

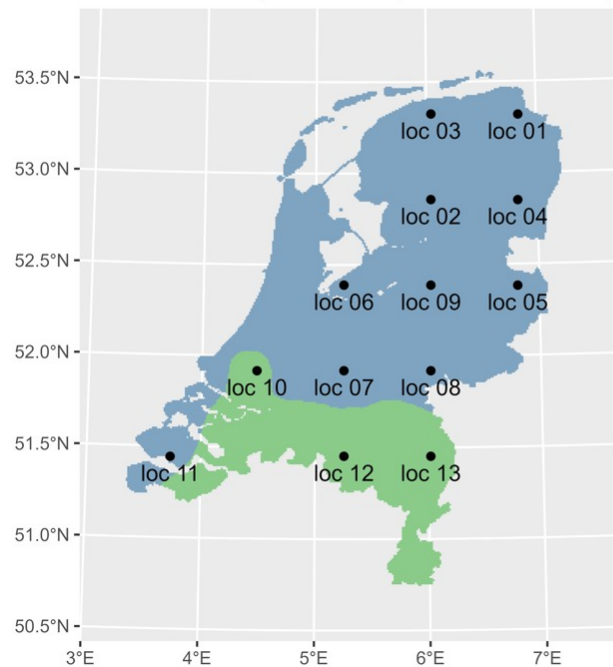
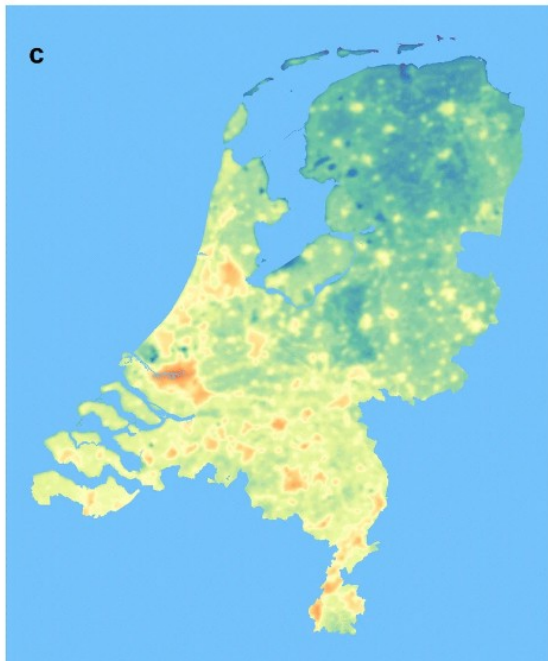
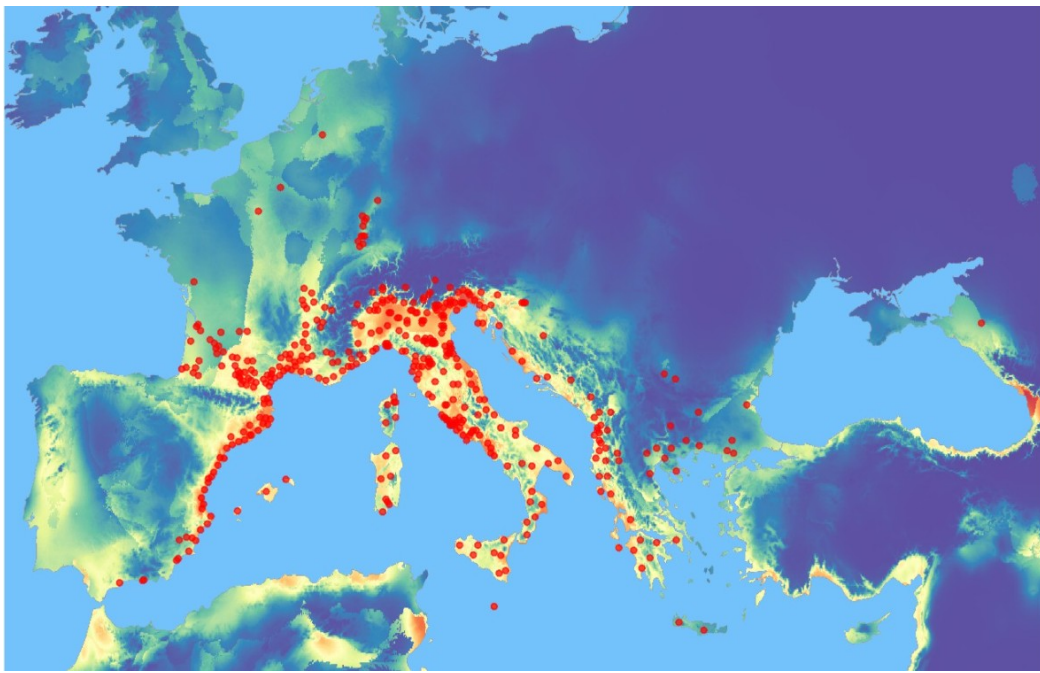


Nederlandse Voedsel- en
Warenautoriteit
*Ministerie van Landbouw,
Natuur en Voedselkwaliteit*



Correlative and mechanistic modelling to advice *Aedes albopictus* surveillance and control actions in the Netherlands

