



University of Novi Sad Faculty of Agriculture



Welcome to Нови Сад

VOJVODINA



THE AUTONOMOUS PROVINCE OF VOJVODINA

- The northern province of Serbia - accounts for 24 % of Serbia's territory
- Vojvodina has population of approximately 2,320,000 inhabitants
- Capital city is Novi Sad

UNIVERSITY OF NOVI SAD



❖ NOVI SAD:

Faculty of Philosophy
Faculty of Agriculture
Faculty of Law
Faculty of Economics
Faculty of Technology
Faculty of Technical Sciences
Faculty of Medicine
Faculty of Natural Sciences
Faculty of Physical Education
Academy of Arts

❖ SUBOTICA

Faculty of Economics
Faculty of Civil Engineering

❖ SOMBOR

Teacher's Training Faculty

❖ ZRENJANIN

"Mihajlo Pupin" Technical Faculty

UNIVERSITY OF NOVI SAD - CAMPUS



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FACULTY OF AGRICULTURE

FOUNDED IN 1954



FACULTY DEPARTMENTS - 8

- Department of Field and Vegetable Crops
- Department of Animal Husbandry
- Department of Fruit Growing and Viticulture
- Department of Agricultural Engineering
- Department of Phytomedicine and Environment Protection
- Department of Water Management
- Department of Agricultural Economics
- Department of Veterinary Medicine





Department for Phytomedicine and Environmental Protection

(Established in 1960)



- Laboratory for Medical and Veterinary Entomology -



Vid

Prof. dr Ignjatović-Ćupina

Prof. dr Zgomba

Mihaela

Prof. dr Petrić



Dušan



One Health approach in WNV surveillance, Serbia

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One Health approach in WNV surveillance, Serbia

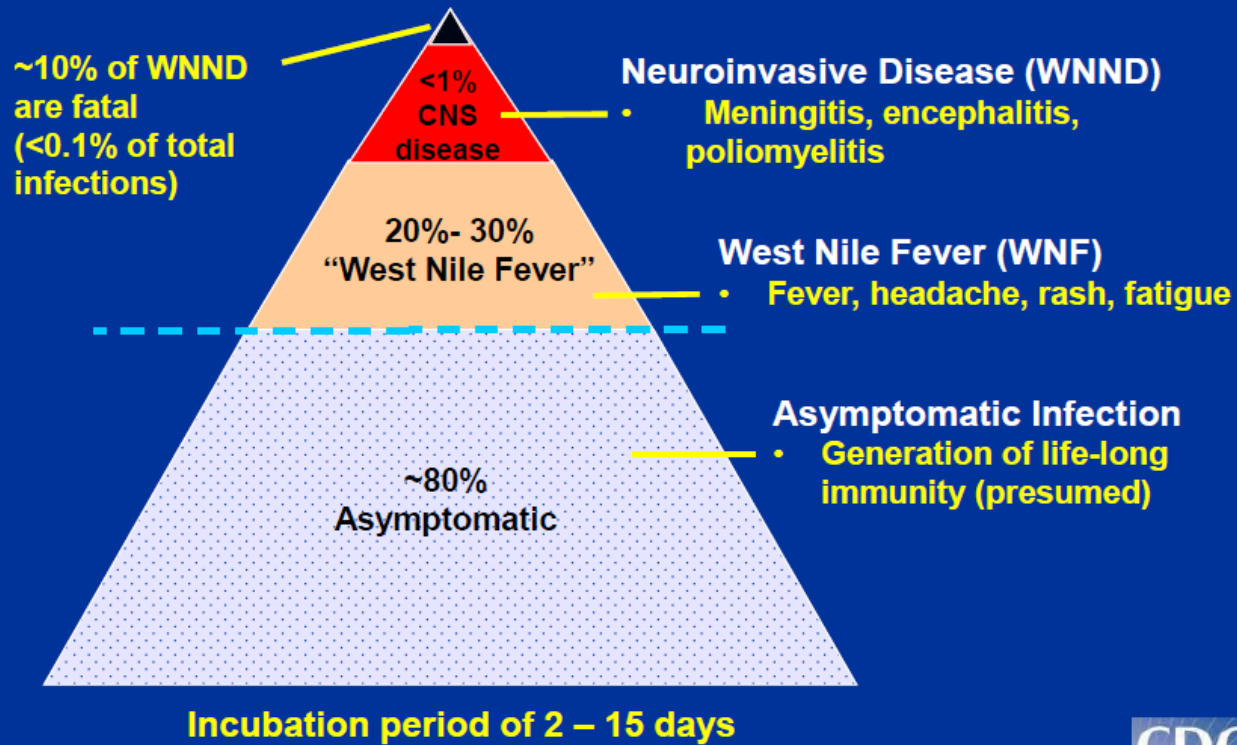


Acknowledgements

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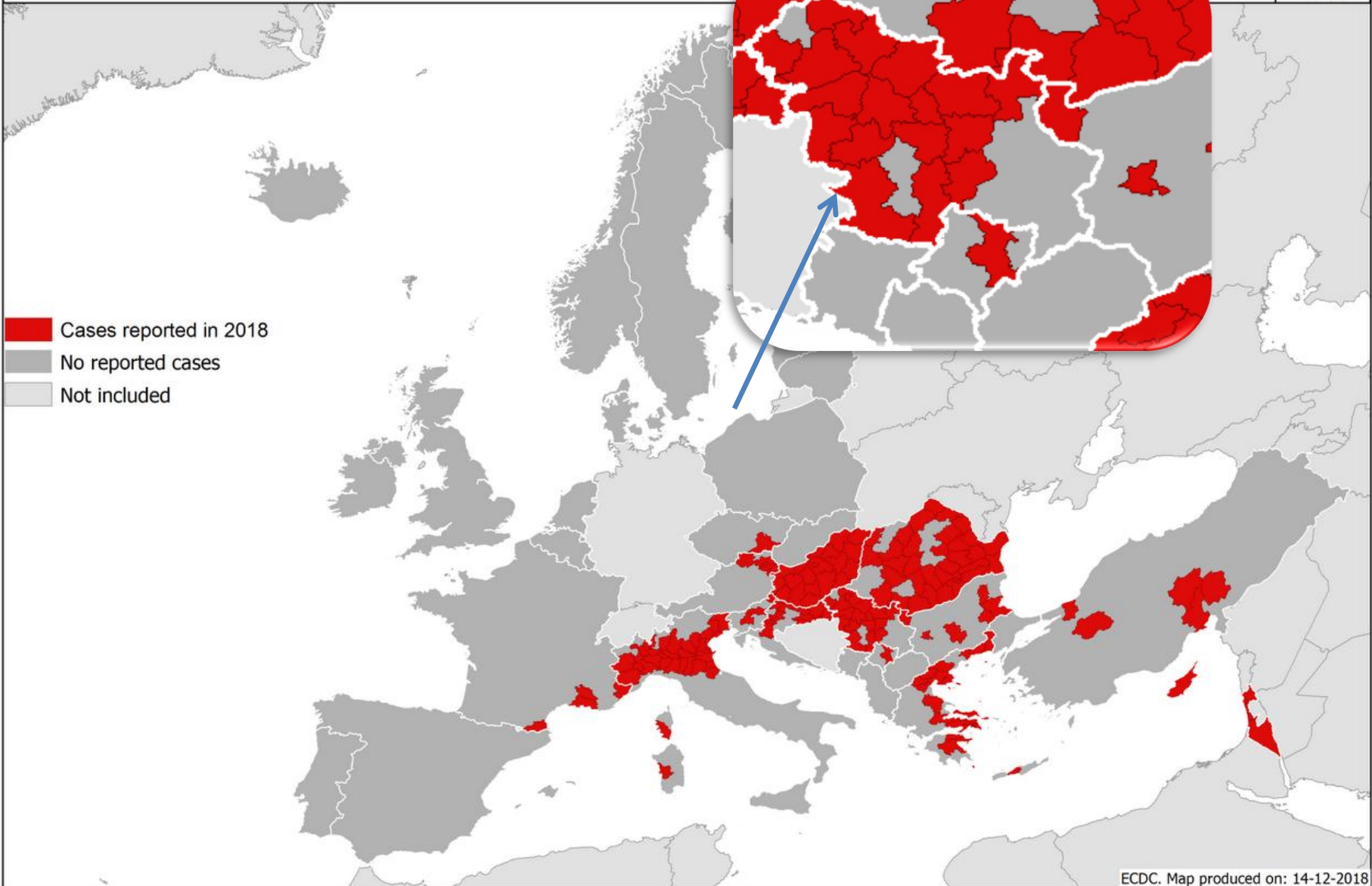
Part of the work was done within the framework of **AIM-COST Action CA17108.**

