Latest knowledge on the epidemiology of African swine fever in Hungary

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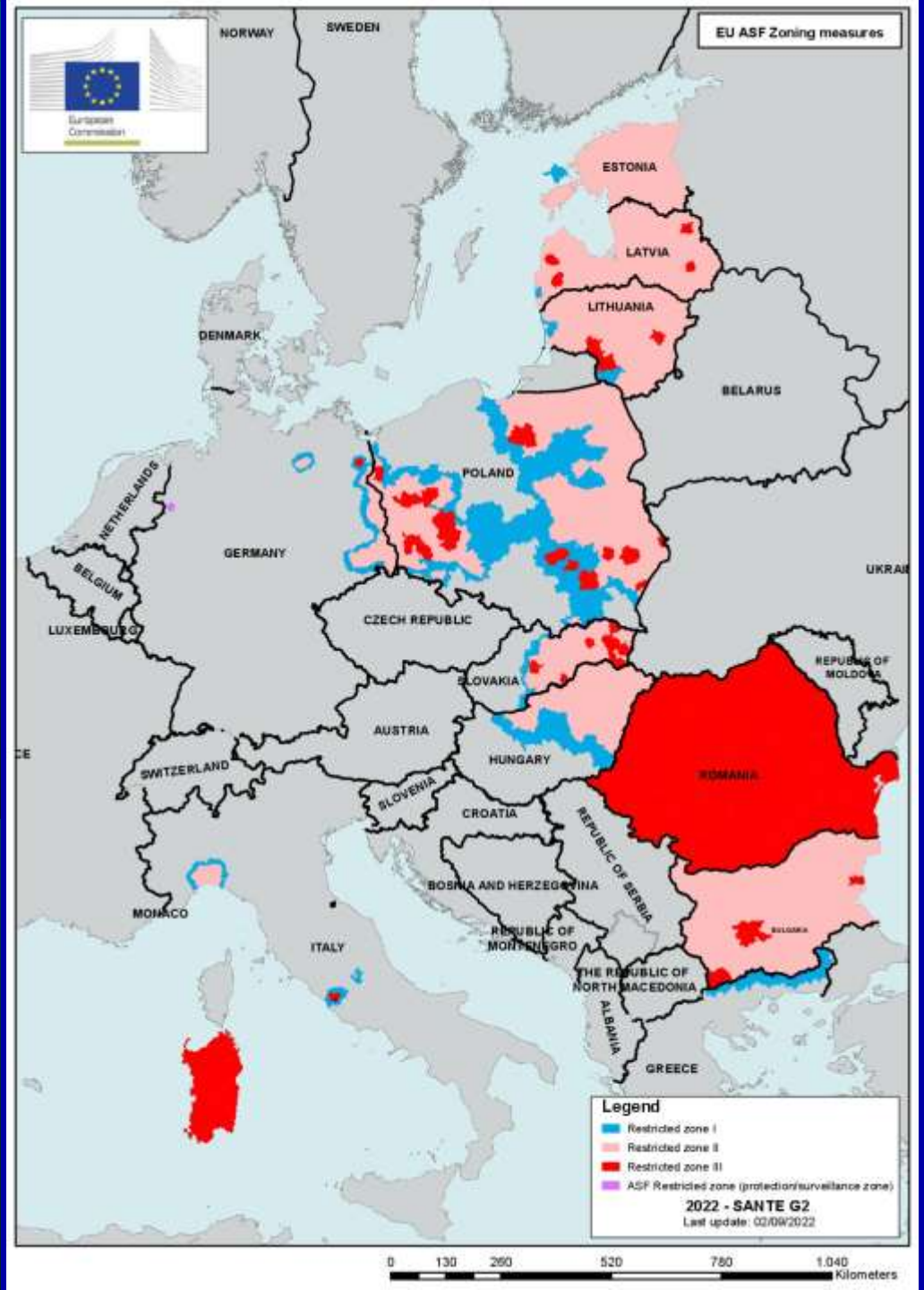
Humorous motto free after Jenő Rejtő

- African swine fever is coming! It always starts like this! Watch out! Attention!
- The veterinary officer in charge of epidemiological management calculates everything carefully, with foresight, precision and finality.
- The veterinary officer sits back, satisfied, because the Contingency Plan is ready, whatever happens, there is a procedure for it.
- And then comes African swine fever! Suddenly what was clear and simple is no longer so.
- But a real administrative professional is not afraid to take up the fight. The only problem is that this is always more difficult in practice than in theory!

Restricted areas in the EU due to ASF



What does the document "Strategic approach to the management of African swine fever for the EU" (SANTE/7113/2015) say about the problem caused by ASF and the wild boar population

- ASF is **considered as a major and unprecedented animal health issue that world has ever faced**.
- The **prevention, control and eradication** of ASF, is a matter of high priority for the EU as **it represents a serious risk for** an important sector of **pig farming, the wild boar population** and the **environment.**
- The **wild boar population in several regions of Europe increased** substantially **in recent decades** and this **plays an important role in the spreading and maintaining this disease**.

Before our story started 1.

- Before the beginning of our story, Hungary was one of the lucky countries that could claim to **have never had an outbreak of African swine fever**.
- When African swine fever **genotype II** was introduced into **Georgia in 2007** and spread widely from there through **Russia to Belarus and Ukraine**, we could have foreseen that **this favourable situation was likely to change soon.**

Before our story started 2.

- In the north-east of the European Union, **ASF first appeared in Lithuania in 2014**, followed by **Poland, Latvia and Estonia**, and we knew it was **only a matter of time before it would be introduced to us**.
- Therefore, in **February 2014**, the **National Classical Swine Fever Expert Group was transformed into the National Classical Swine Fever and African Swine Fever Expert Group** and made **recommendations** mainly on the surveillance system, furthermore the **Chief Veterinary Officer (CVO) issued instructions regarding ASF.**

Professional work based on risk analysis begins

- The **CVO established** the **ASF Risk Analysis Working Group** in **September 2017** on the recommendation of the National CSF and ASF Expert Group.
- At that time, **Hungary was free** of the disease, but **ASF was present in the Transcarpathian** region of neighbouring **Ukraine**.
- Since the working group had a **relatively large number** of **experts**, **they established the principles** and the **ASF Risk Analysis Action Group** was created within the working group in order to work efficiently.

The Hungarian ASF risk assessment system is established 1.

- In early **February 2018**, the **Action Group formulated a detailed proposal** on
- - **identifying the risk** of the **introduction of ASF** to the country and
- - the **determination of areas** of the country **with high, medium and low ASF risk.**

The Hungarian ASF risk assessment system is established 2.

During this work the followings were taken into consideration:

- The estimated wild boar population and density of wild boars
- The hunting units (its border and territory)
- The density of domestic pig population
- Land coverage (forests)
- Public road net
- Number and distance of reported ASF domestic pig outbreaks and wild boar cases in neighbouring and other nearest countries
- Possibility and speed of spread of the disease by wild boars
- Possibility of spread by other means (human factor, etc.)
- Natural and artificial borders (barriers)

ASF risk analysis system, main conclusions 1.

- The **wild boar population play an important role** in the **risk analysis** of the **introduction** of the disease, since the **disease was officially present in wild boar in Transcarpathia** (Ukrainian region neighbouring Hungary).
- According to data from the European Food Safety Authority (EFSA) **the disease spreads further slowly** (1-2 km in a month), **but continuously, even without human interaction**
- The **Action Group assumed that** in **those hunting grounds where the wild boar population density is higher**, the **sharing of food resources is more necessary** and the **number** of **animal-to-animal contacts is higher.**

ASF risk analysis system, main conclusions 2.

- It is **more likely that the disease to appear in high density areas**, and it is **also more likely to spread from the infected populations of the high density areas to healthy ones nearby**.
- The **risk** posed by ASF **also depends on the distance to the confirmed cases in wild boars or outbreaks in domestic pigs**.
- The most **realistic picture of the level of risk** of ASF in some areas of the country **can be obtained by excluding major jumps that may occur due to random events** (mainly human factors), which **cannot be reliably predicted in advance**

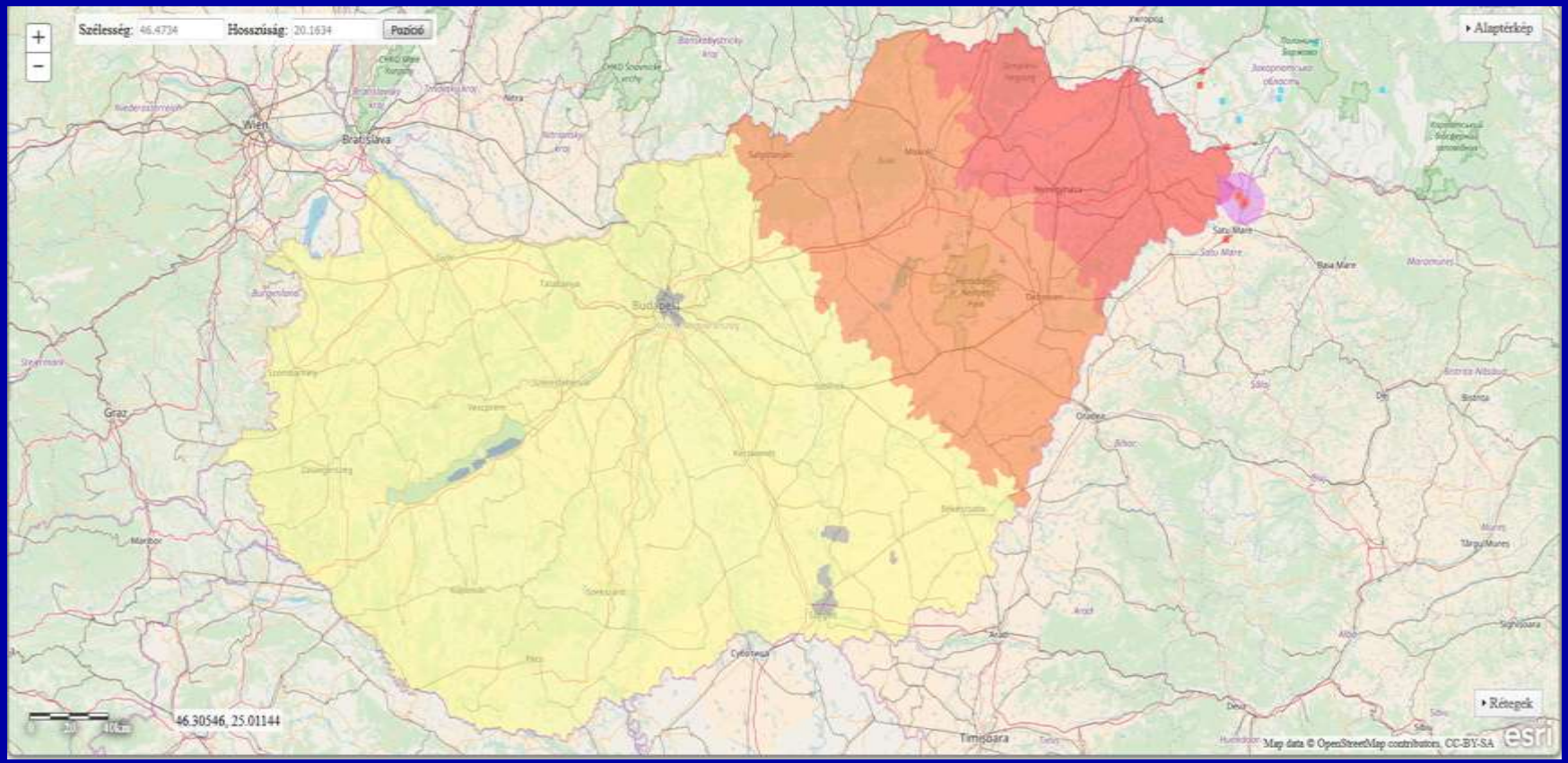
ASF risk analysis system, main conclusions 3.