Adolfo Ibáñez-Justicia & Lukas Sprengers





CMV, The Netherlands and *Aedes albopictus*

> 2005



> 2010



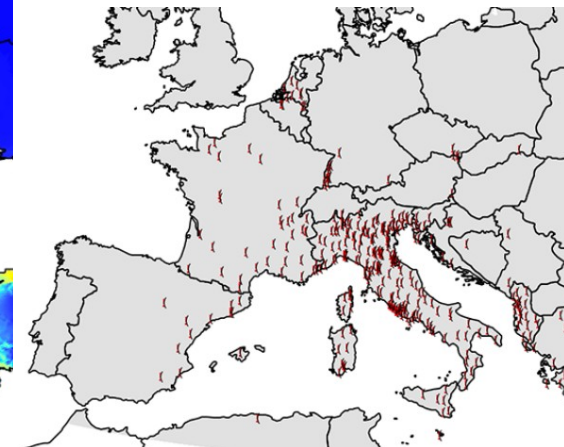
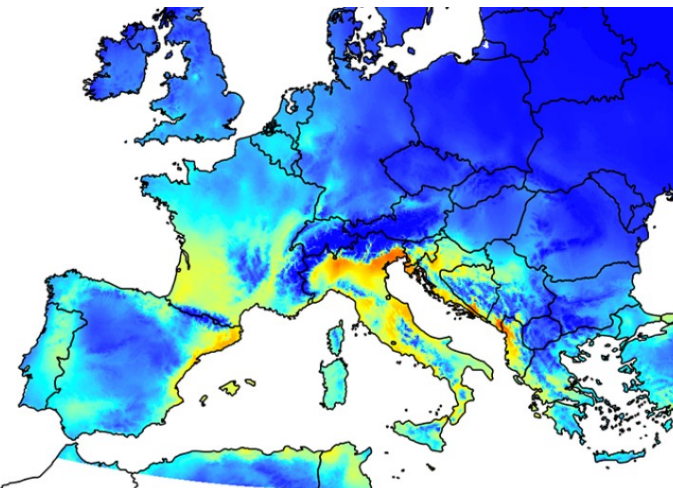
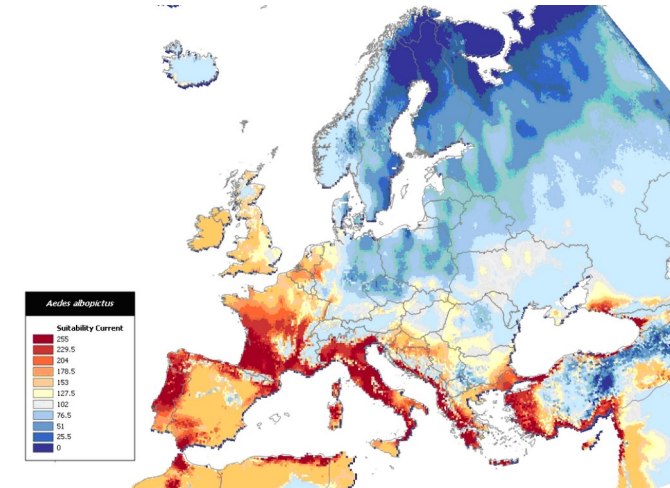
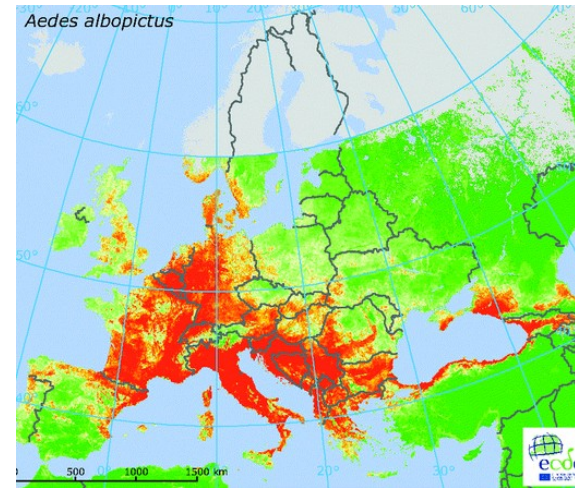
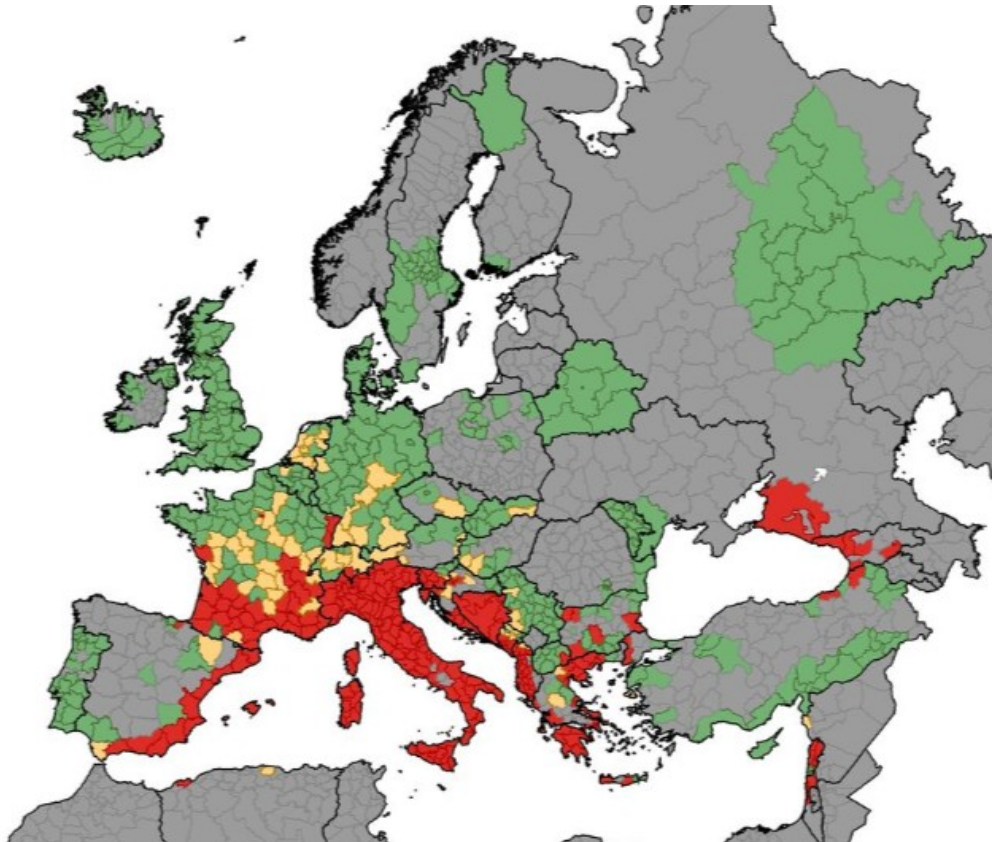
> 2016





