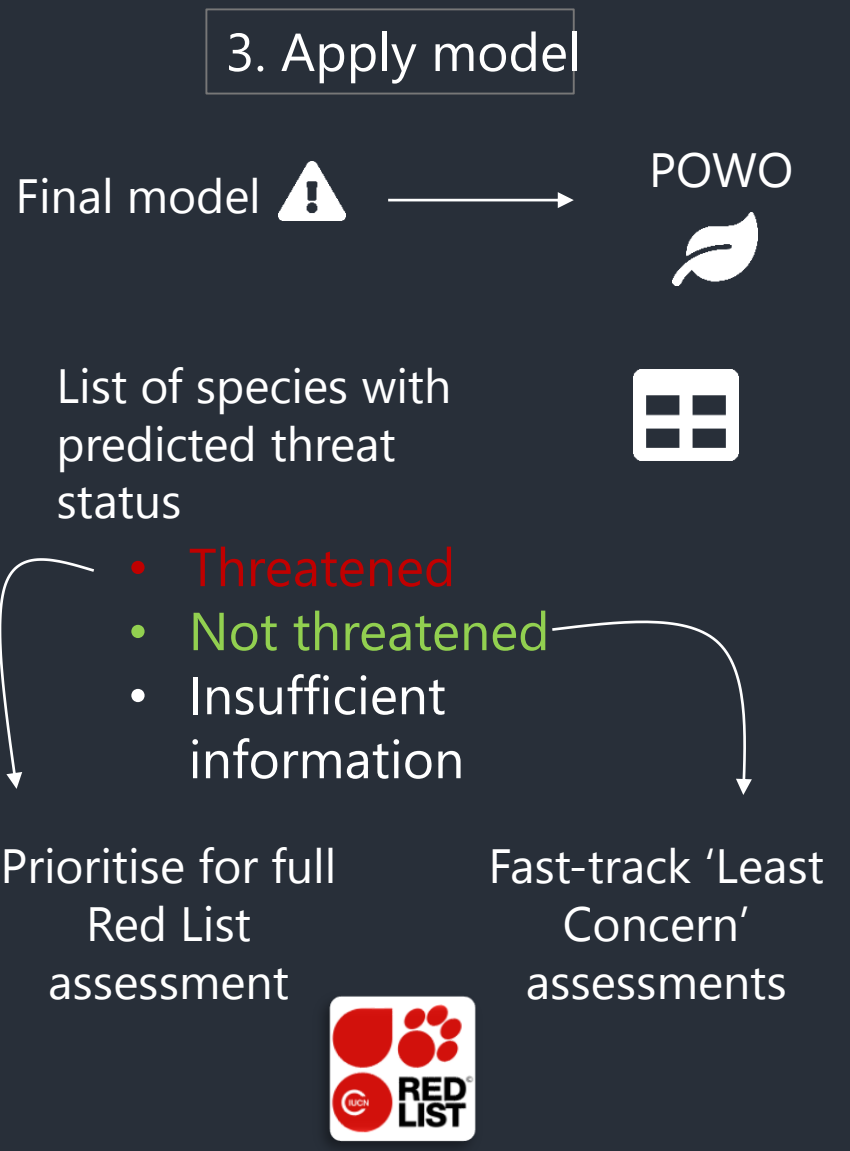


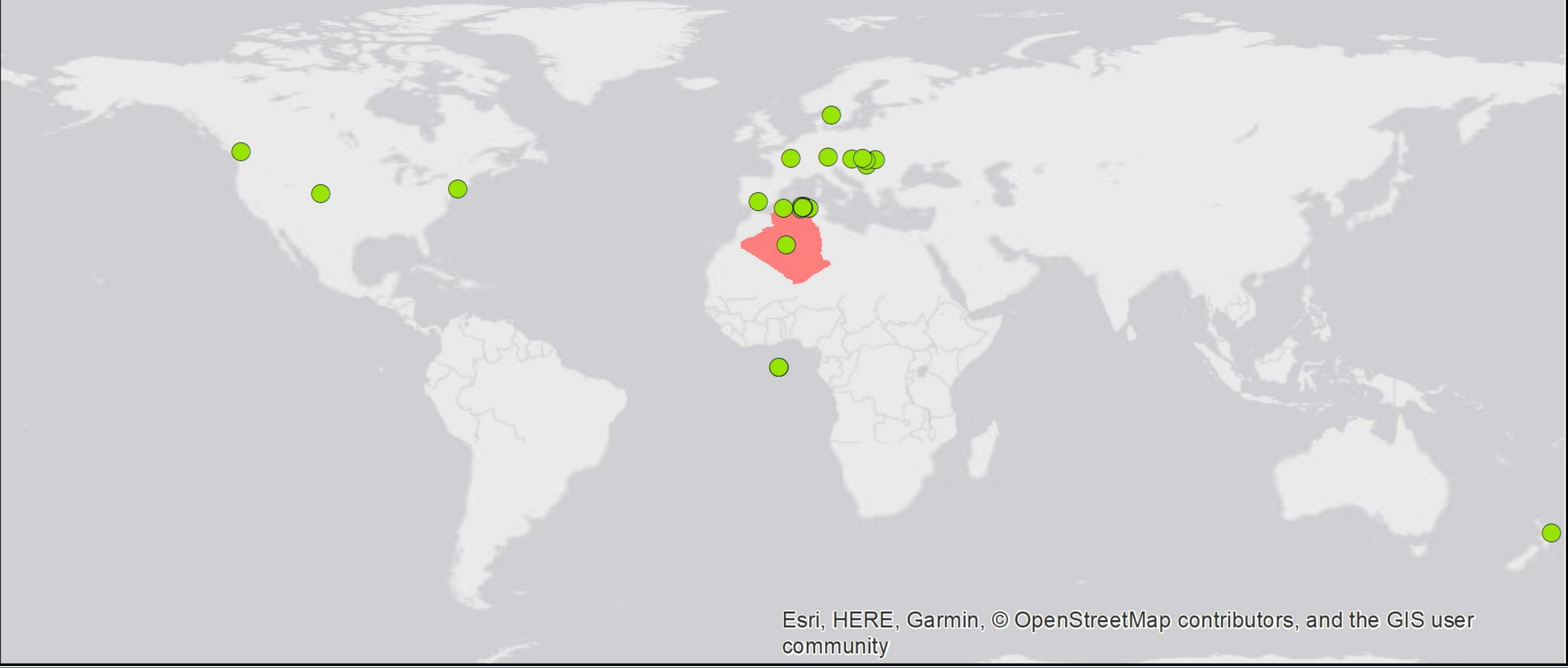
Build a model to predict threat status