- To **determine the distance from the cases or outbreaks to be considered in a risk analysis**, the **analysis of the cases in the Czech Republic confirmed in 2017 provided a good basis**, as they were **close in geographically and in time to each other** and likely the wildlife characteristics did not differ significantly from the Hungarian wild boar population.
- The **Czech cases was found** at a **large distance from other cases or outbreaks,** and it can be **assumed that it originated from a single source.**

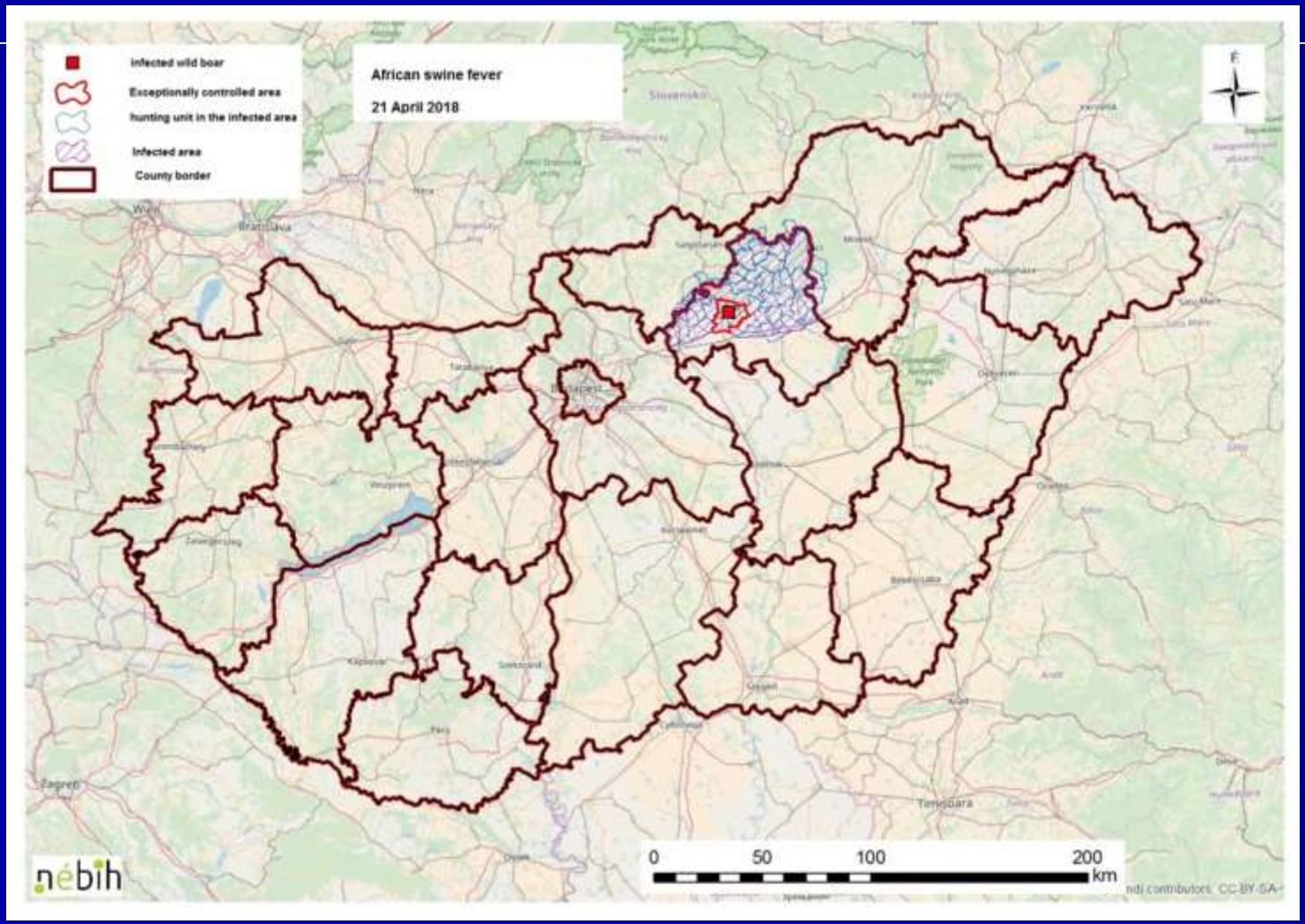
ASF risk analysis system, main conclusions 4.

- When **analysing the distance between all cases** detected between 21.06.2017 and 26.09.2017 in the Zlínský region of the Czech Republic, the **maximum distance between two cases was 16 km**. **Rounding this upwards, we calculated and calculate a distance of 20 km by default.**
- The **most appropriate method for defining** high and medium **risk areas**, and from April 2018 also for defining extremely high risk (infected) areas, **is a risk analysis based on data on the density of wild boars per hunting unit** and **distances from confirmed cases or outbreaks**.

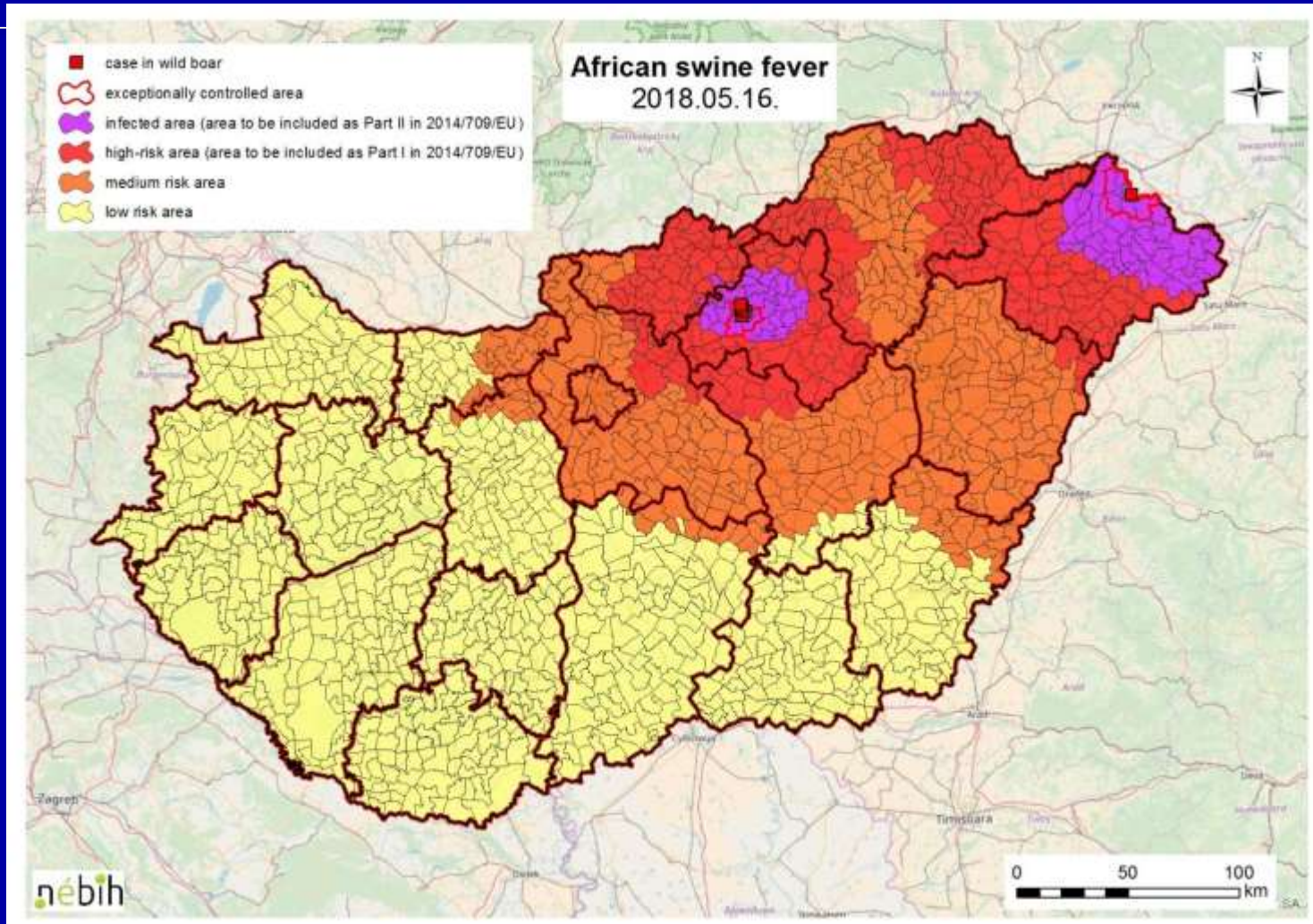
ASF risk areas in February 2018



The first ASP case in Hungary – 21.04.2018.



Official ASF risk areas after the infection of Szabolcs-Szatmár-Bereg County (May 16, 2018)



ASF risk analysis – practical implementation 1.

First level

- We use an **own algorithm running in an R software environment** to **identify extremely high risk (infected), high risk and medium risk hunting management units** (the low risk area classification was discontinued following the proposed decision of the Expert Group meeting in December 2019).
- The **algorithm defines these areas based on the density of wild boars** in the hunting management units **and the distance of the hunting management units from the wild boar cases** in Hungary, and from wild boar cases near the Hungarian border
- For **interactive visualisation** we use **QGIS software**

ASF risk analysis – practical implementation 2.

Second level

The **Expert Group will make the final decision taking into account other important factors** such as **effective natural and artificial barriers**, **epidemiological information**, in particular the **geographical location of new cases** in relation to previous cases, **the distance of new cases** from the **boundary of the infected and high risk area**

Update

We **updated** the risk analysis for **any significant change in the epidemiological situation**

Modification of the system

If justified by practical experience

ASF risk analysis – practical implementation 3.

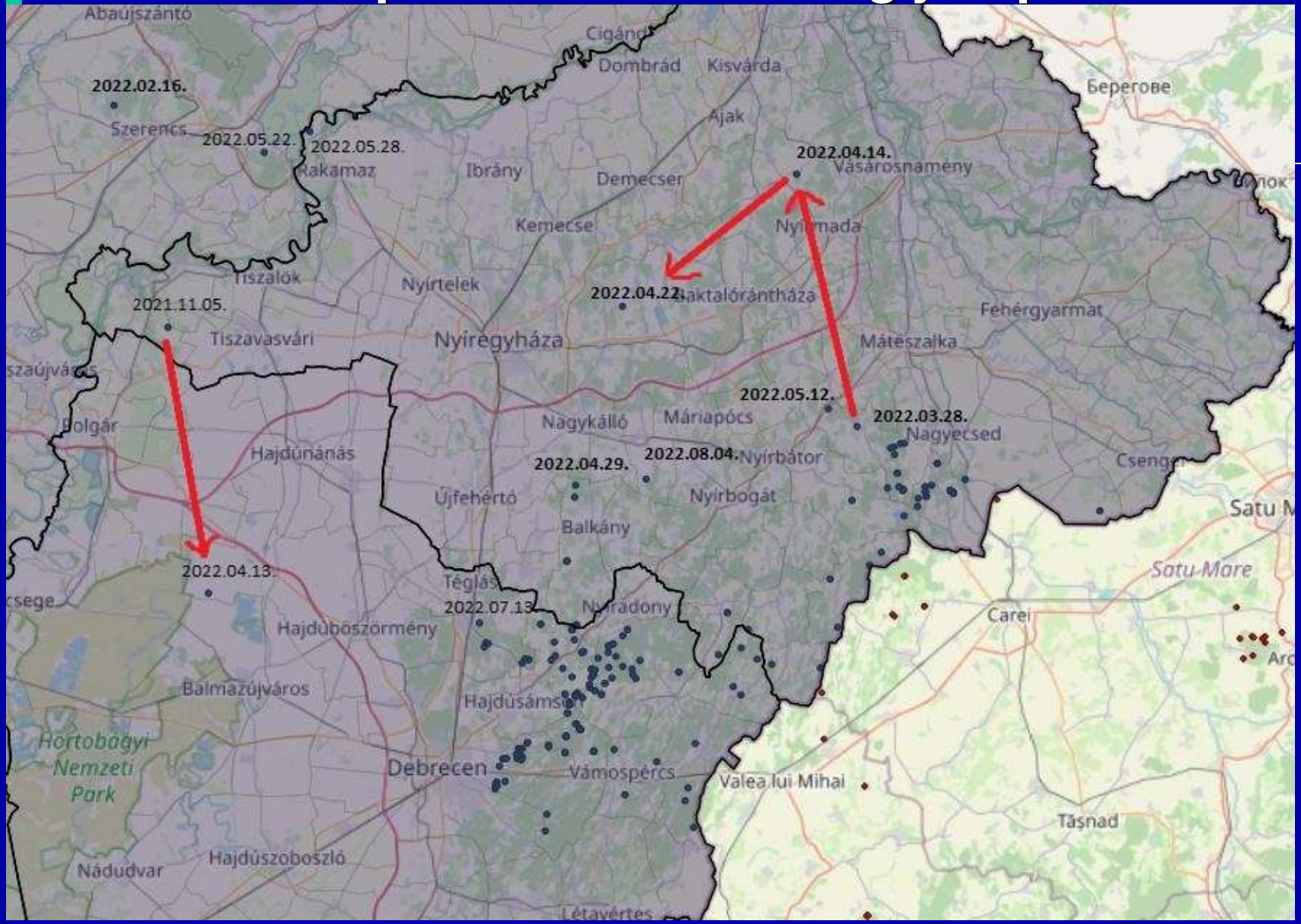
The most important modifications of the risk analysis system

- In 19 **July 2021** it has been proposed that **administrative decisions should then be based on a risk analysis taking into account cases within one year** (last year). It was preceded by a comprehensive retrospective study. It was necessary because we had taken into account all the cases that had occurred until then, so the risk would never have decreased or disappeared.
- In 17 **August 2022** the **existing risk analysis has been supplemented with a second step**, in the **case of hunting management units that could be reclassified from extremely high risk to high risk** based on the first (original) step.