Three General Clinical Categories of WNV Disease

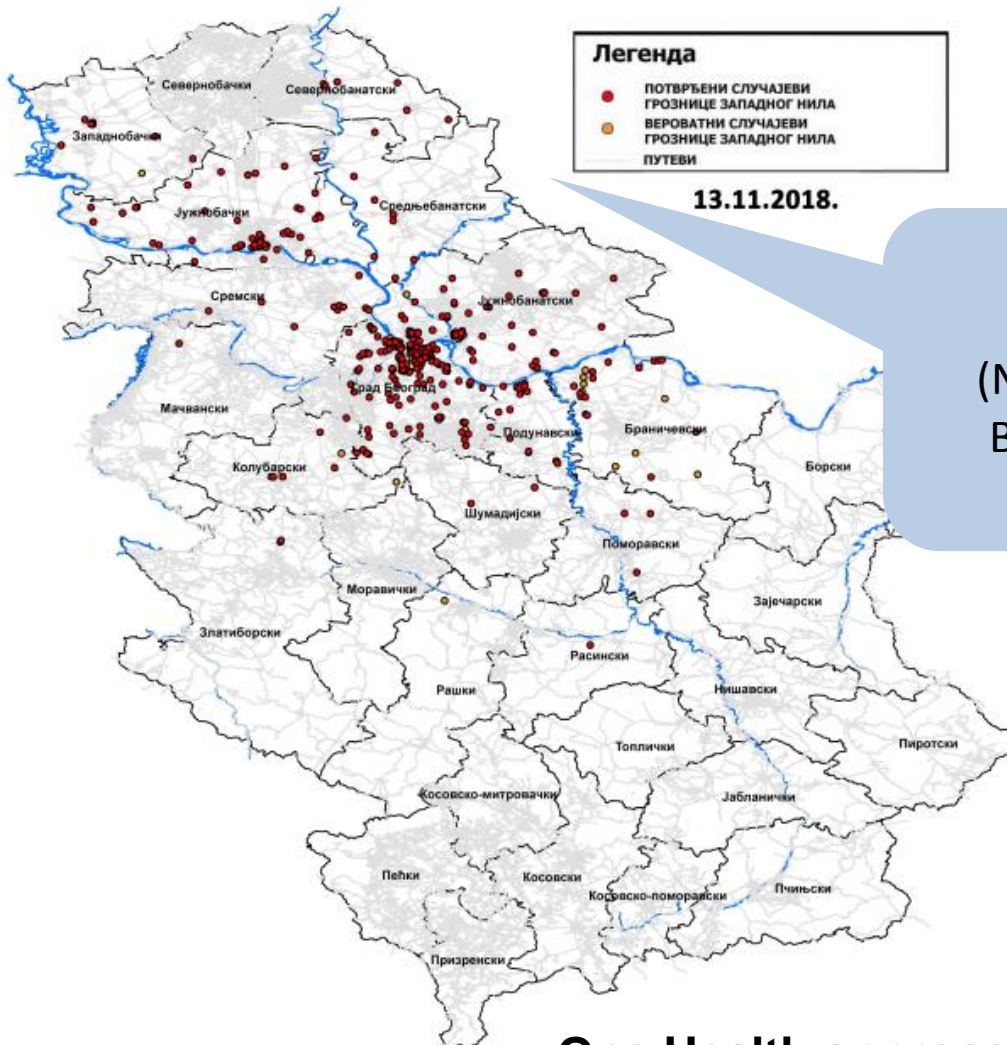


One Health approach in WNV surveillance, Serbia

Distribution of West Nile virus infections in humans by affected areas in the EU/EEA Member States and EU neighbouring countries
Transmission season 2018; latest data update



- Cases reported in 2018
- No reported cases
- Not included

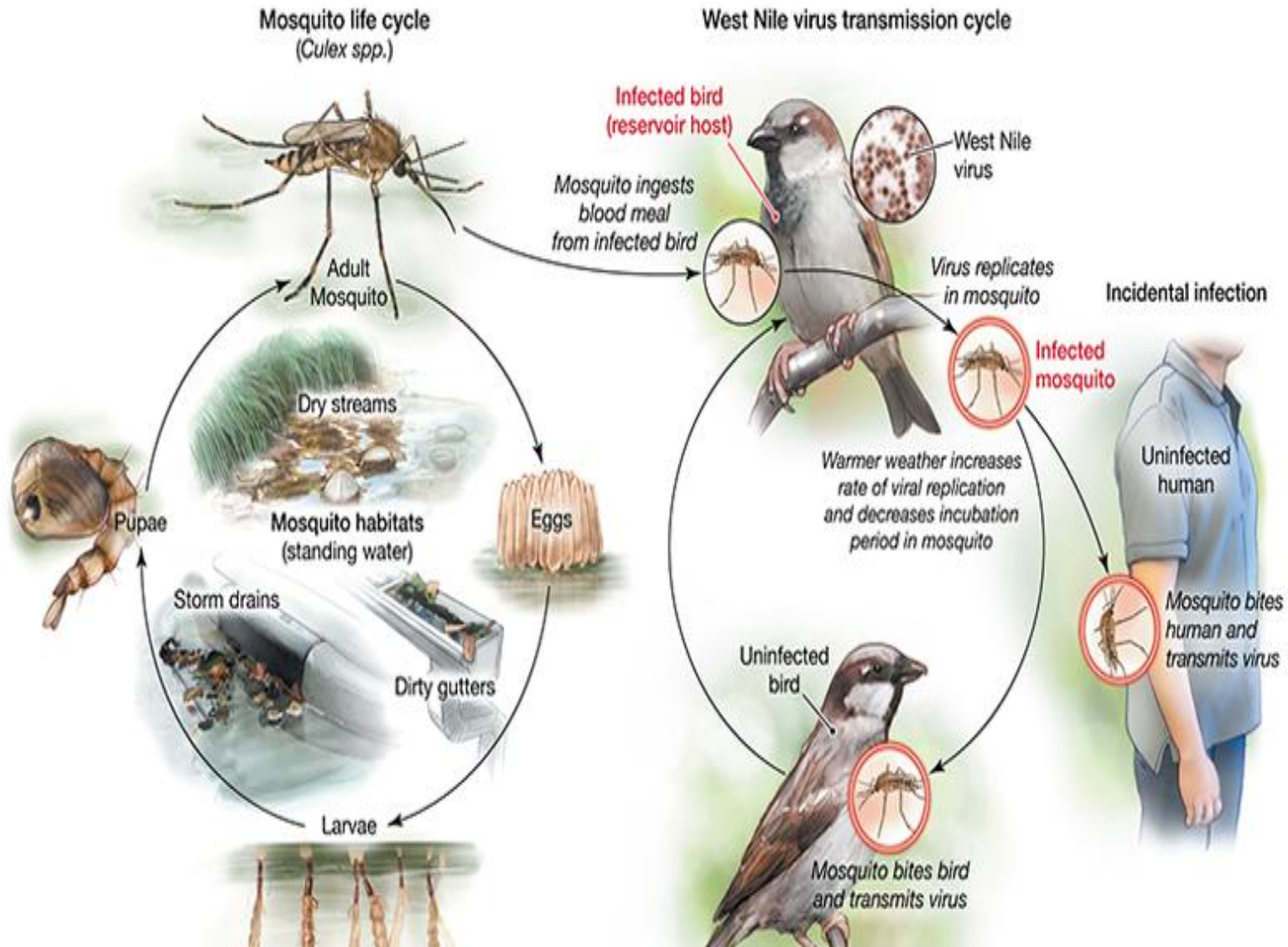


● Confirmed cases

● Suspected cases

Confirmed **human cases - 415** and **36 deaths** in 2018
(National Institut „Dr Milan Jovanović Batut” update 17th November 2018)


One Health approach in WNV surveillance, Serbia



Transmission cycle (<http://www.alison-burke.com>)



Culex pipiens



As of 13 December 2018, 1 503 human cases were reported in the EU/EEA by **Italy (576), Greece (311), Romania (277), Hungary (215), Croatia (53), France (27), Austria (20), Bulgaria (15), the Czech Republic (5), Slovenia (3) and Cyprus (1)**. In the EU neighbouring countries 580 human cases were reported by **Serbia (415), Israel (128), Turkey (23) and Kosovo* (14)**. Hundred-eighty deaths due to West Nile virus infection have been reported by **Greece (47), Italy (46), Romania (43), Serbia (35), Kosovo* (3), Turkey (3), Bulgaria (2), the Czech Republic (1) and Hungary (1)**.



One Health approach in WNV surveillance, Serbia



Definitions of surveillance and monitoring (ECDC, 2014)

Monitoring - consists of procedures implemented for temporary or continuous observation and is not followed by any additional activities (e.g. population dynamics).

Surveillance - consists of procedures developed in response to a risk and carried out to support subsequent actions.



