ISTITUTO ZOOPROFILATTICO SPERIMENTALE DELLA SARDEGNA
"G.PEGREFFI"

Ministero della Salute

REGIONE AUTÒNOMA DE SARDIGNA
REGIONE AUTONOMA DELLA SARDEGNA

African Swine Fever situation in Sardinia

PAFF Committee
18-19 April 2018

ISTITUTO ZOOPROFILATTICO SPERIMENTALE DELLA SARDEGNA "G.PEGREFFI"

Ministero della Salute

REGIONE AUTÒNOMA DE SARDIGNA
REGIONE AUTONOMA DELLA SARDEGNA

ASF Eradication Plan 2015-2018

Control measures are focused on the three target populations:

DOMESTIC PIGS
14 742 holdings - 160 000 heads

WILD BOAR
90 000 heads

ILLEGAL FREE-RANGING PIGS
3-5 000 heads

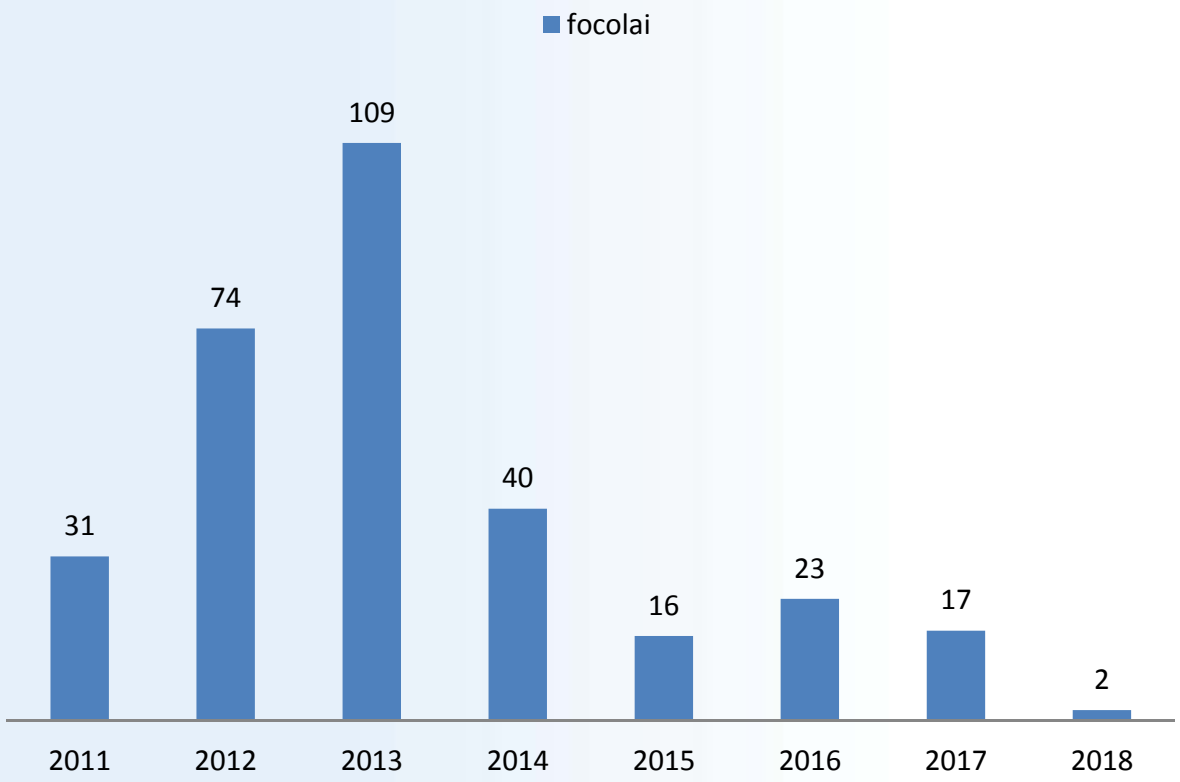
ASF chain of command and operational teams

- «Unità di Progetto» headed by n.1 of the Regional admin.
- New DG at IZS, new Regional Director
- Major reform as from 1 January 2017: One single «azienda sanitaria locale» (instead of the previous eight) now called «Azienda Tutela della Salute della Sardegna» (ATS)
- local Animal Health Services also reorganized - ASF measures coordinated by a single vet – work ongoing
- eight specialised veterinary teams, full-time devoted to ASF controls, under the single coordinator
- specialised culling units with police, forest guards, vets

Outbreaks in domestic pigs

ASSL	2011	2012	2013	2014	2015	2016	2017	2018 (17/04)
SS	6	24	52	8	7	1		
Olbia	1	30	51		4	1	1	
Nuoro	3	7	4	14	4	21	12	2
Lanusei	11		2	8			2	
Oristano	5	1						
Medio Campidano	1			1				
Carbonia Iglesias								
Cagliari	4	12		9	1		2	
Tot	31	74	109	40	16	23	17	2

Outbreaks in domestic pigs



Outbreaks in the last 9 months (mid July 2017 / mid April 2018):

3

Outbreaks in Jan-mid April 2017:

9

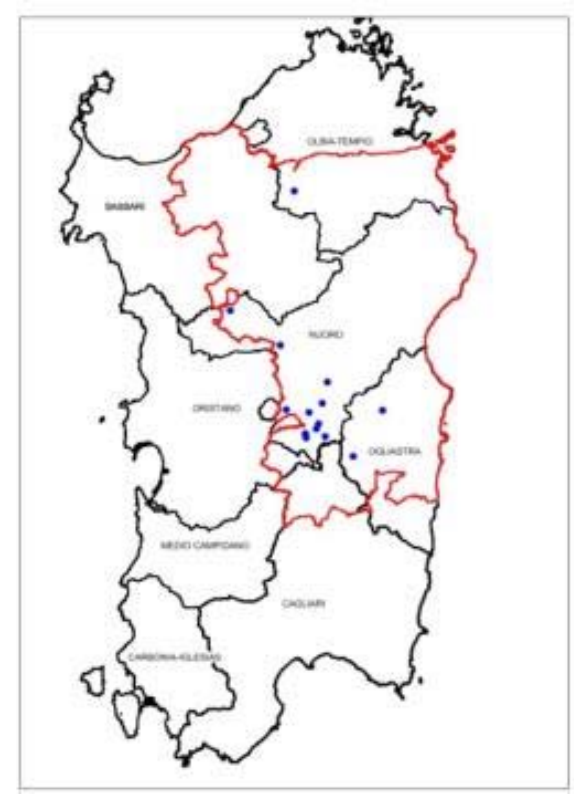
Conclusion: major improvement in the situation in dp holdings

Outbreaks in domestic pigs

Year	primary outbreaks	secondary outbreaks
2013	48	61
2014	36	4
2015	15	1
2016	16	7
2017	14	3
2018	2	0

Conclusion: ASF is not endemic in dp holdings

Outbreaks in domestic pigs in the last 12 months



Conclusion: the geographical area at risk of ASF outbreaks is of limited size and corresponds to the wb «infected area»

