State Veterinary Administration

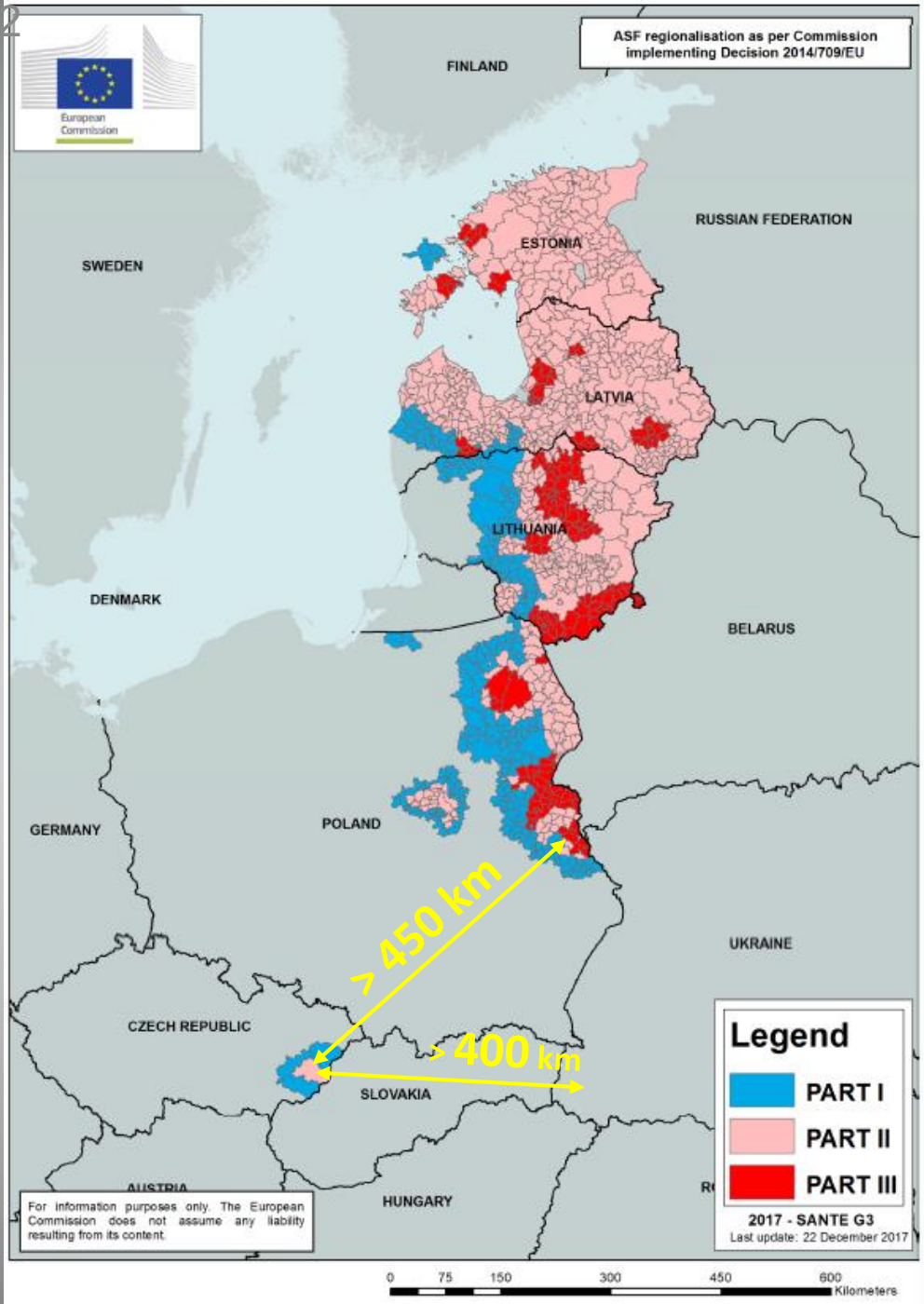
From ASF infection in wild boar to eradication and free status recovery in the Czech Republic

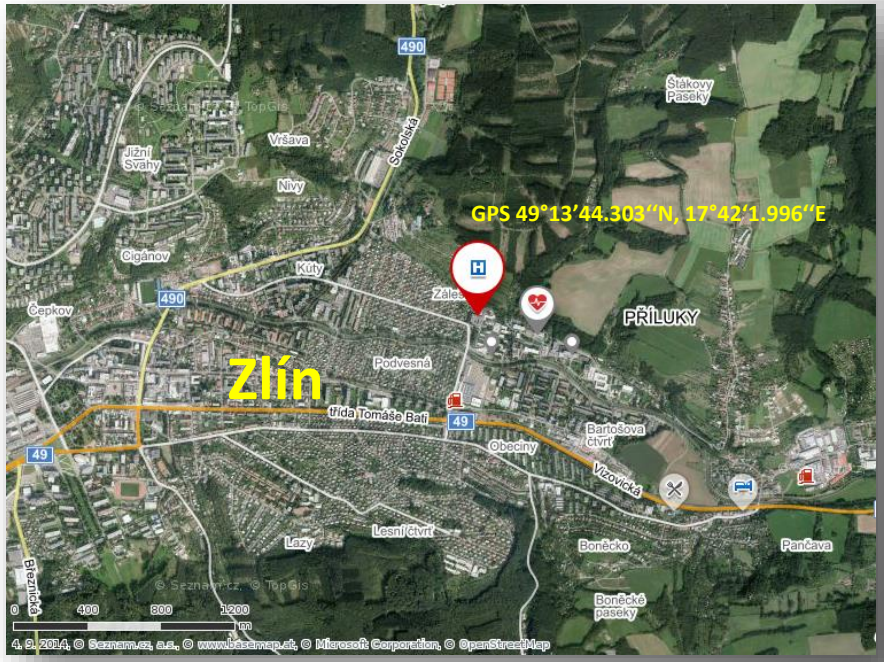
GF – TADs, Praha 11. 3. 2019
Petr Šatrán

First occurence of ASF

First ASF positive carcass location:
Příluky, Zlín district
Date: 26th June 2017

Way of ASF introduction?



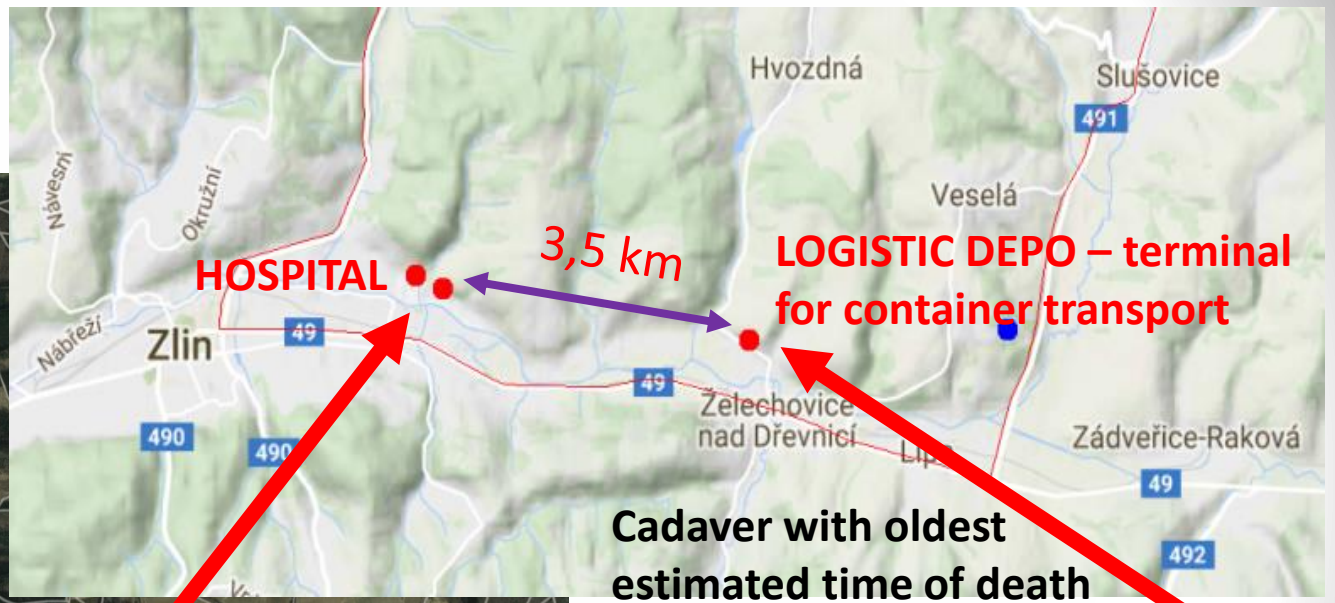


First ASF case in the Czech Republic

- Zlín city - inhabited area
- 1st WB carcasses found nearby the local hospital

First ASF case in the Czech Republic

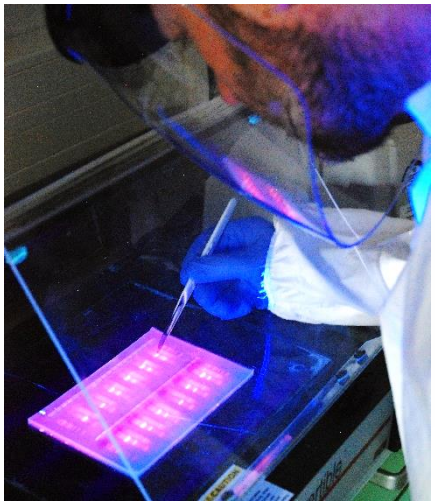
The real source of infection?

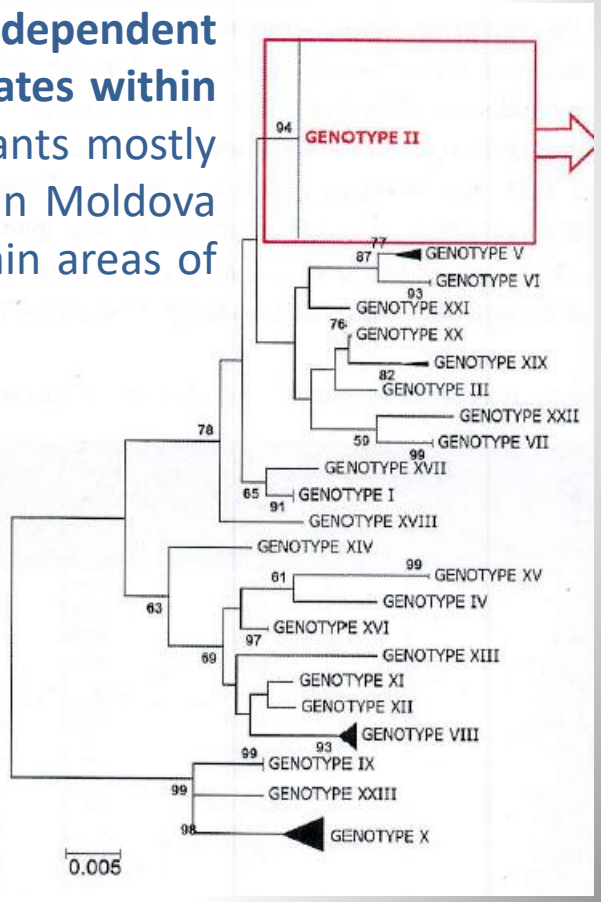


Molecular characterisation of the Czech ASFV isolates
(EURL for ASF, INIA-CISA)

The p72 genotyping of the Czech Republic wild boar ASFV strains clustered the viruses within p72 genotype II circulating in the Eastern European countries since the first introduction in Georgia in 2007.

