



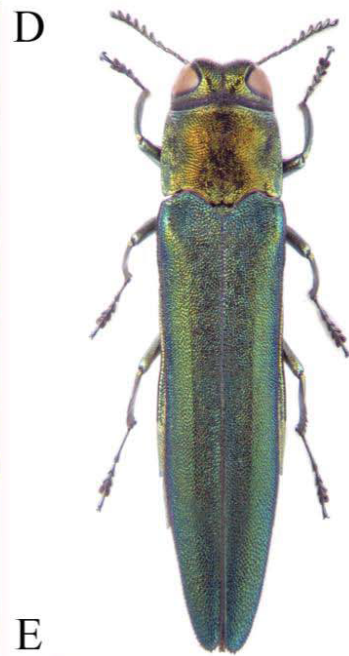
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Agricultural Sciences

Emerald Ash Borer (EAB) approaching eastern EU border: preparing for the worst case scenario

Rimvys Vasaitis, Anders Broberg, Audrius Menkis, Andrey Selikhovkin*, Dmitry Musolin*, Jan Stenlid

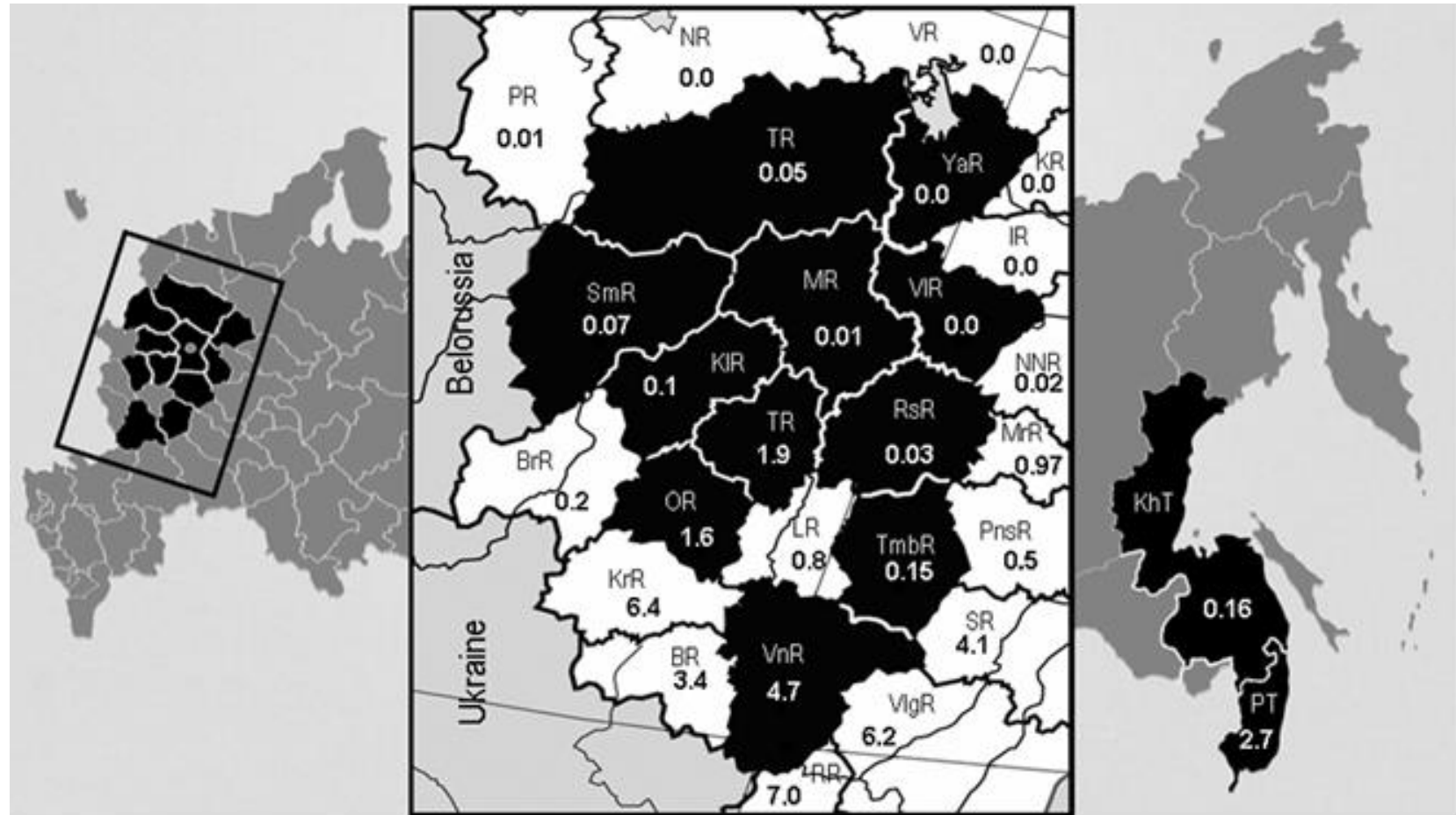
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Musolin, D.L., Selikhovkin, A.V., Shabunin, D.A., Zviagintsev, V.B. and Baranchikov, Y.N. 2017. Between Ash Dieback and Emerald Ash Borer: Two Asian Invaders in Russia and the Future of Ash in Europe. *Baltic Forestry* 23: 316-333.