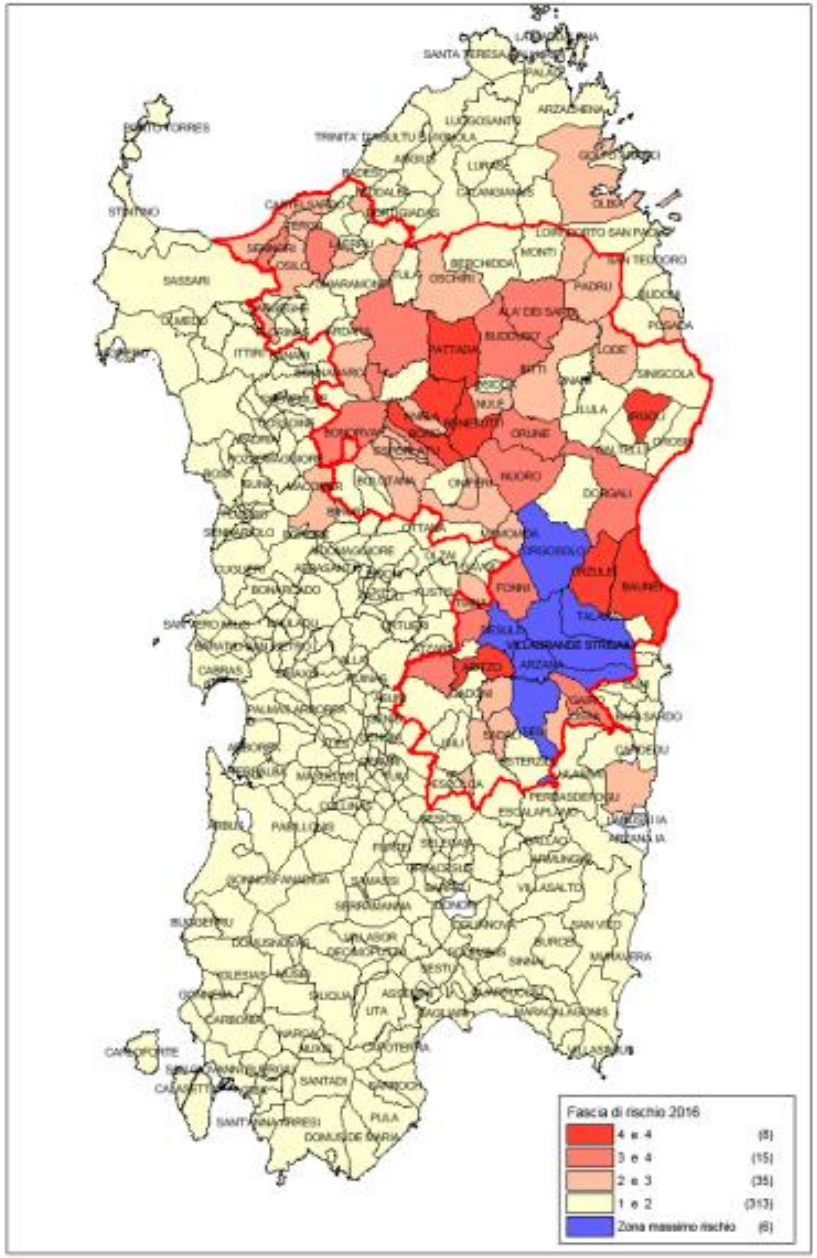
ISTITUTO ZOOPROFILATTICO SPERIMENTALE DELLA SARDEGNA
"G.PEGREFFI"

Ministero della Salute

REGIONE AUTÒNOMA DE SARDIGNA
REGIONE AUTONOMA DELLA SARDEGNA

Official controls in dp holdings

The current risk map



ISTITUTO ZOOPROFILATTICO SPERIMENTALE DELLA SARDEGNA "G.PEGREFFI"

Ministero della Salute

REGIONE AUTÒNOMA DE SARDIGNA
REGIONE AUTONOMA DELLA SARDEGNA

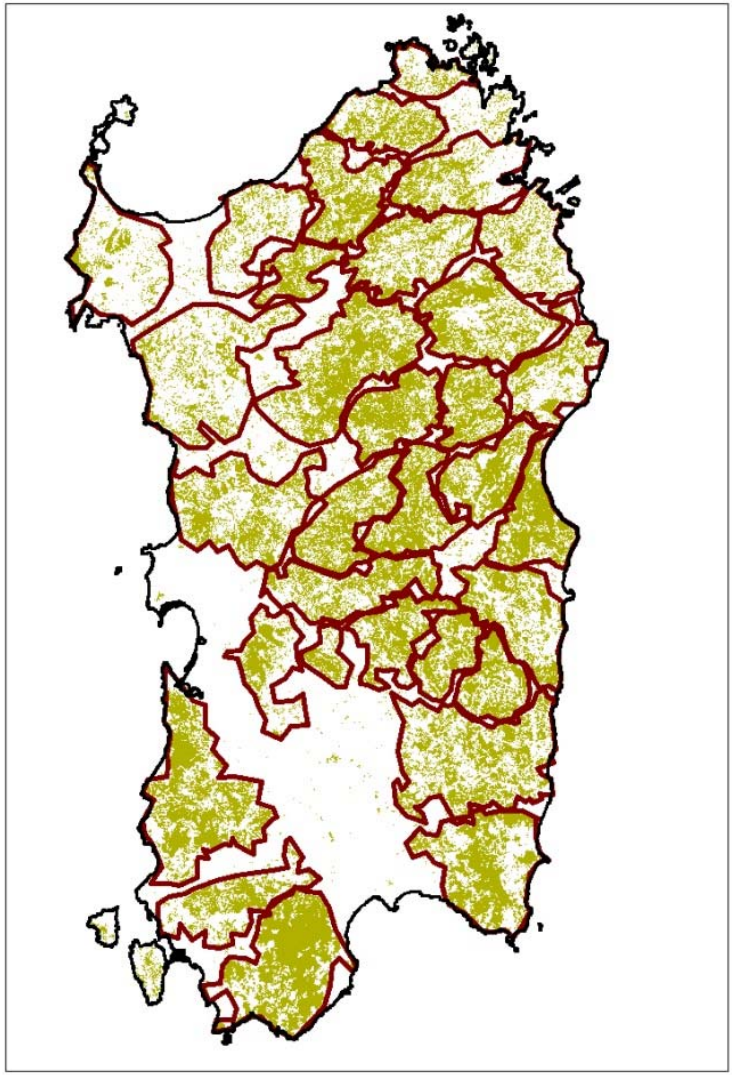
Official controls and surveillance on domestic pig holdings 2017

ASSL	Holdngs	Offiicial controls	Serosurveillance holdings	Sera tested	Suspected holdings	Non conformity	Follow up	Certified holdings	Controlled holdings
SS	2945	1793	2192	7970	67	355	53	1438	355
Olbia	1.409	837	1036	4669	15	236	75	624	154
Nuoro	2462	1258	1671	14271	82	755	211	210	878
Ogliastra	874	487	725	4784	23	75	24	413	748
Oristano	3149	1365	2058	9472	-	176	54	769	177
Medio Campidano	781	594	610	2857	-	39	29	554	39
Carbonia Iglesias	568	285	373	2062		228	24	57	228
CA	2554	680	1381	7784	10	413	25	217	423
Tot	**14742**	**7299**	**10046**	**53869**	**197**	**2277**	**495**	**4282**	**3002**

Wild boar in Sardinia

- **Wild boar population: around 90 000 head**

- **Unevenly distributed in «microareas» of about 900 sq. Km**



ISTITUTO ZOOPROFILATTICO SPERIMENTALE DELLA SARDEGNA "G.PEGREFFI"

