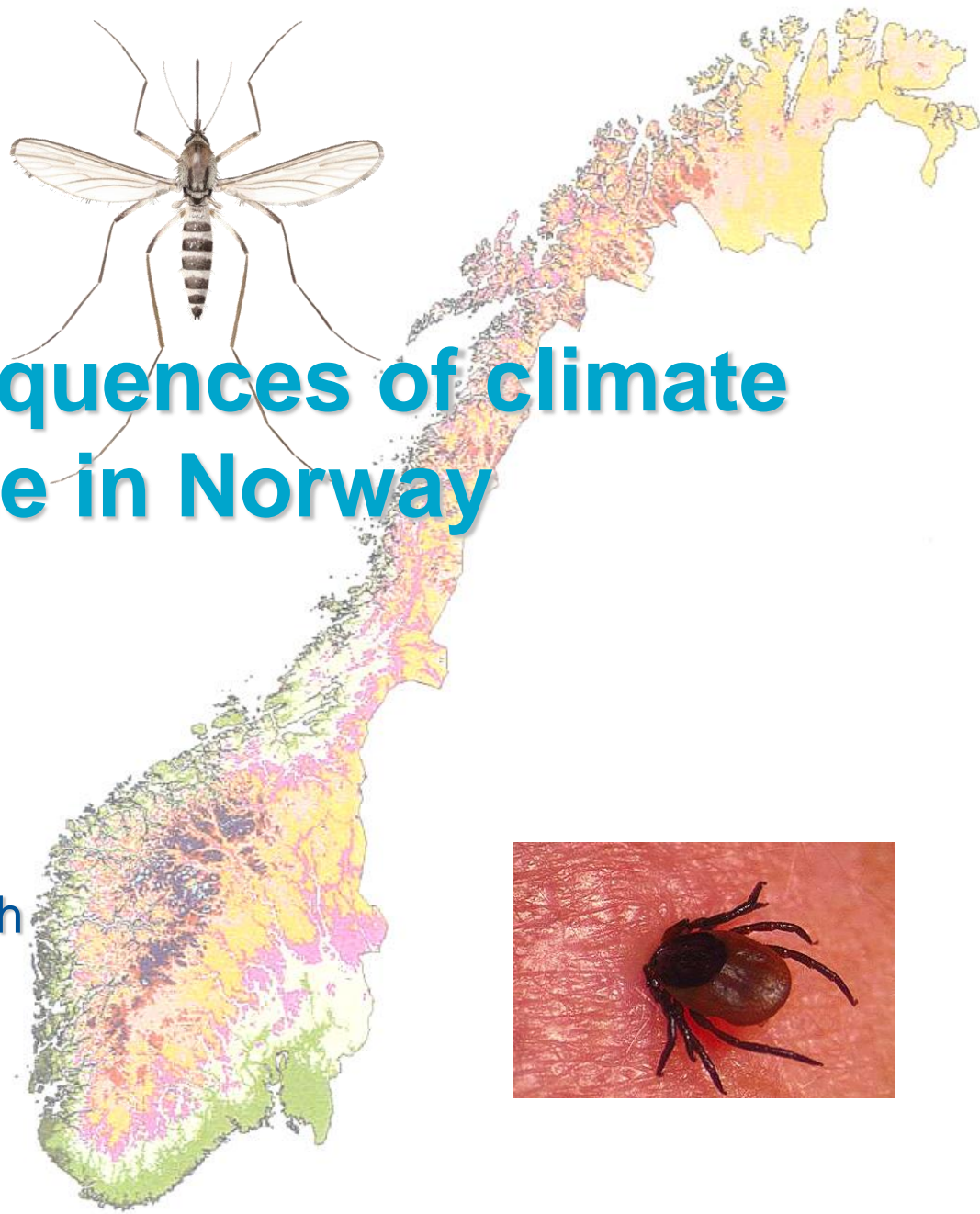


Health consequences of climate change in Norway

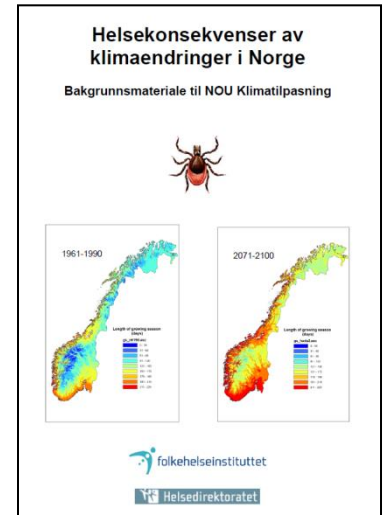
Preben Ottesen
Dept. Director
Dept. of Pest Control
Norwegian Inst. of Public Health