Further subtyping throughout the analysis of three independent ASFV genome regions, clustered the Czech Republic isolates within the CVR-I, IGR-2 and MGF1 variants. These are the variants mostly circulating within the EU countries as well as described in Moldova (2016), Ukraine (2012, 2015), Belarus (2013) and in certain areas of the Russian Federation.





From the first case 26. 6. 2017 to the last case 8. 2. 2018
9 months – 228 days

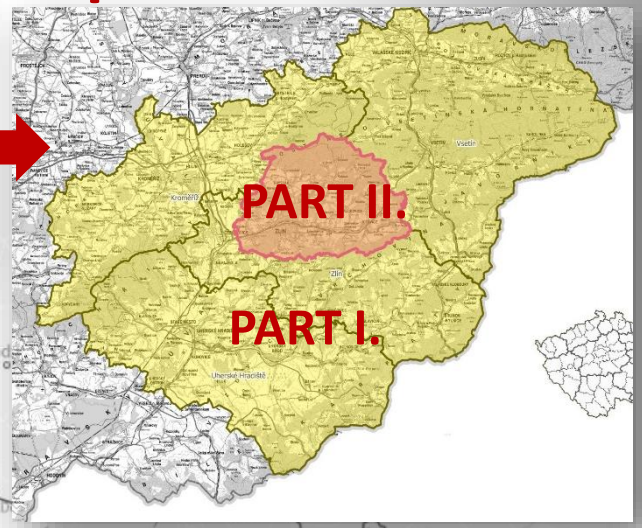
A total **230** cases of African swine fever have been detected in the wild boar population

- The total number of positive cases in found dead wild boar: **212** (last positive cases **15. 4. 2018**)
- The total number of positive cases in hunted wild boar: **18** (last positive cases **8. 2. 2018**)

All positive cases have been detected only in part of district of Zlín.

NO OUTBREAK IN DOMESTIC PIGS !

Measures in 4 levels in the Czech Republic



1- Infected area:

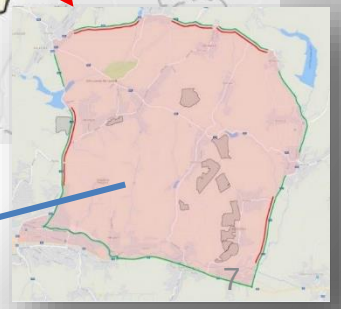
1a- Zone with low risk

1b - Zone with high risk

2 - Intensive hunting area

3 - Rest of the CZ

fenced area in high risk area



- ✓ Intensive hunting area: 8500 km^2 (District Zlín excluded)
  - ✓ District Zlín: 1033 km^2
  - ✓ Infected area with low risk: 1033 – 159 = 874 km^2
  - ✓ Infected area with high risk: 159 km^2
  - ✓ Infected area with the highest risk (inside the fences): 57 km^2

Number of wild boars and domestic pigs tested/positive (26. 6. 2017 – 31. 01. 2018)

WILD BOARS

1) Infected area (Part II according to the EU regionalisation)

- found dead 444 / **212 positive (47 %)**
- hunted 3 758 / **18 positive (0,5%)**

2) Other areas of the Zlín region (Part I)

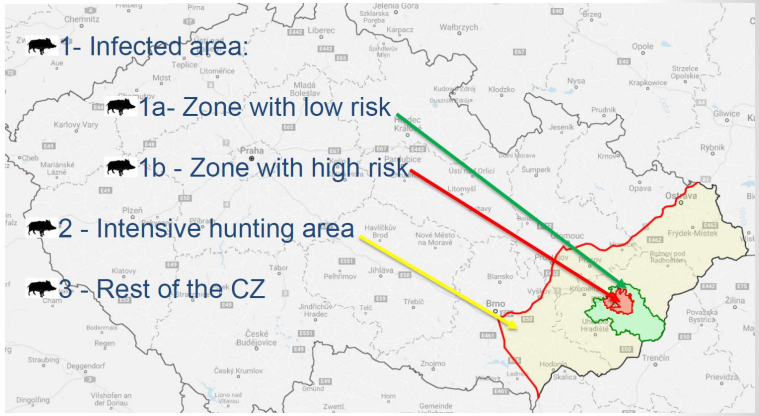
- found dead 154 / **0** positive
- hunted 11 563 / **0** positive

3 Area with intensive hunting (without Part I and II areas)

- hunted 12 343 / **0** positive

4) The whole Czech Republic (without Part I and II areas)

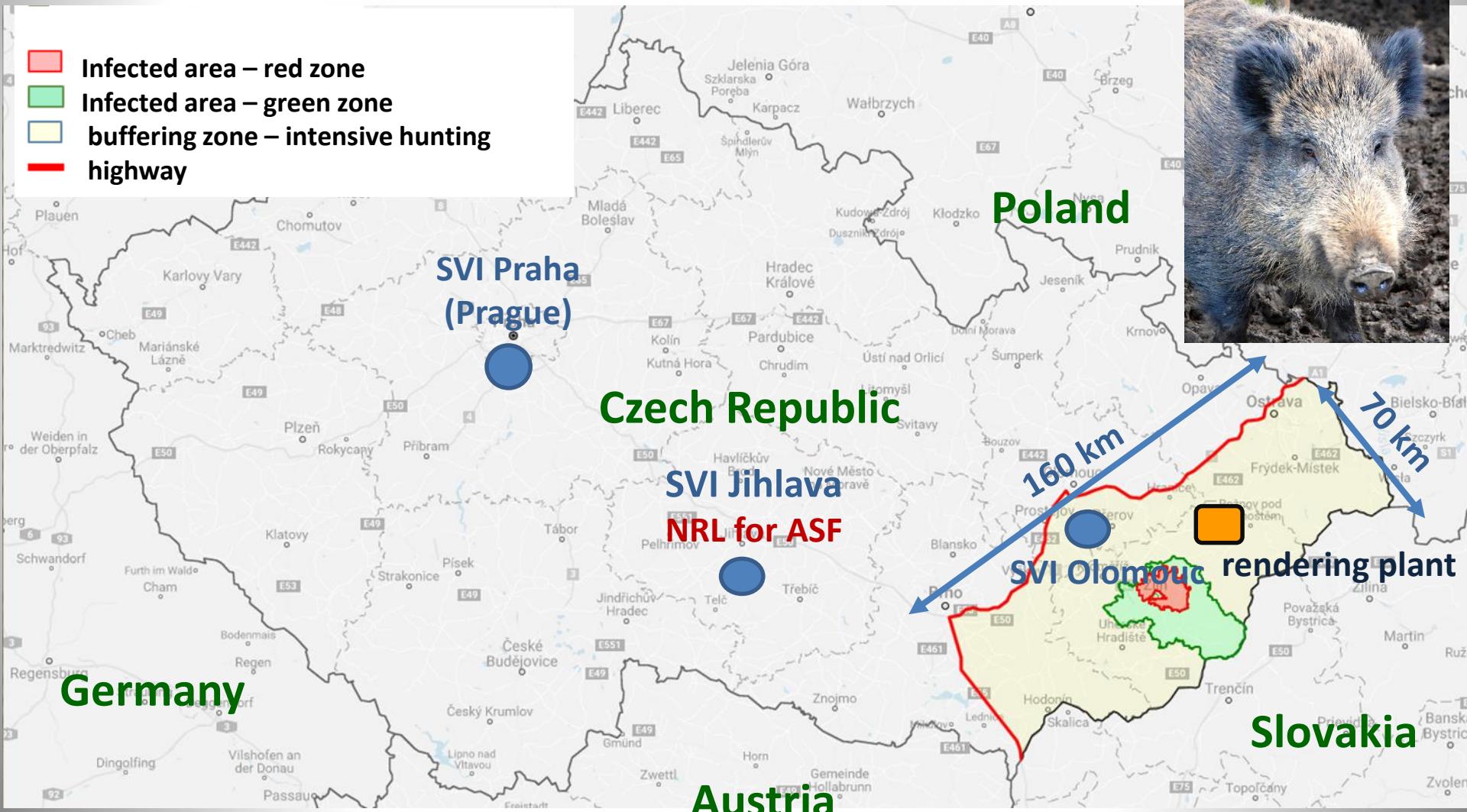
- found dead 2 299 / **0** positive



Total number of domestic pigs tested / positive	Part II		Part I	
	Active	Passive	Active	Passive
	337 / **0**	109 / **0**	723/ **0**	1212 / **0**

Demarcation of the infected area and the buffering zone

In accordance with the Council Directive 2002/60/EC the whole District Zlín has been declared as an infected area (1 034 km^2), 37 municipalities, 89 hunting grounds



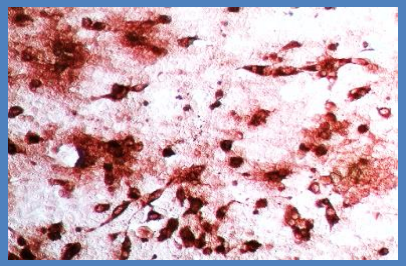
ASF DIAGNOSTICS TESTS used in CZECH LABORATORIES

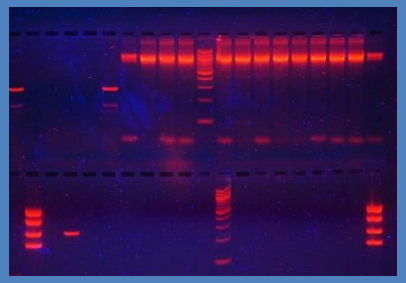
ANTIBODY DETECTION TECHNIQUES

TEST	TYPE	REFERENCE
ELISA test	INGEZIM PPA Compac blocking ELISA	INGENASA
	ID Screen Indirect ELISA	ID.VET
	ID Screen Competition ELISA	ID.VET
	SVANOVIR® ASFV-Ab indirect ELISA -	Svanova
IPT test	Indirect immunoperoxidase test (IPT)	Gallardo et al. 2013