CMV, The Netherlands and *Aedes albopictus*

<https://www.ecdc.europa.eu/en/publications-data/aedes-albopictus-current-known-distribution-europe-april-2017>





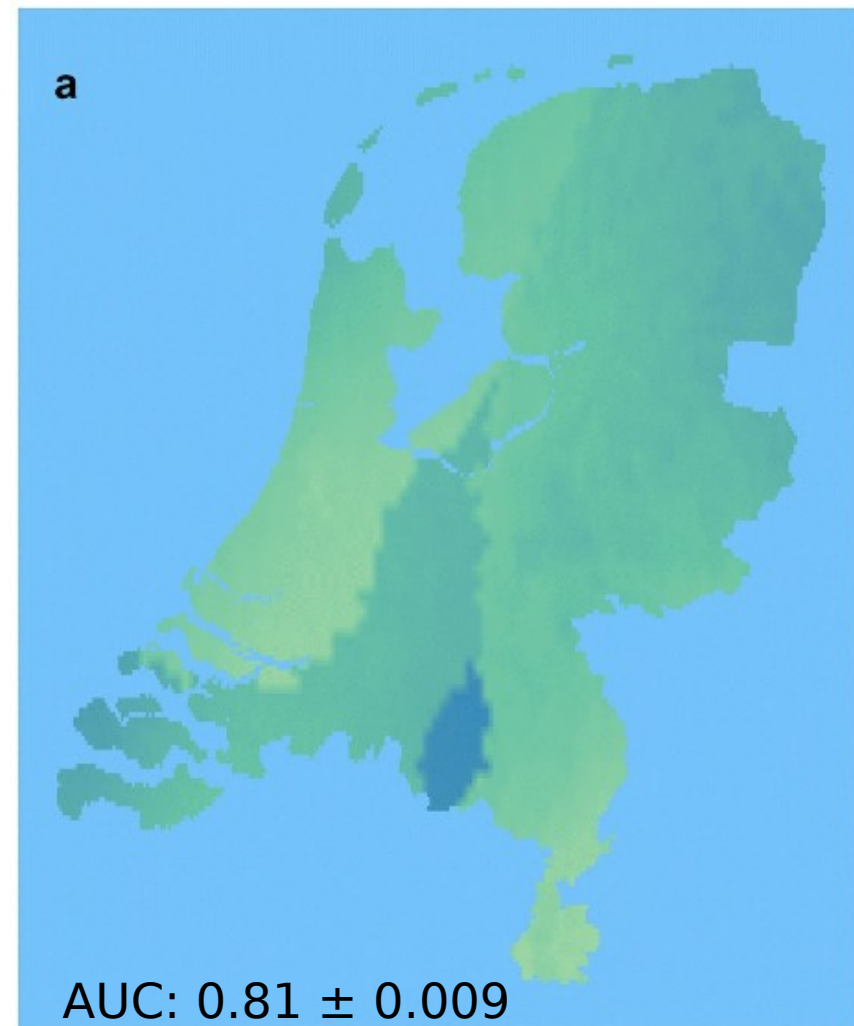
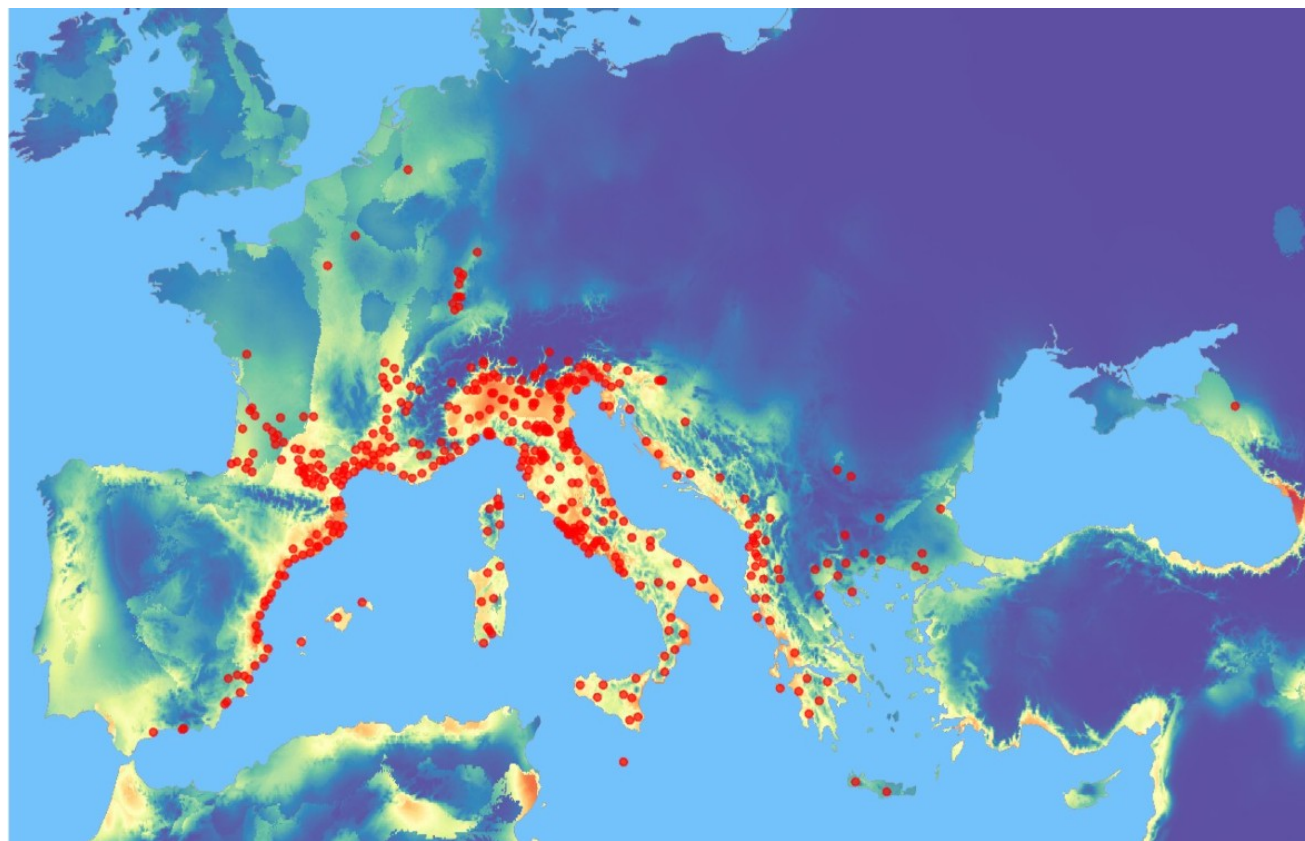
Questions to be answered