Background report for NOU adaptation to climate change

- **Employers and finance**
 - NOU Adaptation to Climate change
 - Norwegian Ministry of Health and Care Services
- **Authors, all Norw. Inst. of Public Health**
 - Jan Alexander (mould toxins in food)
 - Truls Krogh (water quality)
 - Jørgen Lassen (infections in food and vector borne infections)
 - Vidar Lund (water quality)
 - Per Nafstad (extreme temperatures and mortality)
 - Unni Cecilie Nygaard (air quality and allergy)
 - Preben Ottesen (vectors, editor)
 - Per Schwarze (air quality and allergy)
 - Hans Utkilen (water quality)
 - Geir Aamodt (land slides, storms, floods)

See the report at www.fhi.no/dokumenter/80c514cad4.pdf

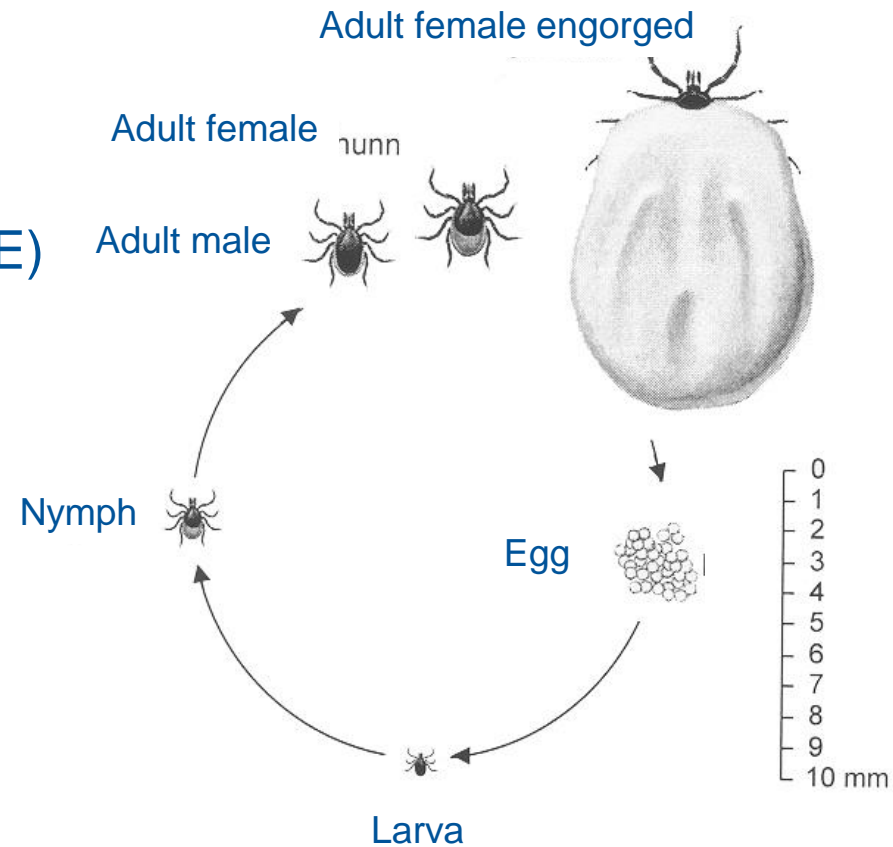


Health and climate

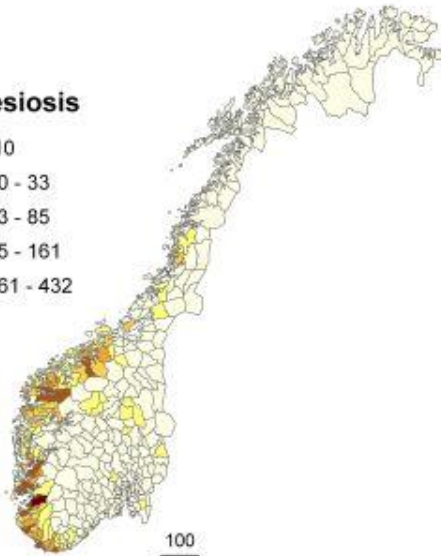
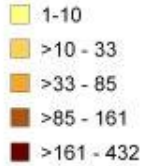
- Extreme temperatures
 - Heat waves / milder winters
- Extreme weather conditions
 - Land slides, floods, storms
- Air quality and allergy
- Water quality
- Infections and toxins transmitted by food
- Vectors and vector borne infections
- Effects most severe in tropical and sub tropical countries, and in low income countries