One Health approach in WNV surveillance, Serbia



Why and how we started

Situation in Serbia before 2005

Public and policy makers' awareness of WNV risk	none
Capacity for detection of human cases, infestation of mosquitoes, horses and birds	none
Logical outcome – mosquito, horse, bird, sentinel chicken surveillance	none



One Health approach in WNV surveillance, Serbia



Why and how we started

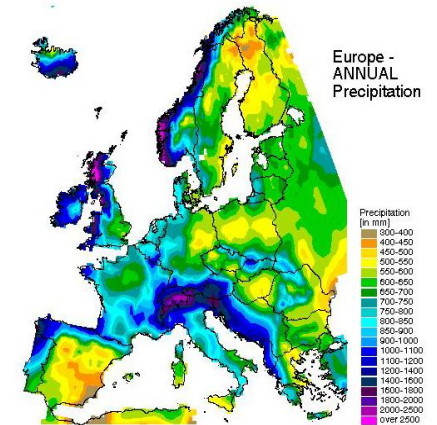
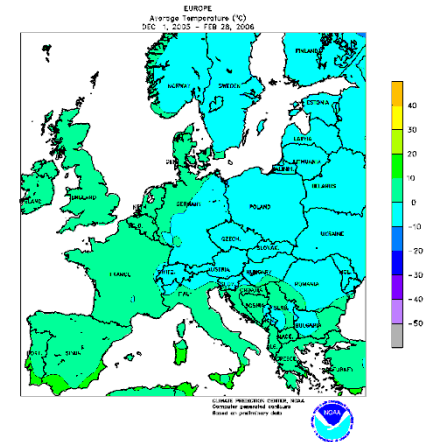
1972 - Bordoški et al. 1972 found 2.6% - 4.7% positive human sera in Vojvodina (Serbia)

2003 – comparing climates of Bucharest region (Romania) - Central Valley (California) – Vojvodina (Serbia)

ONE HEALTH APPROACH

2005-2007 – BTR 1920 National project 'Development of the methods for early detection of West Nile virus at the areas with the high risk for outbreaks

2005 - 2009 – mosquitoes sampled at bird reservoirs and human settlements, Vero cell suspect samples sent to NPHI of Spain, seroprevalence in humans ($\leq 6.04\%$),

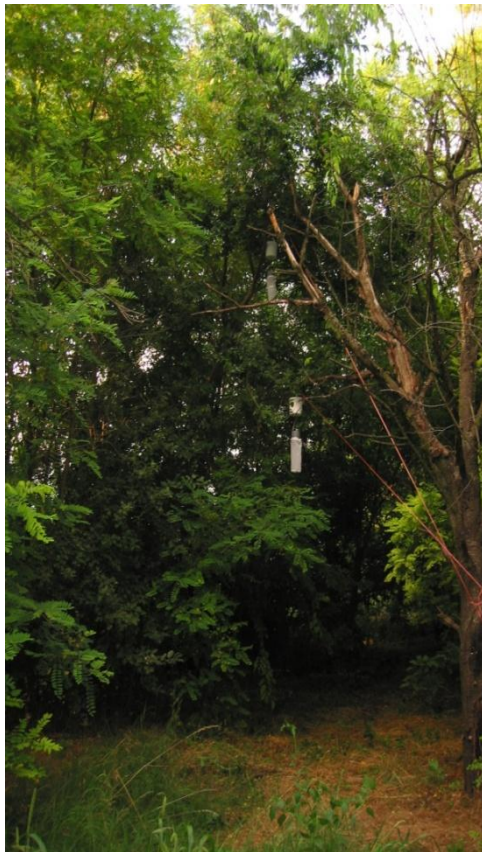




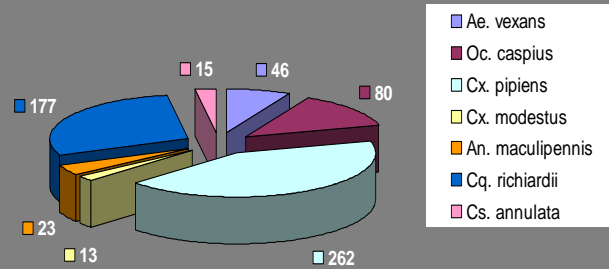
One Health approach in WNV surveillance, Serbia



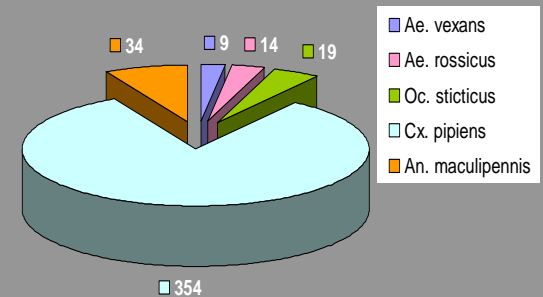
Why and how we started



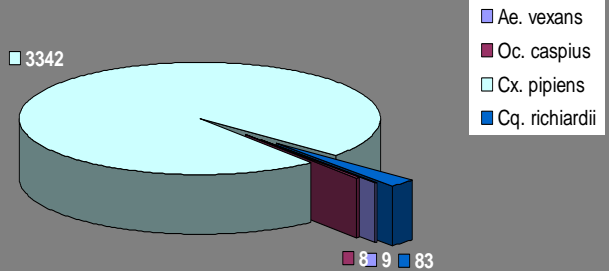
"Ludasko jezero", species composition in traps set 0.8 m above the ground



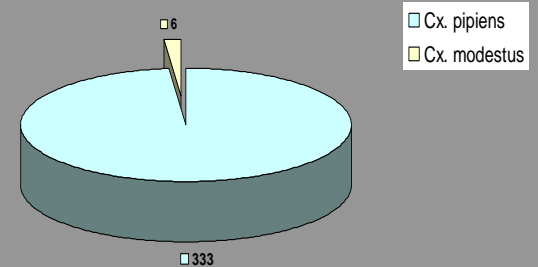
"Obedska bara", species composition in traps set at ground level, 0.5 m height



"Ludasko jezero", species composition in traps set 7 m above the ground



"Obedska bara", species composition in traps set 7m above the ground



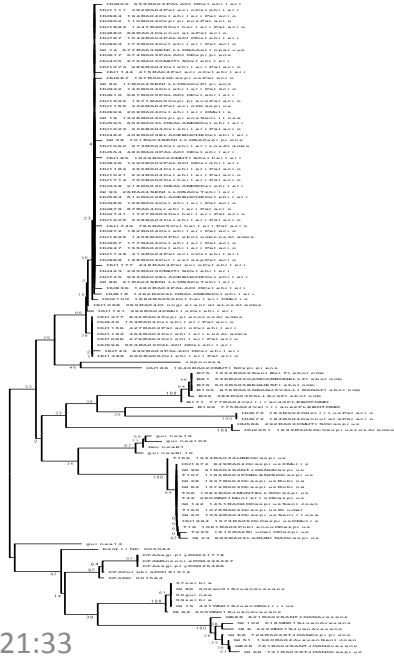


One Health approach in WNV surveillance, Serbia



Why and how we started

49.426 adult mosquitoes tested (630 pools)



Mosquito species	Mosquito species
<i>Anopheles claviger</i>	<i>Oc. caspius</i>
<i>An. hyrcanus</i>	<i>Oc. dorsalis</i>
<i>An. maculipennis</i>	<i>Oc. sticticus</i>
<i>An. ...</i>	
<i>Ae. ...</i>	
<i>Ae. rossicus</i>	<i>Cx. pipiens</i>
<i>Aedimorphus vexans</i>	<i>Culiseta annulata</i>
<i>Ochlerotatus annulipes</i>	

In 2005 mosquito-only flavivirus, cell fusing agent virus *Aedimorphus* [*Aedes*] *vexans* (Petrić et al. 2012)



One Health approach in WNV surveillance, Serbia



Why and how we started

Surveillance of mosquitoes is part of the global response to MBD. **Risk assessment and management of threats to human or animal health** includes several activities (e.g. surveillance of human health and of intermediate hosts), but **surveillance and control of the vector are crucial elements** (ECDC, 2012).

Serbia

- no human cases, no virus detection = no surveillance
- we decided to change strategy and increase probability for virus detection

... AND SO WE DID



One Health approach in WNV surveillance, Serbia



Shift to backward approach

Searching the evidence of WNV circulation in order to elevate alert of public health officials - in 2009/2010 the system of entomological surveillance of WNV was set backwards.

2009 IgG positive humans (likely cases) mapped

2009 grouping pattern detected - “hotspots”

2009 WNV detection allocated to “hotspot” mosquitoes (tailor made to funds available)

2010 mosquito sampling planned on “hotspots” only - area for vector sampling minimized (tailor made to funds available)



One Health approach in WNV surveillance, Serbia



Shift to backward approach

2010 - sampling 3 times at 10 localities in September only, testing *Culex pipiens pipiens* only, **3 out of 29 pools positive to WNV** – Novi Sad authorities prohibited disclosure of the results to public

2011 - sampling widened, sampling spots defined according to funding and priority: 1) old “hotspots” 2) **new groupings** of serological human/horse cases; **positive pools detected** – authorities prohibited disclosure of the results to public



One Health approach in WNV surveillance, Serbia



Shift to backward approach

Might be that intense WNV circulation started in 2010, and we were just timely enough (lucky) to detect the virus in mosquitoes, anyhow:

- **entomologists, veterinarians and medical/public health experts in Vojvodina started to work together (from 2005);**
- **capacities** were developed for WNV detection in mosquitoes, birds, horses and humans (completed in 2010);
- **awareness** of public health authorities was elevated;
- results not disclosed to the public;
- mosquito surveillance not initiated.



One Health approach in WNV surveillance, Serbia



2012 - the first human cases detected, mosquito “surveillance” initiated by Ministry of Health, 3 out of 4 institution that started (2005, 2007, 2009) and developed WNV surveillance system in Serbia not included.