- Habitat suitability for populations in The Netherlands
- Probability for egg overwintering (POE)
- Probability adult survival (PAS)
- Probability life cycle completion (PLC)



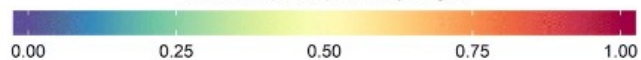


Habitat suitability model Europe - Maxent



2.0 WorldClim dataset BIO2, BIO7, BIO8, **BIO11**, BIO12

Aedes albopictus probability ranges





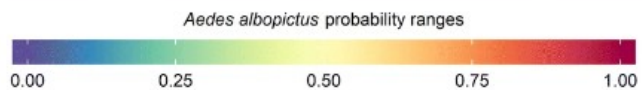
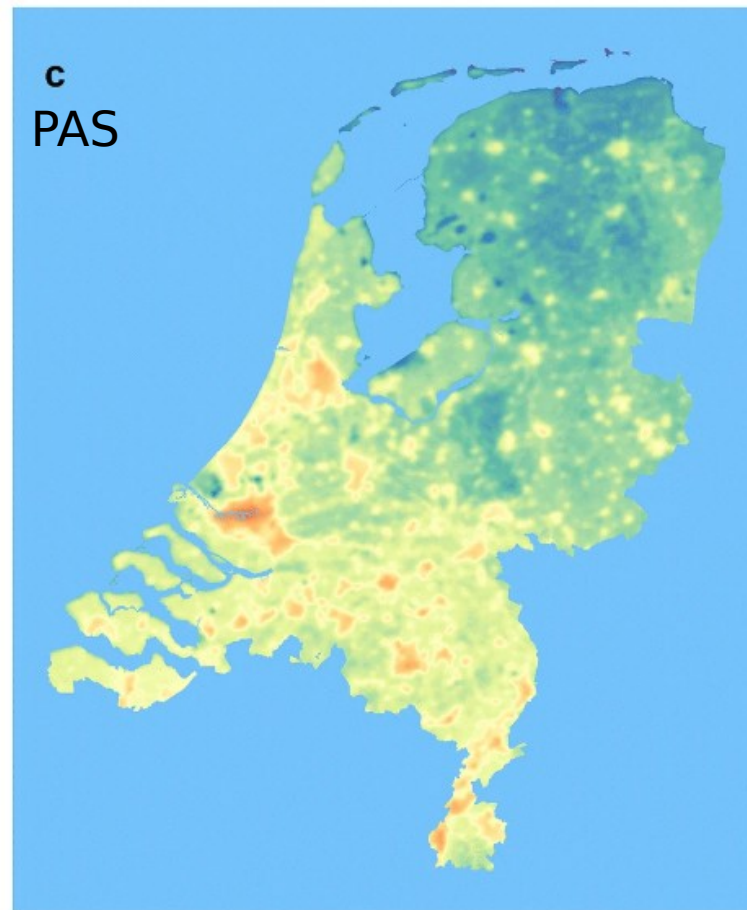
Mechanistic models POE, PAS, PLC