DETECTION of the ASF VIRUS GENOME by PCR

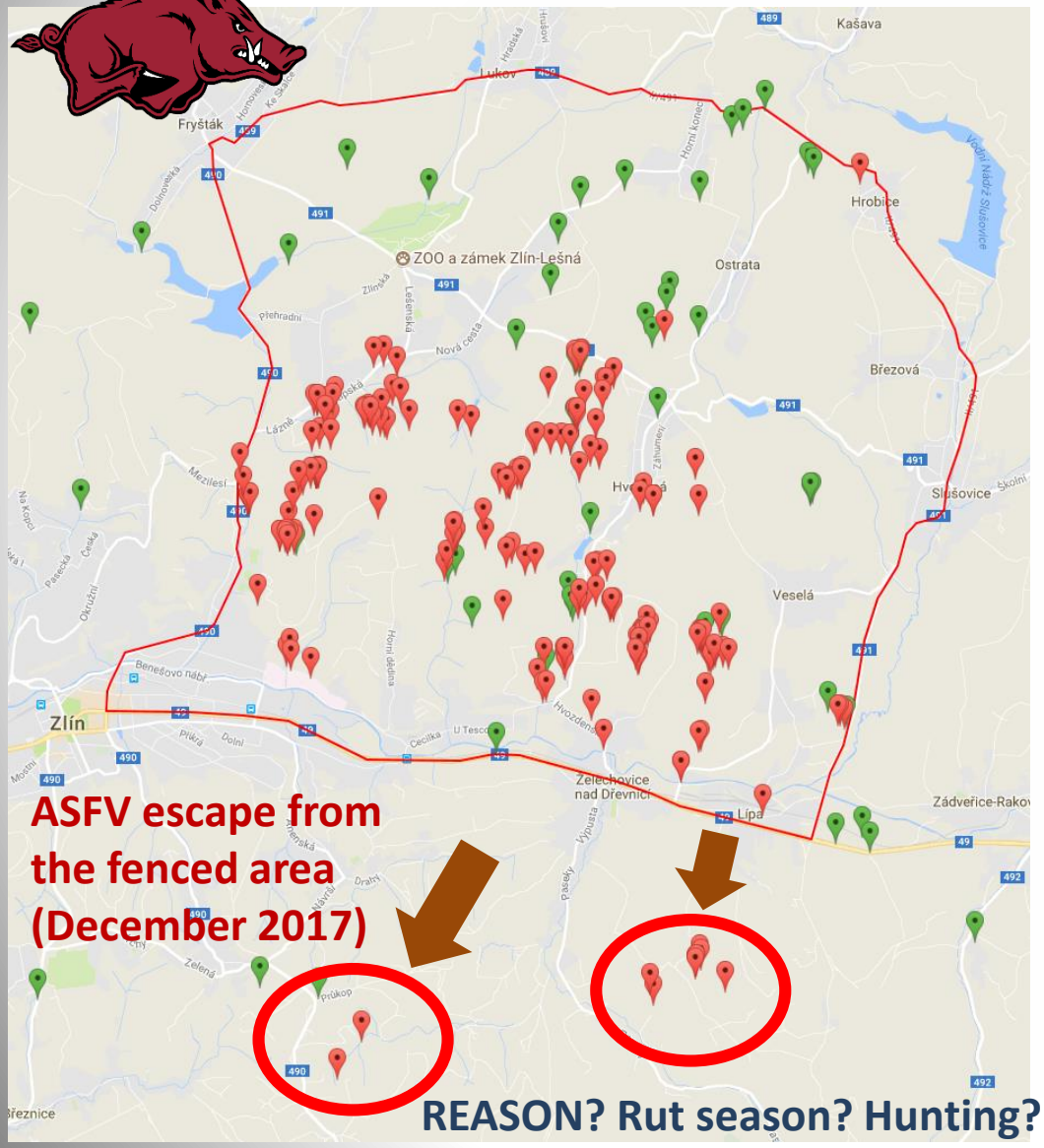
TEST	TYPE	REFERENCE
Conventional PCR	OIE conventional PCR	Agüero et al. 2003
Real Time PCR	UPL Real-time PCR (UPL Probe)	Fernandez et al. 2013
	Taqman Probe (OIE - Real Time PCR)	King et al. 2003 Zsak et al. 2005
	ID Gene ASF Duplex qPCR	ID.vet Innovative Diagnostics





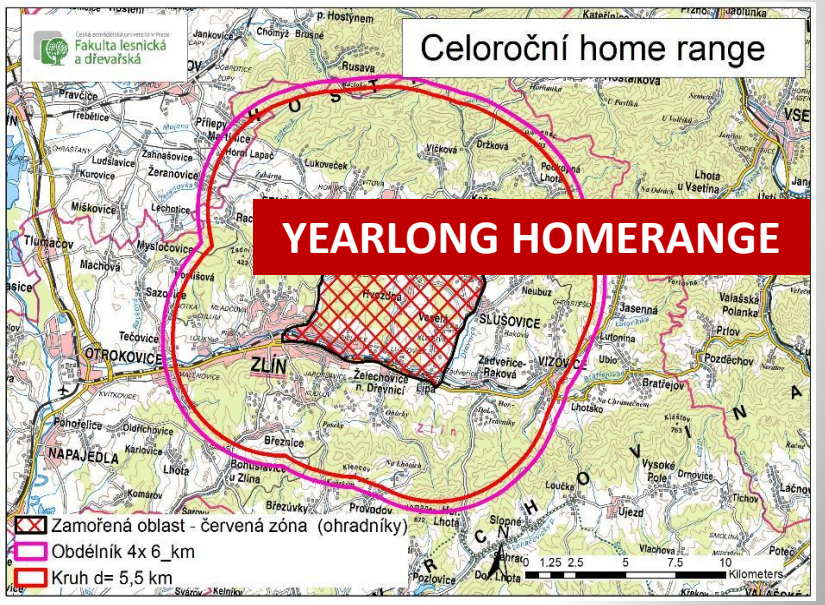
Passive surveillance: wild boars found dead

high risk area (fenced area) inside the infected area

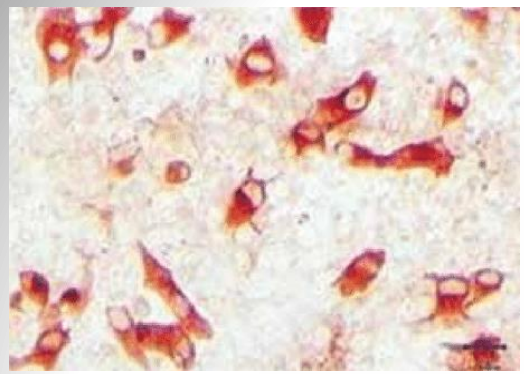


WB density in the fenced area:
more than 520 (found dead+hunted)
WB / 57 km2 = 9.1 WB per 1 km2

21 May 2018



WB positive cases: virology / serology



Positive ASF results: 26 June 2017 – October 2018				
WB	both PCR and ELISA (IPMA) positive	only PCR positive	only ELISA (IPMA comfirmed) positive	Total positive cases
Found dead	10	202	3	215
Hunted	9	9	18	34
TOTAL	19	211	21	251

Wild boars	ASF Virus (PCR)	ASF antibodies (ELISA, IPMA)
Found dead	212	13
Hunted	18	27
TOTAL	230	40

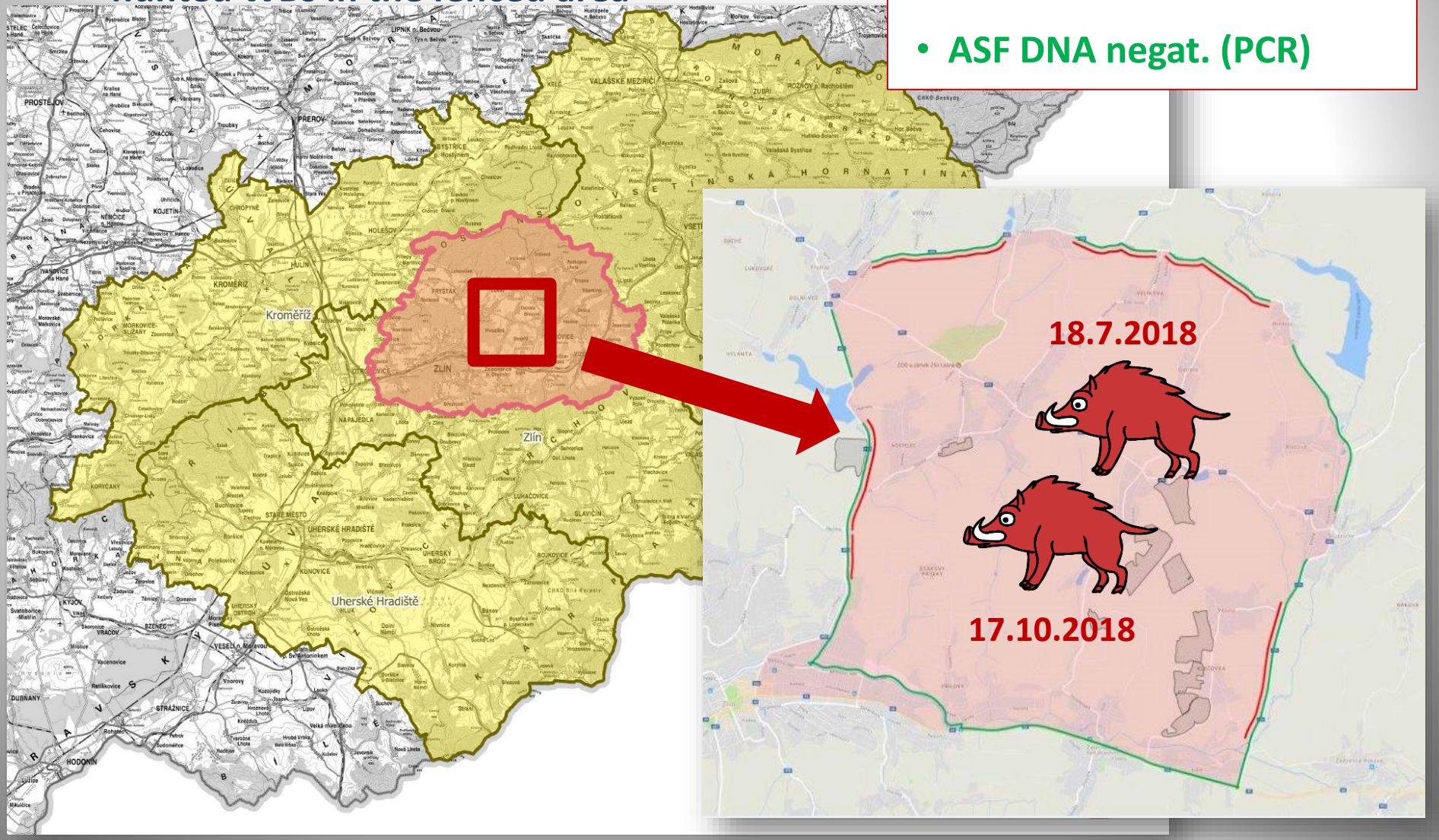
Recovering „survivors“

- piglets / adults (1:1)

Current situation: summer and autumn 2018

- 2 new serologically positive cases in WB
- hunted WBs in the fenced area

- ASF Ab pozit. (ELISA + IPT)
- ASF DNA negat. (PCR)

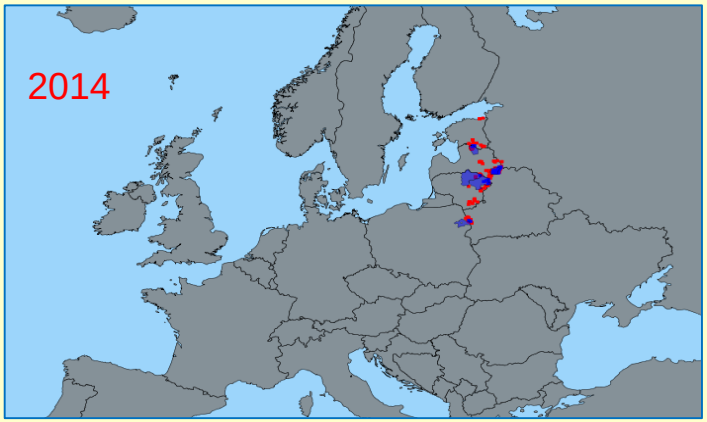


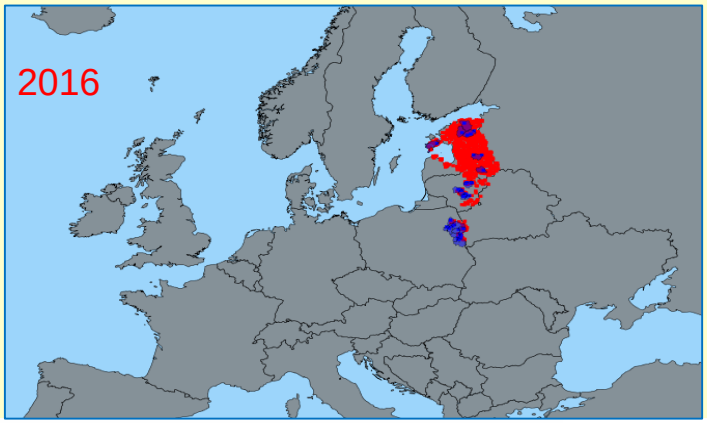
Strategy and Measures applied

Before the first case

PASSIVE SURVEILLANCE

Since 2014, African swine fever (ASF) has been occurring in Estonia, Latvia, Lithuania and Poland





From 2014, all wild boars found dead in the whole territory of the Czech Republic have been tested for ASF; this passive monitoring continues.