Ministero della Salute

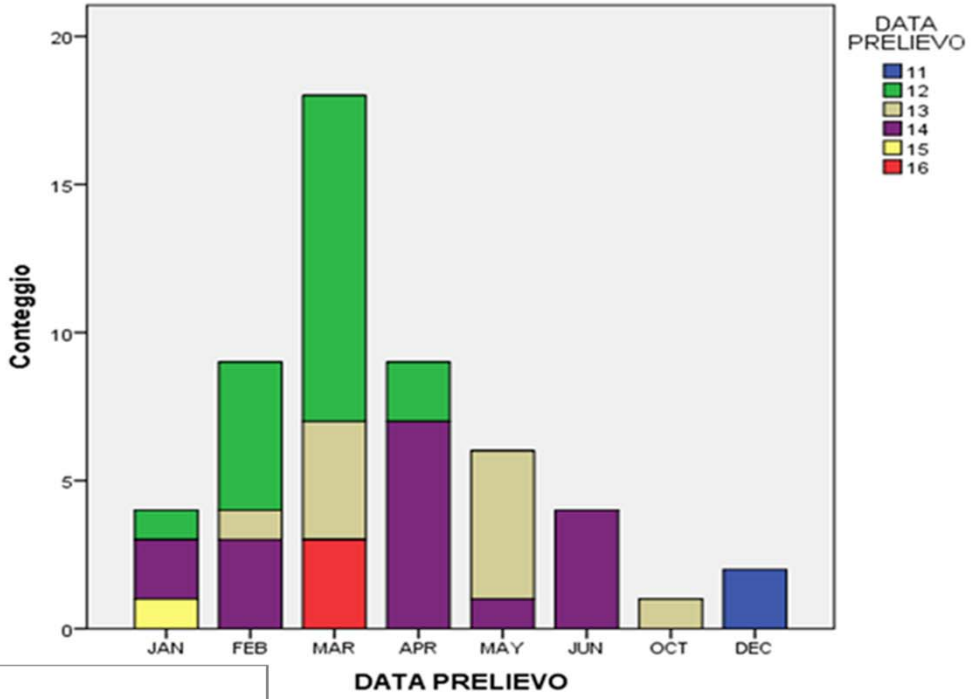
REGIONE AUTÒNOMA DE SARDIGNA
REGIONE AUTONOMA DELLA SARDEGNA

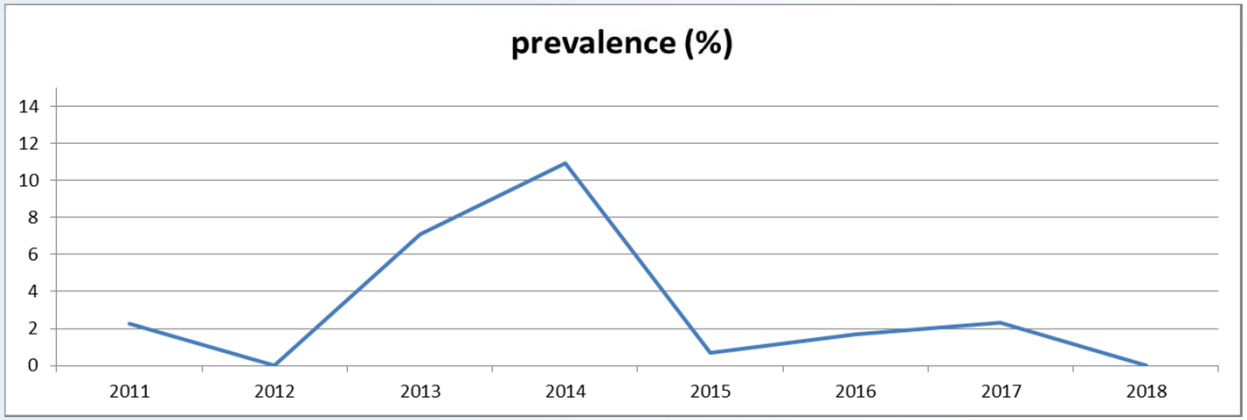
ASF situation in the wild boar

Year Hntng sesn	Head sbmttd for testing	Infected zone						Surveillance zone		
		Spleens PCR	Virus +	Virus Prevalnce	Sera ELISA/IB	Sera +	Sero prevalence	Sera ELISA/IB	Sera +	Sero prevalenza
10/11	1596	626	0	0,00	754	16	2,12	785	0	0,00
11/12	7775	3383	25	0,74	3817	143	3,75	3693	23	0,62
12/13	6224	2363	11	0,47	3256	340	*10,44*	2759	13	0,47
13/14	10419	2047	40	1,95	3431	269	*7,84*	4405	2	0,05
14/15	11361	1479	9	0,61	3676	271	*7,37*	3947	8	0,20
15/16	12734	2859	13	0,45	3549	240	*6,76*	6621	5	0,08
16/17	15673	4106	39	0,95	4898	230	*4,70*	5354	7	0,13
17/18	12599	5188	24	0,46	5202	198	*3,80*	5168	6	0,12

PASSIVE SURVEILLANCE ON WB

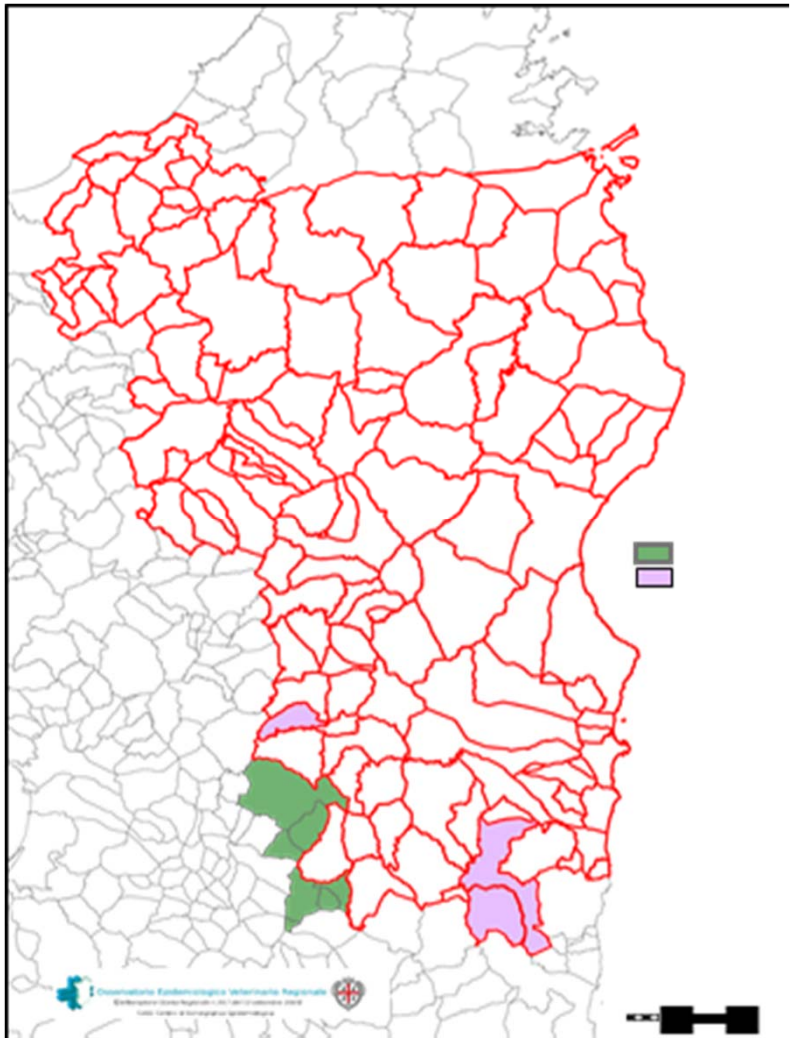
	tested	virus +	%
2011	89	2	2.24
2012	124	19	15.32
2013	155	11	7.09
2014	155	17	10.96
2015	146	1	0.68
2016	238	4	1.68
2017	218	5	2.29
2018	44	0	0