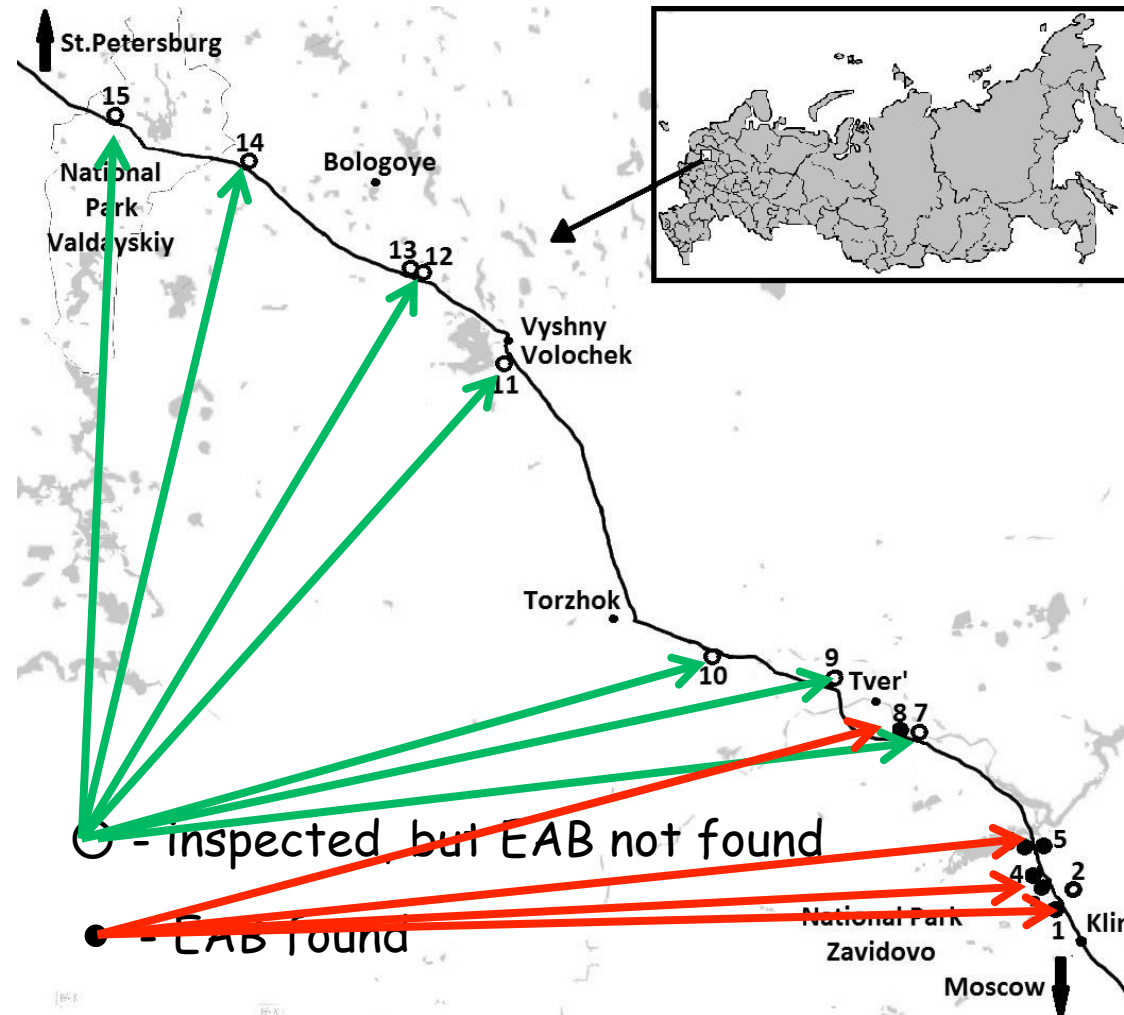
Administrative regions invaded by EAB in Russia in year 2016