Numbers of found and tested dead wild boars – the whole Czech Republic 2014 - 2019												
Year	**2014**		**2015**		**2016**		**2017**		**2018**		**2019 (to 24. 2.)**	
No of tested / positive	243	0	348	0	404	0	**1 622**	**191**	**1 404**	**21**	**59**	**0**

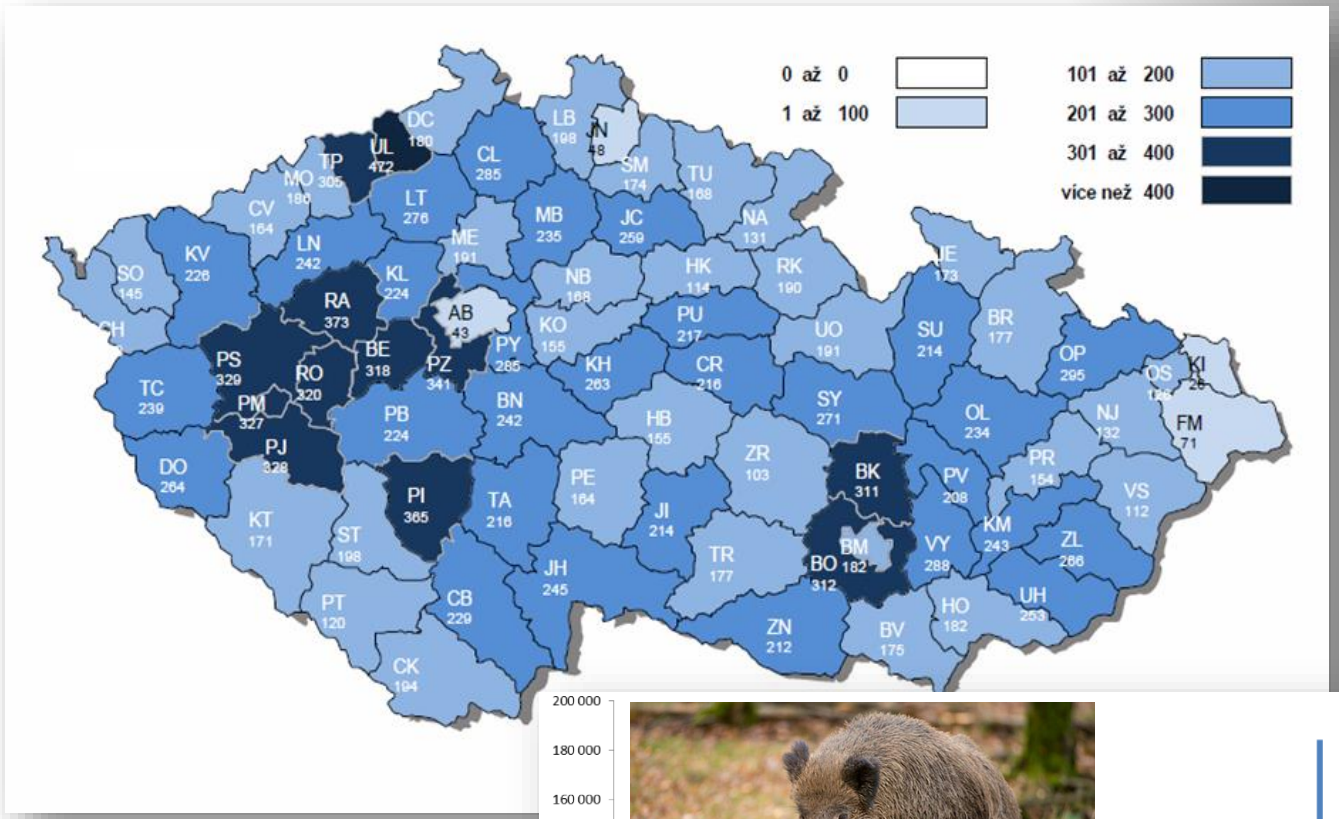
Motto:

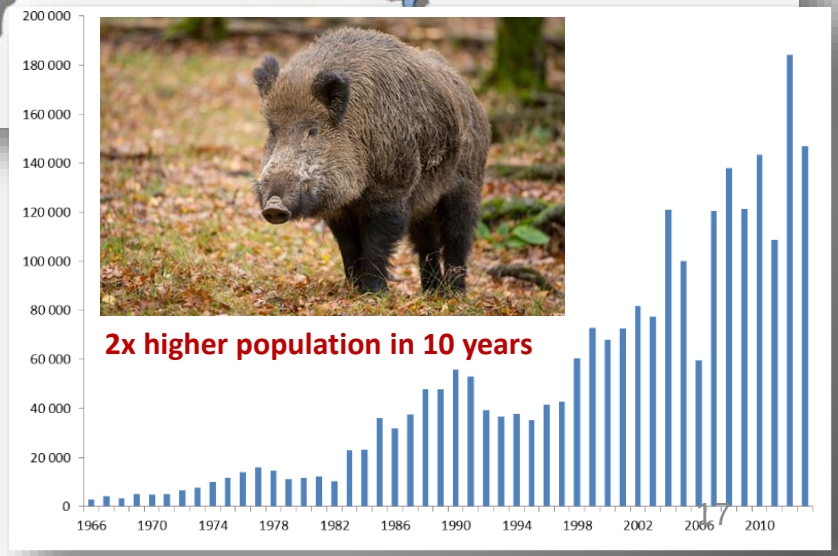
Hunting is not a method for eradication of ASF in wild boar population because:

- **the main source of infection are cadavers that remain infectious for a long time**
- **the stock of wild boar in the infected area is not precisely known, however relatively high**
- **lethality of the virus 95%,**
- **contantagiosity low 10%,**
- **persistence of the virus in the environment is very long**

The density of wild boar population in the Czech Republic (per 100 km2)

Hunting year	Hunting bag
2010	144 305
2011	109 563
2012	185 381
2013	152 468
2014	169 483
2015	186 148
2016	160 164
2017	225 000





- **hunted animals: 1-4 / km2**
- **real WB density?? = 1,5-2x higher**
- **the population doubles every 10 years**
- motivated hunting in the whole country 10-12/2017 (38 EURO per hunted animal)

Strategy:

STOP – ALL HUNTING, KEEP CALM THE AREA

SEARCH – CADAVERS

UNDERSTAND – EPIDEMIOLOGICAL SITUATION AND INFECTED AREA

MAKE – MEASURES

- TO KEEP ANIMALS AT ONE PLACE – VIRUS WORK
- DEPOPULATION AT THE FINAL STAGE

Demarcation of the infected area

In accordance with the Council Directive 2002/60/EC the whole District Zlín has been declared as an infected area (1 034 km^2), 37 municipalities, 89 hunting grounds

General control measures applied in the infected area

1) Increased passive surveillance (each found dead wild boar is rewarded)
2) Ban of hunting (any species, any hunting system)
3) Ban of wild boar feeding
4) Ban of entrance for the general public into the high and higher risk areas (red areas)
5) Sampling and testing for both ASF and CSF (PCR) each found dead wild boar;

Carcasses are collected in a plastic bag, identified with a “seal” and carried to the nearest road where dedicated vehicles transport them to the rendering plant (about 70 km distance). An official veterinarian samples carcasses at the rendering plant.

Collection and disposal of carcasses

one of the most important step in ASF control and eradication

Collection of WB carcasses with financial motivation (1€ - 25 CZK)

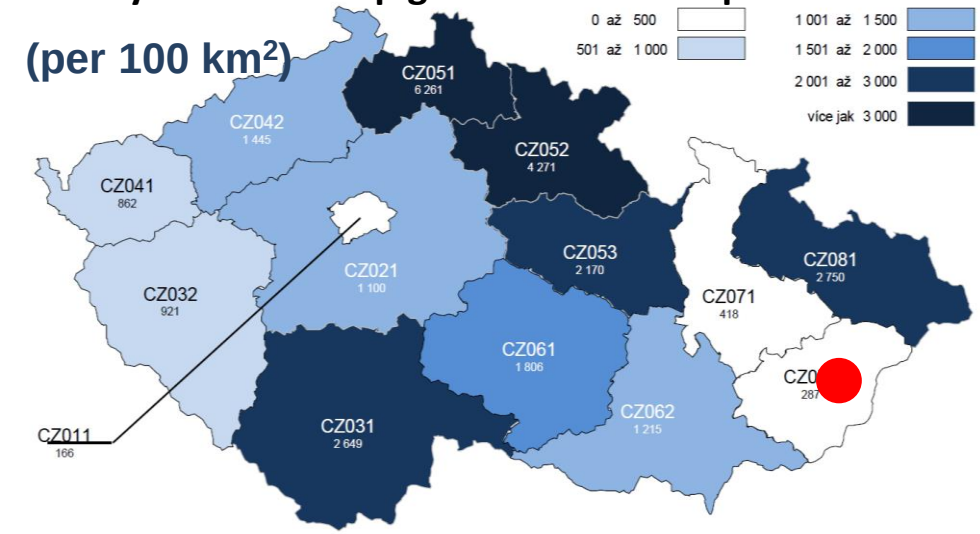
	Area	Reward in CZK
Finder reward	Czech Republic	2 000,-
	Area with intensive hunting	3 000,-
	Infected area – higher risk zone	5 000,-

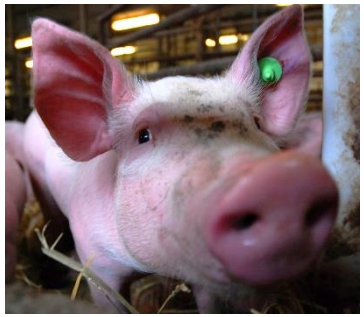
ASF measures for domestic pigs in infected area