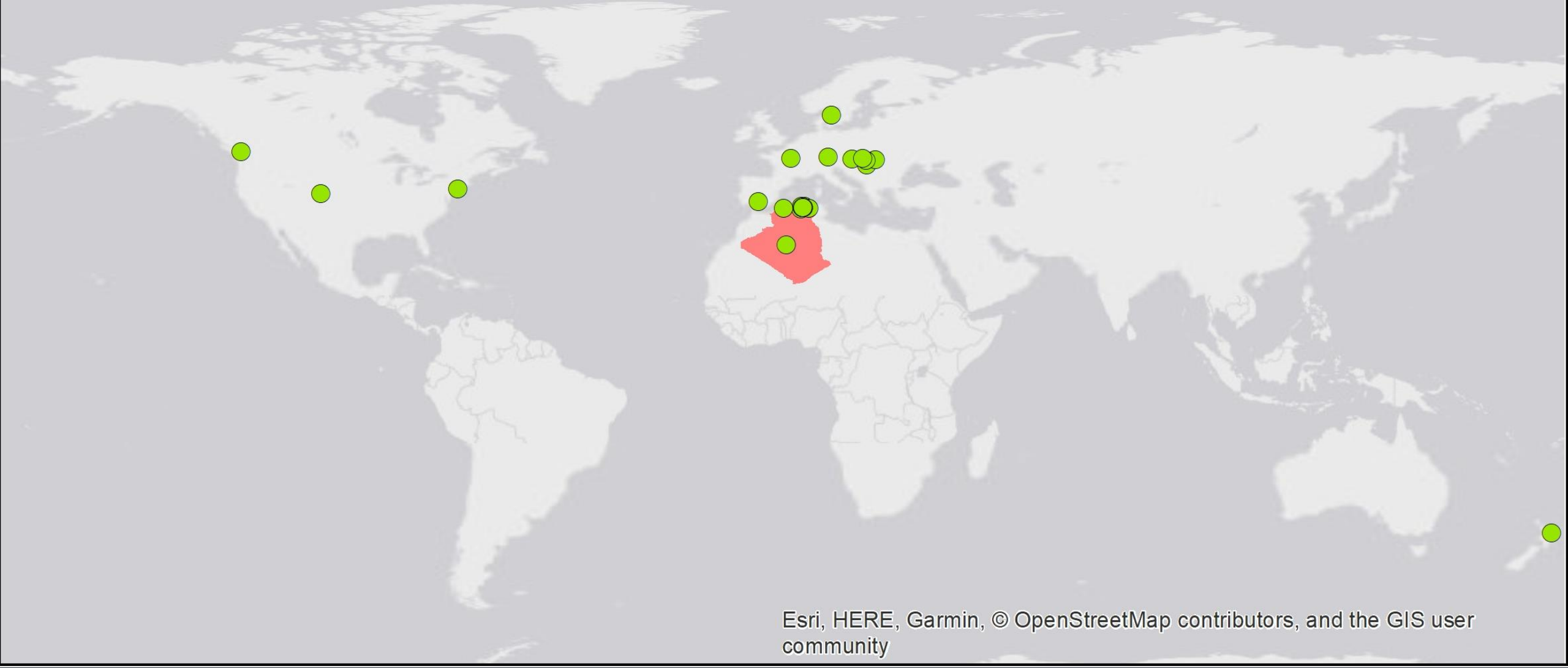
Build a model to predict threat status > Predict status of all plants