Adding a new second step to the ASF risk analysis 1.

- In the **current hunting year**, there have been a few occasions within the infected area where **the distance between a new case and the nearest case within one year was much greater than usual** (large jumps of **at least 20 km**).
- This **could be a problem** if the **ASF risk of hunting management units close to such a new case had decreased prior to the big jump**, and therefore **a proposal was made to reclassify these units** from infected **to high risk.**

Map - Cases with a big jump



Adding a new second step to the ASF risk analysis 2.

- In order to ensure that **the proposal for reclassification to high risk does not have to be changed in the foreseeable future,** the **algorithm should consider in a new step the distance of the cases within one year from the units proposed to be reclassified** from an infected area (extremely high risk) **to a high risk area.**
- **If cases have occurred within one year and within a certain radius**, the **algorithm recommends keeping the affected hunting management units in the infected area** (extremelyhigh risk) instead of reclassifying them as high risk.

Adding a new second step to the ASF risk analysis 3.

- After a comprehensive analysis, the **Risk Analysis Action Group decided to add a second step to the current risk analysis system**, where the **algorithm examines whether cases within one year have occurred within 30 km radius of the border of the units proposed to be reclassified** from an infected area (from extremely high risk) **to high risk. If yes, the infected** (extremely high risk) **area remains**.
- This **procedure provides more reliability** than before for possible area reductions, while **at the same time providing an appropriate level of risk reduction** for this risk analysis.

The effectiveness of ASF risk analysis so far

- The **effectiveness of the risk assessment is well characterized by the fact** that **more than 99.9 percent of all ASF cases confirmed in wild boars** in Hungary until September 5, 2022 **were found within the infected area.**
- Moreover, from **January 1, 2021, all confirmed wilde boar cases occurred within the infected area**.
- We **have improved this already extremely effective system even further** by **introducing the new second step**

Surveillance system in general

- The surveillance system is **designed to detect diseases**, preferably early, or **to prove that a disease is not present**. There are **two types**:
- **passive (general)** surveillance, and
- **active (targeted)** surveillance
- The **classical form of passive** surveillance involves only investigations of suspected cases confirmed by the authority, but it is **less reliable**
- We can **also talk about a so-called enhanced passive surveillance** system, where we **also examine animals where the suspicion has been ruled out** by the authorities, but **there are clinical signs or pathological lesions associated with the disease**, or **they have simply died without the suspicion** being raised
- **Active surveillance always involves** the examination of **clinically healthy animals** or **animals without suspicious pathological lesions** according to a **pre-established pattern**

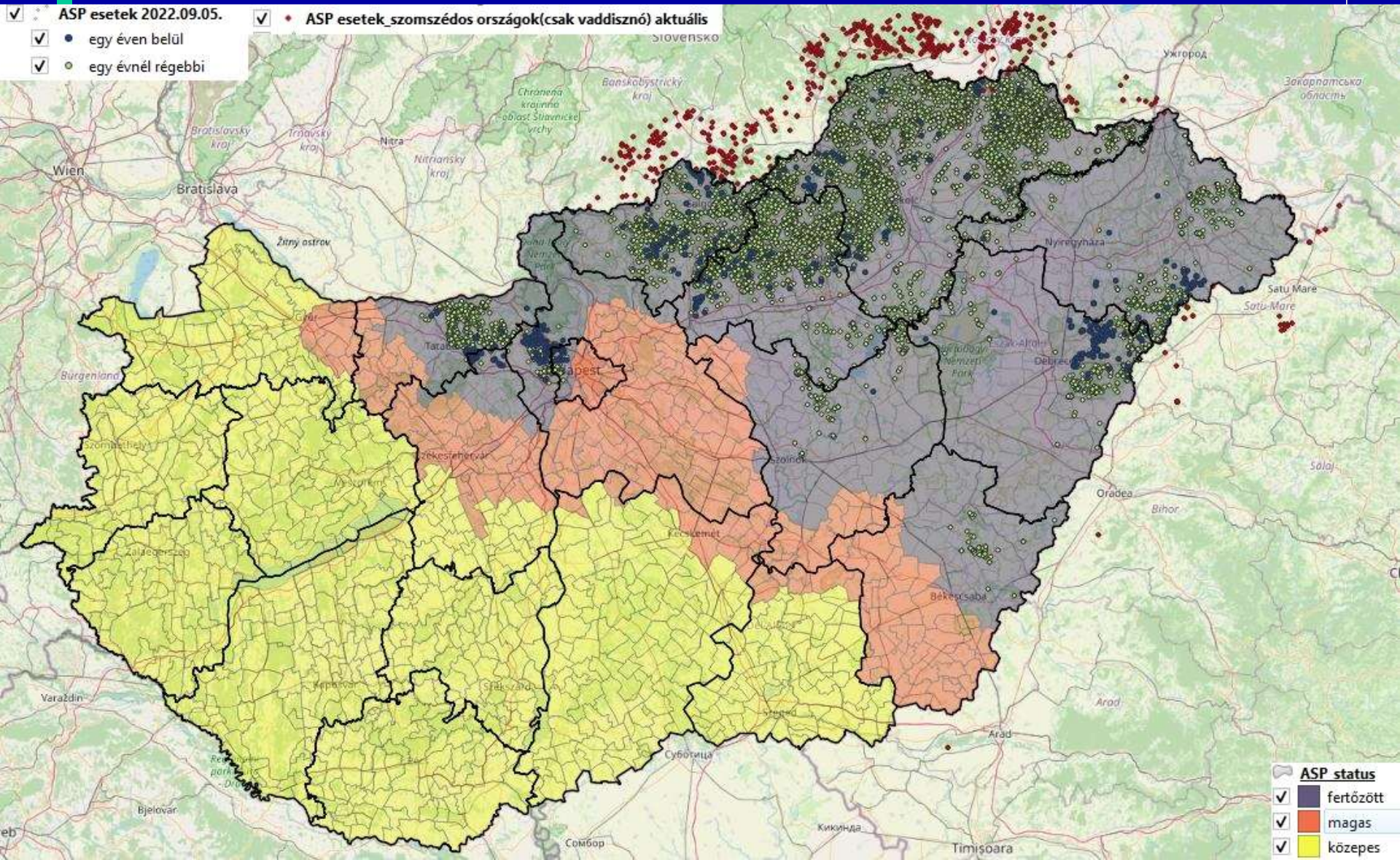
Surveillance system for ASF

- In the case of **ASF, enhanced passive surveillance is the first priority**, as **ASF is not really a highly contagious disease**. Only **around 10%** of the population **becomes infected and sick** within 2 weeks of the **first introduction**, but **almost all sick animals die**.
- Because of the above, **active surveillance is less certain**, and **in most cases late in detecting** the presence of the virus
- However **active surveillance is also necessary in wild boars**, especially in infected and high risk areas, although it is of less importance for early detection in itself, but **it increases the reliability of the surveillance system in view of the difficulties in finding dead wild boars**. In **high risk areas, it allows the use of carcasses of shot wild boars** in case of **negative PCR result** (!).

ASF surveillance system for wild boars

- **In addition to officially confirmed suspicion**, e**nhanced passive surveillance** requires virology (PCR) testing of
  - **all dead wild boars**, i**ncluding** those **died due to a traffic accident**
  - **all wild boars shot due to clinical signs**
- Annex IV to the **ASF Contingency Plan contains detailed guidance on the official confirmation of suspicion** of ASF/ CSF
- **Active surveillance means virological (PCR) testing** for ASF in **wild boars that appear clinically healthy** and are **shot during culling or hunting.**
- The **ASF Eradication Plan** has a **separate chapter on passive and active surveillance per risk category**

Official risk areas in Hungary with Hungarian and foreign wild boar cases until 05.09.2022



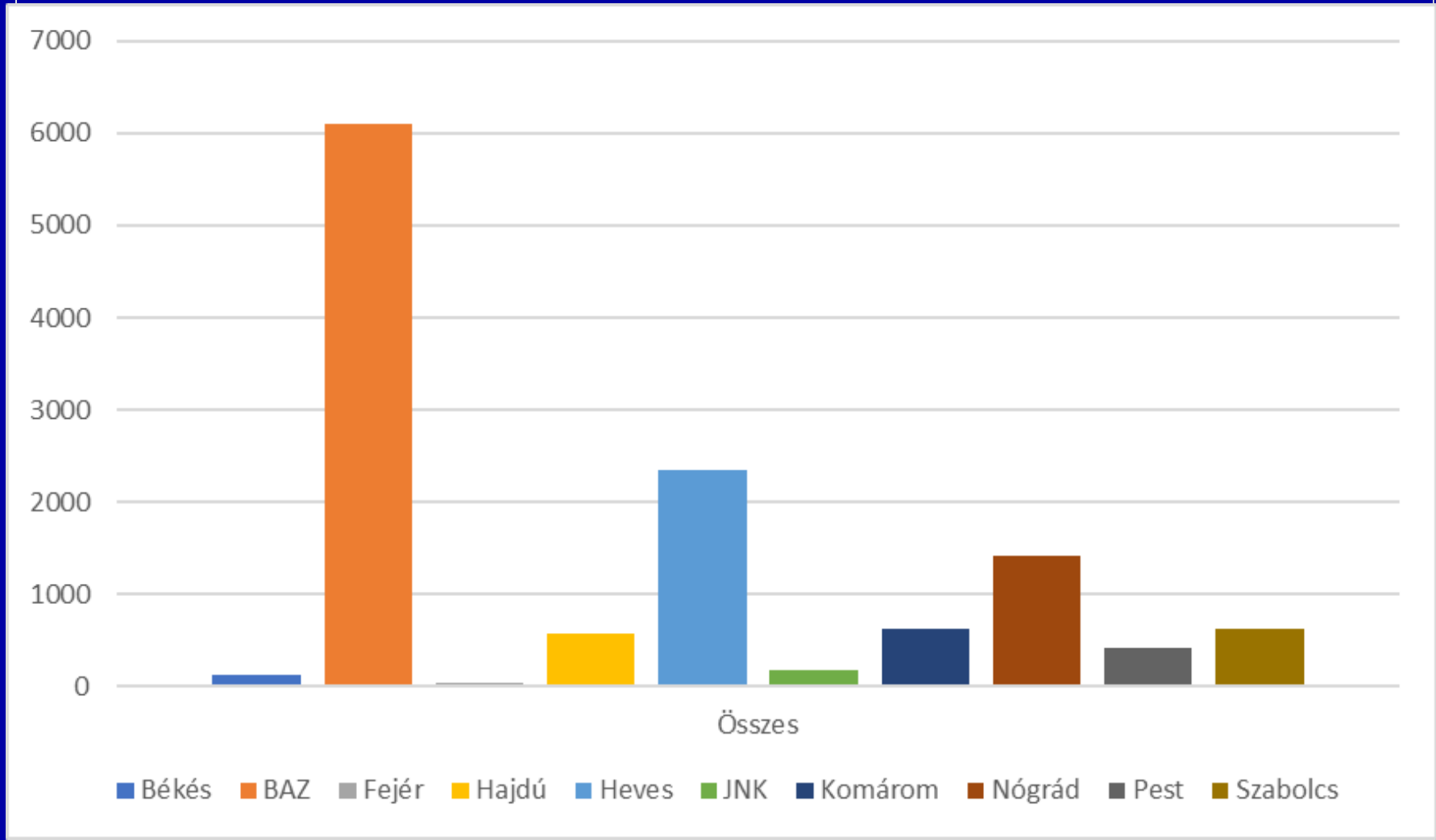
Counties infected with ASF in Hungary, the first and last cases (in wild boar)

County (in order of confirmation)	First case		Last case	
	Date	Category	Date	Category
Heves	21.04.2018.	dead	---	---
Szabolcs-SZ-B	16.05.2018.	dead	---	---
Borsod-A-Z	02.10.2018.	shot (culling)	---	---
Nógrád	28.10.2018.	dead	---	---
Hajdú-Bihar	29.04.2019.	dead	---	---
Jász-N-SZ	30.08.2019.	dead	21.11.2020.	dead
Pest (1st wave)	28.09.2019.	dead	23.07.2020.	dead
Békés	09.12.2019.	dead	06.07.2020.	dead
Komárom-E	15.02.2020.	dead	---	---
Fejér	10.08.2021.	dead	14.05.2022.(FEJ) 05.06.2022.(KOM)	shot (cull.) dead
Pest (2nd wave)	23.10.2021.	shot (culling)	---	---
Jász-N-SZ (2)	28.01.2022.	dead	28.01.2022.	dead