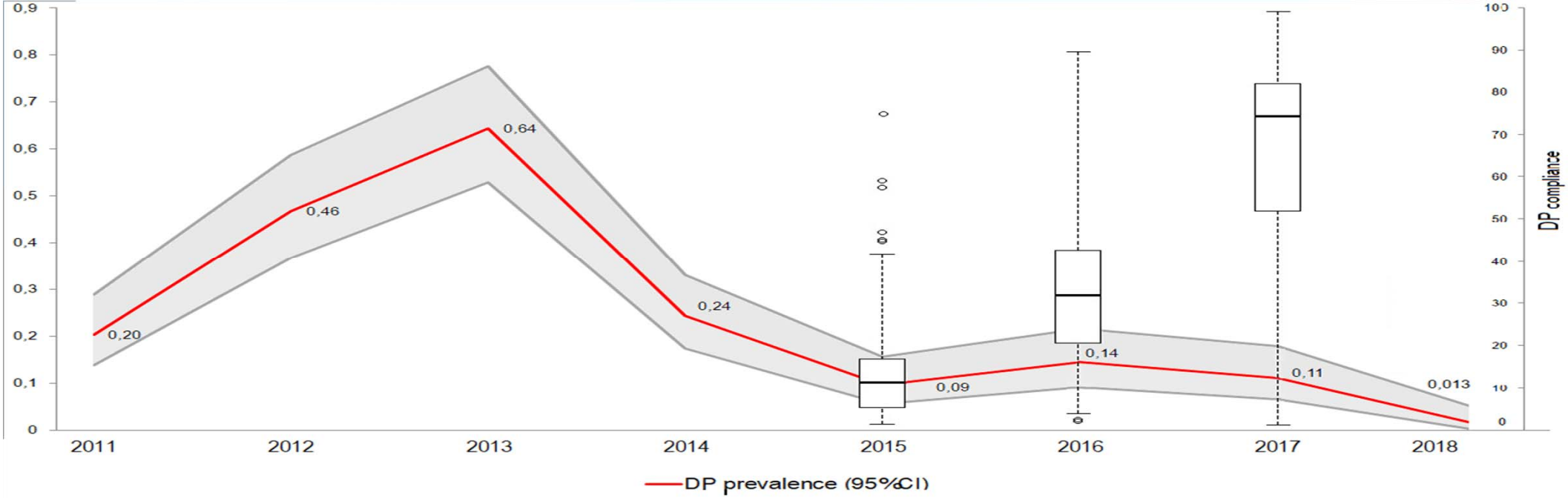




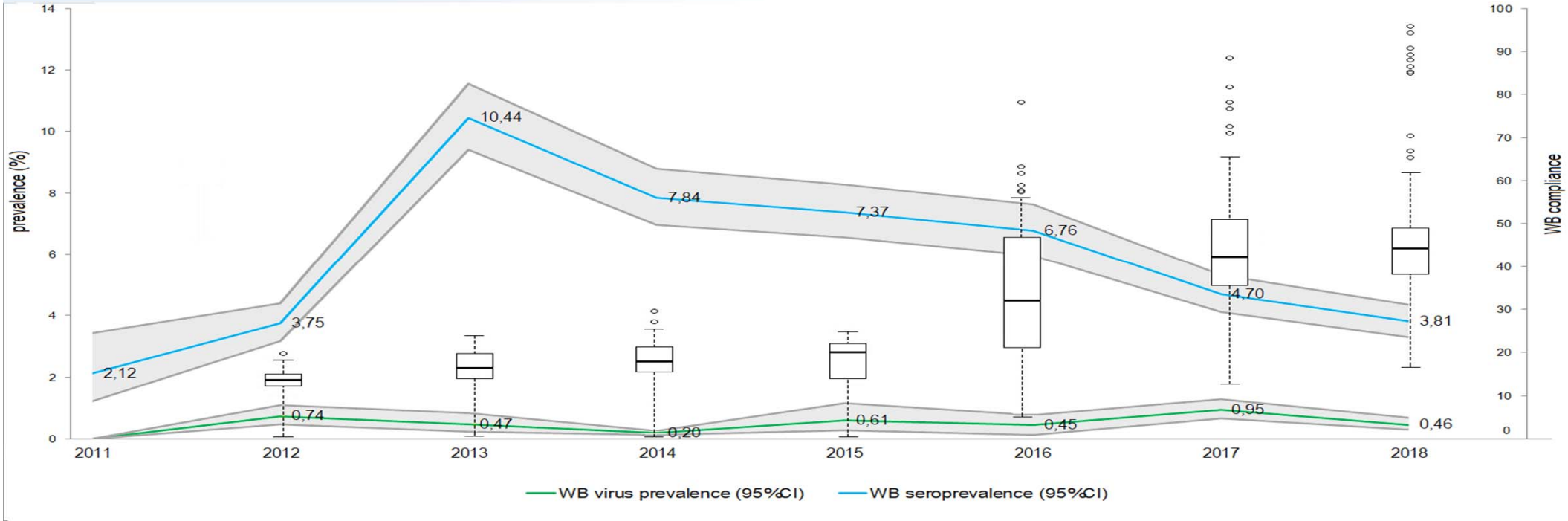
Wild boar in Sardinia

Changes foreseen to the infected area





The new ASF eradication plan has lead to a decreasing trend in disease prevalence.



All this is fine, but ....
... what about the illegal free - ranging pigs?

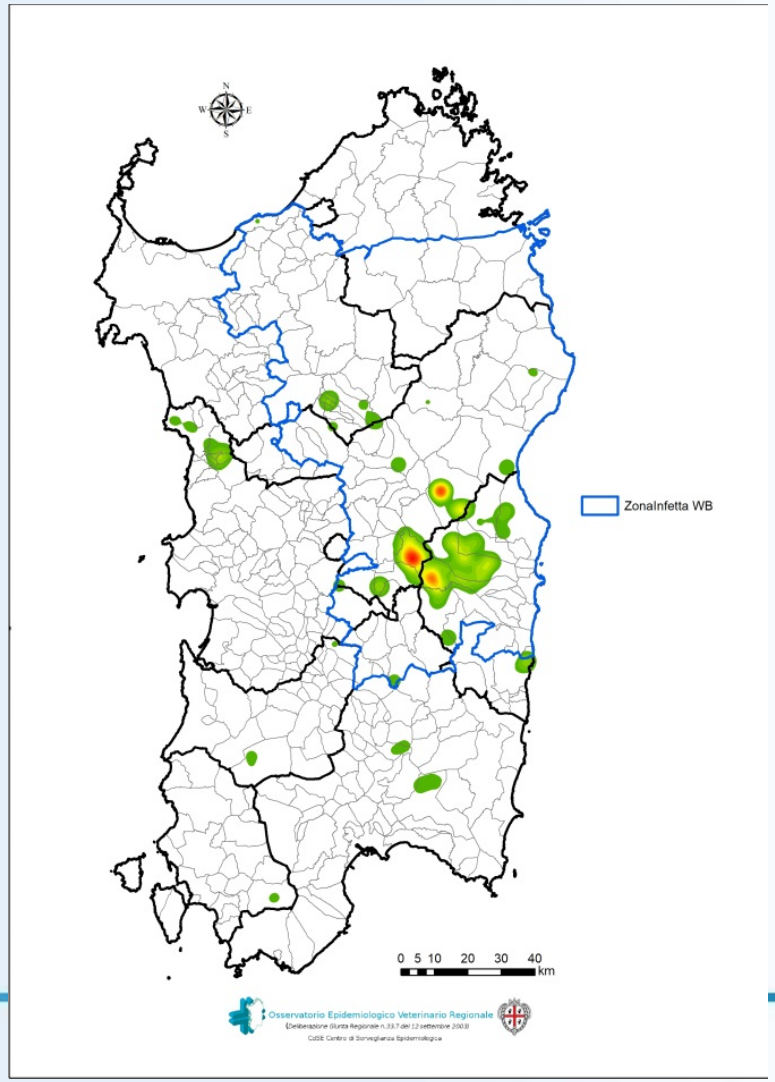
ISTITUTO ZOOPROFILATTICO SPERIMENTALE DELLA SARDEGNA "G.PEGREFFI"