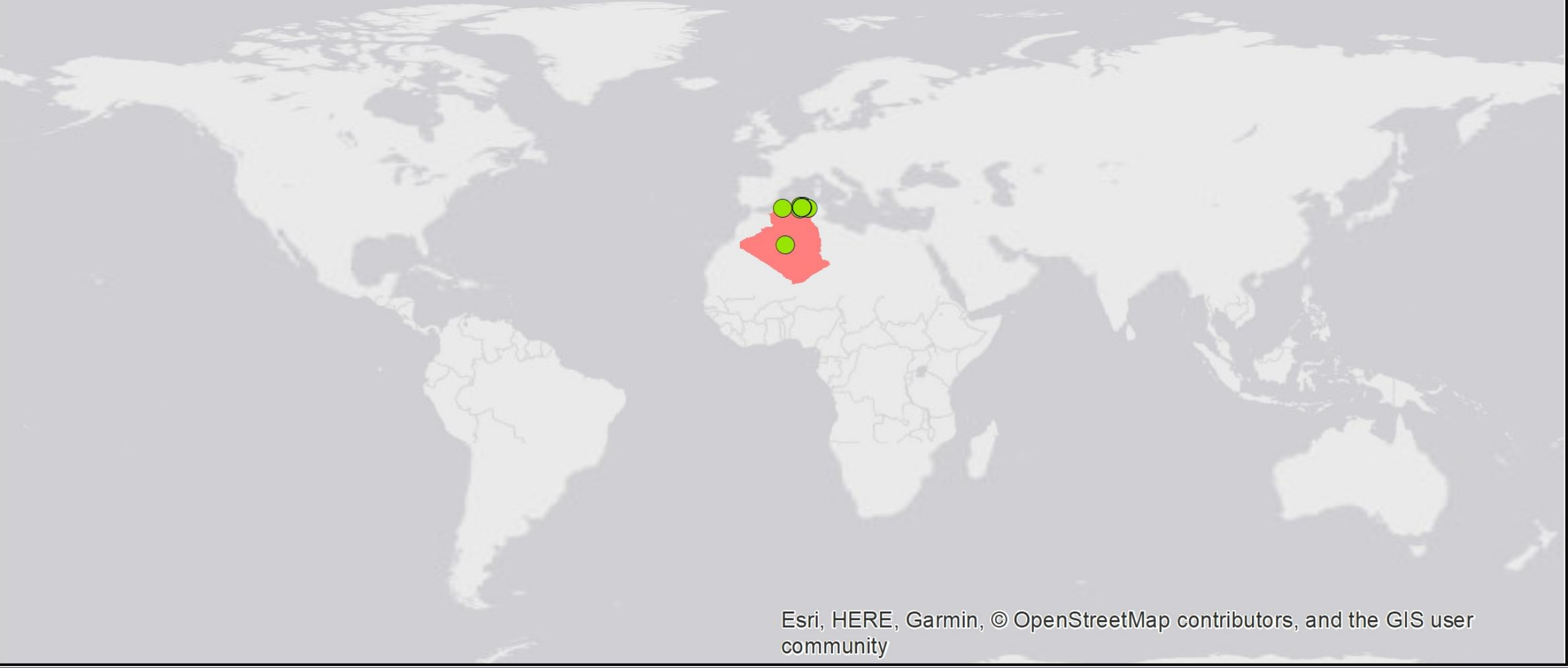




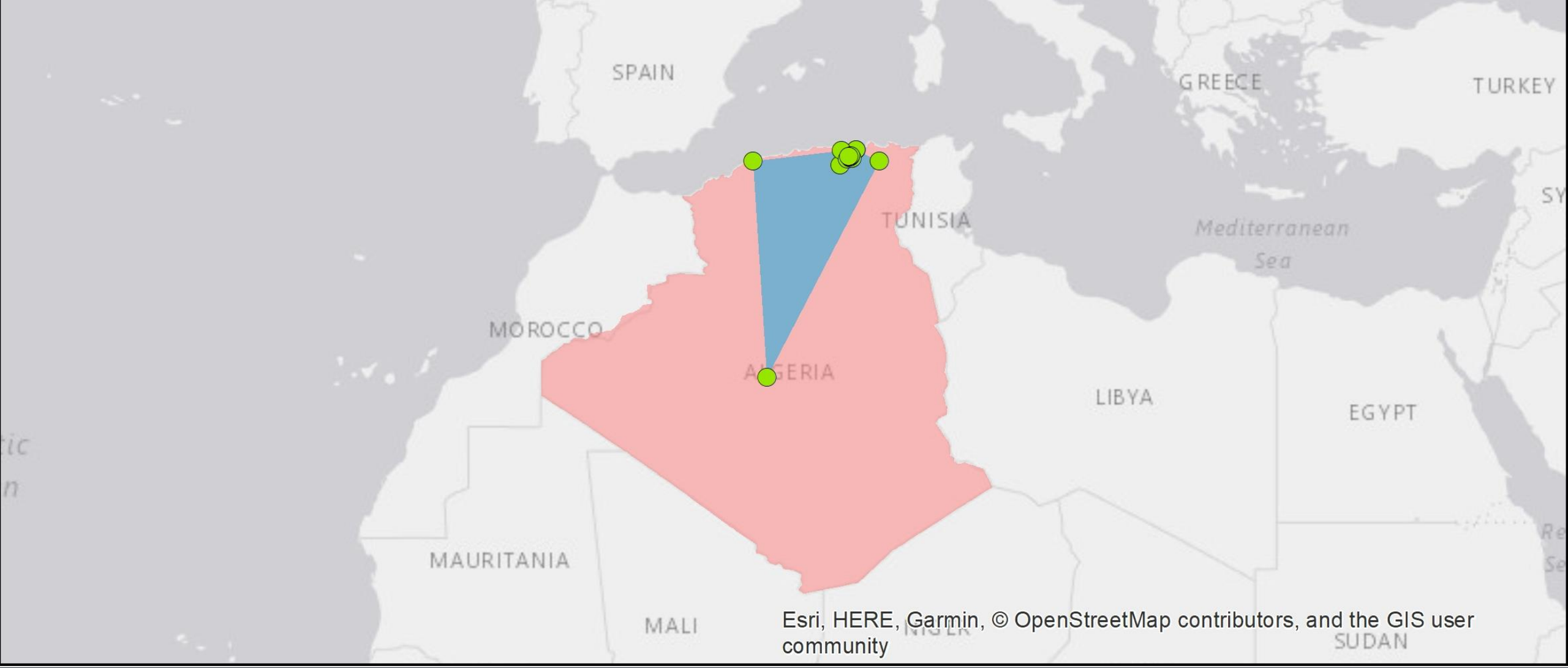
54 *Abies numidica* de Lannoy ex Carrière