Table of all wild boar ASF cases till 05.09.2022

County	Passive surveillance		Active surveillance	All cases	Passive surv. %
	Total	Dead from that			
Békés	108	107	12	**120**	**90,00**
Borsod-A-Z	5317	5276	793	**6110**	**87,02**
Fejér	38	38 (31 KOM VGE)	3 (1 KOM VGE)	**41**	**92,68**
Hajdú-Bihar	383	373	179	**562**	**68,15**
Heves	1896	1880	445	**2341**	**80,99**
Jász-N-K	154	149	26	**180**	**85,56**
Komárom-E	485	478	135	**620**	**78,23**
Nógrád	1058	1058	353	**1411**	**74,98**
Pest	308	276	98	**406**	**75,86**
Szabolcs-Sz-B	492	484	126	**618**	**79,61**
HU total	**10239**	**10119**	**2170**	**12409**	**82,51**

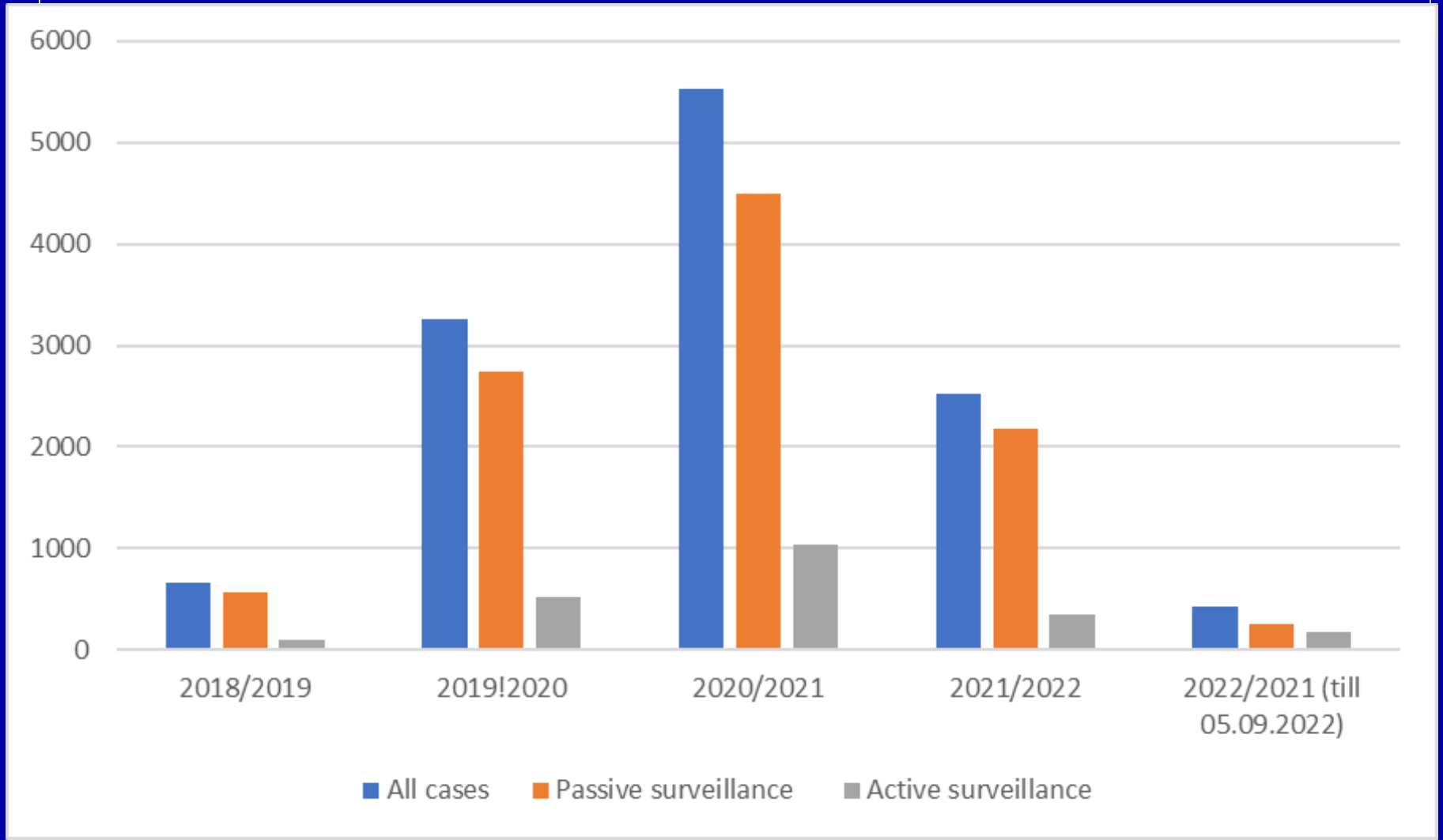
All ASF cases in wild boars by county till 05.09.2022.



ASF cases in Hungary by hunting year, until 05.09.2022

County	Passive surveillance		Active surveillance	All cases	Passive surv. %
	Total	Dead from that			
2018/2019.	563	553	98	**661**	**86,17**
2019/2020.	2748	2703	515	**3263**	**84,22**
2020/2021.	4500	4464	1033	**5533**	**81,33**
2021/2022.	2171	2156	349	**2520**	**86,15**
2022/2023. (05.09.2022.)	257	243	175	**432**	**59,49**
Total so far	**10239**	**10119**	**2170**	**12409**	**82,51**

ASF cases in wild boars in Hungary in the last 4 hunting years and this hunting year



The 2021/2022. hunting year ASF cases

County	Passive surveillance		Active surveillance	All cases	Passive surv. %
	Total	Dead from that			
Békés	0	0	0	**0**	--
Borsod-A-Z	803	799	85	**888**	**90,43**
Fejér	10	10 (8 KOM VGE)	2 (1 KOM VGE)	**12**	**83,33**
Hajdú-Bihar	85	85	29	**114**	**74,56**
Heves	488	487	79	**567**	**85,84**
Jász-N-K	1	1	0	**1**	**100**
Komárom-E	218	217	27	**245**	**88,98**
Nógrád	444	444	81	**525**	**84,57**
Pest	32	26	16	**48**	**66,67**
Szabolcs-Sz-B	90	87	30	**120**	**75,00**
HU total	**2171**	**2156**	**349**	**2520**	**86,15**

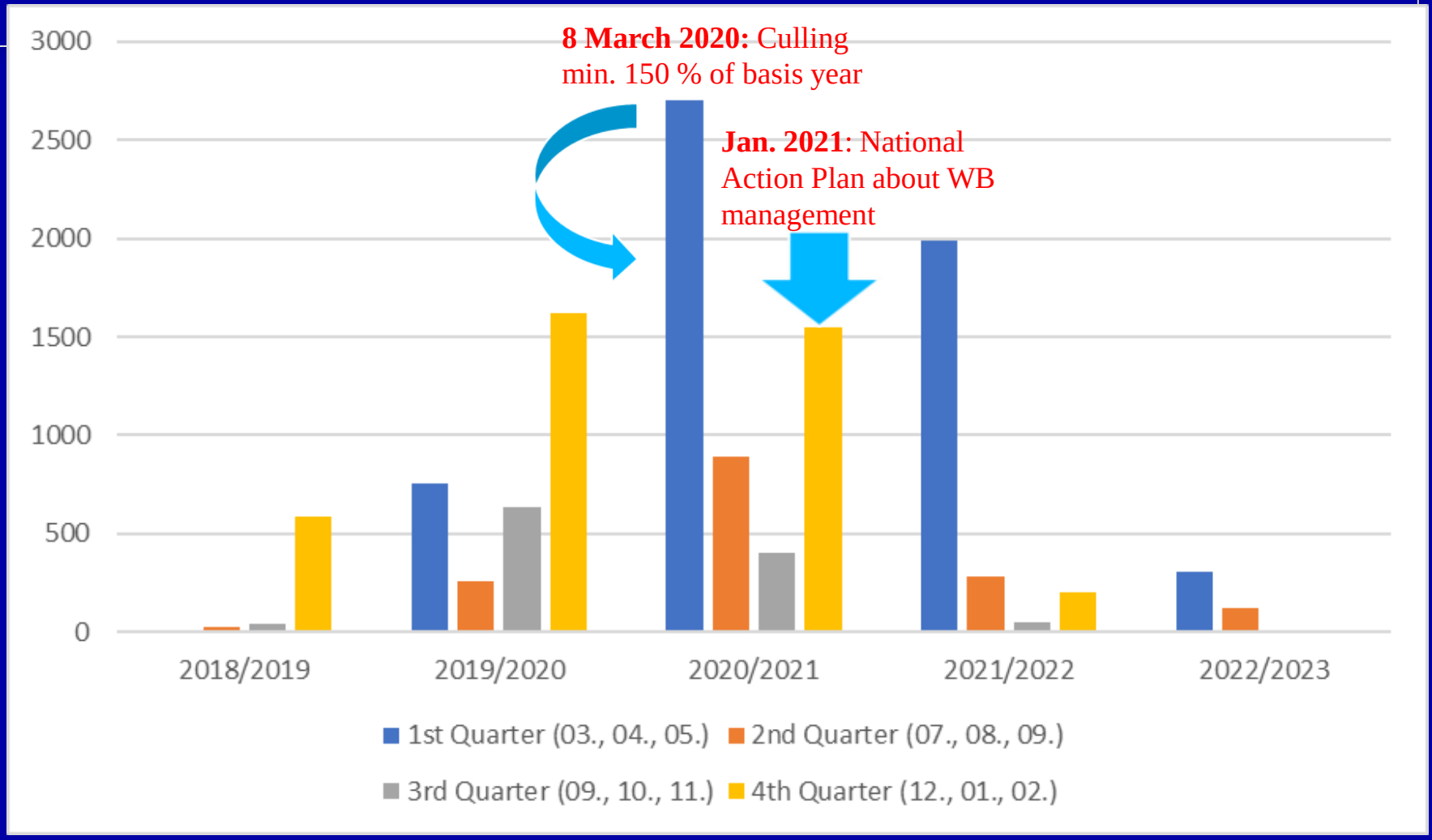
ASF cases in hungary in this hunting year (till 05.09.2022.)

County	Passive surveillance		Active surveillance	All cases	Passive surv. %
	Total	Dead from that			
Békés	0	0	0	**0**	**--**
Borsod-A-Z	29	29	13	**42**	**69,05**
Fejér	28	28 (23 KOM VGE)	1	**29**	**96,55**
Hajdú-Bihar	63	63	53	**116**	**54,31**
Heves	34	34	6	**40**	**85,00**
Jász-N-K	0	0	0	**0**	**--**
Komárom-E	2	2	9	**11**	**18,18**
Nógrád	29	29	32	**61**	**47,54**
Pest	52	38	42	**94**	**55,32**
Szabolcs-Sz-B	20	20	19	**39**	**51,28**
Hu total	**257**	**243**	**175**	**432**	**59,49**

Lessons learned for the surveillance system from Hungarian ASF cases

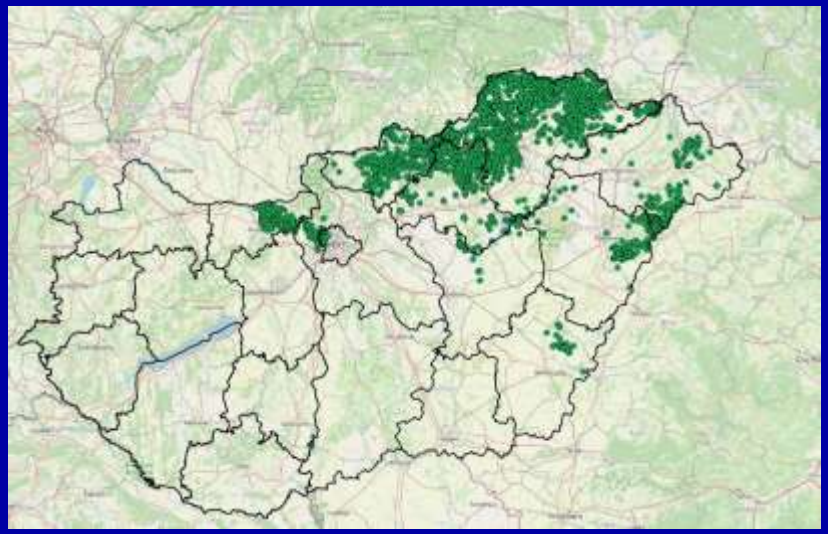
- Approximately **83% of all cases confimed in wild boars** (86% in the 2021/2022 hunting year) were **detected during enhanced passive surveillance**, the **vast majority** of which were **dead wild boars**
- The **experience** also **shows** that the **investigation of dead wild boars is crucial**, but **active surveillance is not negligible**
- The **active surveillance rate has been increasing in recent months,** partly due to the increasing rate of culling, but it also cannot be ruled out as a consequence of inefficient carcass searching and finding