INCREASE BIOSECURITY AND AVOID CONTACT BETWEEN WILD BOAR AND DOMESTIC PIGS

- **ban on keeping of pigs in backyard farms**
- **enhanced passive surveillance in pig farms** - farmers must **report all sick/dead pigs in the infected area** (all cases are **tested for ASF**)
- **movement of pigs only with authorisation** issued by the RVA for Region Zlín.
- **ban on feeding with fresh grass, ban on straw bendding**
- **official controls** in pig farms in accordance with Commission Implementing Decision 2014/709/EU. Targeted for **BIOSECURITY.**
- **information campaign**

Density of domestic pigs in the Czech Republic

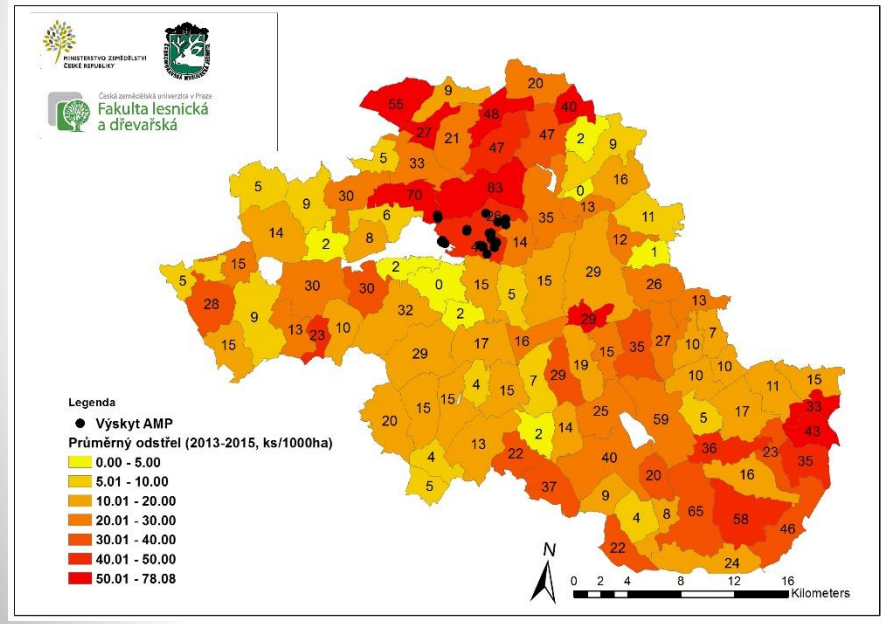




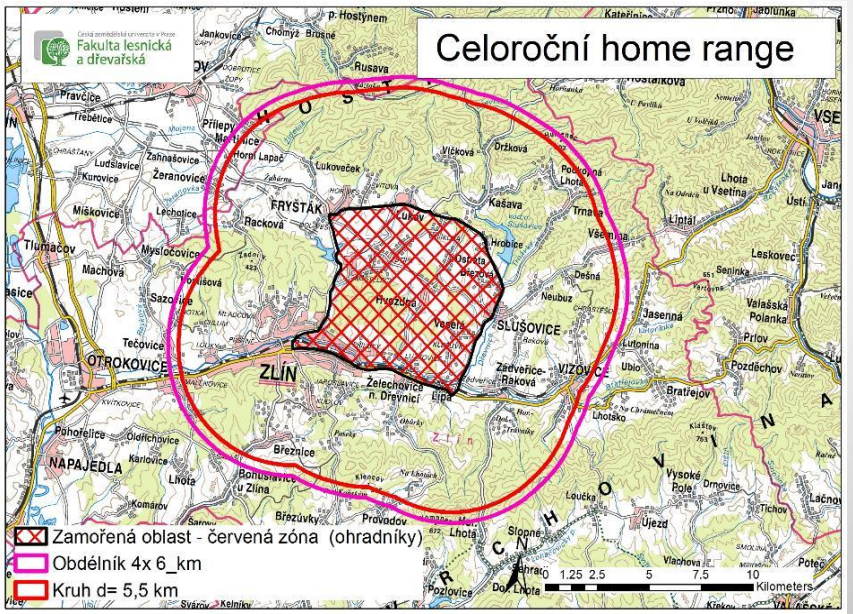
	farms	pigs
Czech Republic	2 160	1 353 935
Zlín region	83	74 088
infected area (district Zlín)	**23**	**16 301**

After 1 month of intensive pasive surveillance
Setting high and low risk zone in infected zone

Hunting

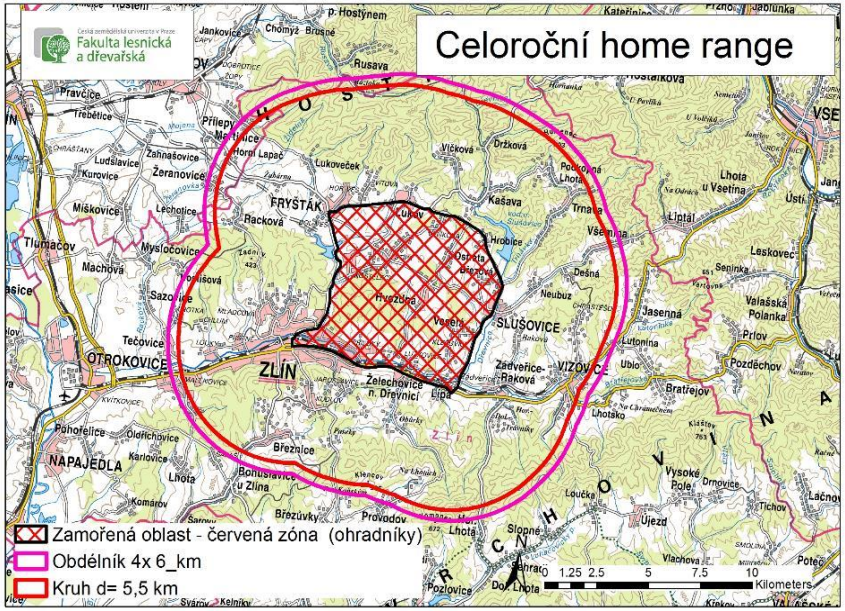


Home range – 100% one year



High risk sub-area

The size of the area was 159 km2. The area was a buffer zone around the higher risk sub-area (fenced area) and has been calculated considering the maximum annual increase of the home ranges of the wild boar living in the fenced area.

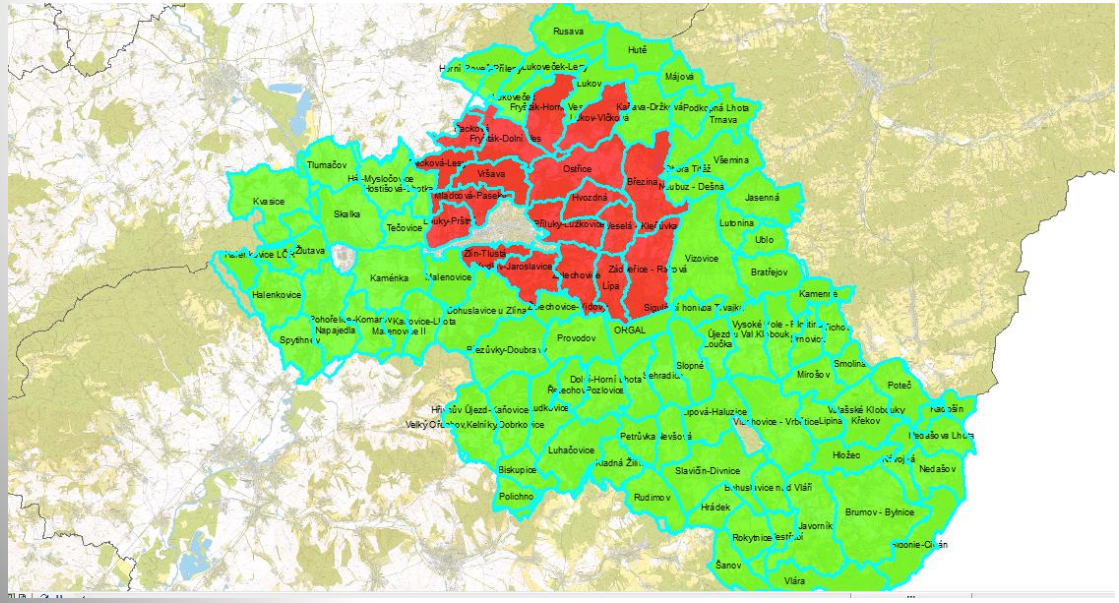


The higher risk area (red grit) surrounded by the perimeter of the wild boar maximum home rage size.

Low risk sub-area

It was the whole infected area (green) excluded the red high and higher risk areas.

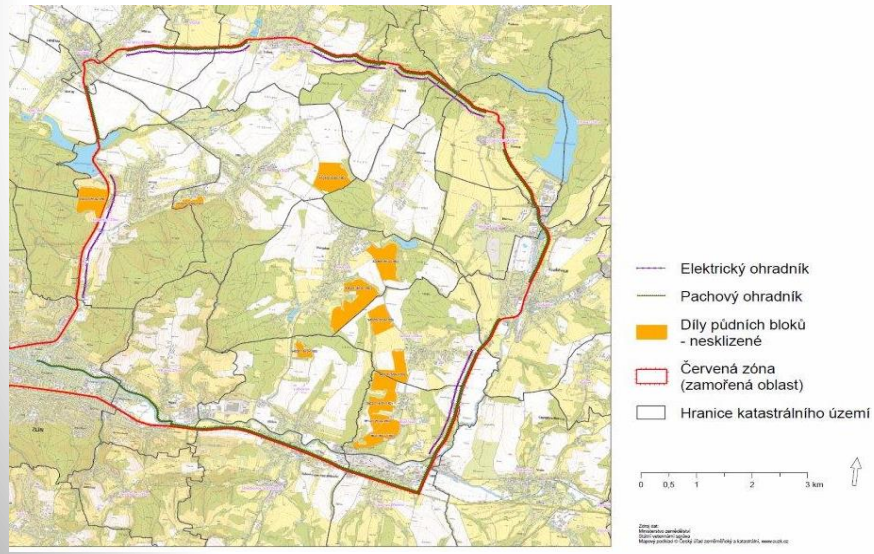
The area was 874 km2 large. All found dead and hunted animals are collect under biosecurity measures, tagged by seal, dispatched with authorised vehicles to a rendering plant where they were sampled by an official veterinarian and then disposed.



Alternative measures

Area 57 km$_2$ is defined as the “behind fence” area.

For minimalization of the possible movement of wild boar, all the perimeter of the high risk area has been fenced with a so called **“odour fence”,** and in addition, to increase fence efficiency, an **electric fence** has been added in the most permeable sectors (i.e. unpaved roads in the forest). The whole perimeter is about 32 km with 10 km of electric fence.