The sheep tick *Ixodes ricinus*

- Diseases:
 - Borreliosis
 - Tick borne encephalitis (TBE)
 - Anaplasmosis
 - Tularemia
 - Babesiosis
 - Rickettsia (spotted fever)
 - Several animal diseases.

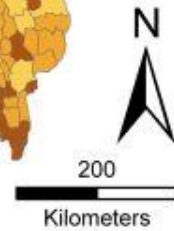
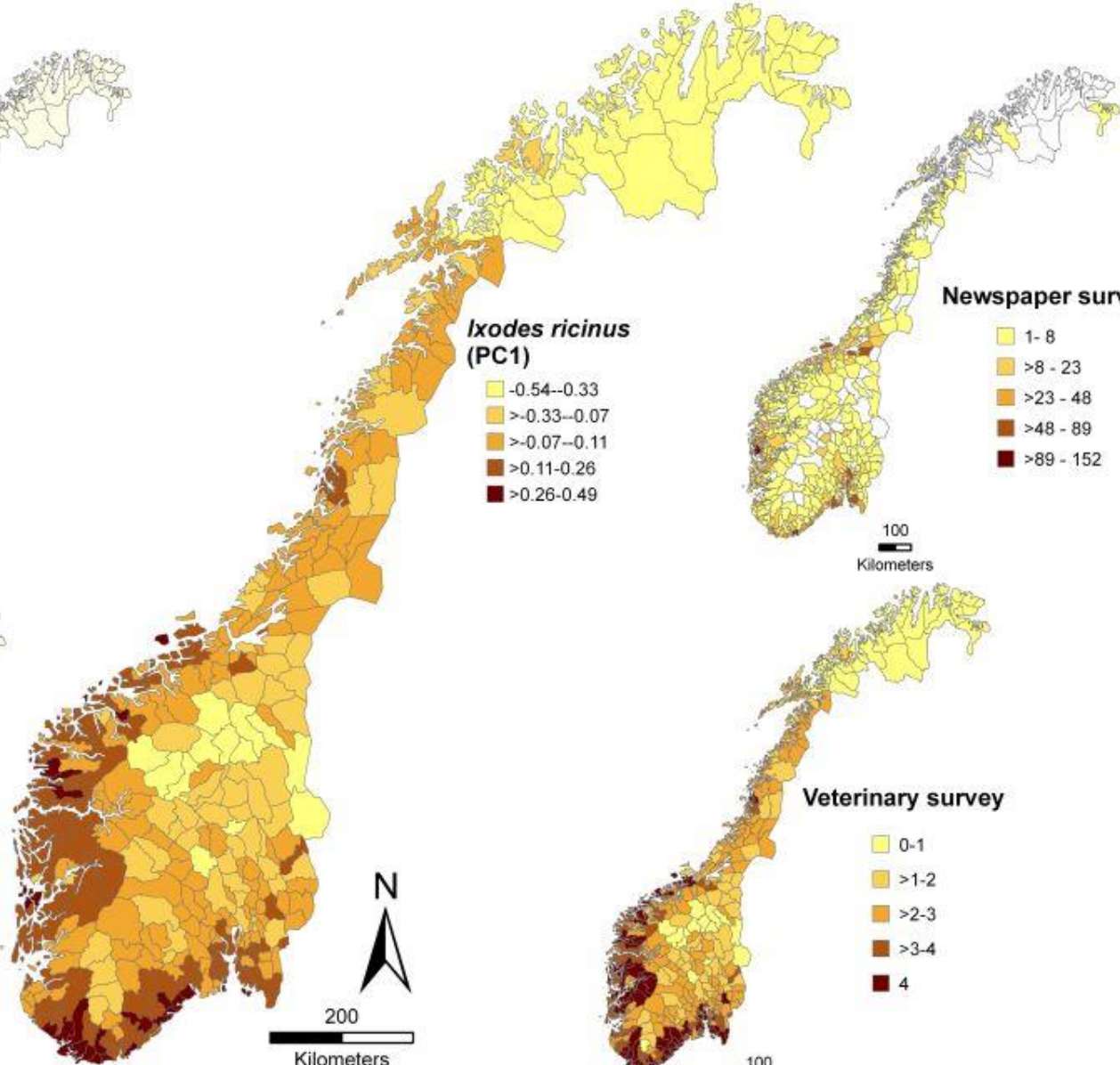
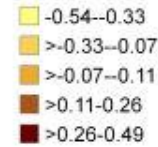