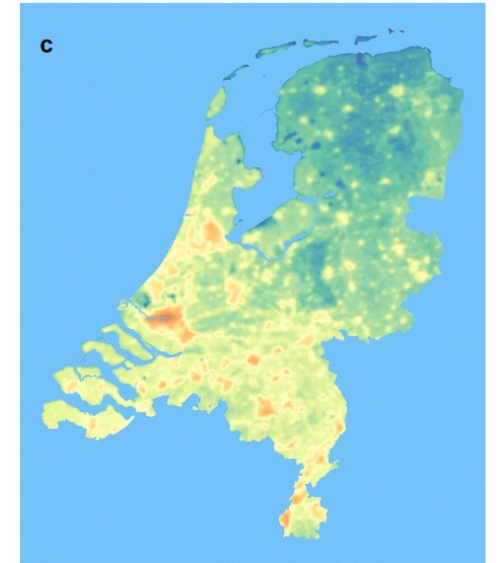
Workflow Neteler et al. 2013: processed daily MODIS LST data into ecological indicators:

- POE threshold: 1°C for the mean January temperature with of 2°C margin (-1°C - 3°C)
- PAS threshold: 11°C for the mean annual temperature with 2°C margin (9°C - 13°C)
- PLC threshold: 1350 GDDs and 11°C, was set to 1st September, margin one month (1st August - 1st October)