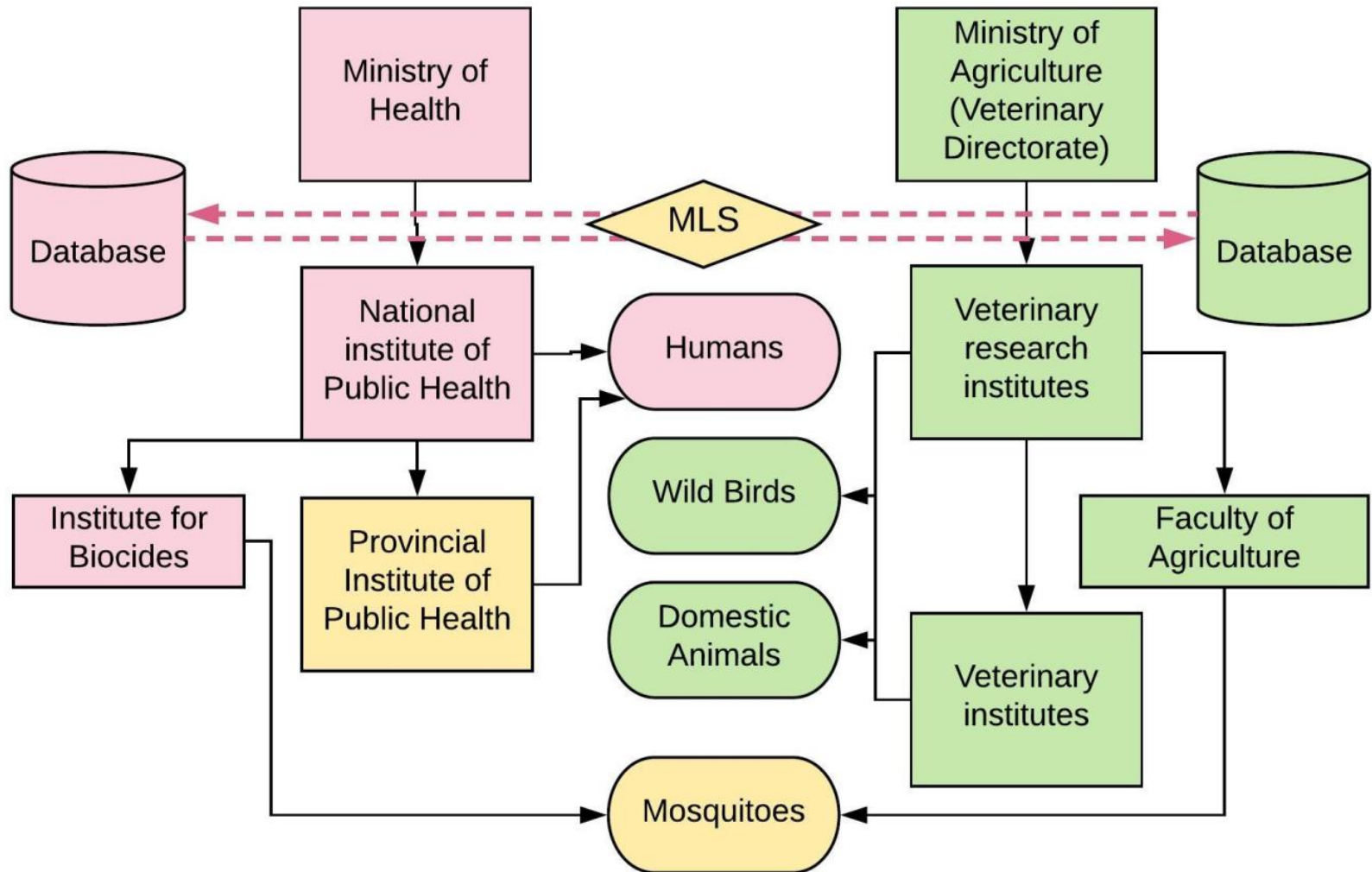
At the territories covered by MH surveillance, approach to entomological surveillance shifted from “backward” to “forward” in order to facilitate predictive risk assessment, but no vector control plan developed?

2013 - Mosquito surveillance conducted by LME financed from the projects within districts with human cases in 2012, City of Novi Sad started independent surveillance programme .



- **National WNV monitoring program** - funded by the Veterinary Directorate and conducted by scientific and specialized veterinary institutes and field veterinary service in close collaboration with entomologists and ornithologists - launched in **2014**.
- The main objectives - early detection of WNV in certain regions and timely reporting to relevant health service institutions and local authorities responsible for establishing appropriate mosquito control measures, sharing the information to the community in order to warn human and animal health authorities.
- The program successfully proved presence and circulation of WNV among sentinel animals, wild birds and mosquitoes before infection outbreaks in humans.
- The program, with minor modification, has continued during 2015, 2017 and 2018 (Petrović et al., 2014b; Petrović et al., 2018).

Implementation of VBD context in Serbia (WNV)





One Health approach in WNV surveillance, Serbia

2014/15 – 64 locations, 21,506 km², 7 times (July – Septembar)

2017/18 – 64 locations, 21,506 km², 4 times (June – August)

Randomly – up to **200** females/trap – 2 pools

WNV detection in **2x 50** females/pool (1-2 pools)



Number of *Culex pipiens* females per trap in one night:

Few mosquitoes to 12,000

(max in 2018 – 23 248)





One Health approach in WNV surveillance, Serbia



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One Health approach in WNV surveillance, Serbia



Surveillance activities in the Vojvodina province, Serbia, 2009-2015 (data on NUTS2 - provincial level)

Year	Trap nights	Period of mosquito sampling	Date of the first WNV positive mosquito pool	Sentinel chicken sampled/ positive	Date of the first WNV positive chicken	Wild birds collected/ positive (n)	Date of the first WNV positive bird	Horses sampled/ positive (n)	Date of the first WNV positive horse	Date of the first human WNND case	Human WNND cases (n)	Incidence WNND (cases/ 100,000)
2009	np	na	na	np	na	np	na	120/10	7.4.2009	na	na	na
2010	38	Sep-Oct	2.9.2010	np	na	np	na	229/32	1.3.2010	na	na	na
2011	32	Sep	6.9.2011	np	na	np	na	np	na	na	na	na
2012	39	Aug-Sep	2.8.2012	np	na	82/9	10.6.2012*	130/64	na**	15.7.2012	9	0.47
2013	86	July-Sep	17.7.2013	np	na	np	na	96/45	na**	12.7.2013	85	4.40
2014	414	Jun-Sep	16.7.2014	566/10	12.6.2014	111/2	29.7.2014	89/13	15.7.2014	9.7.2014	24	1.24
2015	492	Jun-Sep	13.6.2015	np	na	73/7	14.8.2015	326/11	28.9.2015	10.8.2015	10	0.52
2017	260	Jun - Aug	15.6.2017	np	na	2/388	2.8.2017	2495/6	8.7.2017	7.8.2017	49	0,70
2018	260	Jun – Aug	19.6.2018	np	na	-	20.6.2018	-	30.06.2018	15.6.2018	415	5,93

np - not performed;

na - not applicable

*sampled January – September;

** sampled November - December

Petrić et al. 2016



One Health approach in WNV surveillance, Serbia



Species	Year												Total		
	2010		2011		2012		2013		2014		2015		ns	np	positive
	ns	np	ns	np	ns	np	ns	np	ns	np	ns	np			
<i>Anopheles hyrcanus</i>	-	-	-	-	4	3	24	5	346	0	175	0	549	8	0
<i>Anopheles maculipennis</i>	6	2	-	-	5	4	146	24	754	0	202	0	1113	30	0
<i>An. plumbeus</i>	-	-	-	-	-	-	1	1	-	-	8	0	9	1	0
<i>Aedes cinereus</i>	1	1	-	-	-	-	1	1	5	0	3	0	10	2	0
<i>Aedes rossicus</i>	-	-	-	-	-	-	1	1	5	0	451	0	6	1	0
<i>Aedes vexans</i>	11	7	-	-	107	13	319	26	26142	0	2	0	26581	46	2
<i>Aedes annulipes</i>	-	-	-	-	-	-	2	1	20	0	-	-	22	1	0
<i>Aedes cantans</i>	-	-	-	-	-	-	-	-	492	0	115	0	607	0	0
<i>Aedes caspius</i>	11	6	-	-	78	10	51	9	1759	0	-	-	1899	25	0
<i>Aedes geniculatus</i>	-	-	-	-	-	-	1	2	10	0	-	-	11	2	0
<i>Aedes sticticus</i>	-	-	-	-	-	-	3	2	7122	0	23	0	7148	2	0
<i>Aedes albopictus</i>	-	-	-	-	-	-	5	2	-	-	-	-	5	2	0
<i>Culex pipiens</i>	1488	39	510	40	6520	154	20751	179	251538	375	81648	337	362455	1124	95
<i>Culex modestus</i>	-	-	2	2	-	-	2	1	24	0	181	0	209	3	0
<i>Culiseta annulata</i>	3	2	1	1	9	6	249	26	1114	0	201	0	1577	35	2
<i>Coquillettidia richiardii</i>	-	-	1	1	5	2	55	17	5355	0	2851	0	8267	20	0
<i>Uranotaenia unguiculata</i>	-	-	-	-	1	1	-	-	-	-	-	-	1	1	0
Total**	1520	57/3	514	44/3	6729	193/21	21611	297/26	294686	375/23	85860	337/20	410469	1303	99