Fences around the high risk zone

to prevent or complicate the WB migration - **OUT and INTO**

Area: 57 km²
Perimeter: cca 30 km

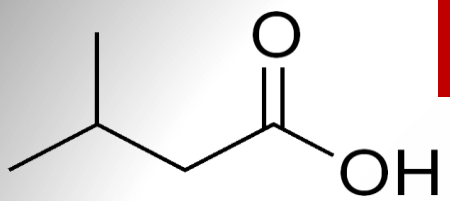
electric fence (voltage 6500 – 11 000 V)
scent fence

Electric fences around the infected core area

https://www.kr-zlinsky.cz

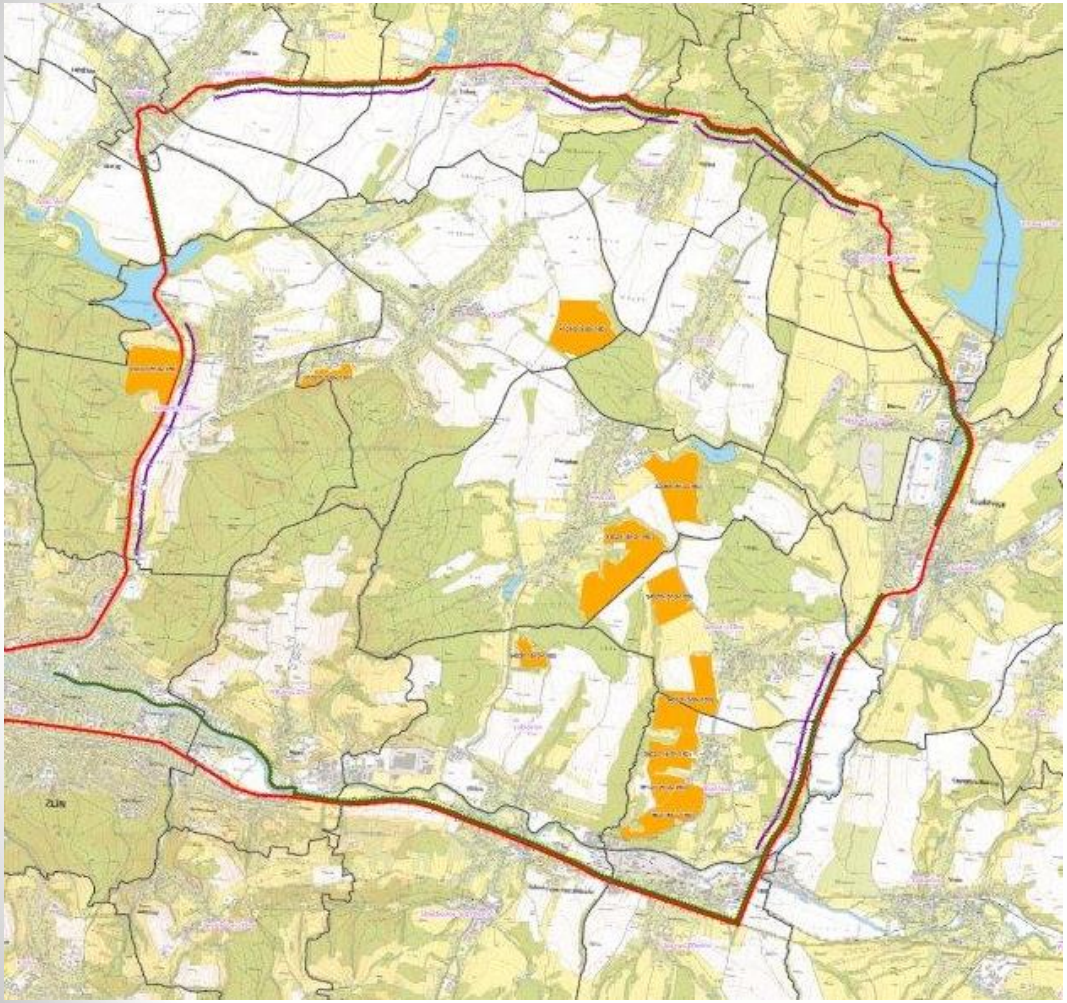
Electric fence installed around the high-risk zone

Odour fences around the infected area



- synthetic foam with **3-Methylbutanoic acid (isovaleric acid)**
- **imitation of typical predators smell /odour**
- **strong pungent cheesy or sweaty smell**
- it is a major component of the cause of unpleasant foot odour
- most durable product chosen – resistant against weather conditions (+ with slow evaporation)
- 5 m distance / 4 weeks period
- product: *Pacholek koncentrát B, Ekoplant, s.r.o.*

Higher risk area (fenced area) - unharvested fields left



115 hectares of unharvested fields (rape, maize and wheat) were left for wild boars providing both food and shelter

Enhanced passive surveillance of WB found dead

Motivated or/and organised searching of carcasses

- very inaccessible terrain
- dense vegetation

Intensive (active) searching of cadavers

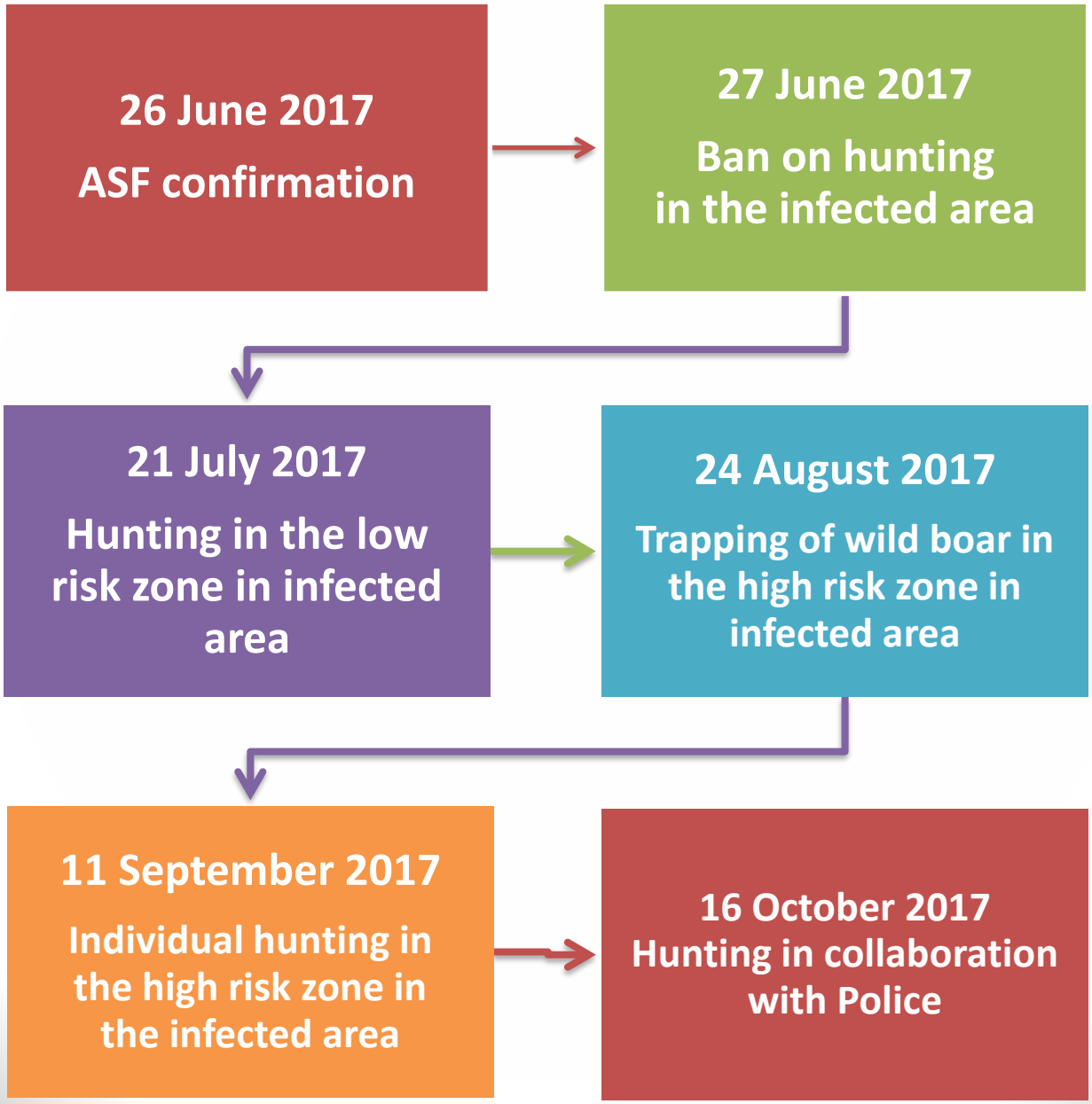
- **Intensive search** for wild boar cadavers from **22. 03. 2018 to 22. 04. 2018.**
- **After depopulation, before new vegetation season**
- **56 cadavers 10** of them were PCR ASF positive
- **Cadavers were 3-6 months old**
- **Infections and death of wild boars occurred at the end of 2017 or early 2018**
- Samples with positive results were sent to European Reference Laboratory for ASF, Madrid, Spain - **no live virus detected in these samples.**

Increased passive surveillance of dead WB – motivated searching for carcases

Ban of Hunting – How long ?

- Developing of **hunting biosecurity measures** aimed in avoiding the further spread of the virus thorough hunting activities
- **Understanding the geographical extents** of the involved areas
- **Prevention of wild boar disturbance**
- **Hunters have to be trained** to reduce the probability of further spread of the virus in the environment and outside the infected area

Timeline of hunting regulations



Hunting and trapping with rendering

— Each Hunting ground is **equipped with containers** or other means of wild boar temporary storage.

— In each collection point is available an equipment for **cleaning and disinfection**.

— Hunters have to **avoid possible contamination** of vehicles, hunting equipment, yards and houses.

— **Common containers** are allowed only for hunting grounds belonging to the same Wild Boar Management Units and when sharing the same infected hunting area

Hunting in the infected area

— Hunting of wild boar is allowed **only for selected and trained hunters**, motivated by financial compenzation.

— **Biosecurity** measures of hunters during hunt.

— **Identification** of hunted WB

— All hunted and found death wild boar **must be disposed in the rendering plant**

— **Sampling at rendering plant,** not in the huntig ground

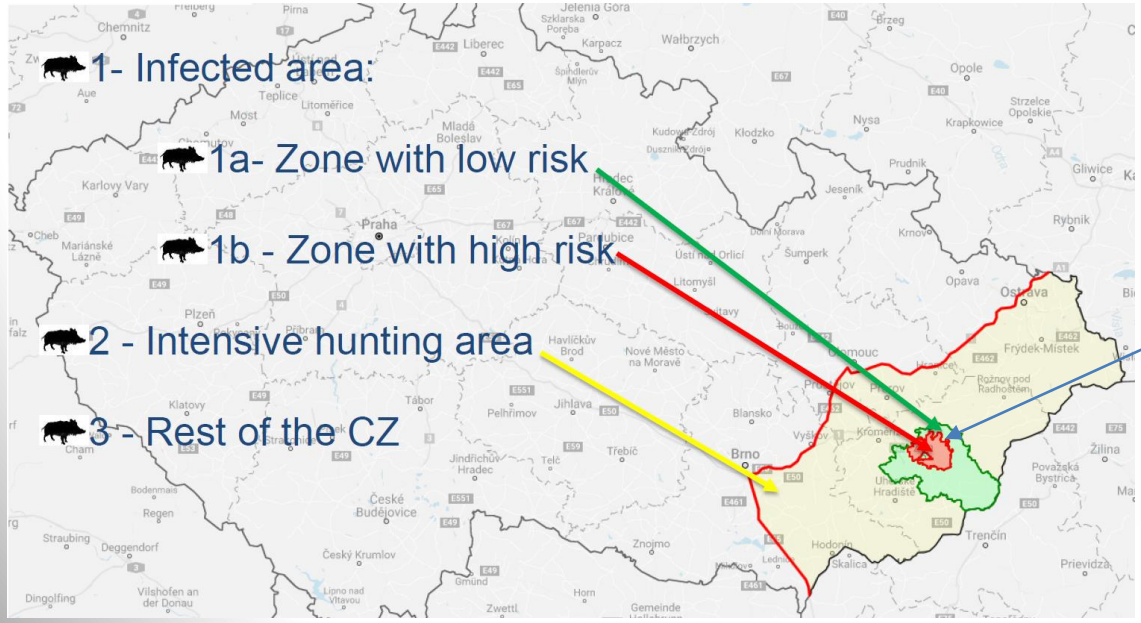
— **Hunters assicioations are compensated for the lost of venison**