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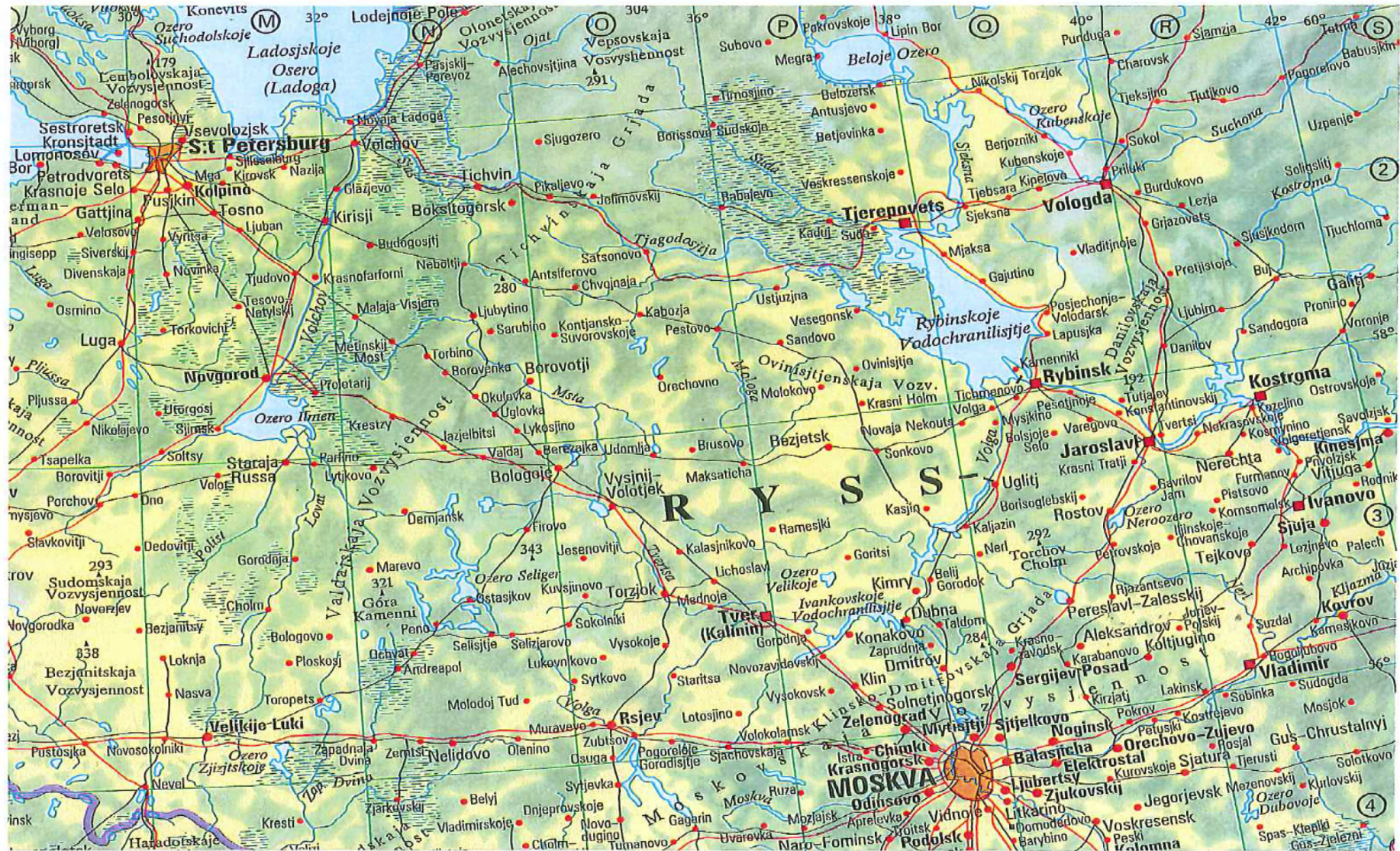
Focusing towards north-west: Moscow - Sankt Petersburg direction