* number of mosquitoes per pool 1-50; ** number of pools/number of positive pools for all species

Petrić et al. 2016



One Health approach in WNV surveillance, Serbia



Seasonal onset of the first positive mosquito pool and the first human case of West Nile neuroinvasive disease (WNND) at the district level (NUTS3) in Vojvodina, Serbia, 2013-2015

District	Year								
	2013			2014			2015		
	Date of the first positive mosquito pool	Date of the first human WNND case	Lag time (days) between human and mosquito	Date of the first positive mosquito pool	Date of the first human WNND case	Lag time (days) between human and mosquito	Date of the first positive mosquito pool	Date of the first human WNND case	Lag time (days) between human and mosquito
Central Banat	23.7.2013	8.8.2013	-16	16.7.2014	nd	na	11.8.2015	nd	na
North Bačka	ns	22.07.2013.	na	16.7.2014	nd	na	11.8.2015	nd	na
North Banat	ns	15.08.2013.	na	11.9.2014	nd	na	nd	nd	na
South Bačka	23.7.2013	12.7.2013	11	16.7.2014	9.7.2014	7	13.6.2015	17.8.2015	-65
South Banat	17.7.2013	31.7.2013	-14	30.7.2014	11.8.2014	-12	22.8.2015	10.8.2015	12
Srem	30.7.2013	22.7.2013	8	16.7.2014	26.7.2014	-10	7.7.2015	19.8.2015	-43
West Bačka	ns	09.08.2013.	na	11.9.2014	nd	na	29.8.2015	nd	na

ns: not sampled;

na: not calculated because no WNND cases were detected

Petrić et al. 2016



One Health approach in WNV surveillance, Serbia



Vector index (*Culex pipiens pipiens*), number and incidence of confirmed West Nile neuroinvasive disease human cases at provincial (NUTS2) and district (NUTS3) levels, Vojvodina, Serbia, 2013-2015

Year	Province/district (NUTS2/NUTS3)	Start VI	Max. VI	Avg VI	WNVD human cases (n)	Incidence WNND (cases/100,000)
2013	Vojvodina		3.33	1.38	85.00	4.40
	North Banat, Central Banat and South Banat	0.54	3.27	1.91	54.00	8.58
	North Bačka, West Bačka, South Bačka and Srem	2.06	3.33	1.34	31.00	2.38
2014	Vojvodina		1.63	1.15	27.00	1.24
	North Banat, Central Banat and South Banat	0.95	2.56	1.51	14.00	2.23
	North Bačka, West Bačka, South Bačka and Srem	1.24	1.24	0.83	13.00	0.69
2015	Vojvodina		0.62	0.26	10.00	0.52
	North Banat, Central Banat and South Banat	0.30	1.49	0.67	6.00	0.95
	North Bačka, West Bačka, South Bačka and Srem	0.10	1.09	0.39	4.00	0.31

Start V: seasonal first vector index

Max. VI: seasonal maximum vector index

Avg VI: seasonal average vector index

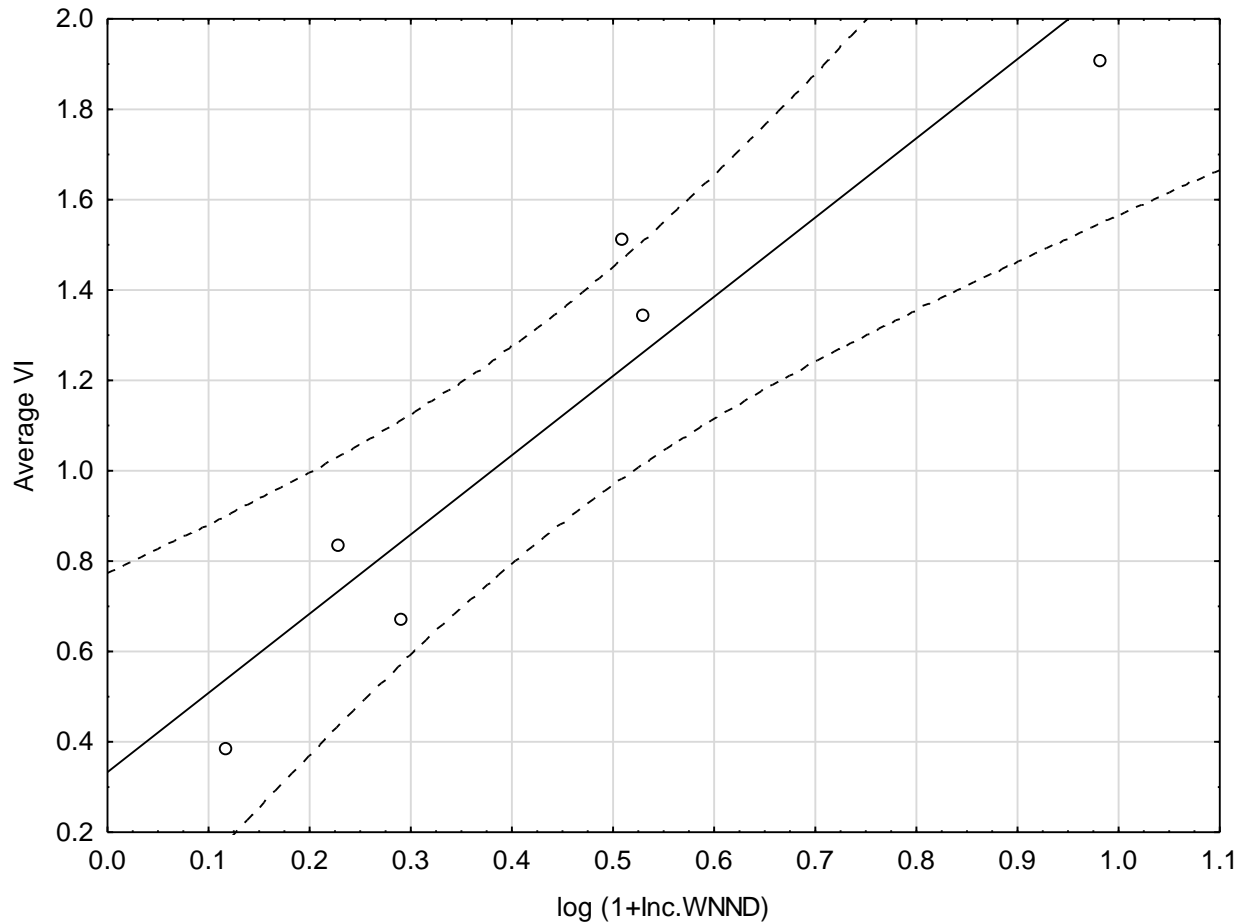
Petrić et al. 2016



One Health approach in WNV surveillance, Serbia



Correlation between average vector index values (at district level in *Culex pipiens pipiens*) and the human cases of West Nile neuroinvasive disease, Vojvodina, Serbia, 2013-2015



Petrić et al. 2016

dashed lines represent 95% confidence interval



One Health approach in WNV surveillance, Serbia



Repetitive appearance of positive pools of *Culex pipiens pipiens* at the same trapping position in Vojvodina, Serbia, 2010-2015

No.	Town	Trap position*		Year						Total years
		LAT	LON	2010	2011	2012	2013	2014	2015	
1	Apatin	45.650	18.950	ns	ns	ns	ns	0	1	1
...										
26	Zrenjanin	45.383	20.407	ns	ns	ns	ns	0	1	1
27	Bečej	45.600	20.017	ns	ns	ns	1	0	1	2
...										
40	Starčevo	44.805	20.691	ns	ns	ns	ns	1	1	2
41	Novi Bečej	45.511	20.300	ns	ns	ns	1	1	1	3
42	Novi Sad	45.263	19.810	1	1	0	1	ns	ns	3
43	Petrovaradin	45.233	19.867	1	1	1	1	ns	1	5

* dry ice baited NS2 traps without light were during 1-5 years placed at exactly the same position
 0: no WNV positive pool detected at specific position during particular season
 1: one or more WNV positive pools detected at specific position during particular season
 ns: not sampled at this position