Babesiosis

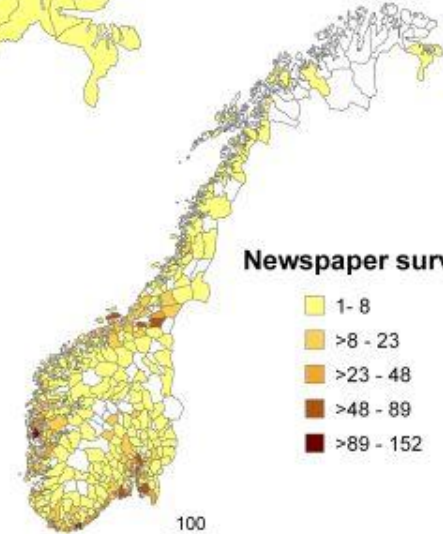
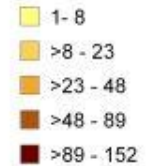


100
Kilometers

Ixodes ricinus (PC1)

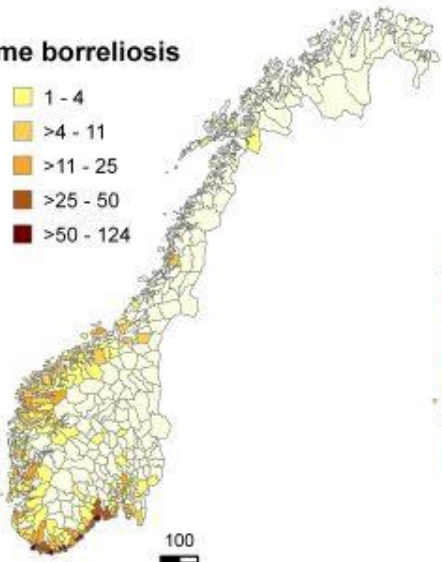
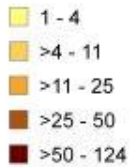


Newspaper survey



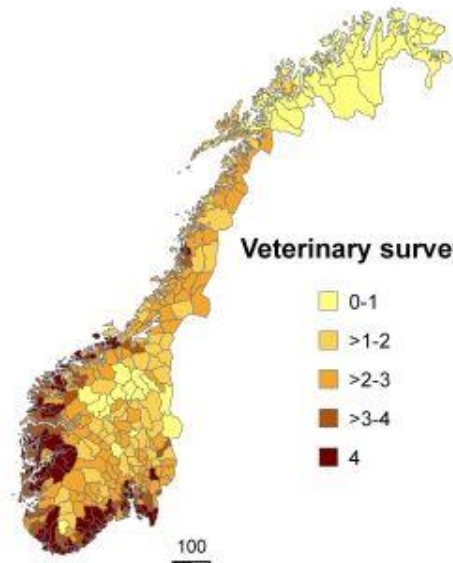
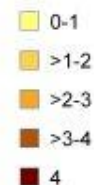
100
Kilometers