Ministero della Salute

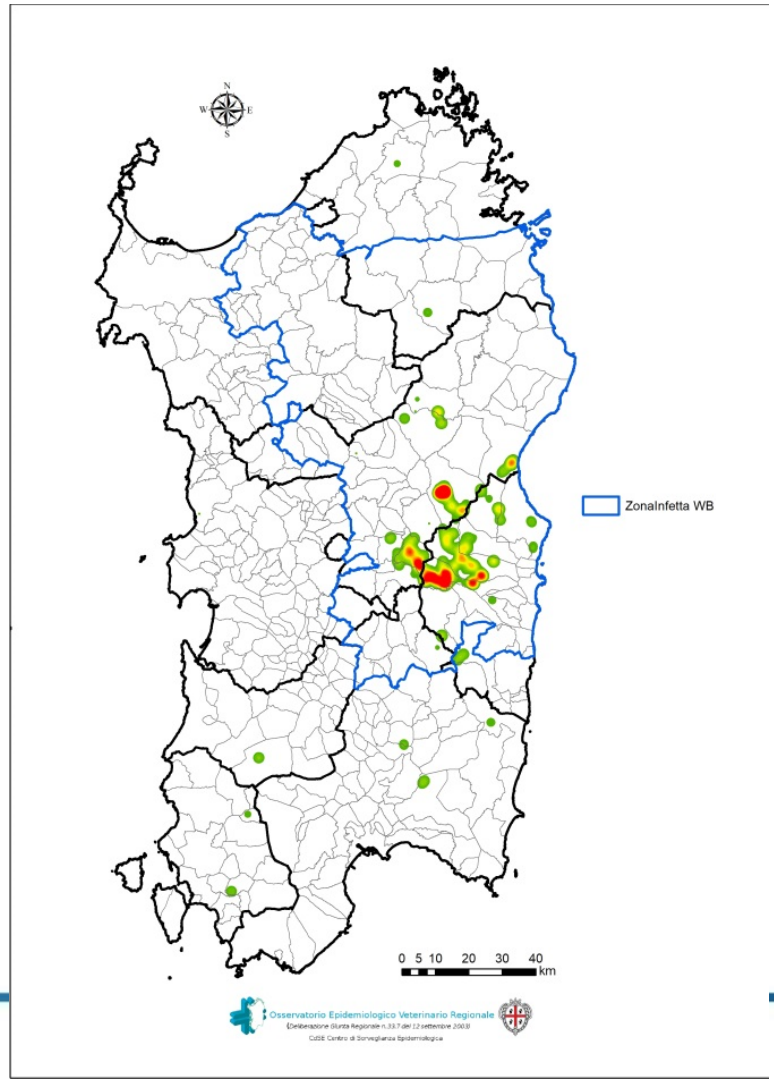
REGIONE AUTÒNOMA DE SARDIGNA
REGIONE AUTONOMA DELLA SARDEGNA

Sighting of free ranging pigs

2013-2015



2016-2017



ISTITUTO ZOOPROFILATTICO SPERIMENTALE DELLA SARDEGNA "G.PEGREFFI"

Ministero della Salute

REGIONE AUTÒNOMA DE SARDIGNA
REGIONE AUTONOMA DELLA SARDEGNA

Illegal Free-ranging pigs
Some figures

- In the past 8/10 thousand head; more recently **3/5 thousand head**

- From October 2017, a complex organization aimed at culling these pigs was set up to ensure a significant reduction of their numbers.

- **A total of 1701 free-ranging pigs illegally kept in eight communes have been culled in the last four months.**

Municipality (from dec. 2017 to april 2018)	**Pigs culled**	Sero-sample tested	Sera (ELISA+Ib) positives	Seroprevalence	Organs tested	Virus (PCR) positives	Virus prevalence
Arzana (8/12)	50	46	32	69,57	46	4	8,7
Baunei (24/1)	36	36	5	13,51	35	0	0
Desulo (8/12)	90	85	70	82,35	49	4	8,16
Desulo (20/12)	35	16	9	56,25	16	0	0
Nuoro (22/2)	139	51	10	19,61	55	0	0
Orgosolo (8/12)	**70**	18	13	**72,22**	51	1	**1,96**
Orgosolo (20/12)	**200**	93	69	**74,19**	103	1	**0,97**
Orgosolo (3/1)	**216**	129	105	**81,4**	132	4	**3,03**
Orgosolo (9/1)	**268**	112	69	**61,61**	111	2	**1,8**
Orgosolo (2/2)	**81**	38	31	**81,58**	40	2	**5**
Orgosolo (08/03)	**72**	60	44	**73,33**	60	0	**0**
Talana (30/12)	60	39	2	5,13	39	0	0
Urzulei (24/1)	63	28	0	0	26	0	0
Urzulei (16/2)	170	104	60	57,69	137	0	0
Villagrande (16/12)	60	24	24	100	28	4	14,29
Villagrande (30/12)	51	36	2	5,56	36	0	0
Villagrande (08/03)	40	19	0	0	20	0	0
Totale	**1701**	**934**	**545**	**58,35**	**984**	**22**	**2,23**

Impact of the depopulation measures

- Illegal free ranging population reduced of ~80/90%
- Pigs slaughtered and /or hidden
- Depopulation actions now more difficult, but they will continue
- Much higher support of the local population to the though actions taken against free ranging pigs
- Local mayors making a further effort to ensure that illegal farmers regularize their situation

Solution of the problem by the end of 2018

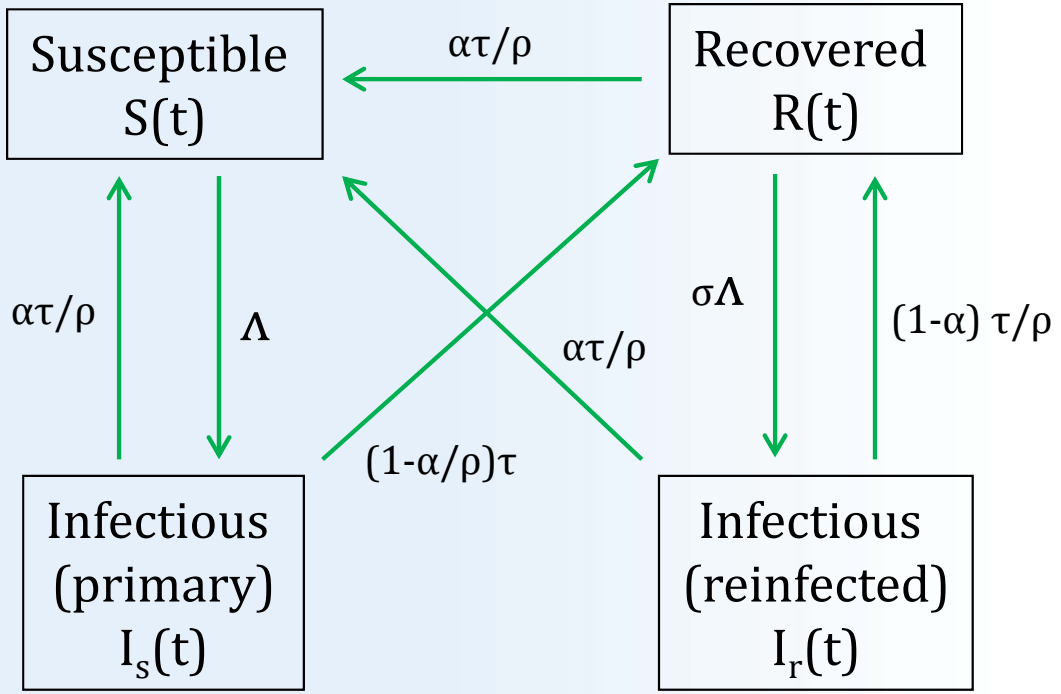
ISTITUTO ZOOPROFILATTICO SPERIMENTALE DELLA SARDEGNA
"G.PEGREFFI"

Ministero della Salute

REGIONE AUTÒNOMA DE SARDIGNA
REGIONE AUTONOMA DELLA SARDEGNA

WHAT HAPPENS IN ORGOSOLO???