Quarterly distribution of ASF cases in the last four and the current hunting years in Hungary

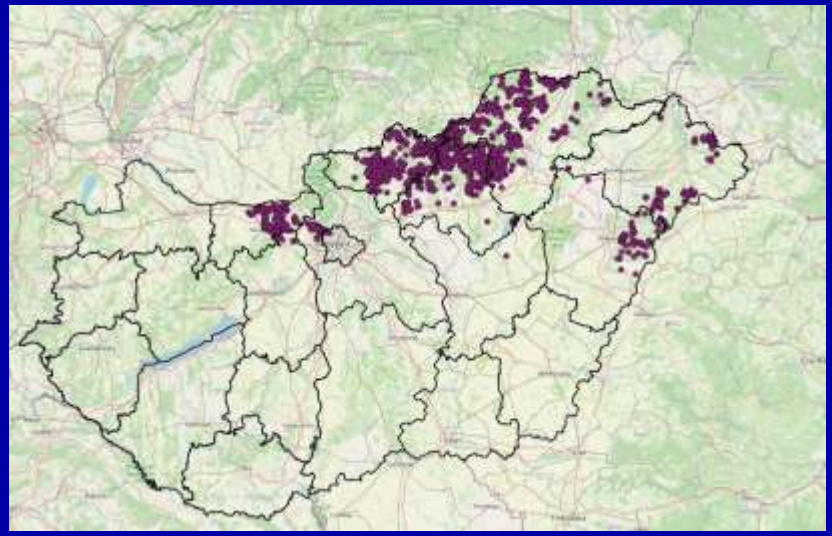


Comparison of ASF cases for hunting years 2020/21 and 2021/22 on map

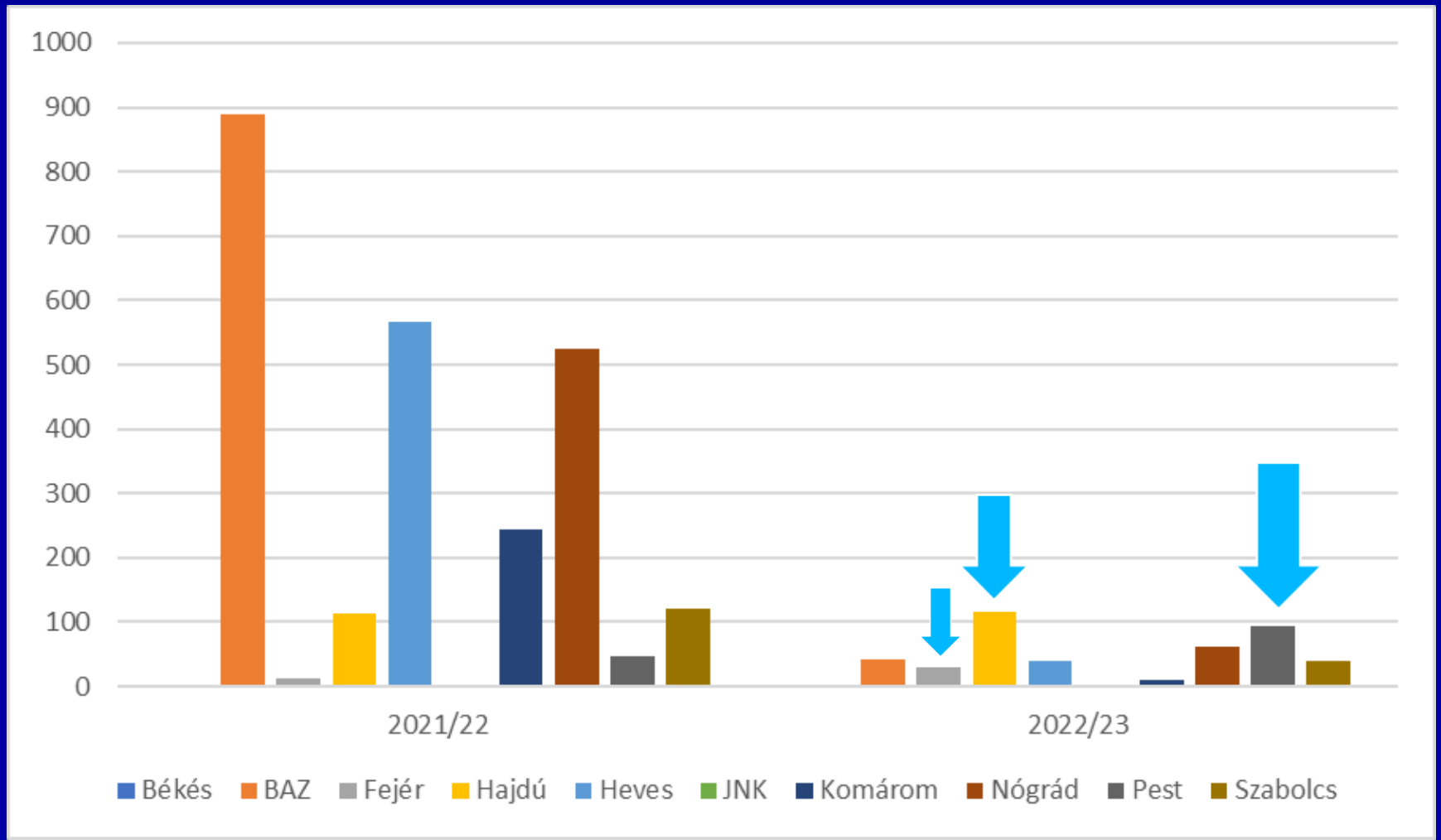
2020/21. hunting year



2021/22. hunting year

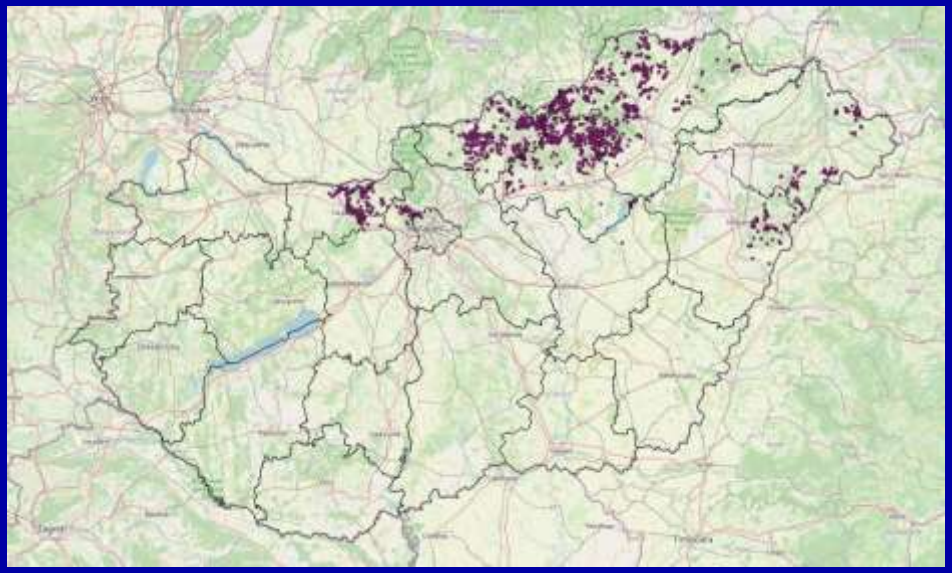


ASF cases per county for the hunting years 2021/2022 and 2022/2023 (until 05.09.2022.)

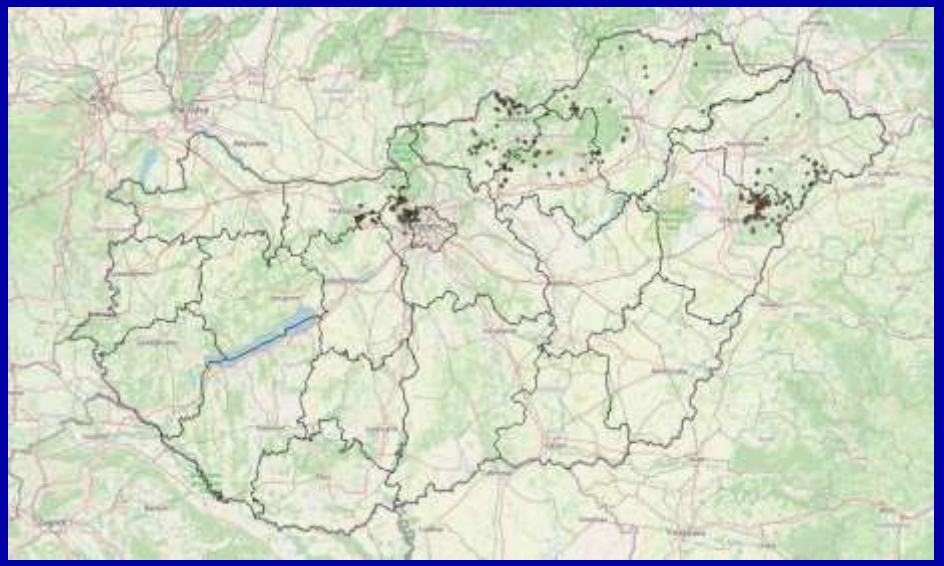


Comparison of ASF cases for hunting years 2021/22 and 2022/23 on map

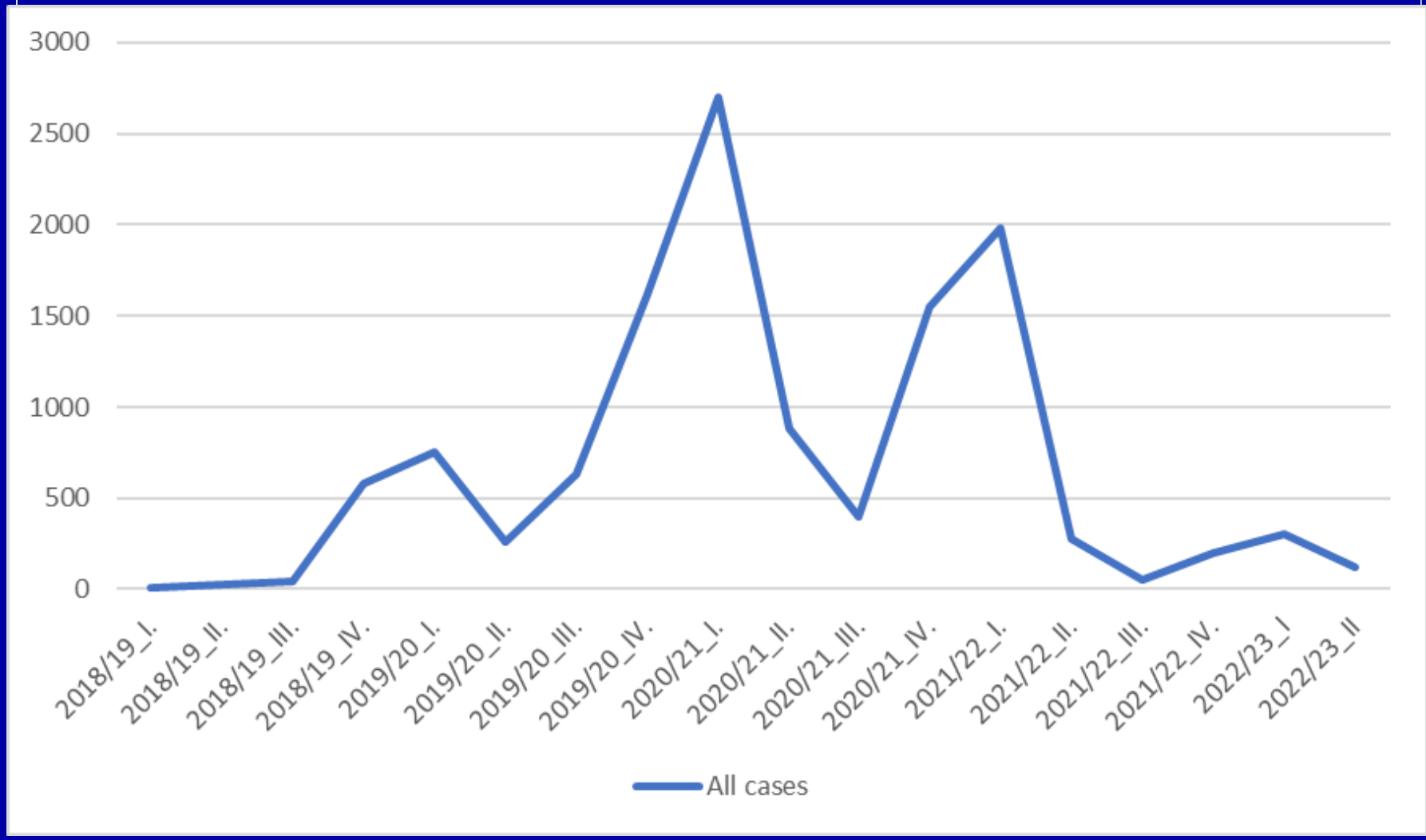
2021/22. hunting year



2022/23. hunting year (till 05.09.2022.)