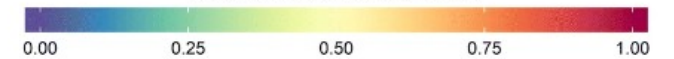


Mechanistic models POE, PAS, PLC



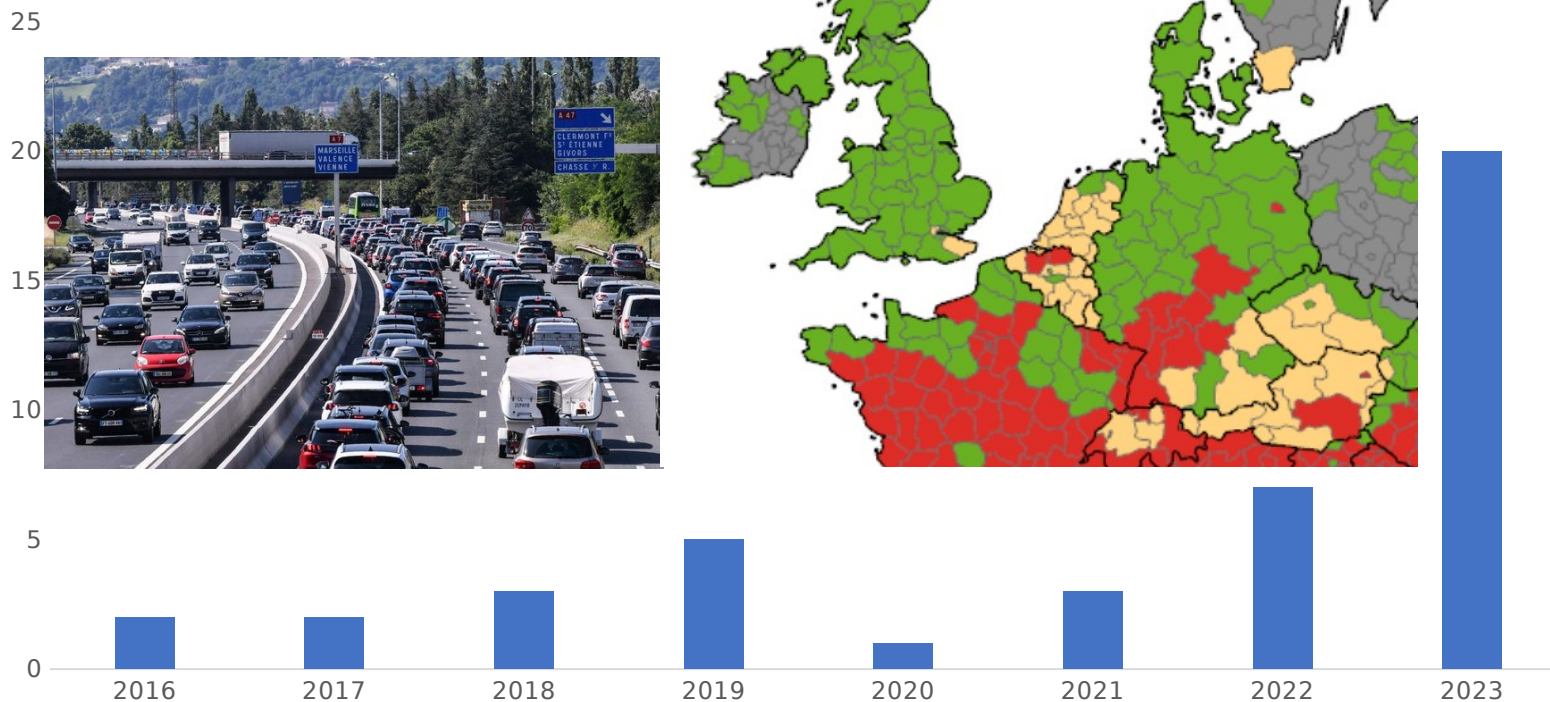


Aedes albopictus probability ranges

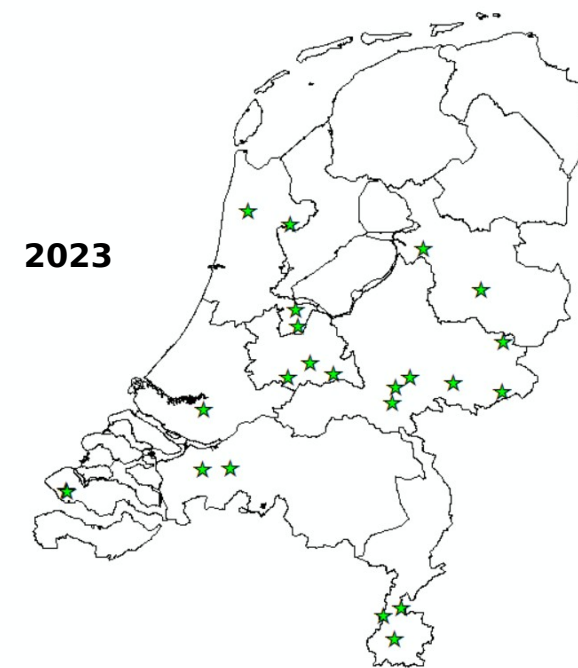
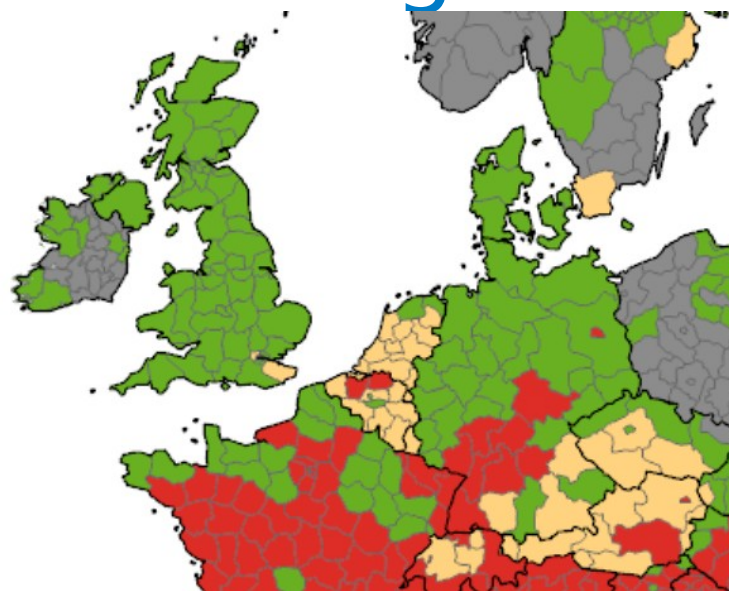




Ae. albopictus findings residential areas



Urban-residential/industrial locations with findings without clear introduction pathway



