

Report on estimation of the Aquatic Warbler population in Belarus, 2013

prepared within the framework of the project:

“International Cooperation for Aquatic Warbler Conservation – RSPB’s support for a charitable purpose”
activity 5.1. Coordination of AW counts 2013 in Belarus;

financial support provided by:

the A.G. Leventis Foundation,
the Secretariat for the Bonn Convention (CMS) and
the Royal Society for the Protection of Birds (RSPB).

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1. AIMS OF THE STUDY

The principle aim of the study was to conduct Aquatic Warbler counts at key Belarusian breeding sites – Zvaniec, Sporava and Dzikoje mires. The following objectives were established:

- 1) Estimate Aquatic Warbler breeding population in Belarus in the year 2013;
- 2) Refine the borders and recalculate area of habitat suitable for the species;
- 3) Map all the singing males at the sites where full counts were carried out;
- 4) Involve and train a considerable number of APB volunteers to perform Aquatic Warbler monitoring;

2. METHODS

The counts were carried out according to the international Aquatic Warbler monitoring scheme which was developed within the framework of the LIFE-Nature Project (Poland and Germany). The counts started one hour before the sunset and lasted for 2 hours maximum – the period of the highest singing activity of males. This time was enough to cover a monitoring route making up to 2 km. Counts were not attempted in windy or rainy weather.

Counts were simultaneously conducted by 1-5 persons at each monitoring route. Teams of 2 or more persons were moving in rows (Fig.1). Before being mapped, each vocalizing male had to be registered by at least 2 counters. Such methodology allows receiving reliable data from volunteers possessing different level of experience.

Depending on the size of the site and availability of volunteers the following methods were used:

- Counts on sample plots (Zvaniec mire, Central part).
- Full counts (at all other sites)



Fig.1 – Counting Aquatic Warblers

3. RESULTS

3.1 AW numbers

Aquatic Warbler counts were carried out at 3 most important AW breeding sites: Zvaniec, Sporava and Dzikoje mires. Double counts were carried out at 18 sample plots in Zvaniec (Central part), plus survey and full counts at all suitable habitats in Western and Eastern parts (the most detailed counts ever carried out at this mire). Full counts were executed at c. 40% of the known localities in Sporava. Full counts at a major part of suitable habitat were performed in Dzikoje mire. Full counts were also carried out at some small sites. The results are presented in the table below. It should be underlined that numbers are delivered from different years.



Fig.2: Location of the Aquatic Warbler breeding sites in Belarus.