Graph of ASF cases in Hungary by hunting year and by quarter (until second quarter of hunting year 2022/2023)



Conclusions on the epidemiological situation from domestic ASF cases 1.

- The **number of ASF cases increased** in the **2020/2021 hunting year**, **more than one and a half times the number of cases in the previous hunting year (3263)**. A total of **5533 cases** were confirmed, of which **4500 were passive surveillance in 2020/2021 hunting year.**
- In the **2021/2022 hunting year**, the **number of ASF cases decreased significantly** to **less than half of the previous hunting year**, with **2520 cases** confirmed, of which **2171** were **passive surveillance.**

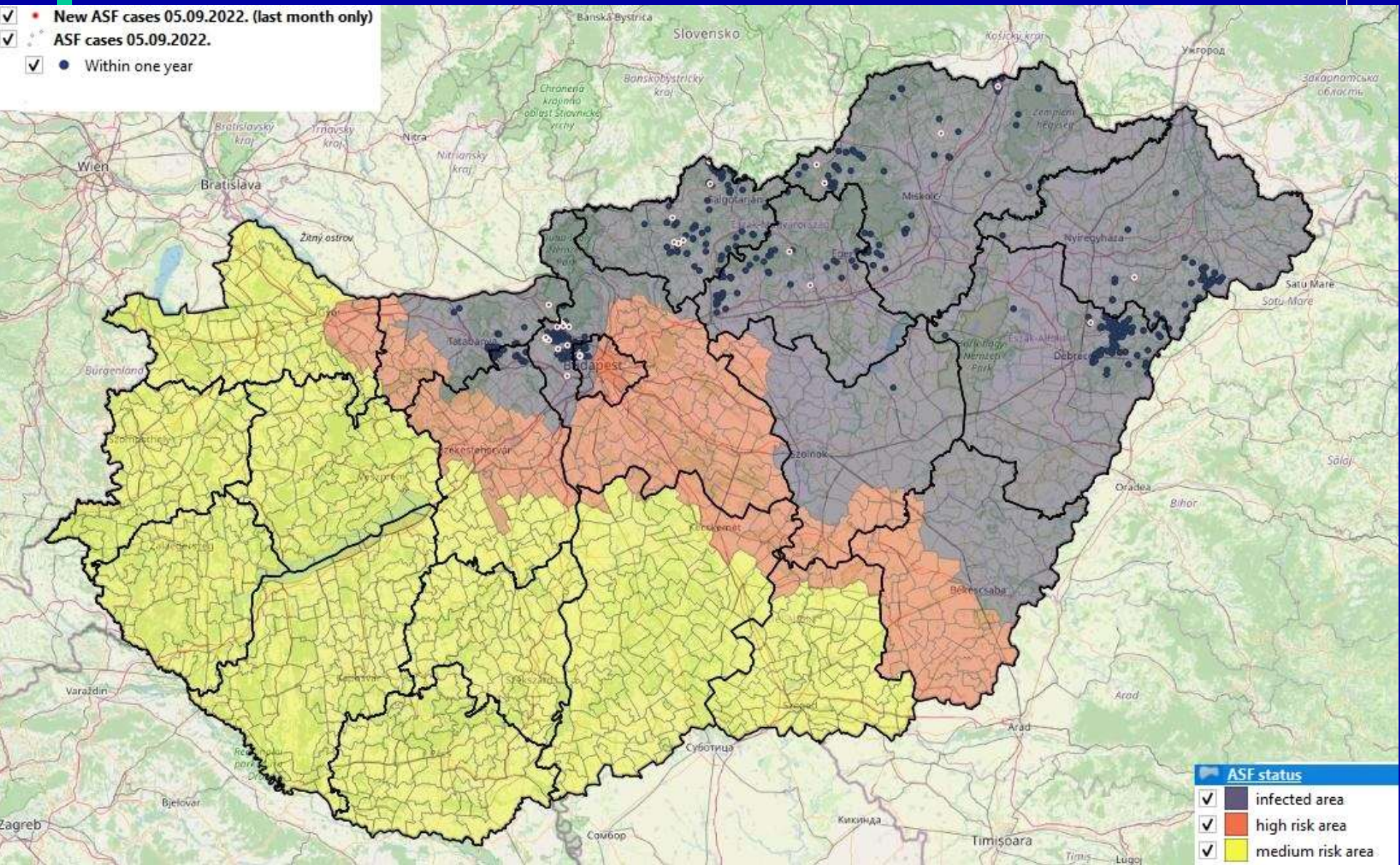
Conclusions on the epidemiological situation from domestic ASF cases 2.

- Thus, **in the hunting year 2021/2022, the ASF epidemiological situation in terms of the number of cases has significantly improved compared to previous hunting years**, despite the fact that this hunting year the disease reached Fejér County and the second wave of the epidemic started in Pest County.
- The **favourable trend seems to continue in this hunting year**, as until **5 September 2022**, a **total of 432 ASF cases** occurred, of which **257 were passive surveillance** cases.
- With just **about half of the current hunting year having passed**, it is **still not easy to predict how many ASF cases can be expected for the whole hunting year**. However, it is increasingly **likely that the number of cases this hunting year will be significantly lower than in the previous hunting year**

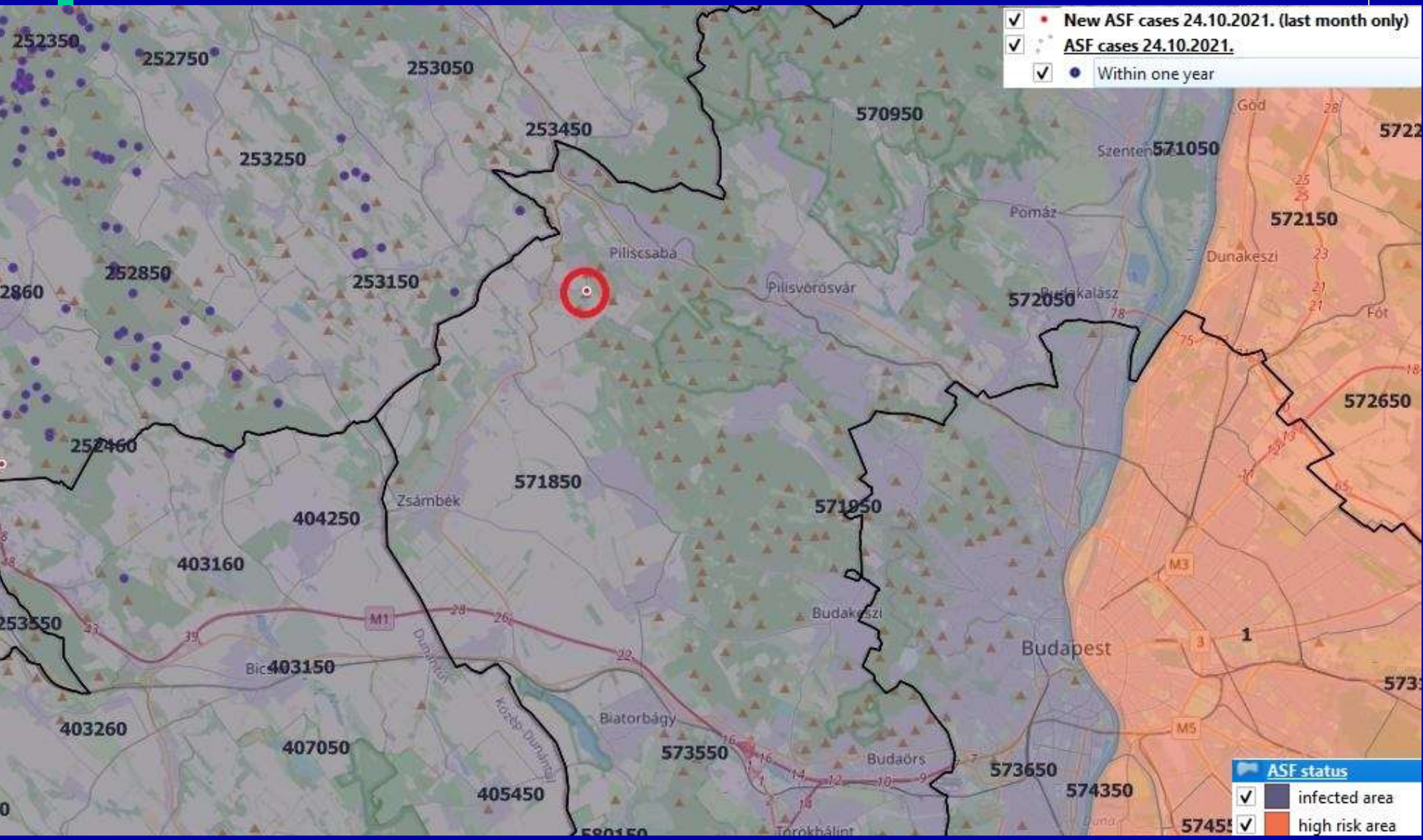
What is behind the improvement in the epidemiological situation?

- The **main factors behind the improvement** of the epidemiological situation are:
- The **ASF Eradication Plan**, published as an annex to Decision 2/2020 of the CVO published **on 8 March 2020**, amended the **rules for reduction of wild boar population (diagnostic shooting for culling)**:
- "The diagnostic shooting shall be ordered taking into account the sum of the number of wild boars killed by diagnostic shooting and, if it was allowed in the area during the base year, shot during hunting in the hunting management unit during the hunting year 2019/2020 as the base year. The **minimum target to be achieved for each age group is 150% of the amount thus calculated."**
- In **January 2021, the National Action Plan for the management of wild boar population** was issued and introduced, among other measures, the **obligation for all hunting units to draw up a long-term plan,** covering several years **on the measures to be taken to achieve a maximum density of 0.5 wild boars per km²** (0.5 wild boars per 100 hectares) by **28 February 2025**.

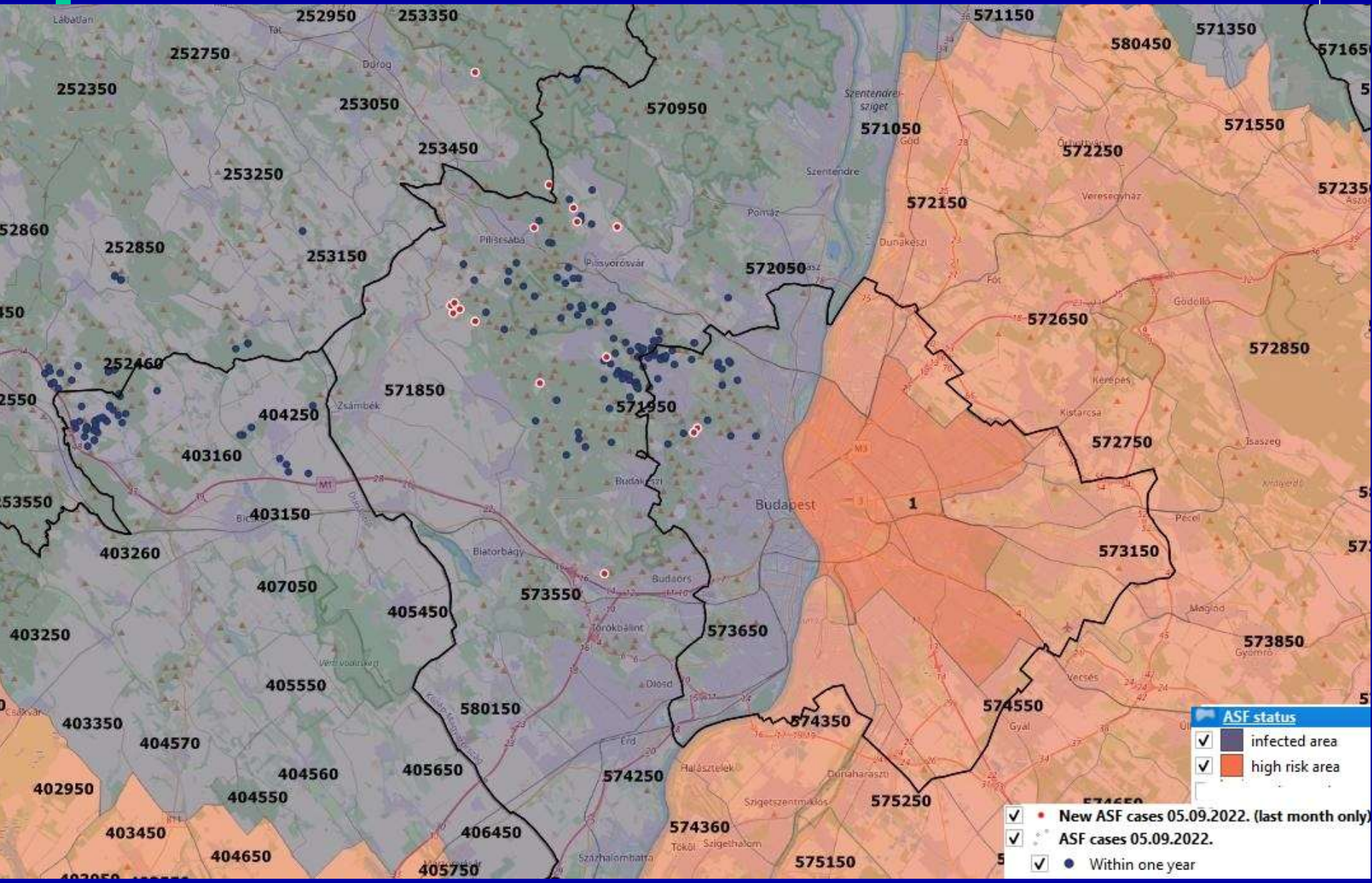
Official risk categories (status) with cases within one year highlighted for the last month (05.09.2022)