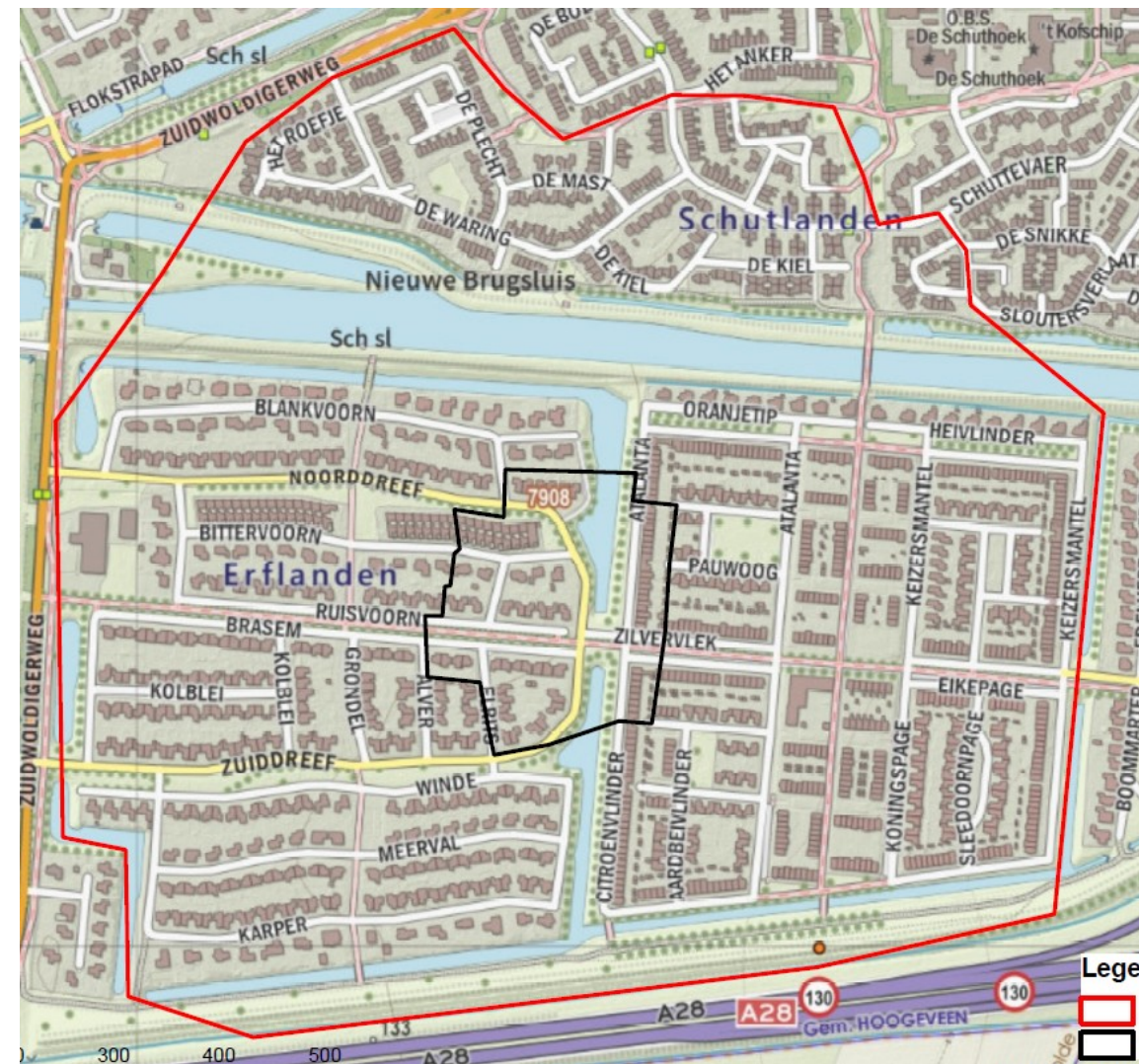
2023



Ae. albopictus findings residential areas

Early spring actions:

- Source reduction
- Larvicide





Ae. albopictus development time GDD model

Journal of the American Mosquito Control Association, 35(4):249–257, 2019
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DEVELOPMENT OF A DEGREE-DAY MODEL TO PREDICT EGG HATCH OF *AEDES ALBOPICTUS*

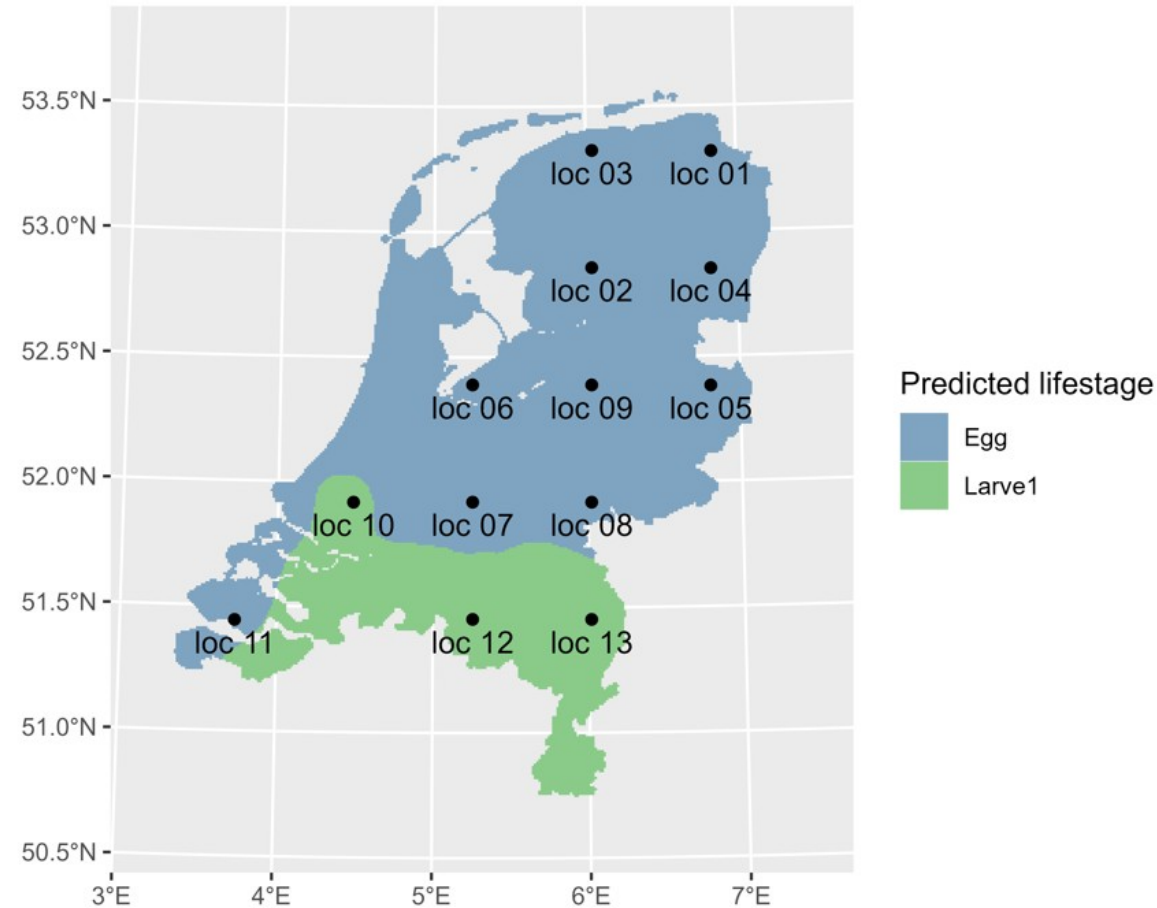
KRISTEN B. HEALY,^{1,4} EMILY DUGAS² AND DINA M. FONSECA³

Table 3. Degree-day parameters for female *Aedes albopictus*.