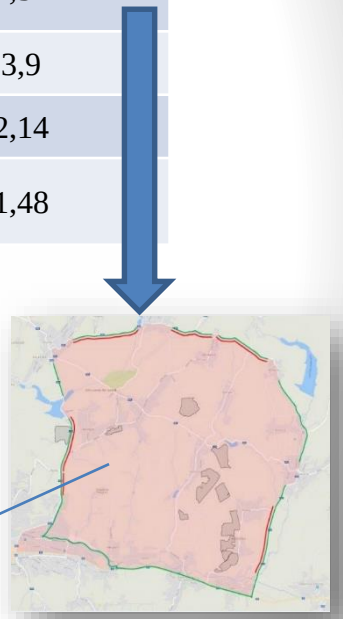
Disposal of hunted wild boars from the infected area to determined rendering plant

Samples taken in rendering plant by official veterinarien

Hunting of wild boars in defined areas from 26. 6. 2017 to 31. 1. 2018

ASF - hunting of wild boars in defined areas from 26. 6. 2017 to 31. 1. 2018					
	until 31 January 2018				
Area	Fenced	Size in km^2	Hunting beginn	Culled wild boar	Culled wild boar per km^2
Highest risk area (fenced)	yes	57,2	Sep 17	247	4,32
High risk area	no	102,8	Sep 17	401	3,9
Low risk area	no	874	July 17	1 874	2,14
Intensive Hunting area	no	8500	July 17	12 601	1,48





Trapping of wild boars

- 32 traps in the area
- cage traps with sensors and cameras

Fenced area	total trapped	negat.	posit.	prevalence
in	40	36	4	10%
out	66	66	0	-

Hunting by police snipers in the infected area

task: as fast as possible total depopulation inside the fenced area - quickly, silently, efficiently and with high biosecurity

- **individual hunting by Police snipers (Elite Squad, Police Special Unit, Airport snipers)**
- started from **16 October 2017 (**3 days a week during 10 weeks)
- **in total 157 WB hunted - 8 positive for ASF**
- snipers trained for hunting **biosecurity**
- organization and coordination by RVA and by regional hunters

- over night hunting (18:00 – 6:00)
- **mobile thermovision** used
- snipers with **silencers**

ALL hunted WB collected and rendered !!!

Training of snipers

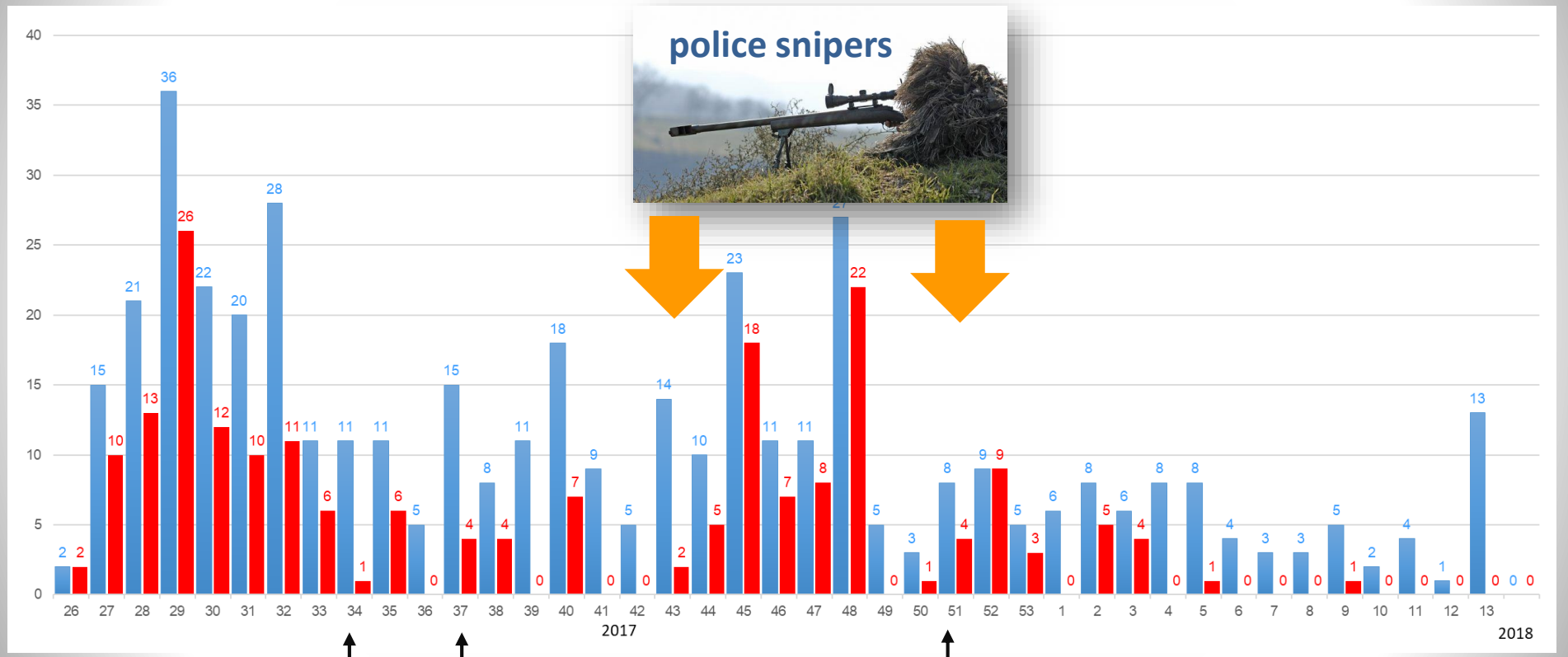
on a moving target

Collection of hunted WB during snipers hunting done by SVA

Weekly incidence in relation to hunting measures

number of WB **found dead**

number of ASF PCR positive **found dead WB**



week 34: hunting by trapping

week 37: individual hunting by trained hunters

hunting by Police snipers week 42-52/2017 and week 4-5/2018

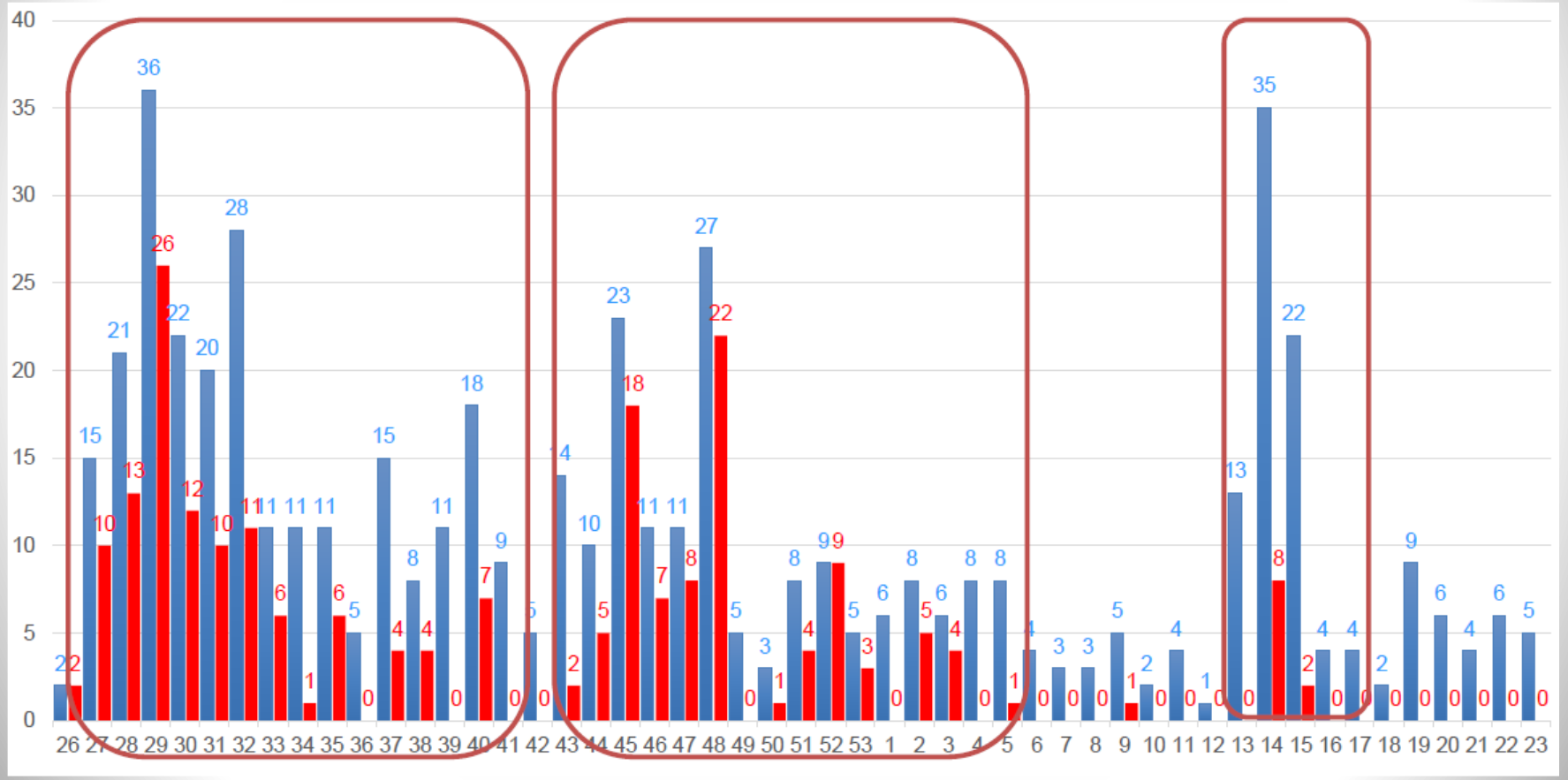
week 51: first positive WB cases outside fenced area