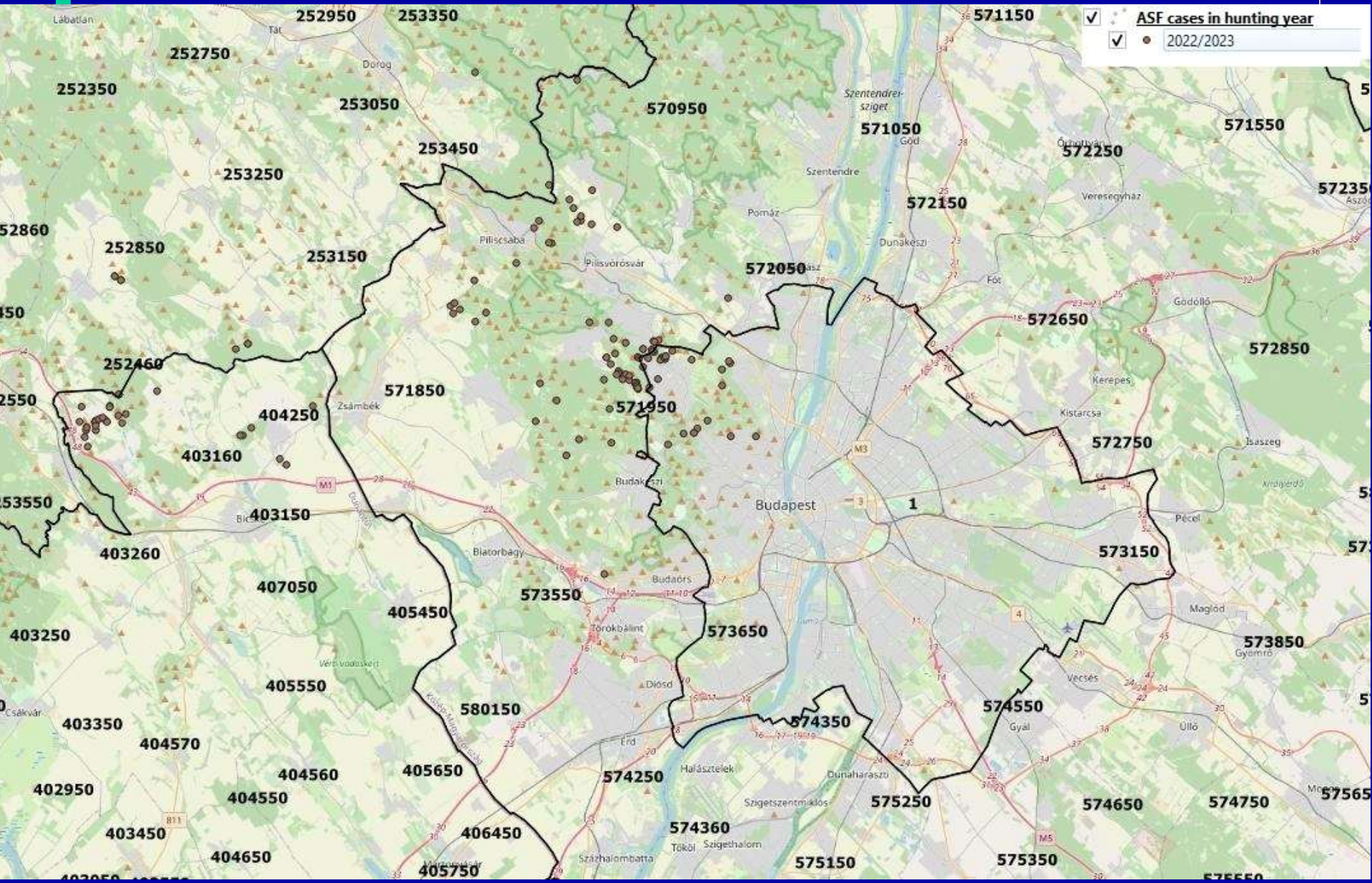
Important recent events in the epidemiological situation in Hungary 1. ASF has been re-established in Pest County after a long break (23.10.2021)



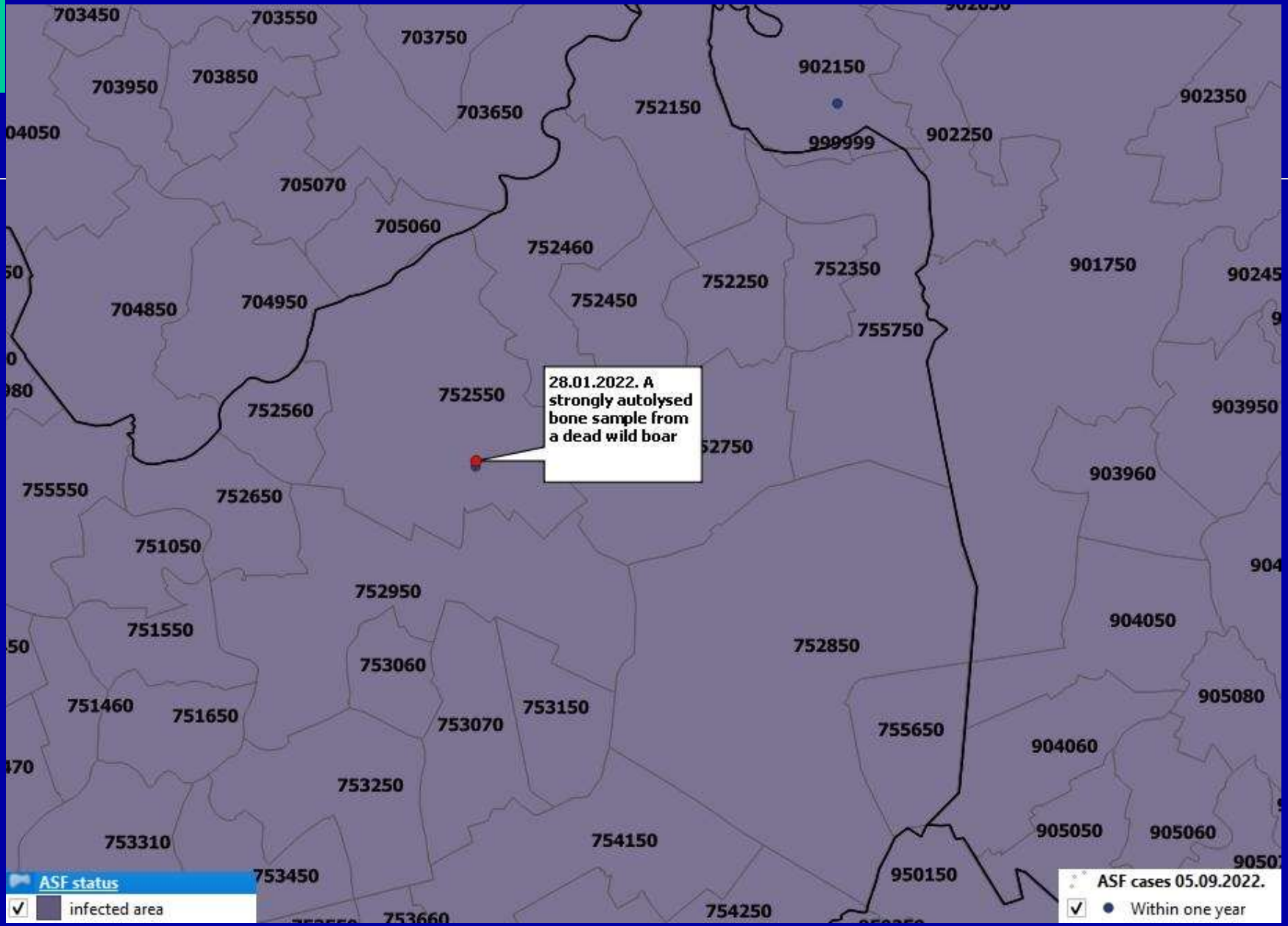
Important recent events in the epidemiological situation in Hungary 2. Current situation in Pest County (cases within 1 year)



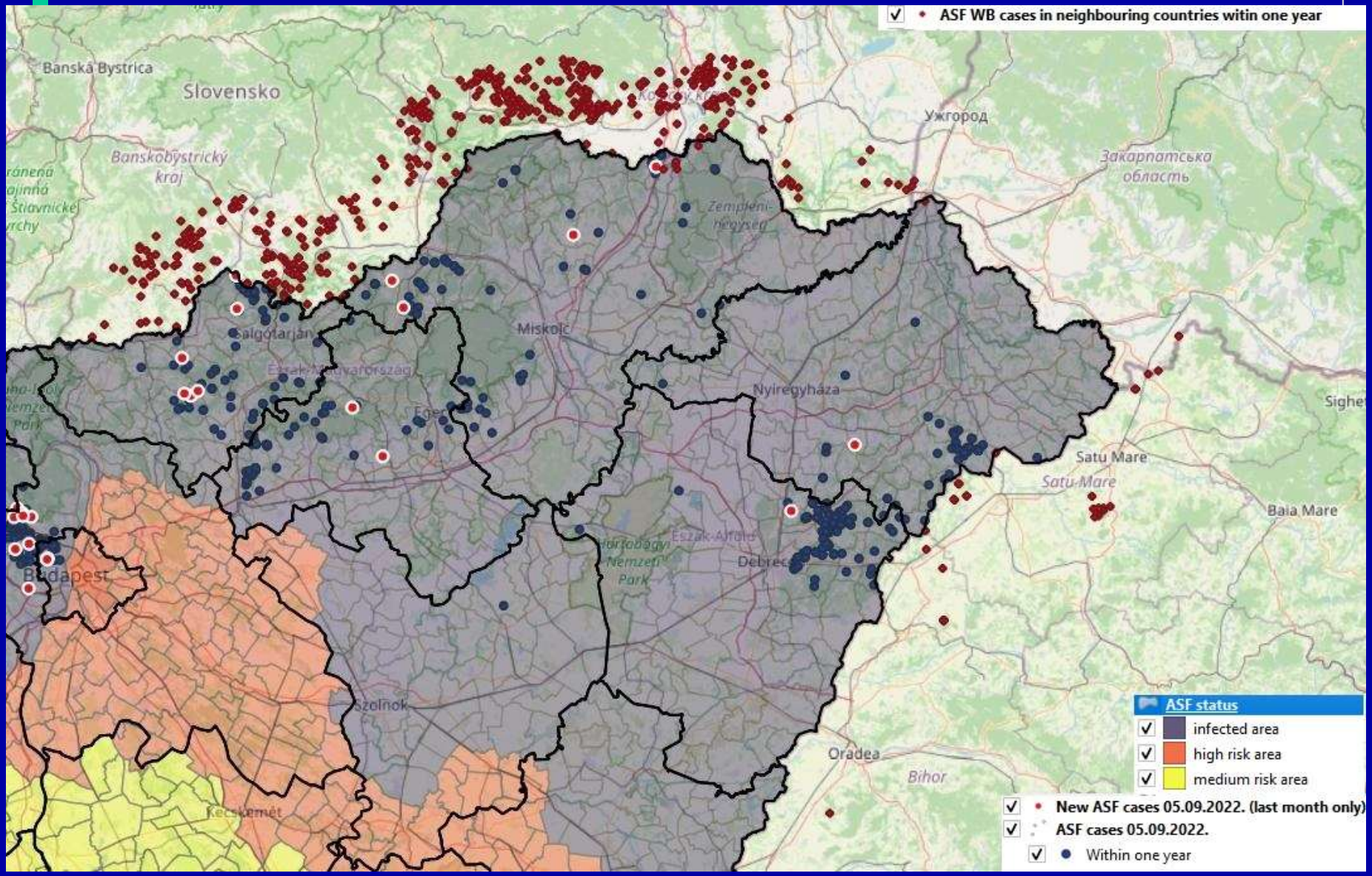
Important events in the recent epidemiological situation in Hungary 3. Current situation in Pest County (this hunting year)