- Aim: to estimate status quo with EAB spread towards north-west, from Moscow to Sankt Petersburg as for year 2016
- St.Petersburg and its suburbs would be very vulnerable to EAB: contain numerous historical parks and alleys with monumental ash trees
- ... but in later decades, ash was commonly planted along federal highway Moscow - St.Petersburg
- As natural occurrence of ash in surrounding forests is scarce, inspecting roadside trees provided excellent opportunity for monitoring EAB spread

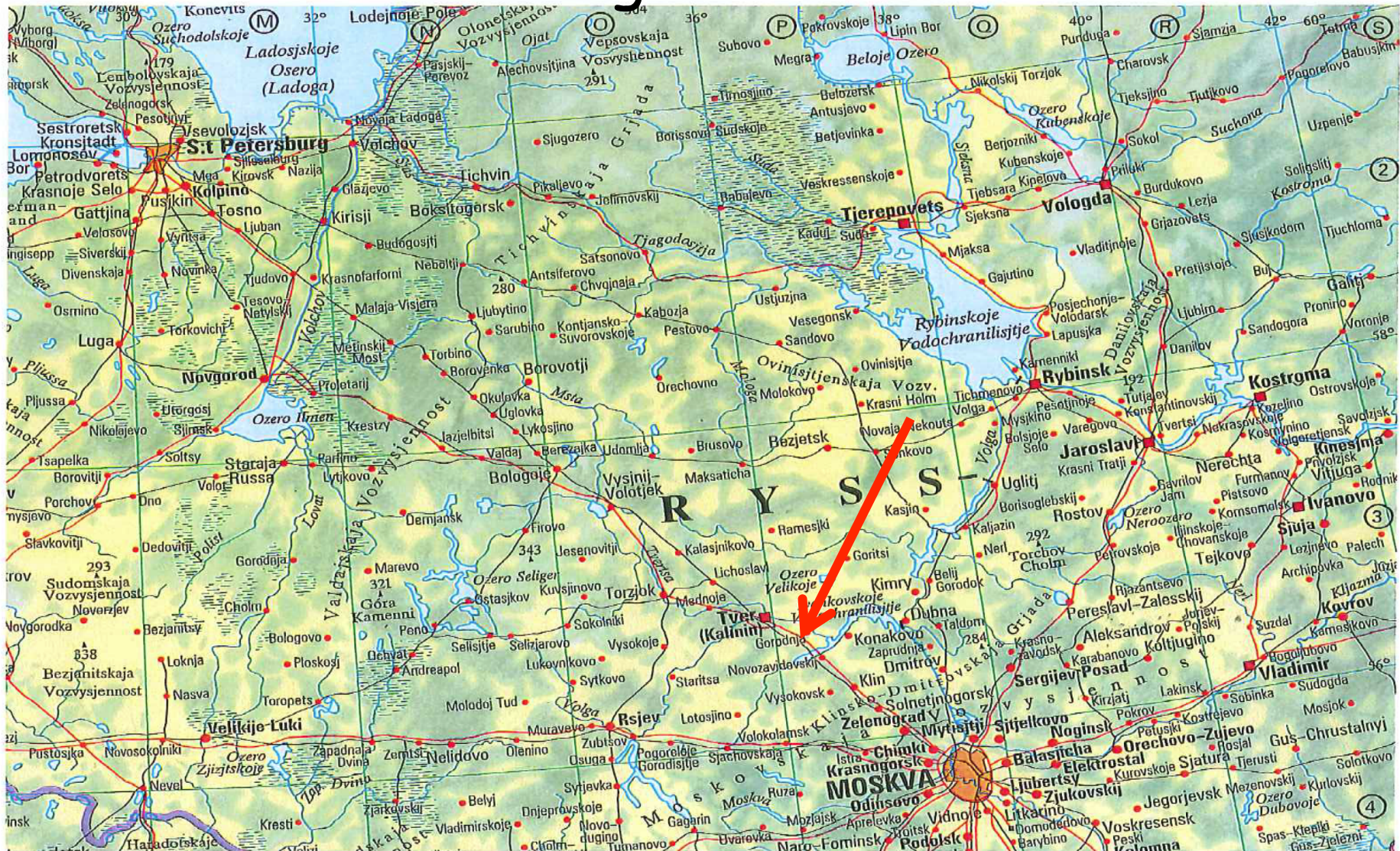


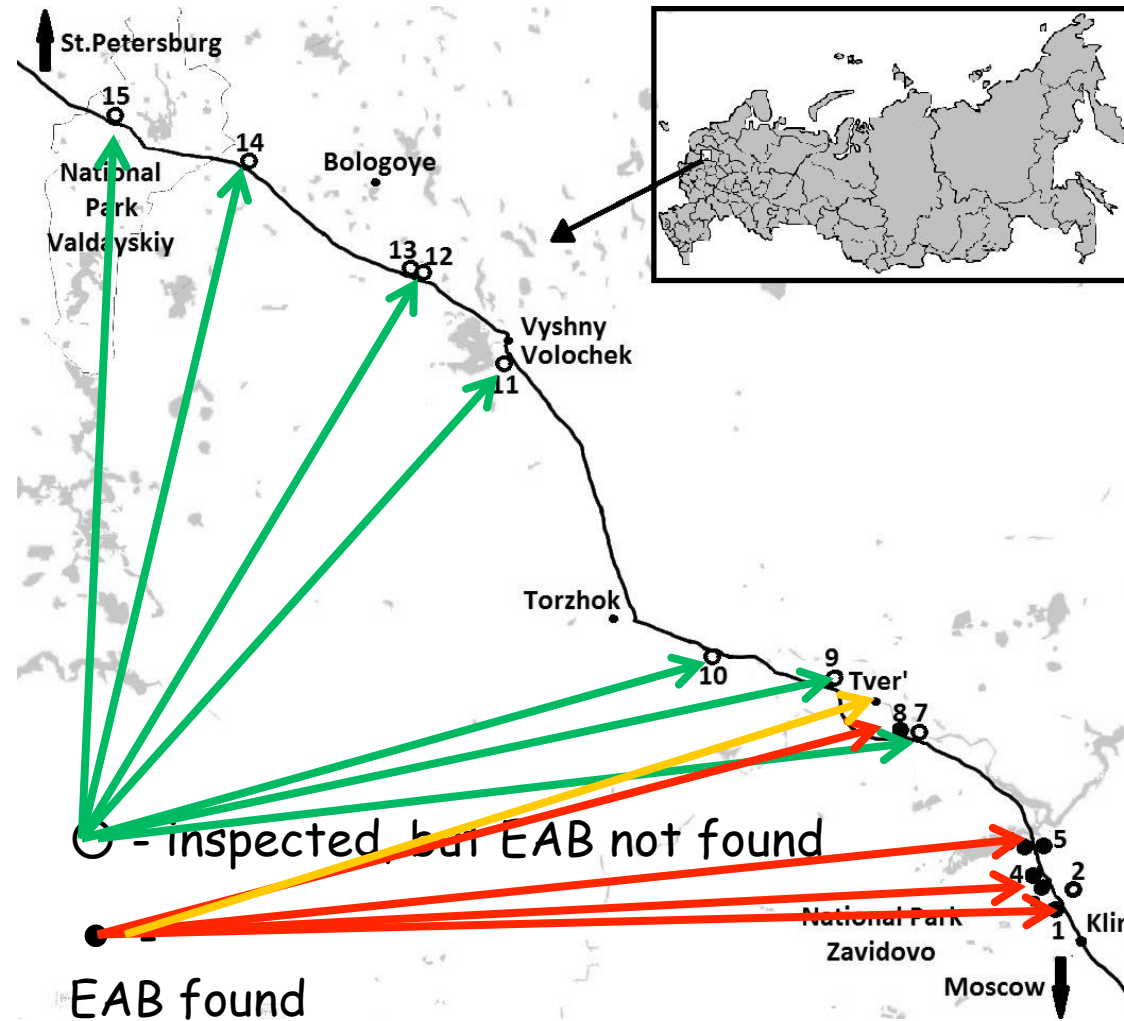
Selikhovkin, A.V., Popovichev, B.G., Mandelshtam, M.Y., Vasaitis, R. and Musolin, D.L. 2017. The Frontline of Invasion: the Current Northern Limit of the Invasive Range of Emerald Ash Borer, in European Russia. *Baltic Forestry* 23: 309-315. (modified)