Full model flow diagram



$$\frac{dS}{dt} = \mu P - \frac{\Lambda S}{P} + \frac{\alpha\tau}{\rho}(I_S + I_R + R) - \mu S,$$

$$\frac{dI_S}{dt} = \frac{\Lambda S}{P} - (\tau + \mu) I_S,$$

$$\frac{dI_R}{dt} = \frac{\sigma \Lambda R}{P} - \left(\frac{\tau}{\rho} + \mu\right) I_R,$$

$$\frac{dR}{dt} = \left(1 - \frac{\alpha}{\rho}\right)\tau I_S + (1-\alpha)\frac{\tau}{\rho} I_R - R\left(\frac{\sigma\Lambda}{P} + \frac{\alpha\tau}{\rho} + \mu\right)$$

Key input parameters in model
size of time step (months)
Total population size
Average pre-infectious period (months)
Average duration of infectiousness (months)
R0

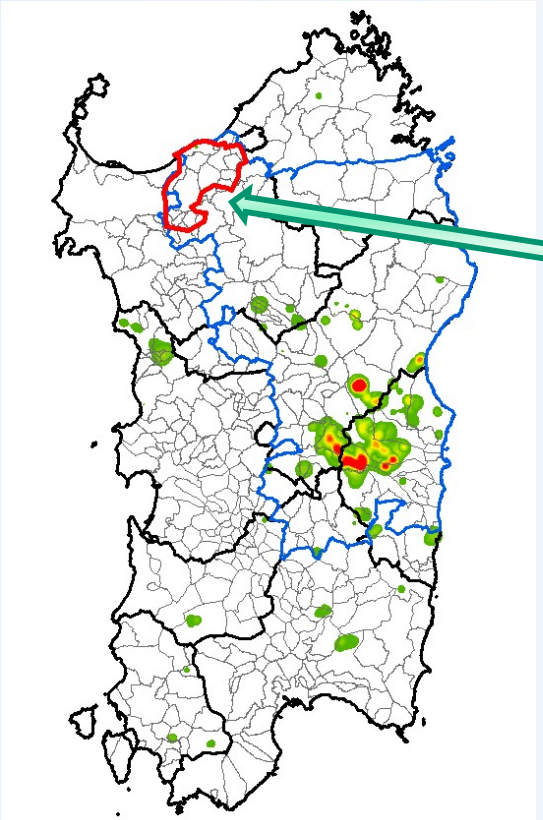
Average number of individuals effectively contacted per time step (ecr)
Rate at which 2 specific individuals come into effective contact per time step (beta)
Average rate of onset of infectiousness per time step (f)
Average recovery rate per time step (r)

White L.J. Et al., 2007. *Understanding the transmission dynamics of respiratory syncytial virus using multiple time series and nested models.* Mathematical Biosciences 209 (2007) 222–239

ISTITUTO ZOOPROFILATTICO SPERIMENTALE DELLA SARDEGNA
"G.PEGREFFI"

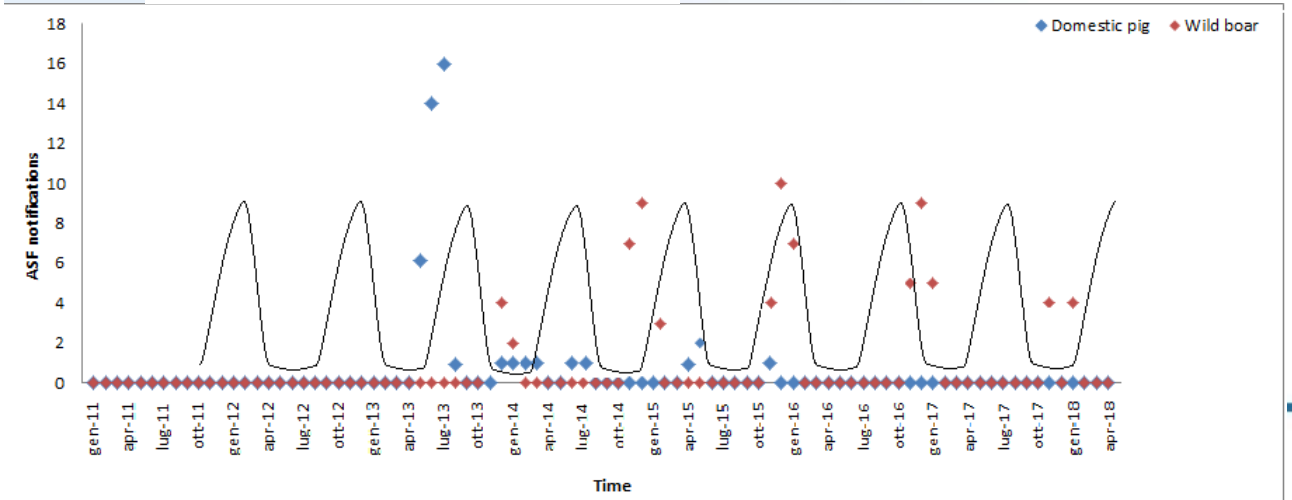
Ministero della Salute

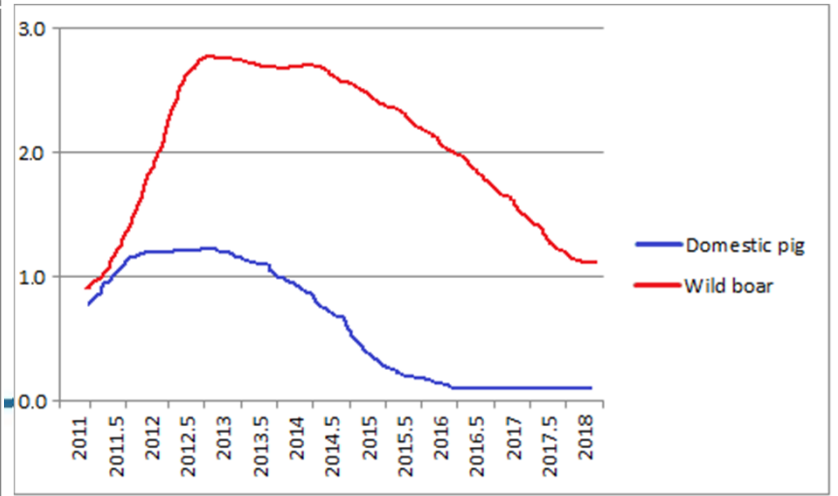
REGIONE AUTÒNOMA DE SARDIGNA
REGIONE AUTONOMA DELLA SARDEGNA



OSILO - NULVI

Illegal free-ranging pigs
never found!