Lyme borreliosis



100
Kilometers

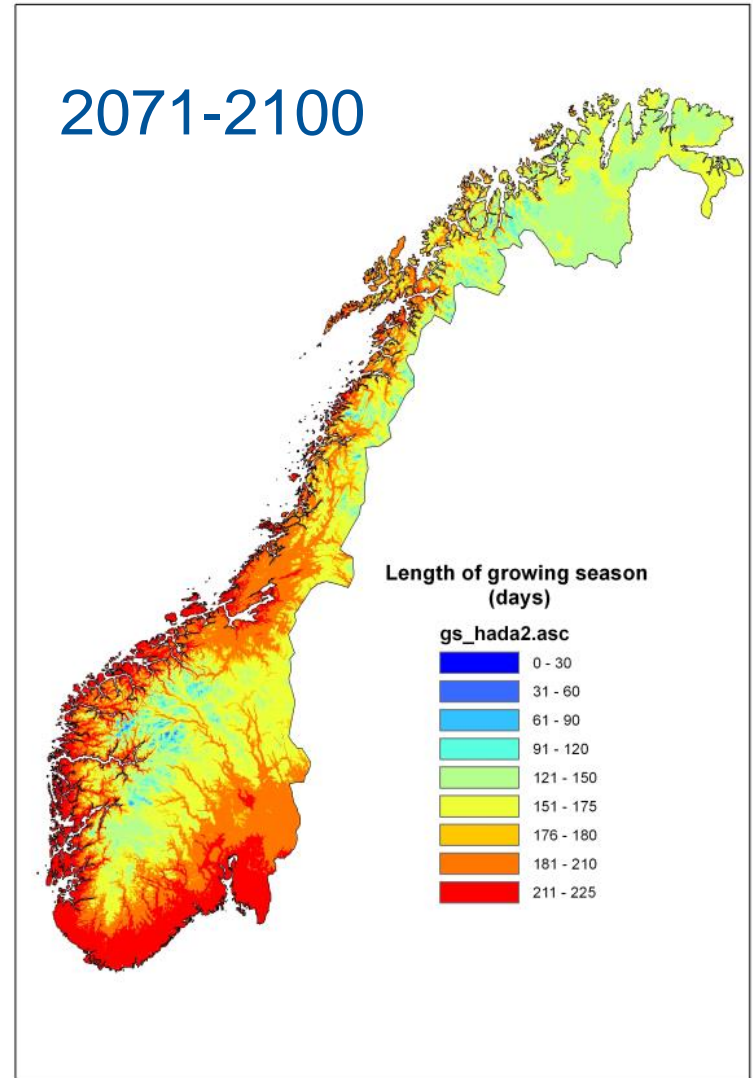
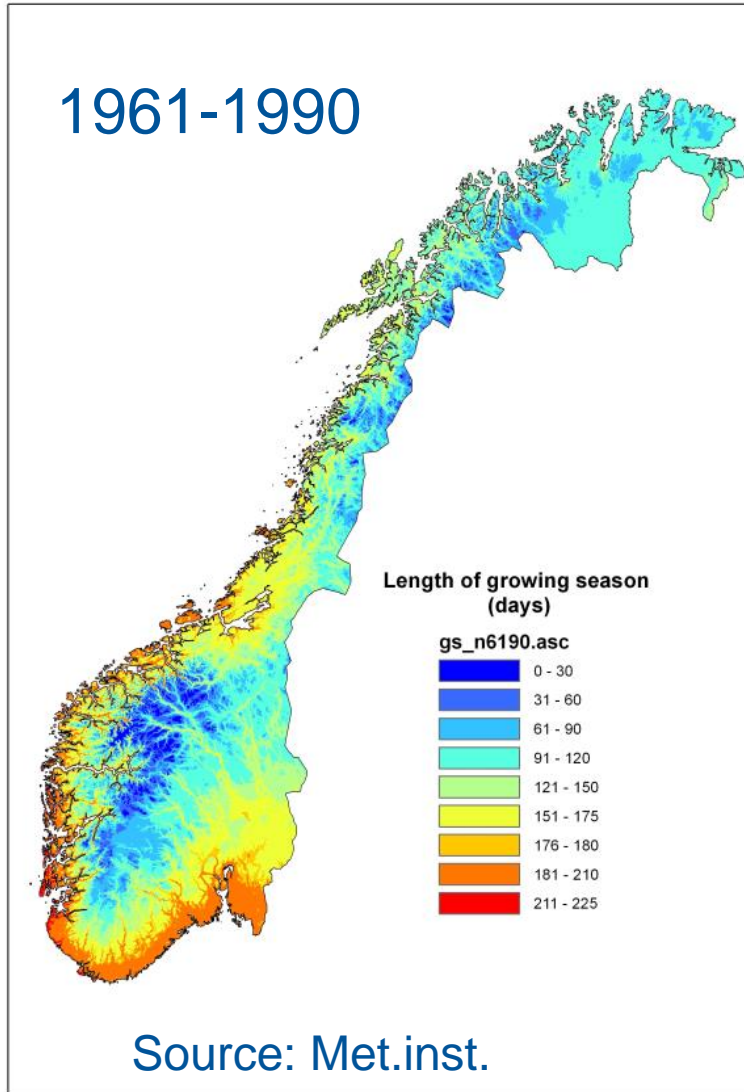
Veterinary survey