Variable	Field population	Laboratory population
Thresholds		
Thermal minimum	10.7	10.5
Peak temperature	32.35	33.93
Thermal maximum	36.8	36.2
Cumulative degree days to adult	156.3	172.4
Cumulative degree days required to reach stage of development		
Egg to 1st	12.5	13.8
2nd	32.8	36.2
3rd	53.1	58.6
4th	84.4	93.1
Pupae	117.2	129.3
Adult	156.3	172.4

Daily gridded temperature data KNMI
Photoperiod: >11,25 hours

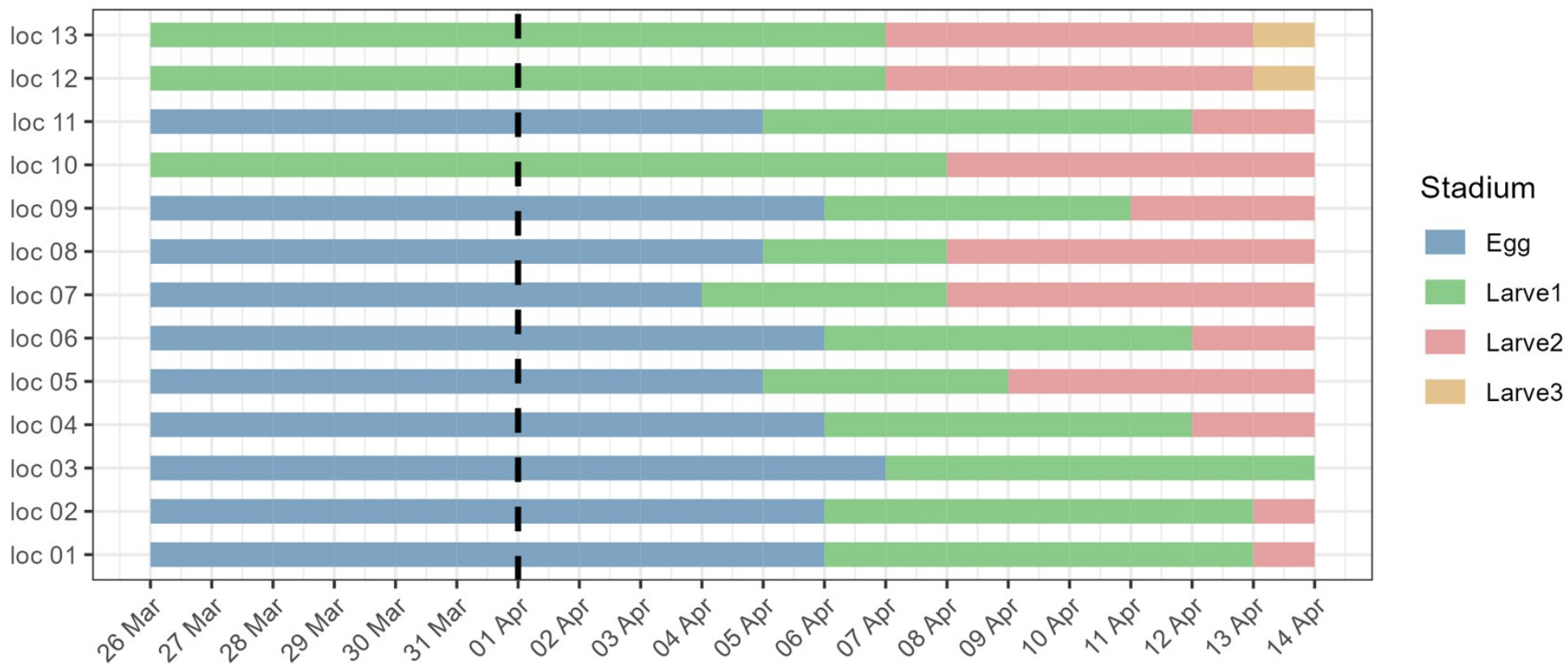
Predicted mosquito development at 1st of April 2024



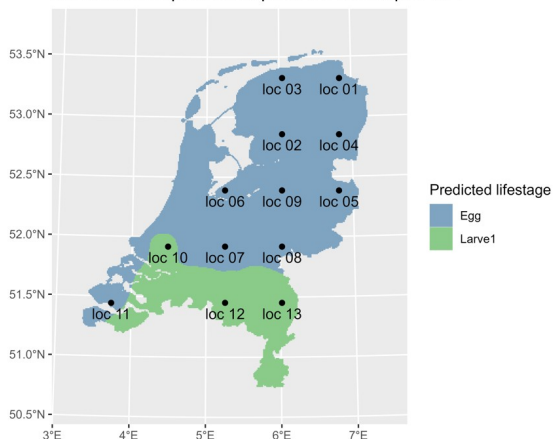


Ae. albopictus development time GDD model

Temperature threshold = 10.5; Daylight threshold = 0



Predicted mosquito development at 1st of April 2024





Next steps

- End of season adult traps
- End of season larval activity
- End of season larvicide/source reduction

- Needs:
 - Temperature threshold flight activity
 - Temperature threshold larval development
 - Temperature/photoperiod threshold stop egg laying



a.ibanezjusticia@nvwa.nl