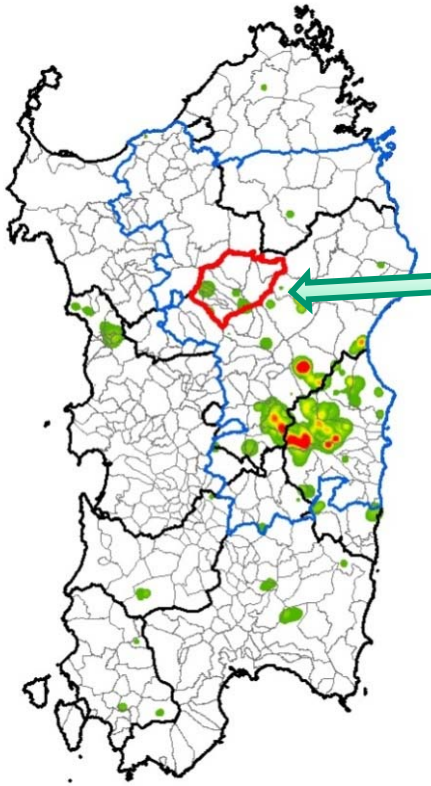


ISTITUTO ZOOPROFILATTICO SPERIMENTALE DELLA SARDEGNA "G.PEGREFFI"

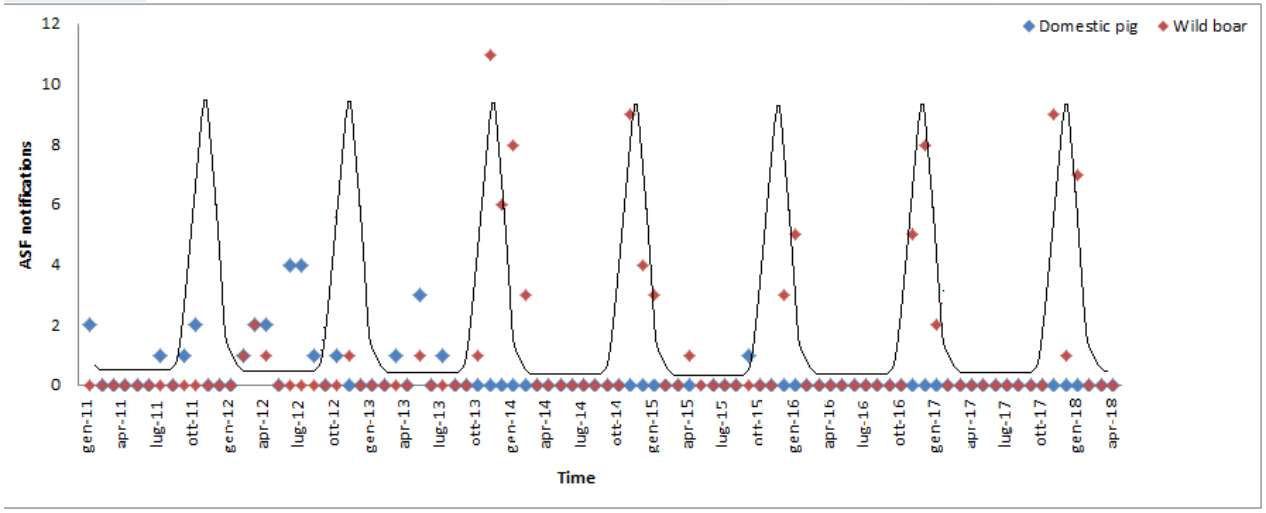
Ministero della Salute

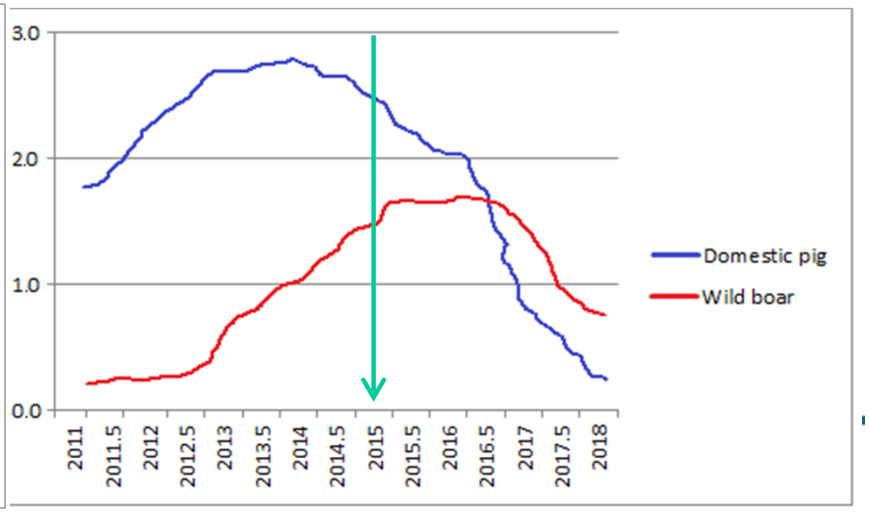
REGIONE AUTÒNOMA DE SARDIGNA
REGIONE AUTONOMA DELLA SARDEGNA

GOCEANO



Illegal free-ranging pigs found during 2013-2015, then eliminated.