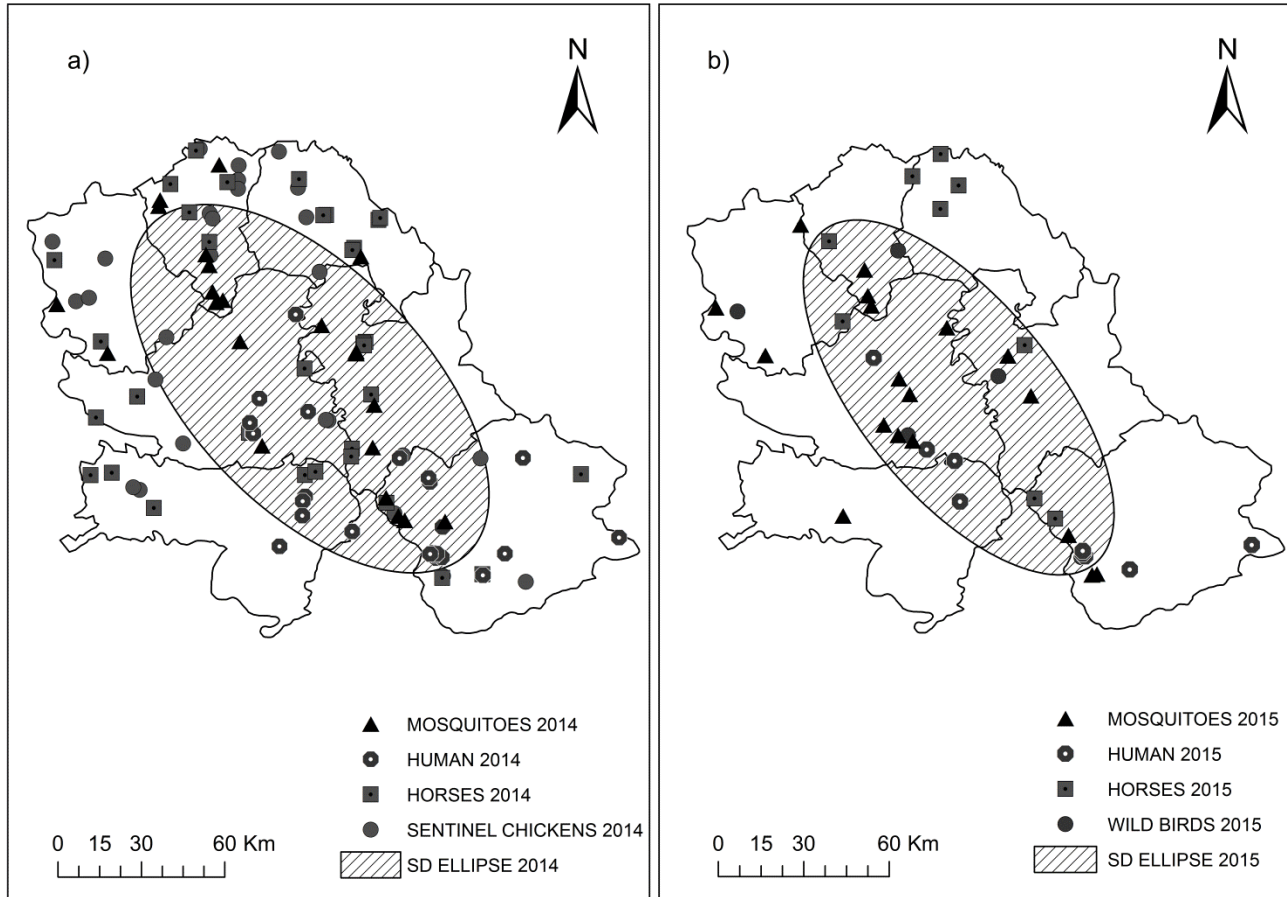
Petrić et al. 2016



One Health approach in WNV surveillance, Serbia



Clustering of mosquito, bird, horse and human cases in 2014 (a) and 2015 (b), Vojvodina, Serbia, 2014-2015



Petrić et al. 2016

Ripley's K-function and Average Nearest Neighbor analysis 2014 (ANN = 0.463375, z-score: -11.705051, p-value: 0.000000) and 2015 (ANN = 0.671317, z-score: -4.356416, p-value: 0.000013)

Broj uzorka	Naselje	18-19 jun		10-11 Jul		24-25/Jul		14-15/avgust	
		Oznaka uzorka	Rezultat	Oznaka uzorka	Rezultat	Oznaka uzorka	Rezultat	Oznaka uzorka	Rezultat
1	Starčevo	8.1.1 A	POZITIVNO	8.2.1 A	negativno	8.3.1 A	negativno	8.4.1 A	POZITIVNO
2	Starčevo	8.1.2 A	negativno	8.2.2 A	POZITIVNO	8.3.2 A	POZITIVNO	8.4.2 A	negativno
3	Pančevo	8.1.3 A	negativno	8.2.3 A	negativno	8.3.3 A	POZITIVNO	8.4.3 B	negativno
4	Jabuka	8.1.4 A	negativno	8.2.4 A	negativno	8.3.4 A	negativno	8.4.4 A	negativno
5		8.1.5 A	negativno	8.2.5 A	POZITIVNO	/	/	8.4.5 A	negativno
6	Glogonj	8.1.6 A	negativno	8.2.6 A	negativno	8.3.6 A	negativno	8.4.6 A	negativno
7	Sefkerin	8.1.7 A	negativno	8.2.7 A	negativno	8.3.7 A	negativno	8.4.7 A	negativno
8		8.1.8 A	negativno	8.2.8 A	negativno	8.3.8 A	negativno	8.4.8 A	negativno
9	Opovo	8.1.9 A	negativno	8.2.9 A	negativno	8.3.9 A	POZITIVNO	8.4.9 A	negativno
10		8.1.10 A	POZITIVNO	8.2.10 A	POZITIVNO	8.3.10 A	POZITIVNO	8.4.10 A	negativno
11	Perlez	8.1.11 A	negativno	8.2.11 A	negativno	8.3.11 A	negativno	8.4.11 A	POZITIVNO
12		8.1.12 A	/	8.2.12 A	negativno	8.3.12 A	POZITIVNO	8.4.12 A	negativno
13	Ečka	8.1.13 A	POZITIVNO	8.2.13 A	negativno	8.3.13 A	POZITIVNO	8.4.13 A	POZITIVNO
14		8.1.14 A	negativno	8.2.14 A	negativno	8.3.14 A	POZITIVNO	8.4.14 A	negativno
15	Zrenjanin	8.1.15 A	POZITIVNO	8.2.15 A	negativno	8.3.15 A	negativno	8.4.15 A	negativno
16		8.1.16 A	negativno	8.2.16 A	negativno	8.3.16 A	negativno	8.4.16 A	negativno
17	Melenci	8.1.17 A	POZITIVNO	8.2.17 A	POZITIVNO	8.3.17 B	negativno	8.4.17 B	negativno
18		8.1.18 A	POZITIVNO	8.2.18 A	POZITIVNO	8.3.18 A	negativno	8.4.18 A	negativno
19	Novi Bečej	8.1.19 A	negativno	8.2.19 A	negativno	8.3.19 A	negativno	8.4.19 A	negativno
20		8.1.20 A	negativno	8.2.20 A	negativno	8.3.20 A	POZITIVNO	8.4.20 A	negativno
21	Bečej	8.1.21 A	POZITIVNO	8.2.21 A	negativno	8.3.21 A	negativno	8.4.21 A	negativno
22	Zobnatica	8.1.22 A	negativno	8.2.22 A	POZITIVNO	8.3.22 A	negativno	8.4.22 A	negativno
23	Bačka Topola	8.1.23 A	negativno	8.2.23 A	negativno	8.3.23 A	negativno	8.4.23 A	negativno
24	Mali Idoš	8.1.24 A	negativno	8.2.24 A	negativno	8.3.24 A	negativno	8.4.24 A	negativno
25		8.1.25 A	negativno	8.2.25 A	negativno	8.3.25 A	negativno	8.4.25 A	negativno
26	Lovćenac	8.1.26 A	negativno	8.2.26 A	negativno	8.3.26 A	negativno	8.4.26 A	negativno
27	Feketić	8.1.27 A	negativno	8.2.27 A	negativno	8.3.27 A	negativno	8.4.27 A	negativno
28	Srbrbran	8.1.28 A	POZITIVNO	8.2.28 A	negativno	8.3.28 A	negativno	8.4.28 A	negativno
29	Sirig	8.1.29 A	negativno	8.2.29 A	negativno	8.3.29 A	negativno	8.4.29 A	negativno
30	Cenej	8.1.30 A	negativno	8.2.30 A	negativno	8.3.30 A	negativno	8.4.30 A	negativno
31	Temerin	8.1.31 A	negativno	8.2.31 A	negativno	8.3.31 A	negativno	8.4.31 A	negativno
32	Palić	8.1.32 A	negativno	8.2.32 A	POZITIVNO	8.3.32 A	POZITIVNO	8.4.32 A	negativno
33	Subotica	8.1.33 A	negativno	8.2.33 A	POZITIVNO	8.3.33 A	negativno	8.4.33 A	POZITIVNO
34		/	/	8.2.34 A	negativno	8.3.34 A	negativno	8.4.34 A	negativno
35	Bajmok	8.1.35 A	POZITIVNO	8.2.35 A	POZITIVNO	8.3.35 A	negativno	8.4.35 A	negativno
36	Aleksa Santić	8.1.36 A	POZITIVNO	8.2.36 A	negativno	8.3.36 A	negativno	8.4.36 A	negativno
37	Svetozar Miličić	8.1.37 A	POZITIVNO	8.2.37 A	negativno	8.3.37 A	POZITIVNO	8.4.37 A	negativno
38	Čonoplja	8.1.38 A	POZITIVNO	8.2.38 A	negativno	8.3.38 A	negativno	8.4.38 A	negativno
39	Ključicevo	8.1.39 A	negativno	8.2.39 A	POZITIVNO	8.3.39 A	negativno	8.4.39 A	negativno
40	Sombor	8.1.40 A	negativno	8.2.40 A	negativno	8.3.40 A	negativno	8.4.40 A	negativno
41	Apatin	8.1.41 A	POZITIVNO	8.2.41 A	negativno	8.3.41 A	negativno	8.4.41 A	negativno
42	Junaković banya	/	/	8.2.42 A	POZITIVNO	8.3.42 A	POZITIVNO	8.4.42 A	negativno
43	Sonta	8.1.43 A	negativno	8.2.43 A	negativno	8.3.43 A	negativno	8.4.43 A	negativno
44	Karavukovo	8.1.44 A	negativno	8.2.44 A	negativno	8.3.44 A	negativno	8.4.44 A	negativno
45	Odžaci	8.1.45 A	negativno	8.2.45 A	POZITIVNO	8.3.45 A	POZITIVNO	8.4.45 A	negativno
46	Parage	8.1.46 A	negativno	8.2.46 A	negativno	8.3.46 A	POZITIVNO	8.4.46 A	negativno
47	Bački Maglič	8.1.47 A	negativno	8.2.47 A	POZITIVNO	8.3.47 A	negativno	8.4.47 A	POZITIVNO
48	Rumenka	8.1.48 A	negativno	8.2.48 A	negativno	8.3.48 A	negativno	8.4.48 A	negativno
49	Novi Sad	8.1.49 A	POZITIVNO	8.2.49 A	negativno	8.3.49 A	negativno	8.4.49 A	negativno
50		8.1.50 A	POZITIVNO	8.2.50 A	negativno	8.3.50 A	negativno	8.4.50 A	negativno
51	Indija	8.1.51 A	negativno	8.2.51 A	POZITIVNO	8.3.51 A	negativno	8.4.51 A	negativno
52	Stara Pazova	8.1.52 A	negativno	8.2.52 A	negativno	8.3.52 A	negativno	8.4.52 A	negativno
53	Petrovaradin	8.1.53 A	negativno	8.2.53 A	POZITIVNO	8.3.53 A	negativno	8.4.53 A	negativno
54	Bukovac	8.1.54 A	negativno	8.2.54 A	negativno	/	/	8.4.54 A	negativno
55	Ruma	8.1.55 A	negativno	/	/	8.3.55 A	negativno	8.4.55 A	negativno
56	Hrtkovići	8.1.56 A	negativno	8.2.56 A	negativno	8.3.56 A	negativno	8.4.56 A	negativno
57	Sveti Mitrovića	8.1.57 A	negativno	8.2.57 A	negativno	8.3.57 A	negativno	8.4.57 A	negativno
58	Kuzmin	8.1.58 A	negativno	8.2.58 A	negativno	8.3.58 A	negativno	8.4.58 A	negativno
59	Batrovići	8.1.59 A	negativno	8.2.59 A	negativno	8.3.59 A	POZITIVNO	/	/
60	Morović	/	/	8.2.60 A	negativno	/	/	8.4.60 A	negativno
61	Bašaid	8.1.61 A	negativno	8.2.61 A	POZITIVNO	8.3.61 A	negativno	8.4.61 A	negativno
62	Kikinda	8.1.62 A	negativno	8.2.62 A	negativno	8.3.62 A	negativno	8.4.62 A	negativno
63	Idoš	8.1.63 A	negativno	8.2.63 A	negativno	8.3.63 A	negativno	8.4.63 A	negativno
64		8.1.64 A	POZITIVNO	8.2.64 A	negativno	8.3.64 A	negativno	8.4.64 A	negativno
65	Kanjiža	8.1.65 A	negativno	8.2.65 A	POZITIVNO	8.3.65 A	negativno	8.4.65 A	negativno