Weekly incidence - 3 epidemic peaks

EPIDEMIC

SNIPERS

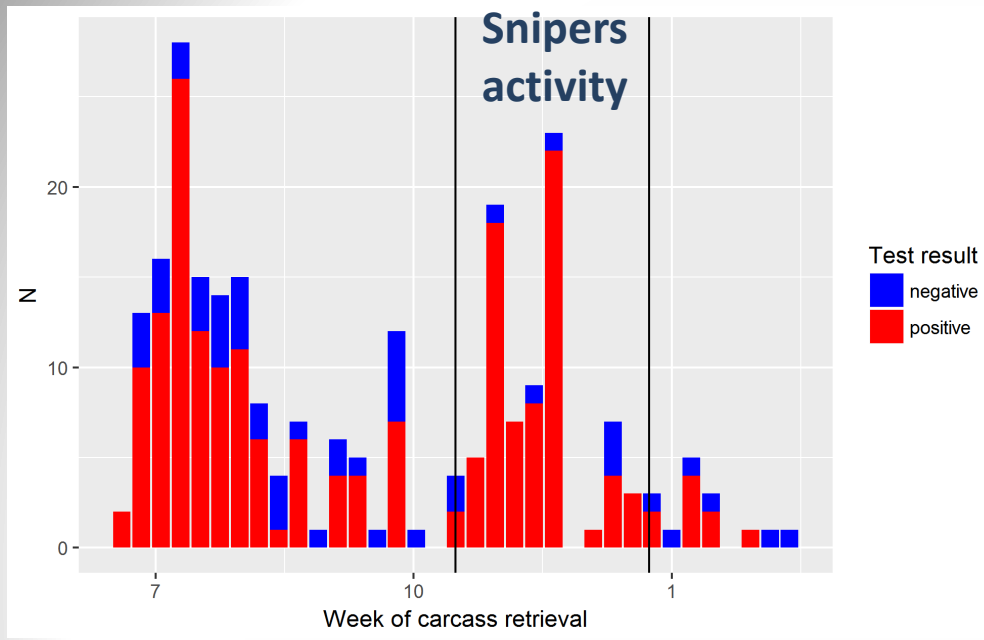
MOTIVATED and ORGANISED SEARCHING OF CARCASSES

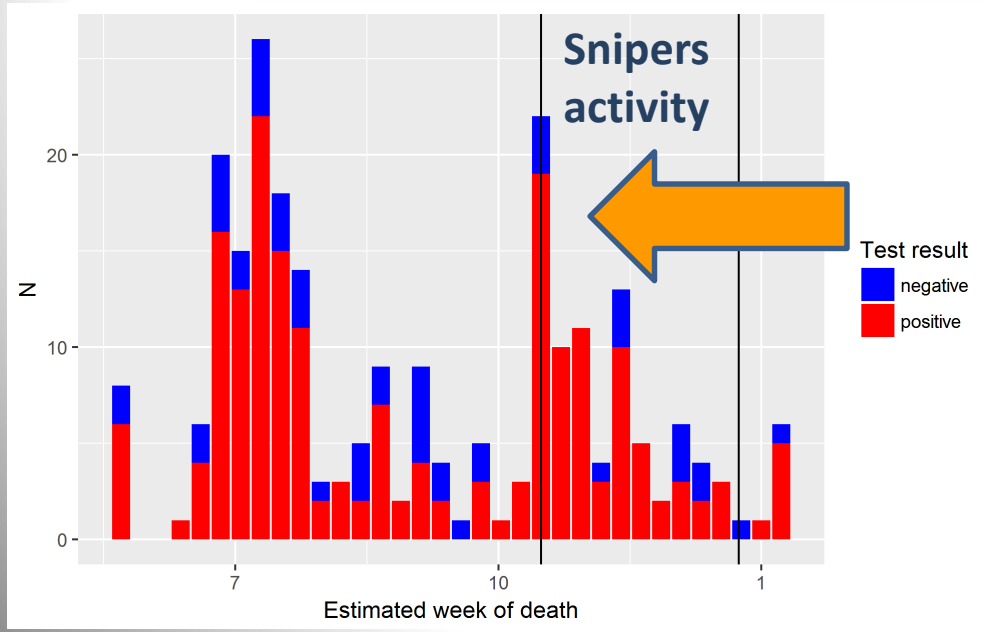


2017

2018

Carcasses „age“ – date of finding vs. date of death (estimated)

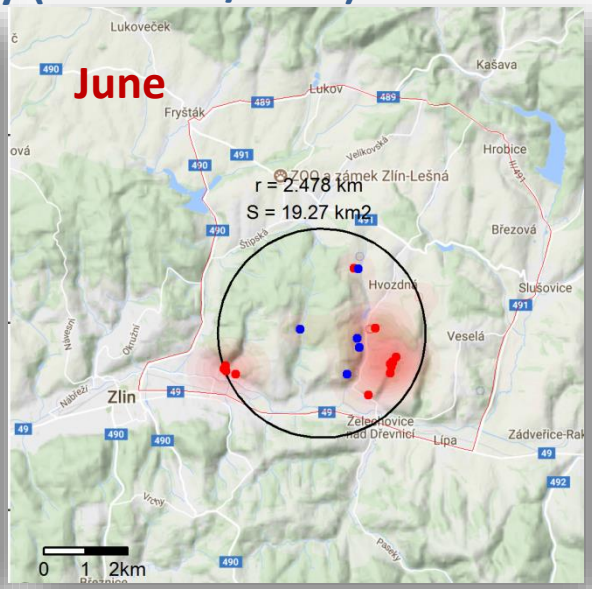


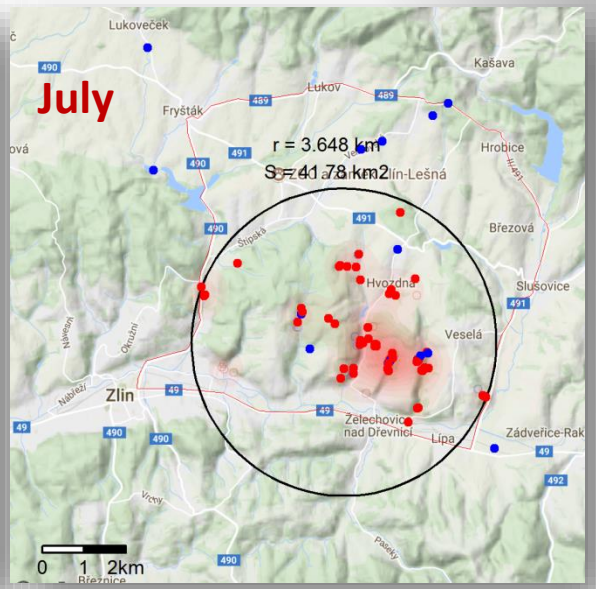


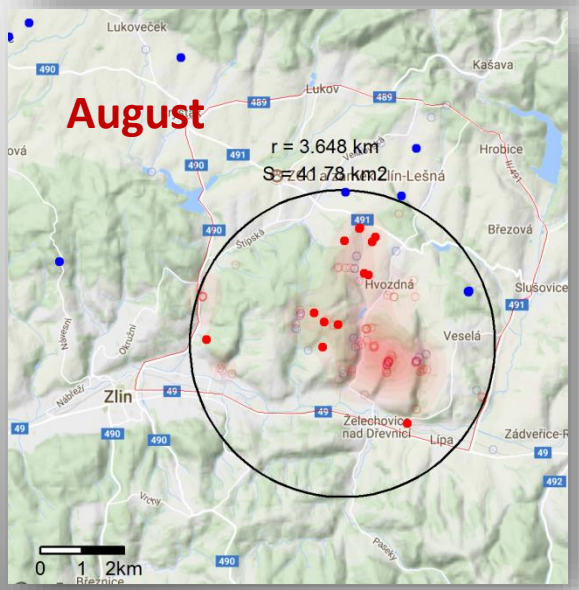
The speed rate of disease expansion

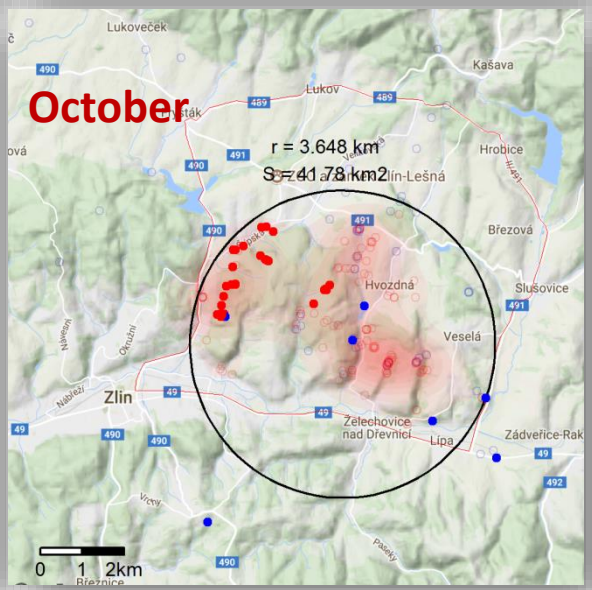
DIAMETER 11 KM / 11 MONTHS = SLOW speed = Ø 0,5 km/ 1 month

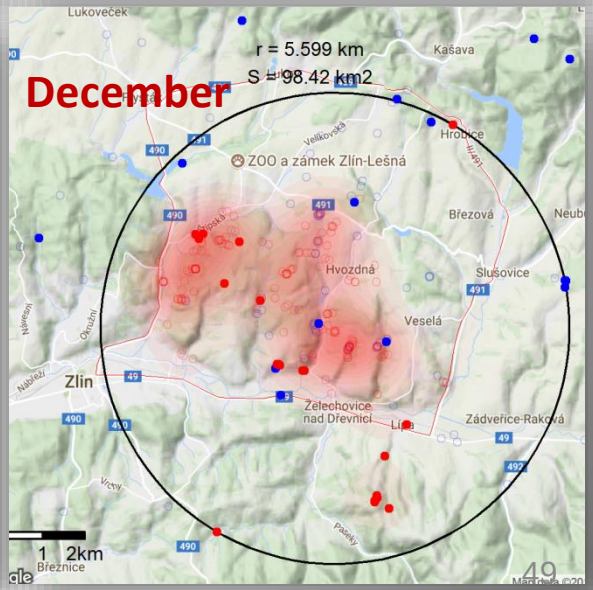
despite the high WB density (8-10 WB / km2)











based on the estimated date of death of WB found

Estimation of the number of wild boars in the core area (fenced area)

- Original estimate (July 2017) was 150 – 200 (250 max) wild boars only
- Total number of hunted or found dead wild boars is 582 to 17. 9. 2018 (299 hunted; 283 found dead)
- New estimates were made in July - August 2018 using trail cameras (game cameras), thermovisions and watching by hunters. The total estimated number of pigs was 15-20 (August 2018), only individual wild boars were observed.

The current situation confirms that the process of reducing the number of wild boars has been correct and effective.

Summary: What we learned from our „small“ outbreak?

The best rated measures (effectiveness and practicality):

- **motivated and active passive surveillance** – fast systematic removal of carcases
- **ban on hunting** (despite public/hunters opposition and political pressure)
- **Hunting in infected area is possible only under strict biosecurity conditions**
- **disposal of hunted wild boars** from the infected area - **ALL WB to rendering plant from PART II.**
- **hunters motivation** (financial rewards and compensation)
- **hunting in the infected area by profesionals to depopulate WB** (snipers)
- **unharvested fields** in infected area

Conclusions

- ✓ **indirect transmission by a human activity seems to be the most probable way of introduction to the Czech Republic**
- ✓ **the uniqueness of the Czech outbreak is the local occurrence in a small solitary area without direct connection to the affected localities in the neighbouring countries**
- ✓ by implementing strict measures in a small isolated area **the human factor (regarding to spreading of infection) has been substantially eliminated**
- ✓ **responsible authorities took both pioneering and alternative measures**
- ✓ **Key point is collaboration of all steakholders !!!**




If you want to manage the infection, behave like a virus, not like a pig!

State
Veterinary
Administration

Thank you !!!