Where are we with EAB in north-west Russia?



... **here:** approx. 140 km from Moscow & 480 km to St. Petersburg





Selikhovkin AV, Popovichev BG, Mandelshtam MY, Vasaitis R, Musolin DL (2017)
 The Frontline of Invasion: the Current Northern Limit of the Invasive Range of
 Emerald Ash Borer, in European Russia. *Baltic Forestry* 23: 309-315. (modified)

The frontline of invasion: highway Moscow - St. Petersburg



Selikhovkin, A.V. et al. 2017. The Frontline of Invasion: the Current Northern Limit of the Invasive Range of Emerald Ash Borer, in European Russia. *Baltic Forestry* 23: 309-315.

... and a closer look ...



Selikhovkin, A.V. et al. 2017. The Frontline of Invasion: the Current Northern Limit of the Invasive Range of Emerald Ash Borer, in European Russia. *Baltic Forestry* 23: 309-315.

... but in 60's 70's in Soviet (incl. Belarus) mainly *Fraxinus pennsylvanica* was planted along roadsides etc.;

... and now it appears to be the most susceptible ash to the Emerald Ash Borer in USA;

... but (as told, see below) during the recent years *P. pennsylvanica* was planted in Belarus, as deemed to be more resistant to Ash Dieback than *F.excelisior*;

- a possible trap that needs to be monitored?

The worst EAB scenario

- in case if EAB would expand further west: the fate of ash in St. Petersburg and EU countries at risk
- need for measures to be taken to prevent or mitigate eventual impact of such scenario

Possibilities for prevention / eventual control

- i) parasitoids of EAB native to Europe: a candidate is parasitoid wasp *Spathius polonicus*, regularly detected in the remains of *A. planipennis* larvae in Moscow
- ii) level of its parasitism to EAB is high, as >50% of last instar larvae of EAB were inhabited by *S. polonicus*
- iii) thus *S. polonicus* could be suitable candidate for the biocontrol of EAB in Europe;
- iv) search for more natural enemies of EAB native to Europe
- v) role of Belarus?

Prospects?

- studies on EAB in Moscow region: about half of *F. excelsior* were in a good condition and showed no signs of EAB, whereas the other half were in rapid decline
- this suggests that different individuals of *F. excelsior* exhibit different levels of resistance (or attractiveness) to EAB attacks
- there are indications that *F. excelsior* is less prone to EAB than North American species of ash

Recent Moscow example

During last 4 years EAB nearly disappeared from the city and from Moscow suburbs and many of damaged ash are still alive and are regenerating successfully

Seraya L, et al. (2018) Susceptibility of different ash species to Emerald Ash Borer in ash collection of the Main Botanical Garden in Moscow. In: *Proceedings of LIFE+ ELMIAS Ash and Elm Conference, 26 August - 1 September, Uppsala - Visby, Sweden* (ed. R.Vasaitis). Swedish University of Agricultural Sciences, Uppsala p. 75.