100
Kilometers

Jore, S., Viljugrein, H., Hofshagen, M., Brun-Hansen, H., Kristoffersen, A.B, Nygard, K., Brun, E., Ottesen, P., Saevik, B.K. & Ytrehus, B. 2011. Multi-source analysis reveals latitudinal and altitudinal shifts in range of *Ixodes ricinus* at its northern distribution limit. *Parasites & Vectors* 4:84

Change in growing season, daily average $> 5\text{ }^{\circ}\text{C}$





Cited in IPCC Climate Change 2014: Impacts, Adaptation, and Vulnerability, WG II, Chpt. 11: Human Health:

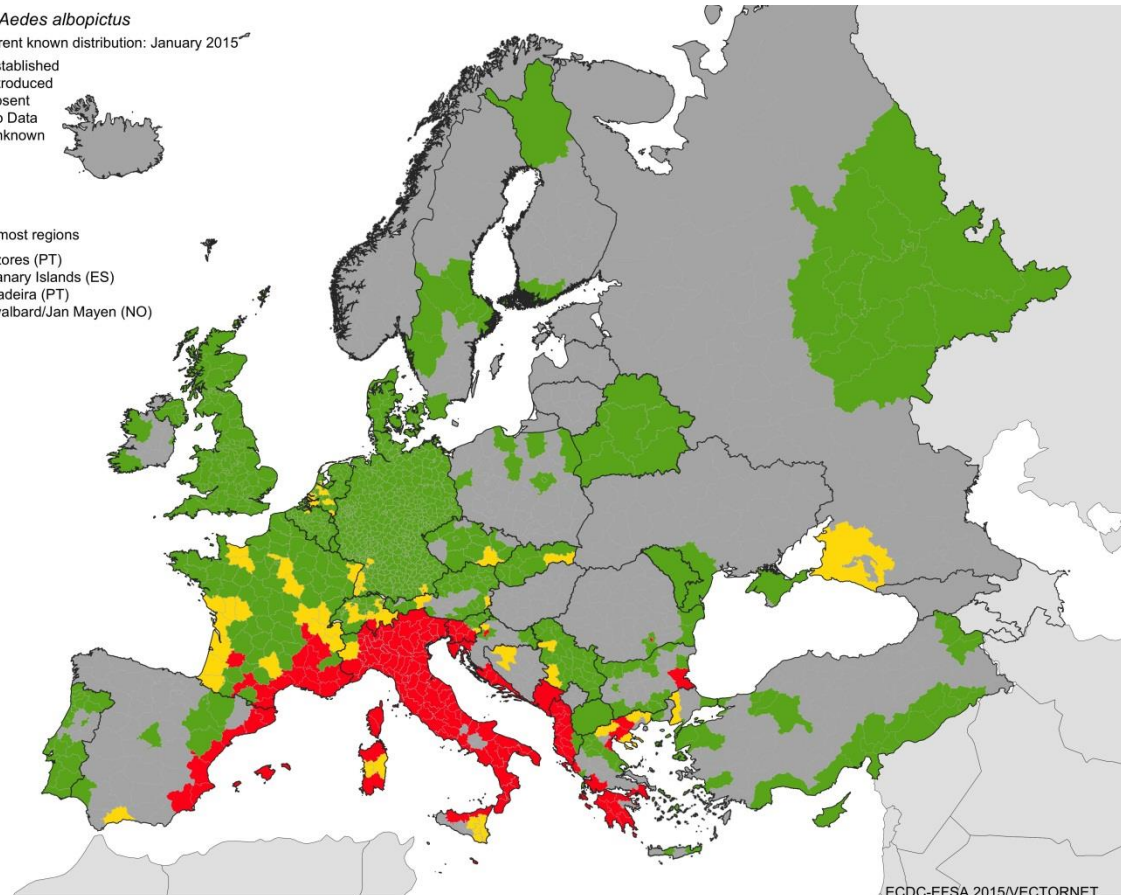
Andreassen A, Jore S, Cuber P, Dudman S, Tengs T, Isaksen K, Hygen HO, Viljugrein H, Anestad G, Ottesen P, Vainio K. 2012. Prevalence of tick borne encephalitis virus in tick nymphs in relation to climatic factors on the southern coast of Norway. *Parasites and Vectors* 22;5:177.