49 *Abies numidica* de Lannoy ex Carrière



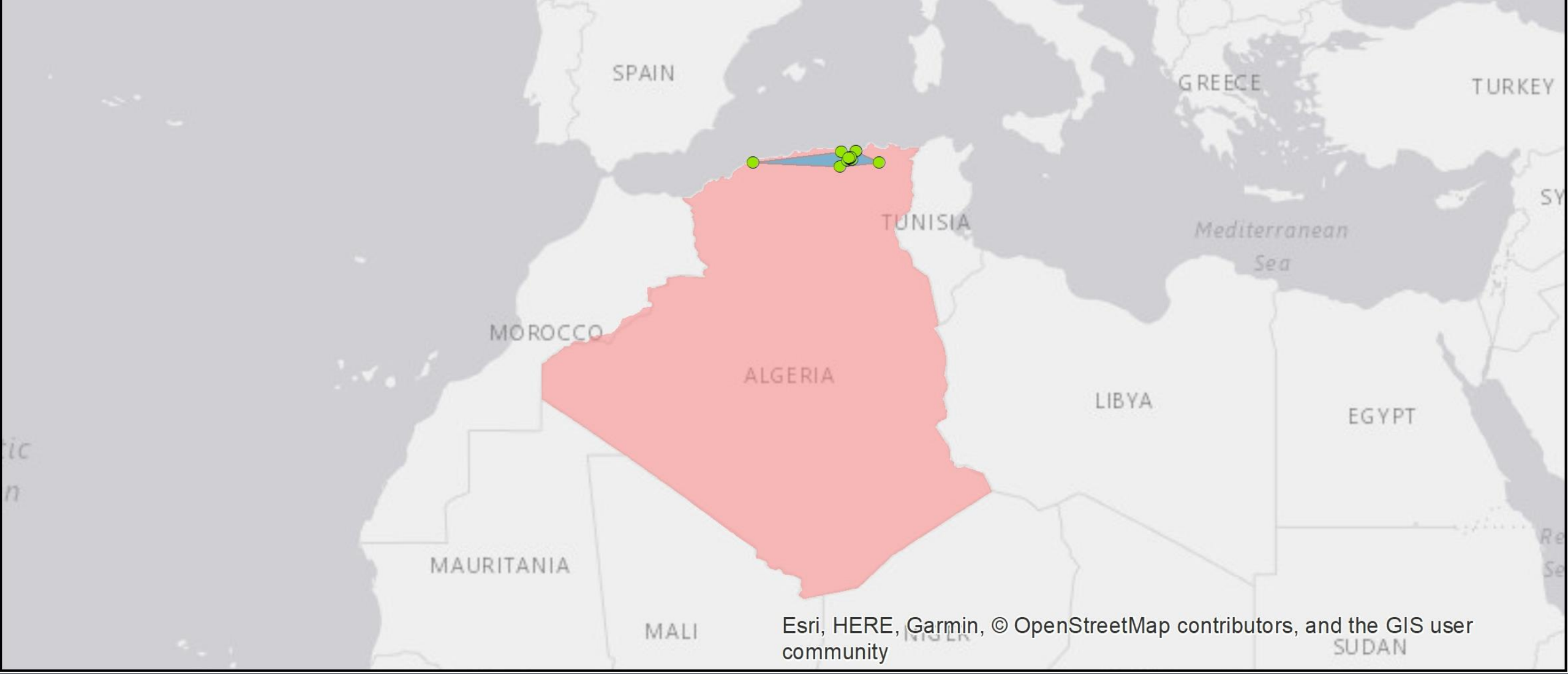
36 *Abies numidica* de Lannoy ex Carrière