The network "Emerald Ash Borer (*Agrilus planipennis*), invasive deadly pest approaching eastern EU border: preparing for the worst case scenario (EMERALD)" has been recently initiated, and currently in action ...

Funded by Nordic Forest Research (SNS)

Main Aim:

to initiate related EU H2020 project proposal, elaborating the basis for the future work to mitigate the effects of eventual invasion of EAB to European Union

Initiated Consortium now includes: Sweden, Finland, Russia, Estonia, Latvia, Lithuania, Austria, Hungary, Scotland, Ireland, England;

Associated countries: Russia, Belarus, Ukraine;

Contacts in Belarus:

Prof. Zviagincev, but we need more support, and especially from the Belarus Forestry Authorities;
... and here You are 😊

... all of interest for monitoring, from Russian border to Belovezh, closing Poland;

... so please contact me if interested to be in the project and could support this initiative, thank you;

From: Звягинцев В.Б. <mycolog@tut.by>
Sent: Saturday, October 13, 2018 12:33 PM
To: Rimvydas Vasaitis
Subject: Re: Belarus H2020 contact

Dear Dr. Vasaitis,

Thank you for your offer!

We are very interested in participating in such a project, because it seems that Belarus will become the next country in Europe which *Agrilus planipennis* will penetrate. The problem of invasion of Emerald Ash Borer in our country is expected to be particularly difficult, because over the past decade the country's forestry enterprises spontaneously switched to growing *Fraxinus pennsylvanica* in the forests. It is related to the fact that this species is more resistant to *Hymenoscyphus fraxineus*, comparing with European ash. According to known data american ashes are preferred species for Emerald Ash Borer.

Topics to be addressed:

- i) EAB monitoring, detection and containment (border RU/Belarus / EU);
- ii) selection and GPS-mapping databases of vigorous ash in attacked areas in WE-RU & Belarus;
- iii) study interactions between ADB & EAB;
- iv) analyses of biochemical traits of affected vs. non-symptomatic ash;
- v) sampling ash plant material in European populations of ash, checking for those hypothetical traits, creating databases;
- vi) including those latter in future breeding & propagation programs;
- vii) establishing "sentinel" plantations;
- viii) establishing facility for search and ev. propagation of EAB biological control agent native to Europe; etc., etc. ...

Biochemistry

- basis for such resistance unknown, but biochemical properties of individual trees in this respect cannot be excluded
- in North America numerous studies have been published on biochemical mechanisms potentially contributing to ash resistance to EAB
- in this respect, native host Manchurian ash appeared to possess specific traits than ash species native to North America
- regarding European ash, the respective data are not available
- such data could provide valuable insights for future selection, breeding and eventual hybridization of European ash tolerant / unattractive for EAB

Aims of initiated network of Nordic Forest Research (SNS)

- intended / planned project proposal is to conduct a pilot study and to elaborate the basis for the future work to mitigate the effects of eventual invasion of EAB to EU
- eventually, it will involve continuous checking of transmissibility of EAB, investigating options for its biological control and biochemical mechanisms of tree resistance to provide visions for resistance breeding

Objectives:

- i) in European Russia, monitoring spread of EAB & perform "alert" monitoring on Eastern EU borders with forestry authorities of Russia, Ukraine, Belarus, Baltics;
- ii) search for existence of symptomless Ash in EAB-infested areas, GPS-map trees, collect plant material for biochemistry & propagation;
- iii) population genetics of EAB in advancing front (European Russia) and its native environment (Asian Far East);
- iv) search for potential European biological control agents against EAB and setting tests for their rearing;
- v) study biochemical traits of ash that could contribute for EAB-resistance mechanisms & visions for further breeding

Thank you!