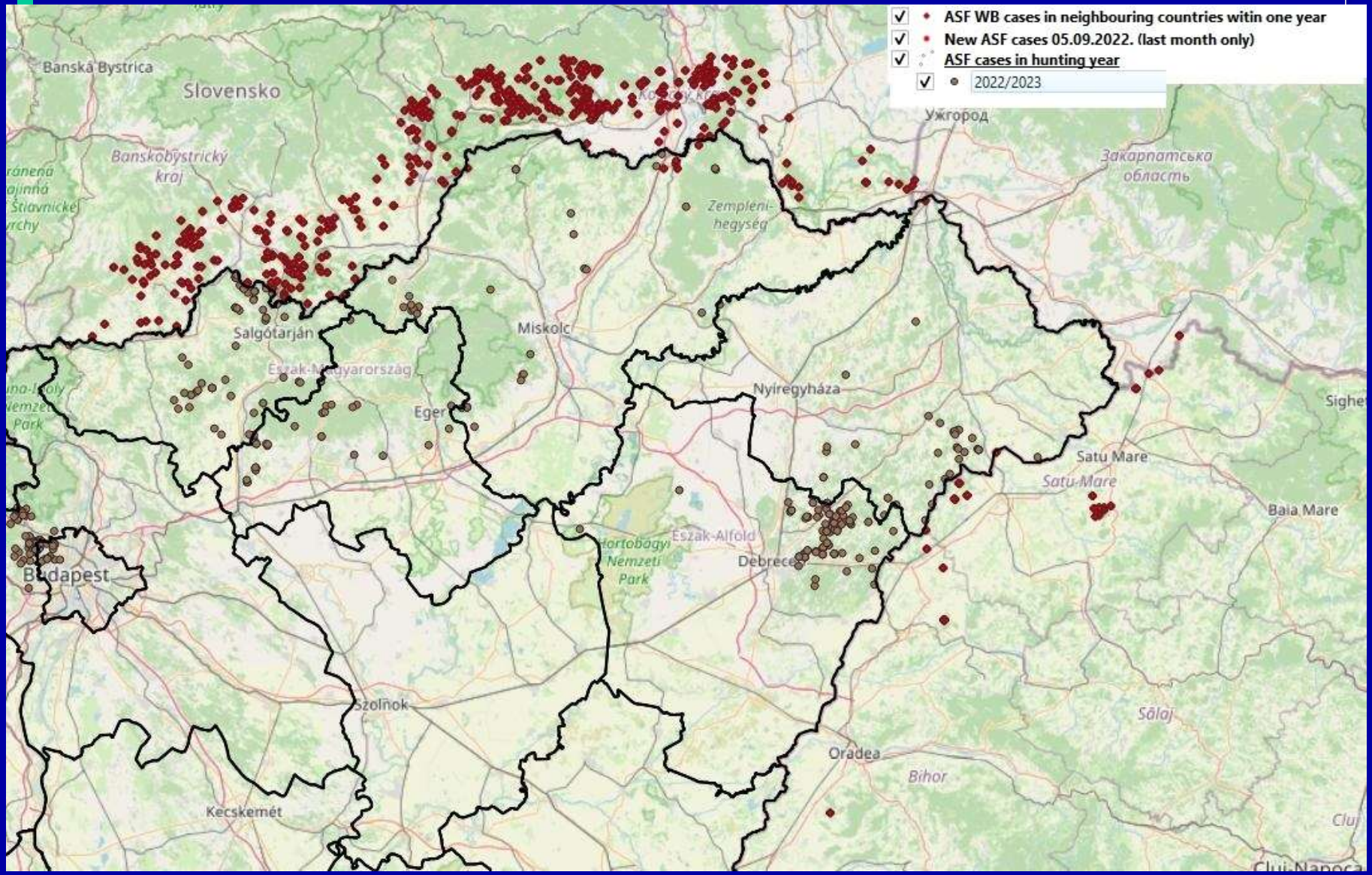
Important events in the epidemiological situation in Hungary recently 4.
ASF Case were detected in Jász-Nagykun-Szolnok county on 28.01.2022, and the current situation (05.09.2022)



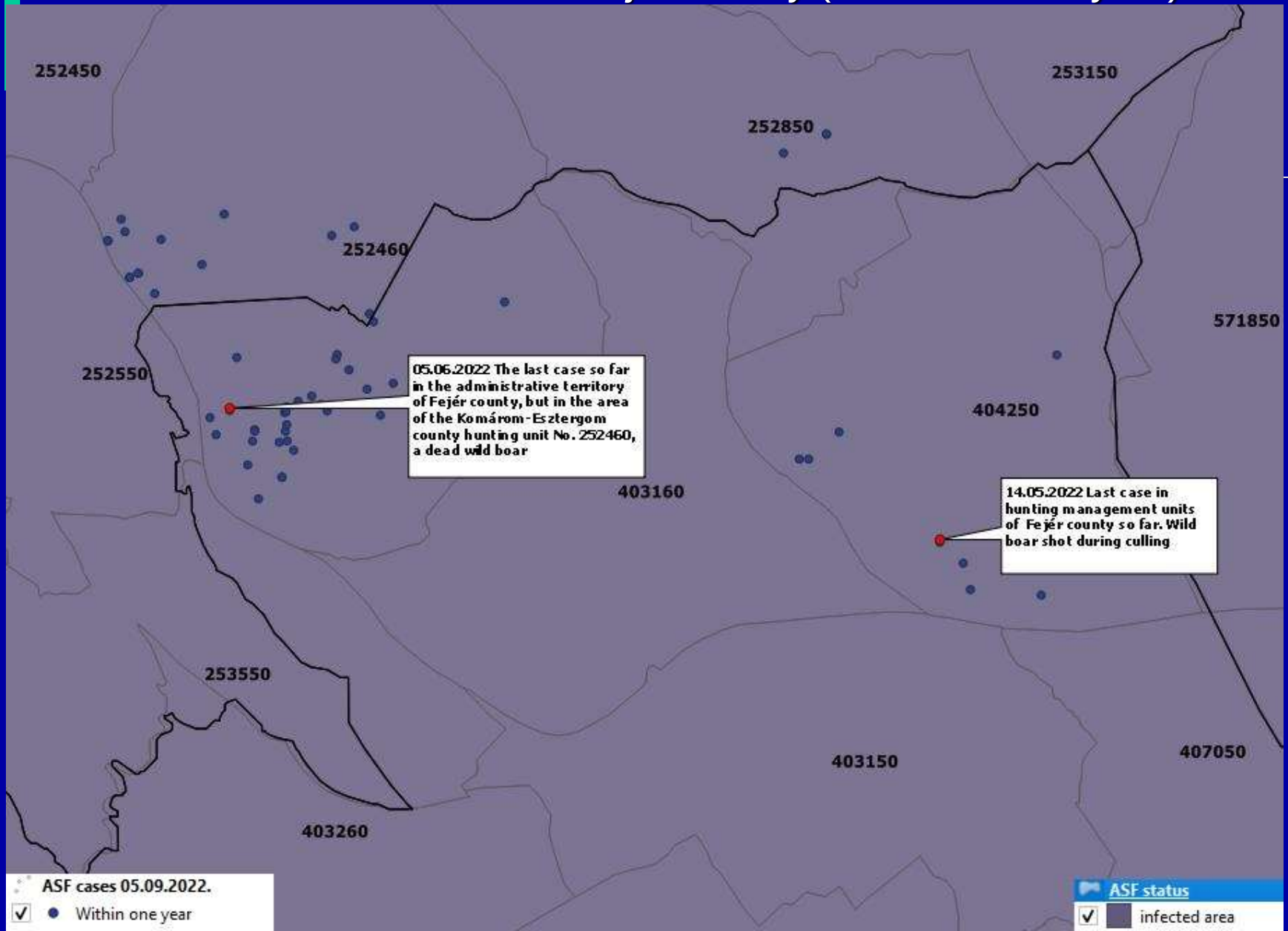
Important events in the epidemiological situation in Hungary recently 5. Current situation in Nógrád, Heves, Borsod-Abaúj-Zemplén, Hajdú-Bihar and Szabolcs-Szatmár-Bereg counties (cases within 1 year)



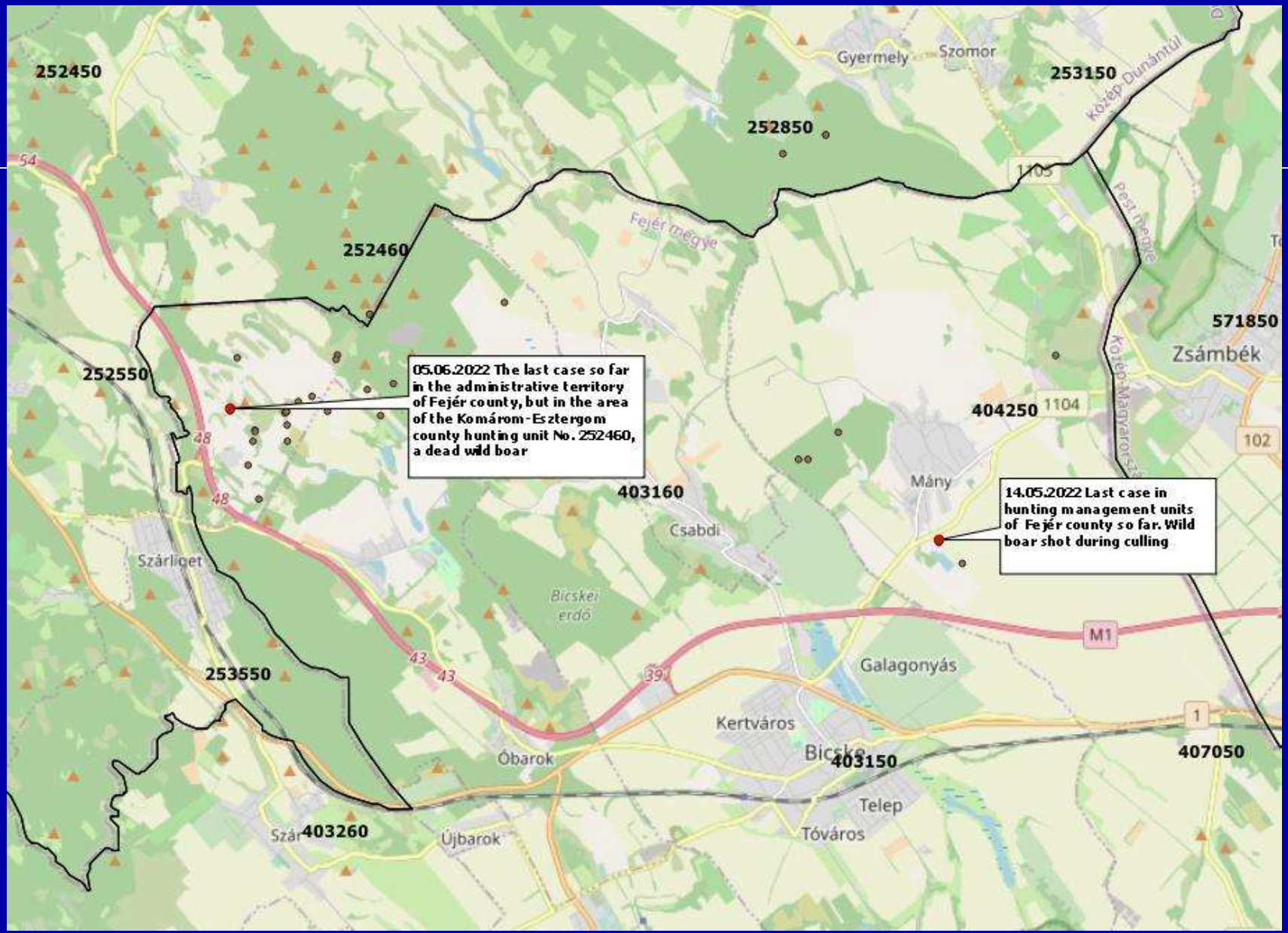
Important events in the epidemiological situation in Hungary recently 6. Current situation in the counties of Nógrád, Heves, Borsod-Abaúj-Zemplén, Hajdú-Bihar and Szabolcs-Satmár-Bereg (this hunting year)



Important events in the epidemiological situation in Hungary recently 7. The last cases so far in Fejér County (cases within 1 year)



Important events in the epidemiological situation in Hungary recently 8. The last cases so far in Fejér County (this hunting year)



Thank you for your attention!