Asian tiger mosquito – distribution January 2015 (VBORNET)



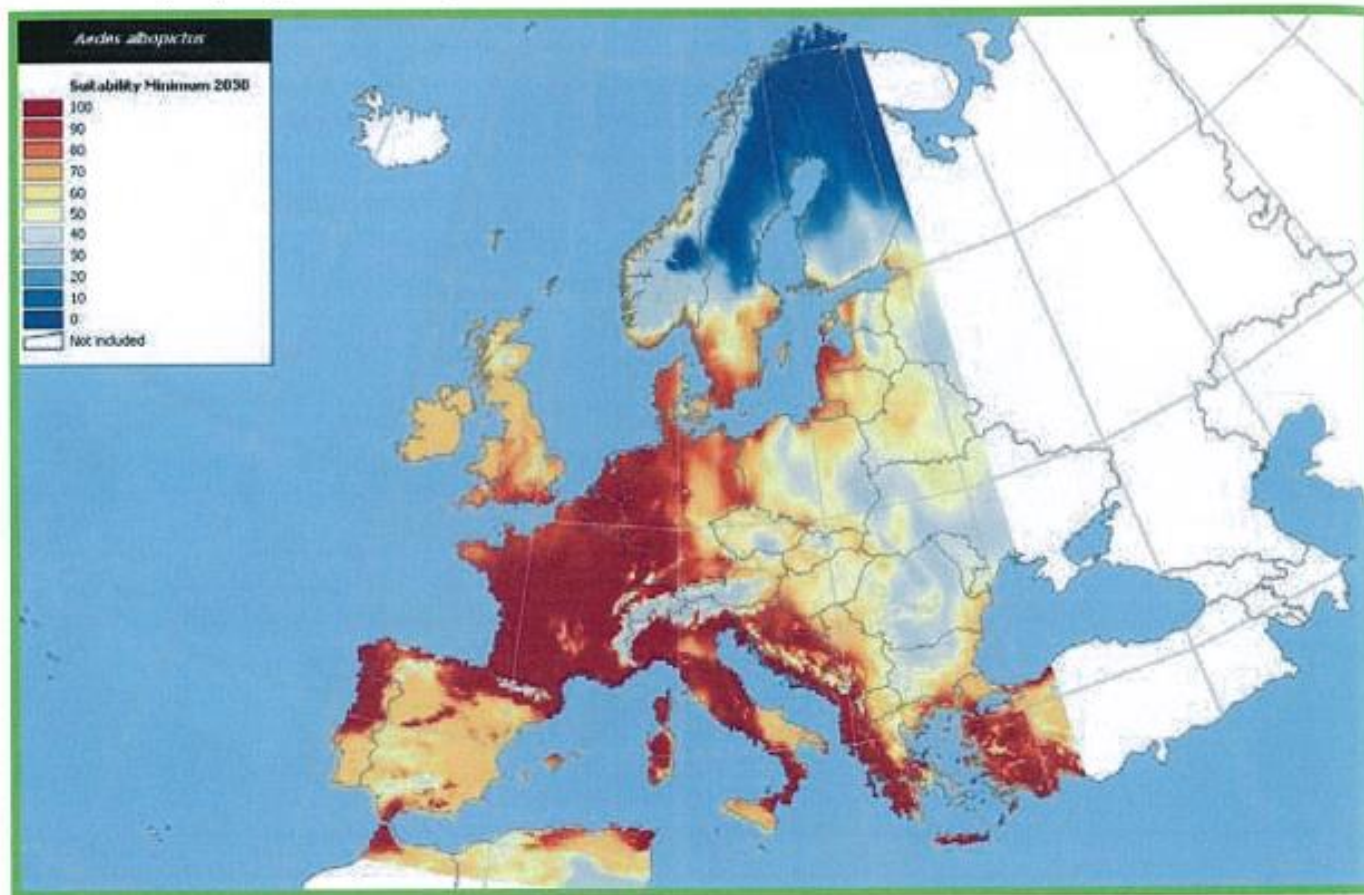
Aedes albopictus
Current known distribution: January 2015*