No.pools positive 23 27 28 8

Broj uzorka	Naselje	18-19 jun		10-11/jul		24-25/jul		14-15/avgust	
		Oznaka uzorka	Rezultat	Oznaka uzorka	Rezultat	Oznaka uzorka	Rezultat	Oznaka uzorka	Rezultat
1	Starčevo	8.1.1 A	POZITIVNO	8.2.1 A	negativno	8.3.1 A	negativno	8.4.1 A	POZITIVNO
		8.1.1 B	negativno	8.2.1 B	negativno	/	/	/	/
2	Starčevo	8.1.2 A	negativno	8.2.2 A	POZITIVNO	8.3.2 A	POZITIVNO	8.4.2 A	negativno
		8.1.2 B	negativno	8.2.2 B	negativno	/	/	/	/
3	Pančevo	8.1.3 A	negativno	8.2.3 A	negativno	8.3.3 A	POZITIVNO	8.4.3 A	negativno
		8.1.3 B	negativno	8.2.3 B	negativno	8.3.3 B	POZITIVNO	8.4.3 B	negativno
4	Jabuka	8.1.4 A	negativno	8.2.4 A	negativno	8.3.4 A	POZITIVNO	8.4.4 A	negativno
		8.1.4 B	negativno	8.2.4 B	negativno	8.3.4 B	negativno	8.4.4B	POZITIVNO
5		8.1.5 A	negativno	8.2.5 A	POZITIVNO	/	/	8.4.5 A	negativno
		8.1.5 B	negativno	8.2.5 B	negativno	/	/	/	/
6	Glogonj	8.1.6 A	negativno	8.2.6 A	negativno	8.3.6 A	negativno	8.4.6 A	negativno
		/	/	8.2.6 B	negativno	8.3.6 B	negativno	8.4.6 B	negativno
7	Sefkerin	8.1.7 A	negativno	8.2.7 A	negativno	8.3.7 A	negativno	8.4.7 A	negativno
		8.1.7 B	negativno	8.2.7 B	negativno	8.3.7 B	POZITIVNO	/	/
8		8.1.8 A	negativno	8.2.8 A	negativno	8.3.8 A	negativno	8.4.8 A	negativno
		8.1.8 B	negativno	/	/	8.3.8 B	negativno	8.4.8 B	POZITIVNO
9	Opovo	8.1.9 A	negativno	8.2.9 A	negativno	8.3.9 A	POZITIVNO	8.4.9 A	negativno
		8.1.9 B	negativno	/	/	/	/	/	/
10		8.1.10 A	POZITIVNO	8.2.10 A	POZITIVNO	8.3.10 A	POZITIVNO	8.4.10 A	negativno
		8.1.10 B	negativno	8.2.10 B	negativno	8.3.10 B	negativno	/	/
11	Perlez	8.1.11 A	negativno	8.2.11 A	negativno	8.3.11 A	negativno	8.4.11 A	POZITIVNO
		8.1.11 B	negativno	8.2.11 B	negativno	8.3.11 B	POZITIVNO	/	/
12		/	/	8.2.12 A	negativno	8.3.12 A	POZITIVNO	8.4.12 A	negativno
		/	/	8.2.12 B	POZITIVNO	8.3.12 B	negativno	8.4.12 B	negativno
13	Ečka	8.1.13 A	POZITIVNO	8.2.13 A	negativno	8.3.13 A	POZITIVNO	8.4.13 A	POZITIVNO
		8.1.13 B	negativno	8.2.13 B	negativno	8.3.13 B	/	/	/
14		8.1.14 A	negativno	8.2.14 A	negativno	8.3.14 A	POZITIVNO	8.4.14 A	negativno
		8.1.14 B	negativno	8.2.14 B	negativno	8.3.14 B	POZITIVNO	/	/
15	Zrenjanin	8.1.15 A	POZITIVNO	8.2.15 A	negativno	8.3.15 A	negativno	8.4.15 A	negativno
		8.1.15 B	negativno	8.2.15 B	POZITIVNO	8.3.15 B	negativno	/	/
16		7.1.16 A	negativno	8.2.16 A	negativno	8.3.16 A	negativno	8.4.16 A	negativno
		8.1.16 B	negativno	8.2.16 B	negativno	8.3.16 B	negativno	8.4.16 B	negativno
17	Melenci	8.1.17 A	negativno	8.2.17 A	negativno	8.3.17 A	negativno	8.4.17 A	negativno
		8.1.17 B	POZITIVNO	8.2.17 B	POZITIVNO	8.3.17 B	negativno	8.4.17 B	negativno
18		8.1.18 A	POZITIVNO	8.2.18 A	POZITIVNO	8.3.18 A	negativno	8.4.18 A	negativno
		8.1.18 B	negativno	8.2.18 B	POZITIVNO	8.3.18 B	negativno	/	/
19	Novi Bečej	8.1.19 A	negativno	8.2.19 A	negativno	8.3.19 A	negativno	8.4.19 A	negativno
		8.1.19 B	POZITIVNO	8.2.19 B	negativno	8.3.19 B	POZITIVNO	/	/
20		8.1.20 A	negativno	8.2.20 A	negativno	8.3.20 A	POZITIVNO	8.4.20 A	negativno
		8.1.20 B	negativno	8.2.20 B	negativno	8.3.20 B	negativno	8.4.20 B	negativno
21	Bečej	8.1.21 A	negativno	8.2.21 A	negativno	8.3.21 A	negativno	8.4.21 A	negativno
		8.1.21 B	POZITIVNO	8.2.21 B	negativno	8.3.21 B	negativno	8.4.21 A	negativno
22	Zobnatica	8.1.22 A	negativno	8.2.22 A	POZITIVNO	8.3.22 A	negativno	8.4.22 A	negativno
		/	/	8.2.22 B	POZITIVNO	8.3.22 B	negativno	/	/
23	Bačka Topola	8.1.23 A	negativno	8.2.23 A	negativno	8.3.23 A	negativno	8.4.23 A	negativno
		8.1.23 B	negativno	8.2.23 B	POZITIVNO	8.3.23 B	POZITIVNO	/	/
24	Mali Idoš	8.1.24 A	negativno	8.2.24 A	negativno	8.3.24 A	negativno	8.4.24 A	negativno
		8.1.24 B	negativno	8.2.24 B	POZITIVNO	8.3.24 B	negativno	8.4.24 B	negativno
25		8.1.25 A	negativno	8.2.25 A	negativno	8.3.25 A	negativno	8.4.25 A	negativno
		/	/	8.2.25 B	negativno	8.3.25 B	negativno	8.4.25 B	negativno
26	Lovćenac	8.1.26 A	negativno	8.2.26 A	negativno	8.3.26 A	negativno	8.4.26 A	negativno
		8.1.26 B	negativno	8.2.26 B	negativno	8.3.26 B	negativno	8.4.26 B	negativno
27	Feketić	8.1.27 A	negativno	8.2.27 A	negativno	8.3.27 A	negativno	8.4.27 A	negativno
		8.1.27 B	negativno	8.2.27 B	negativno	8.3.27 B	negativno	8.4.27 B	negativno
28	Srbobran	8.1.28 A	negativno	8.2.28 A	negativno	8.3.28 A	negativno	8.4.28 A	POZITIVNO
		8.1.28 B	POZITIVNO	8.2.28 B	negativno	8.3.28 B	negativno	/	/
29	Širig	8.1.29 A	negativno	8.2.29 A	negativno	8.3.29 A	negativno	8.4.29 A	negativno
		8.1.29 B	negativno	8.2.29 B	negativno	8.3.29 B	negativno	8.4.29 B	negativno
30	Čenej	8.1.30 A	negativno	8.2.30 A	negativno	8.3.30 A	negativno	8.4.30 A	negativno
		/	/	8.2.30 B	negativno	8.3.30 B	negativno	8.4.30 B	negativno