254,000 km²

Abies numidica de Lannoy ex Carrière

CoordinateCleaner - Outliers
https://github.com/azizka/CoordinateCleaner



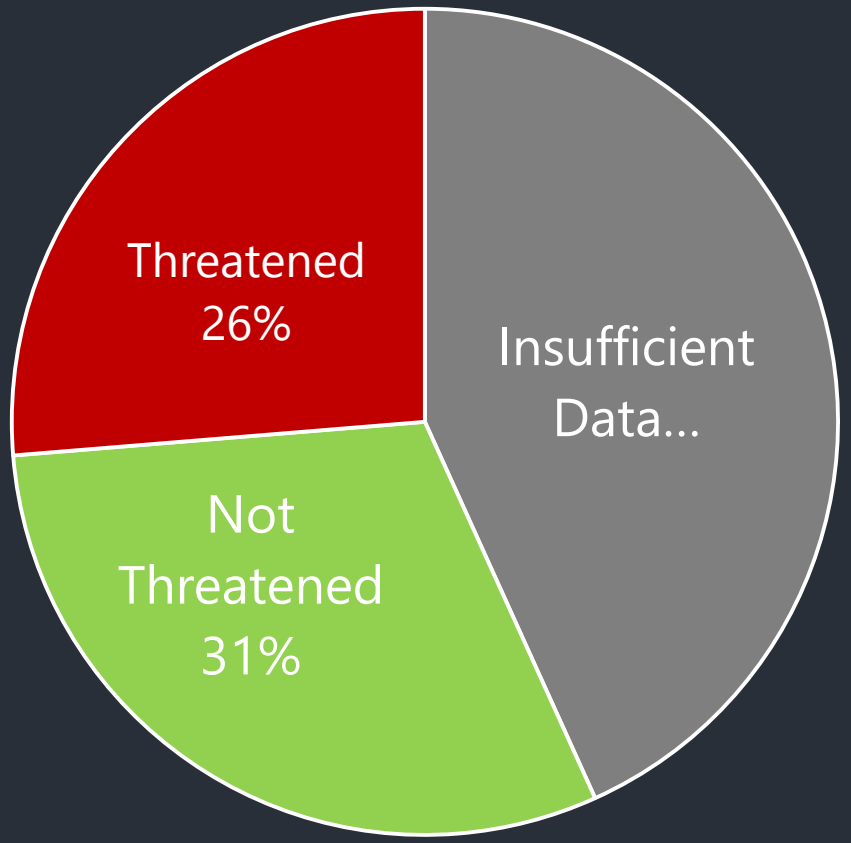
EOO = 16,000 km^2

IUCN Red List EOO = 27 km^2

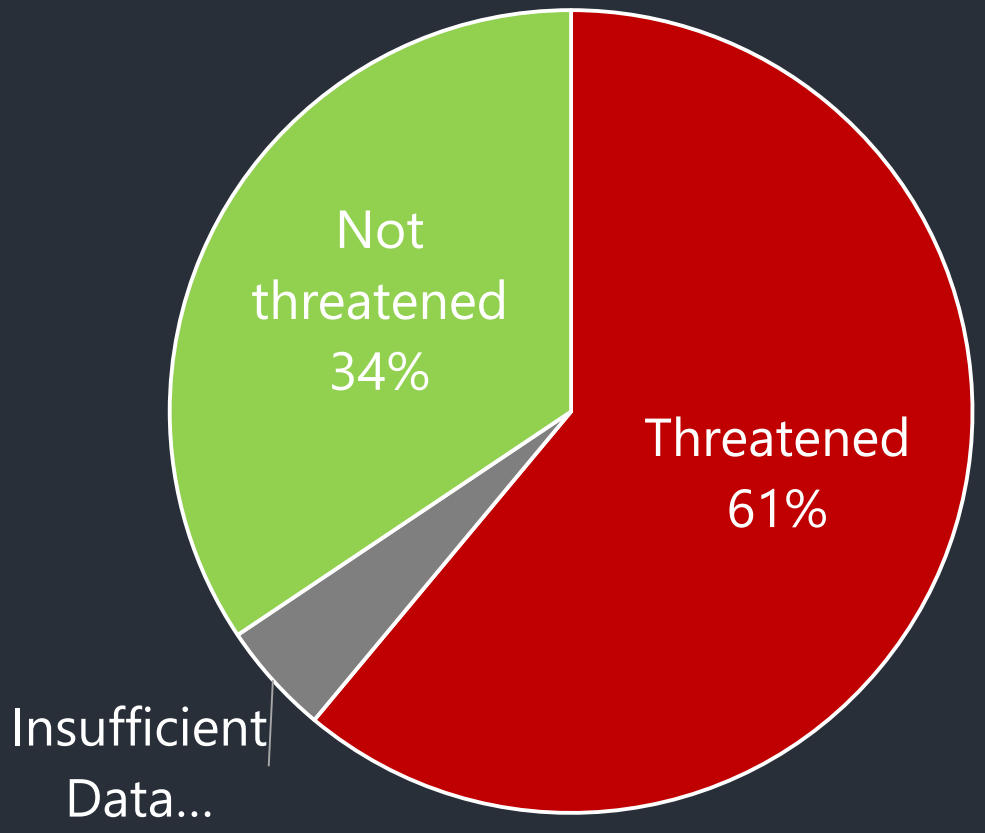
Abies numidica de Lannoy ex Carrière

Example - Acanthaceae

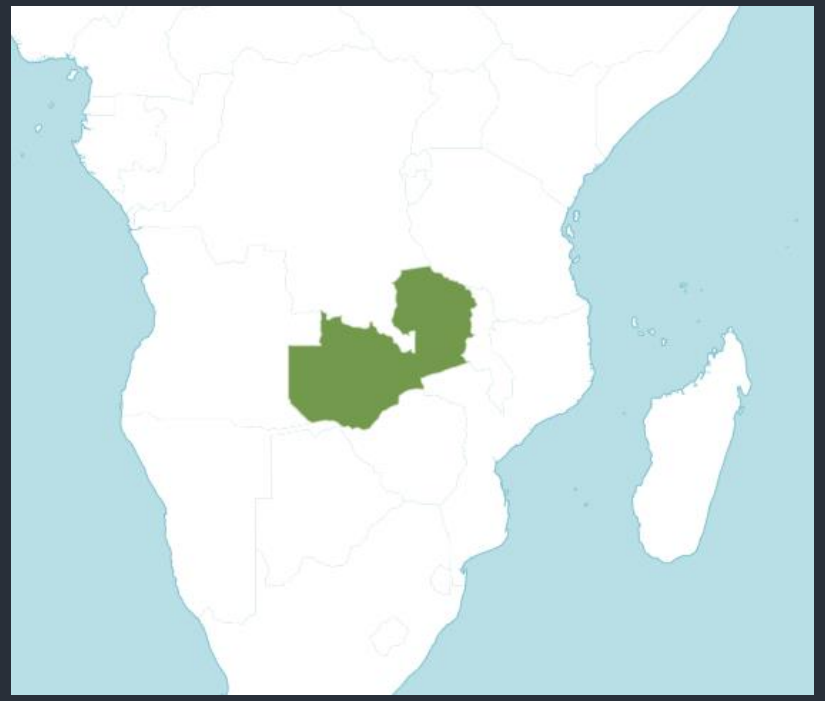