- Established
 - Introduced
 - Absent
 - No Data
 - Unknown
- Outermost regions
- Azores (PT)
 - Canary Islands (ES)
 - Madeira (PT)
 - Svalbard/Jan Mayen (NO)



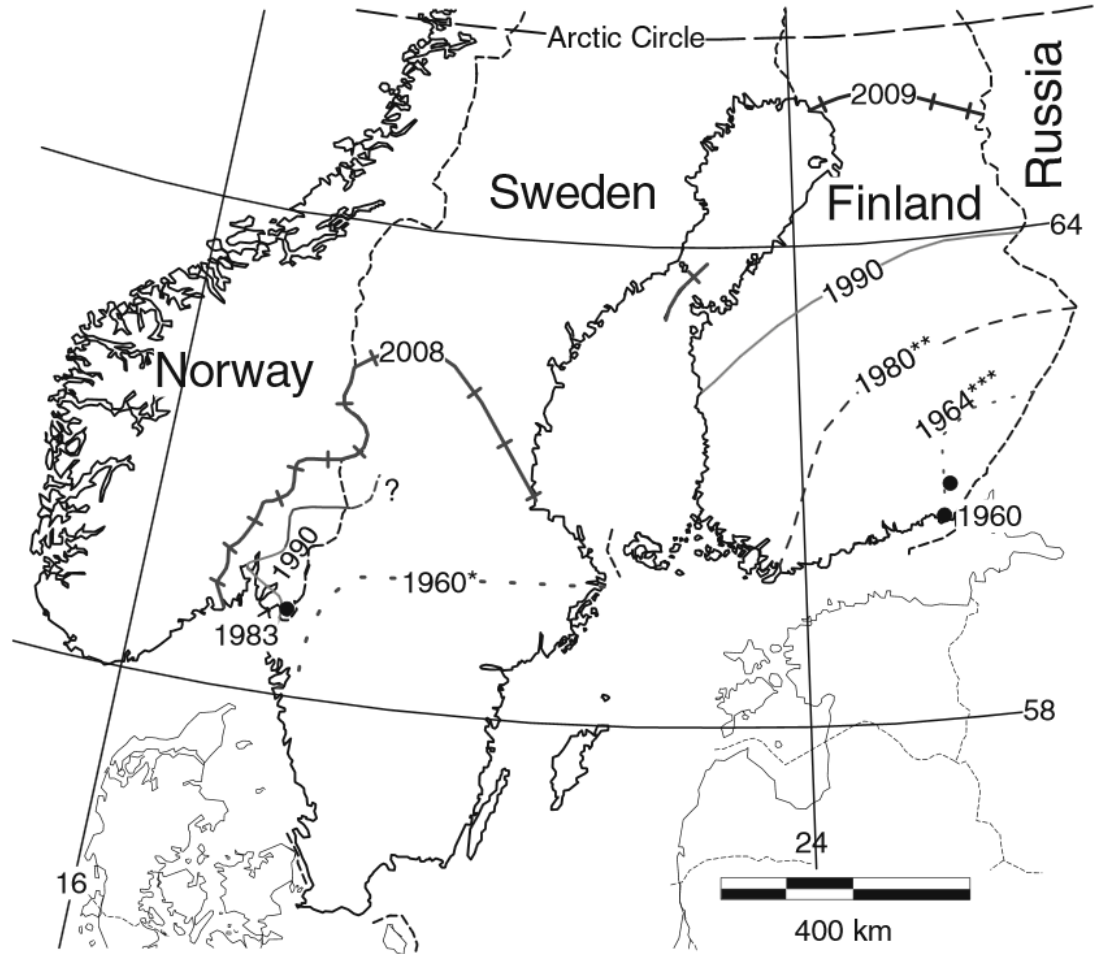
Minimal impact: long-term change scenario

Figure 7b (i). Prospective impact of climate change on *Aedes albopictus* distribution in Europe: minimal impact, long-term change scenario



The minimal impact long-term projections for 2030 show a shift. While the central European zone (as described above) clearly extends in all directions and reaches as far as the Baltic states and even encompasses large parts of southern Sweden, the Balkan zone shrinks, with parts of Romania and Bulgaria now becoming unsuitable.

Deer ked *Lipoptena cervi*



(Välimäki et al. 2010)



Moose nose bot fly *Cephenemyia ulrichi*

Figur 1. Felte elg i Norge 1913–2015