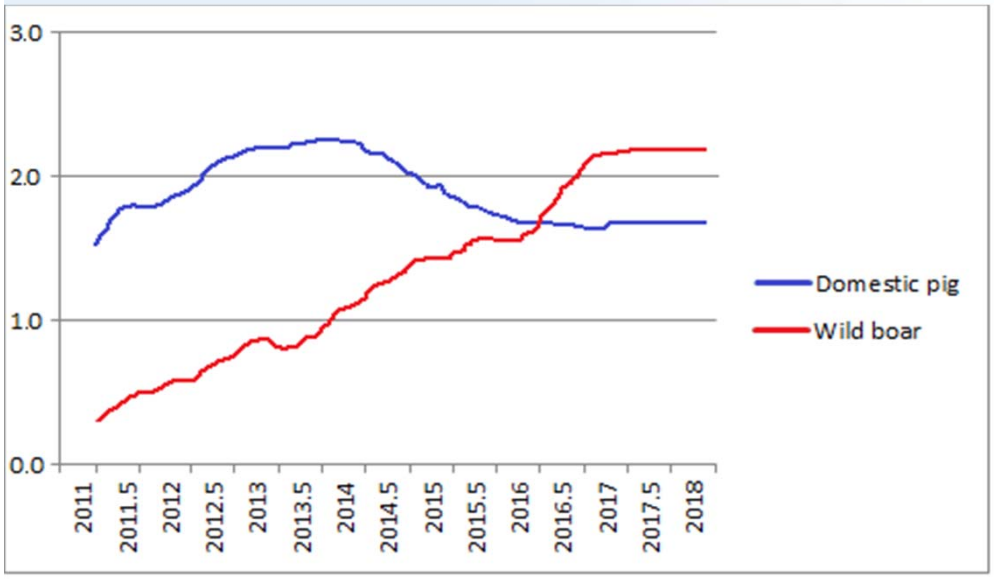


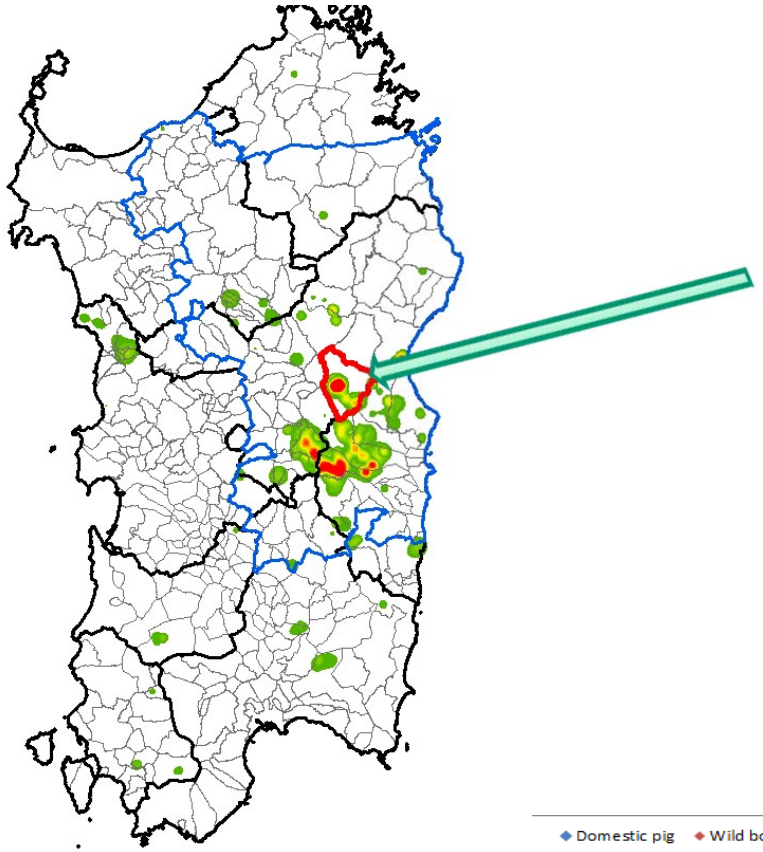
ISTITUTO ZOOPROFILATTICO SPERIMENTALE DELLA SARDEGNA "G.PEGREFFI"

Ministero della Salute

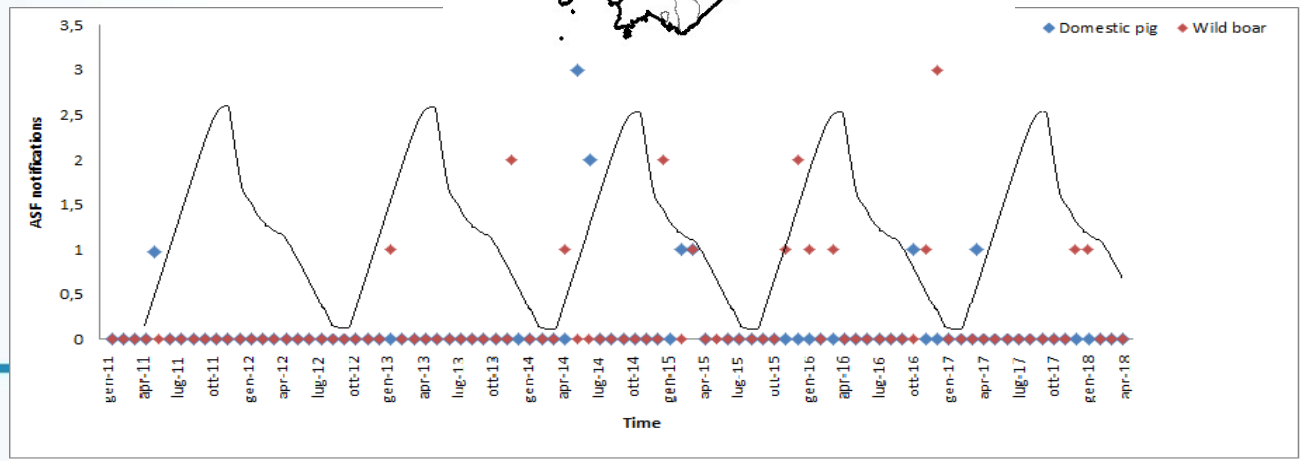
REGIONE AUTÒNOMA DE SARDIGNA
REGIONE AUTONOMA DELLA SARDEGNA

ORGOSOLO





Until pigs were kept at free range, ideal conditions for ASF virus persistence occured in Orgosolo, confirming the fundamental role of free range pig population as major virus reservoir in Sardinia.



ISTITUTO ZOOPROFILATTICO SPERIMENTALE DELLA SARDEGNA "G.PEGREFFI"

Ministero della Salute

REGIONE AUTÒNOMA DE SARDIGNA
REGIONE AUTONOMA DELLA SARDEGNA

Eradication Plan 2015-2018

DOMESTIC PIGS
- 90% disease outbreaks

WILD BOAR
- 64%
seroprevalence

ILLEGAL FREE-RANGING PIGS
Number reduced of 80/90%

Conclusions

•**Eradication measures** have already led to a **major decrease in virus incidence and prevalence both in domestic pigs and the wild boar**

•Unprecedented measures have also been recently adopted and **are ongoing** to **tackle the illegal free ranging pigs** still present in a few areas

•Our model:

- clearly confirms the role of **illegal free ranging pigs as a fundamental virus reservoir**
- shows that the disease is on the **brink of eradication** (even from the wild boar) in those previously affected areas in which pigs are not (anylonger) kept at free range

All this suggests that ASF will most likely be eradicated from Sardinia, provided that the ongoing measures continue to be applied

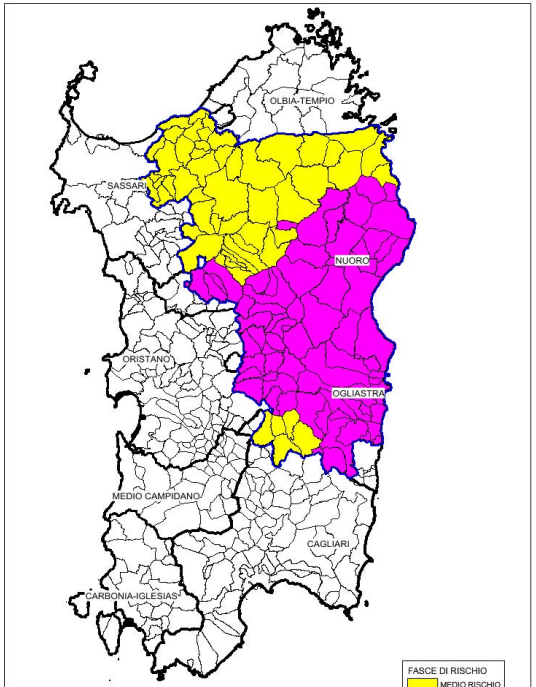
ASF eradication from Sardinia has never been so close!

ISTITUTO ZOOPROFILATTICO SPERIMENTALE DELLA SARDEGNA "G.PEGREFFI"

Ministero della Salute

REGIONE AUTÒNOMA DE SARDIGNA
REGIONE AUTONOMA DELLA SARDEGNA

On the bases of the results presented, <u>three areas</u> with different ASF risk can be identified in Sardinia



ISTITUTO ZOOPROFILATTICO SPERIMENTALE DELLA SARDEGNA "G.PEGREFFI"

Ministero della Salute

REGIONE AUTÒNOMA DE SARDIGNA
REGIONE AUTONOMA DELLA SARDEGNA

After fourty years of failures how can Sardinia be considered reliable?

How can the people in charge of the eradication programme be capable to tackle such a complex and difficult situation?

The project unit for the eradication of African swine fever in Sardinia (Unita di progetto) has the power and capacity to ensure effective management, coordination and cooperation among different authorities (at central, regional and local levels) involved in the eradication of African swine fever. This is a good pre-requisite to run an eradication programme. Although this unit has adequate power and resources, there are still a significant number of uncontrolled pigs - which are illegal under national law - in Sardinia and this is one of the key obstacles to the eradication of the disease. The lack of effective control over all pig populations on the island and the ineffectiveness of the project unit to eliminate uncontrolled pigs, reduce the confidence that an eradication programme will deliver a significant improvement of the current situation.

ISTITUTO ZOOPROFILATTICO SPERIMENTALE DELLA SARDEGNA
"G.PEGREFFI"

Ministero della Salute

REGIONE AUTÒNOMA DE SARDIGNA
REGIONE AUTONOMA DELLA SARDEGNA

To win is not important ....

<u>... is the only thing that matters</u>