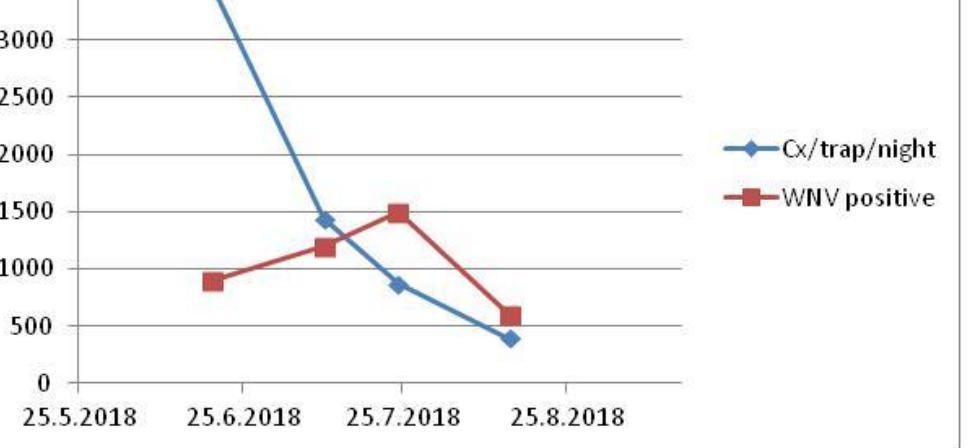
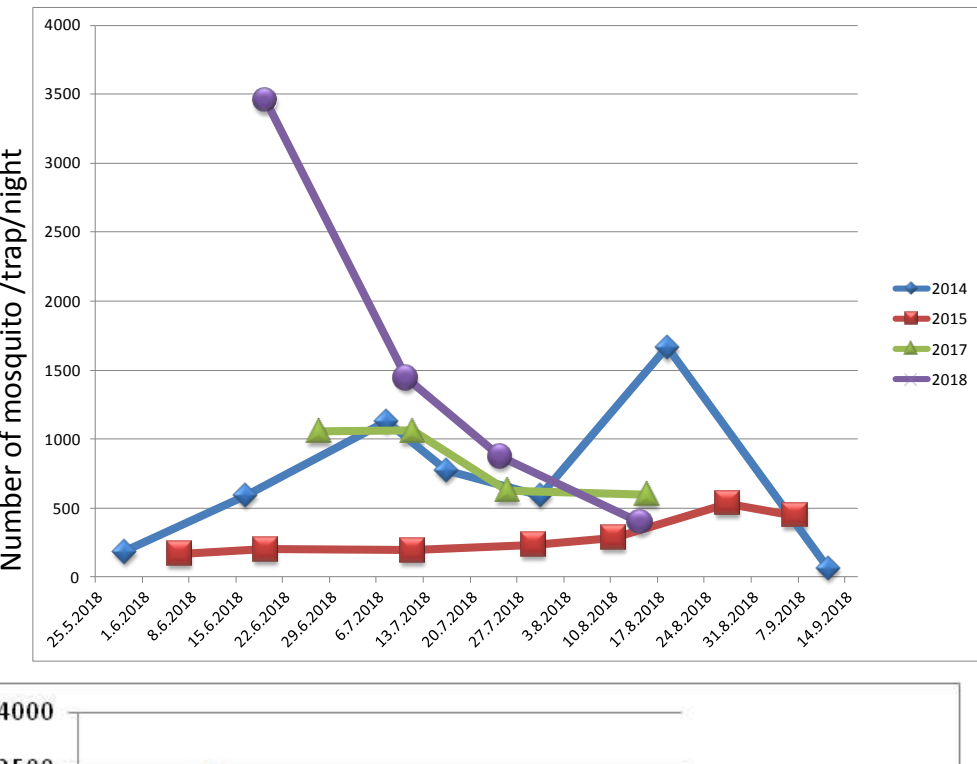
No.pools positive

9

12

15

6





One Health approach in WNV surveillance, Serbia



Definitions of surveillance and monitoring (ECDC, 2014)

Monitoring - consists of procedures implemented for temporary or continuous observation and is not followed by any additional activities (e.g. population dynamics).

Surveillance - consists of procedures developed in response to a risk and carried out to support **subsequent actions**.

VECTOR CONTROL

Education of the population

How to recognize?

Спобедите опасне комарце: Не стајаћу воду!

ТРАЖИ СЕ



Ваша помоћ драгоценна:

- да спречи болести и честе убоде током дана и ноћи
- да елиминира ризик од опасних болести.

Тигрasti, црно бело обојен комарац боде напољу у току дана. Уколико уочите сумњивца, фотографисите га и пошаљите фотографију путем наше андроид апликације.

Кућни, браон жуто обојен комарац боде у собама и у близини кућа и кафана у току ноћи. Он преноси опасни вирус Западног Нила.

Код квадратни

Треба да знате да:

- надлежне државне, покрајинске и локалне власти сузбијање ларви и одраслих комараца у окружењу (шахтови, баре, канали).
- али само Ви можете спречити развој комараца у домаћинству (кући и башти).
- у Вашој окупацији ларве тигрaстог комарца живе скоро на свим местима као и ларве кућних комараца (преносиоца вируса Западног Нила).
- у стајаћим водама природног порекла могу се развијати ларве кућних али не и тигрaстих комараца! хлорисани базени.

Преузми апликацију

Немојте заборавити да:

- од априла до октобра, једном недељно проверите предмете (контејнере/посуде) у којима се налази вода (тимае ћете елиминисати и ларве кућних комараца).
- онемогућите задржавање кишнице или воде за заливање у свим, па и најмањим (чаше, подлошке за саксије), предметима (посудама/кантама/бурадима), а све пукотине и рупе на подовима и зидовима око куће у којима се може задржавати вода напуните песком.



А уколико се придржавате наших савета, и додатно поставите мрежу на врата ваше куће или стана, решите се и досадног и опасног кућног комарца да не дава славу у летњим ноћима и преноси вирус Западног Нила.

You should know...

Don't forget to...

Use the application

✓

- Окрените наопак све предмете који могу да задрже воду (кофе, саксије, старе гуме) или их чувате под кровом.
- Покријте бурад да женке комараца не могу да полажу јаја у њима.
- Природне стајаће воде и потоци не продукују тигрaсте комарце.

✗

- Уклоните све предмете који могу да задрже воду.
- Сваке недеље празните подлошке за саксије и деције базене.
- Очистите олуке да се вода не задржава.
- Све пукотине и рупе на зидовима и подовима напуните песком.

BTI

- Места на којима се налази вода могу бити кућни комарци. Тигрaсти комарци се срећују у срединама третирања комараца у Вашој околини.

Влада Републике Србије, Тим за јединствено спровођење активности сузбијања комараца и Лабораторија за медицинску и ветеринарску ентомологију, Пољопривредни факултет, Нови Сад



Swiss Mosquito Network

Нови Сад, 2019.



One Health approach in WNV surveillance, Serbia



Surveillance system performance 2014/2015

- Surveillance system showed satisfactory results in area specificity and sensitivity.
- Highly significant clustering of infected mosquito, horse, bird and human WNND cases.
- Average seasonal VI was strongly correlated to incidence of human WNND cases.
- Mosquito, bird and horse surveillance can signal the start of WNV circulation.



Thank you
for your
attention