Modelled n = 5,065

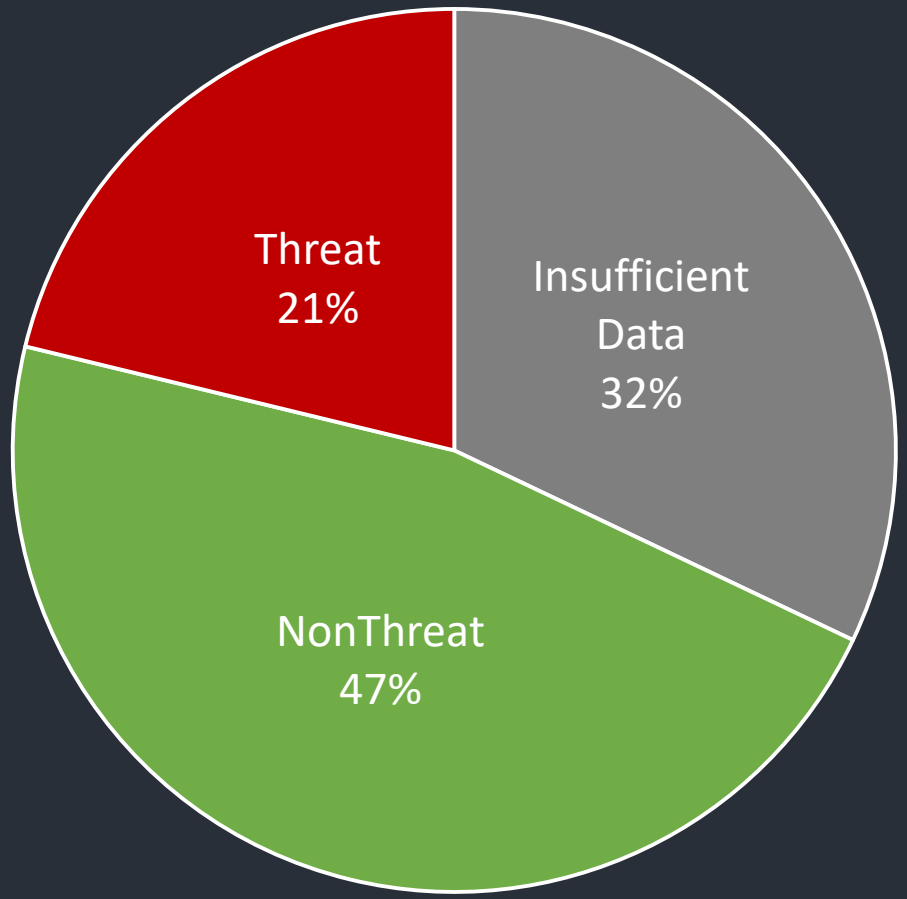


Observed n = 439



Example: Zambia (n = 5,441)





What next?

- **Improve model accuracy** –more/better variables, deeper point cleaning, better name handling
- **Update –** run model again as Red List is updated
- **Regional prioritisation -**
  - Identify potentially threatened species in each region as priorities for full assessments
- **Fast-track Least Concern** – only minimal data needed, but also expert checking stage
- **Open up** - R package and Shiny app – user friendly

Thanks to:

John Iacona – Plants of the World API
Justin Moat – rCAT
Baz Walker – Random Forests
Scott Chamberlain – rGBIF
IUCN PCSC
BGCI & GTA