Table 1: Aquatic Warbler numbers at breeding sites in Belarus

	Name of site / locality	Year	Coordinator	Number of counts	Type of counts	Accuracy	Area, ha**	Population on site, males	
								min	max
1	Zvaniec						4,660	2,149	4,459
	<i>Zvaniec East (Selišča)</i>	2013	UM	1	full	good(obs)	140	34	34
	<i>Zvaniec Central</i>	2013	UM	2	reg. plots	good(est)	4,520	2,115	4,425
	<i>Zvaniec West</i>	2013	UM	1	full	good(obs)	0	0	0
2	Dzivin						175	12	12
	<i>Dzivin-Chabovičy</i>	2011	UM	1	full	good(obs)	28	3	3
	<i>Dzivin-Lipava</i>	2013	UM	1	full	good(obs)	17	0	0
	<i>Dzivin-Liubań</i>	2011	UM	1	full	good(obs)	63	0	0
	<i>Dzivin-Rudziec</i>	2010	UM	1	full	good(obs)	67	9	9
3	Sporava						1,426	492	667
	<i>31 localities (within PA)</i>	2013	UM	1	full/est	good(est)	1,358	475	650
	<i>Bielaje (in a buffer zone)</i>	2012	UM	1	full	good(obs)	55	14	14
	<i>Vysokaje East (buffer zone)</i>	2013	VP	1	full	good(obs)	13	3	3
4	Dzikoje						1,563	174	209
	<i>Dzikoje</i>	2013	UM	1	full/est	good(est)	1,155	170	194
	<i>Hlybokaje</i>	2006	MC	1	full/est	good(est)	35	2	5
	<i>Lomaŭka</i>	2006	MC	1	full	good(obs)	139	0	0
	<i>Naraŭ</i>	1996-2005	MC	1	full/est	good(est)	234	2	10
5	Ščara						411	16	16
	<i>Babrovickaje</i>	2010	DL	1	full	good(obs)	3	0	0
	<i>Dabromysl</i>	2013	SL	1	full	good(obs)	123	0	0
	<i>Końki</i>	2010	DL	1	full	good(obs)	12	3	3
	<i>Rahačy***</i>	2012	UM	1	full	good(obs)	200	5	5
	<i>Tuchavičy</i>	2010	DL	1	full	good(obs)	71	8	8
	<i>Vyganaščanskaje</i>	2010	DL	1	full	good(obs)	2	0	0
6	Servač						493	30	30
	<i>Dzierkaŭščyna</i>	2012	VL	1	full	good(obs)	444	8	8
	<i>Prachody</i>	2010	VL	1	full	good(obs)		20	20
	<i>Šantaraŭščyna</i>	2012	VL	1	full	good(obs)		2	2
7	Svislač						202	37	37
	<i>Hrajna</i>	2010	DV	1	full	good(obs)	153	35	35
	<i>Rahačy</i>	2010	DV	1	full	good(obs)	49	2	2
8	Middle Prypiac						647	26	26
	<i>Jasiełda</i>	2011	VL	2	full	good(obs)	42	0	0
	<i>Korabje</i>	2011	SL	1	full	good(obs)	67	1	1
	<i>Mikaševičy</i>	2011	VL	1	full	good(obs)	23	1	1
	<i>Styr</i>	2010	MD	2	full	good(obs)	515	24	24
9	Prostyr						800	10	50

	<i>Prostyr</i>	2010	DZ	-	guess	poor(susp)	*500	10	50
	<i>Zarelišča</i>	2010	DL	1	full	good(obs)	300	0	0
10	Álmany	2010	MD	1	estimate	med(est)	*1,500	0	0
11	Dzitva	2010	DL	1	full	good(obs)	31	2	2
12	Hajna	2010	SL	1	full	good(obs)	711	0	0
13	Lielčyckaja Ubaré	2010	PP	-	guess	poor(susp)	*600	0	0
14	Sary Žadzien	2006	VF	1	estimate	med(est)	*600	20	40
15	Upper Pcič	2013	UM	1	full	good(obs)	36	0	0
	TOTAL						13,855	2,968	5,548

* The sites are not sufficiently surveyed. The area of suitable habitat is considerably overestimated due to mosaic structure of site. Further surveys are needed to refine (reduce) these numbers.

** Area of suitable habitat

*** New locality discovered in 2012

Type of counts

Full = full counts covered the whole site.

Full/est = full counts were executed for the most part of the site and minimum figure corresponds to the number of counted males, an estimation resulting in a maximum figure was produced for the rest of the site.

Reg. plots = counts were implemented at sample plots located regularly.

Accuracy

Good (Observed) = based on reliable or representative quantitative data derived from complete counts.

Good (Estimated) = based on reliable or representative quantitative data derived from sampling or interpolation.

Medium (Estimated) = based on incomplete quantitative data derived from sampling or interpolation.

Poor (Suspected) = based on no quantitative data, but guesses derived from circumstantial evidence.

Coordinators

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Below goes a detailed description of the AW monitoring results for the most important Belarusian breeding sites: Zvaniec and Sporava mires.

3.1.1 Zvaniec

The total area of IBA “Zvaniec” equal to 16,230 ha includes the area of 10,460 ha protected as a National landscape reserve (zakaznik) “Zvaniec”. Satellite images analysis with subsequent field checks made during Aquatic Warbler census in the year 2013 allowed allocating the area suitable for AW roughly. The area makes about **4,660 ha** in total (Fig.3).

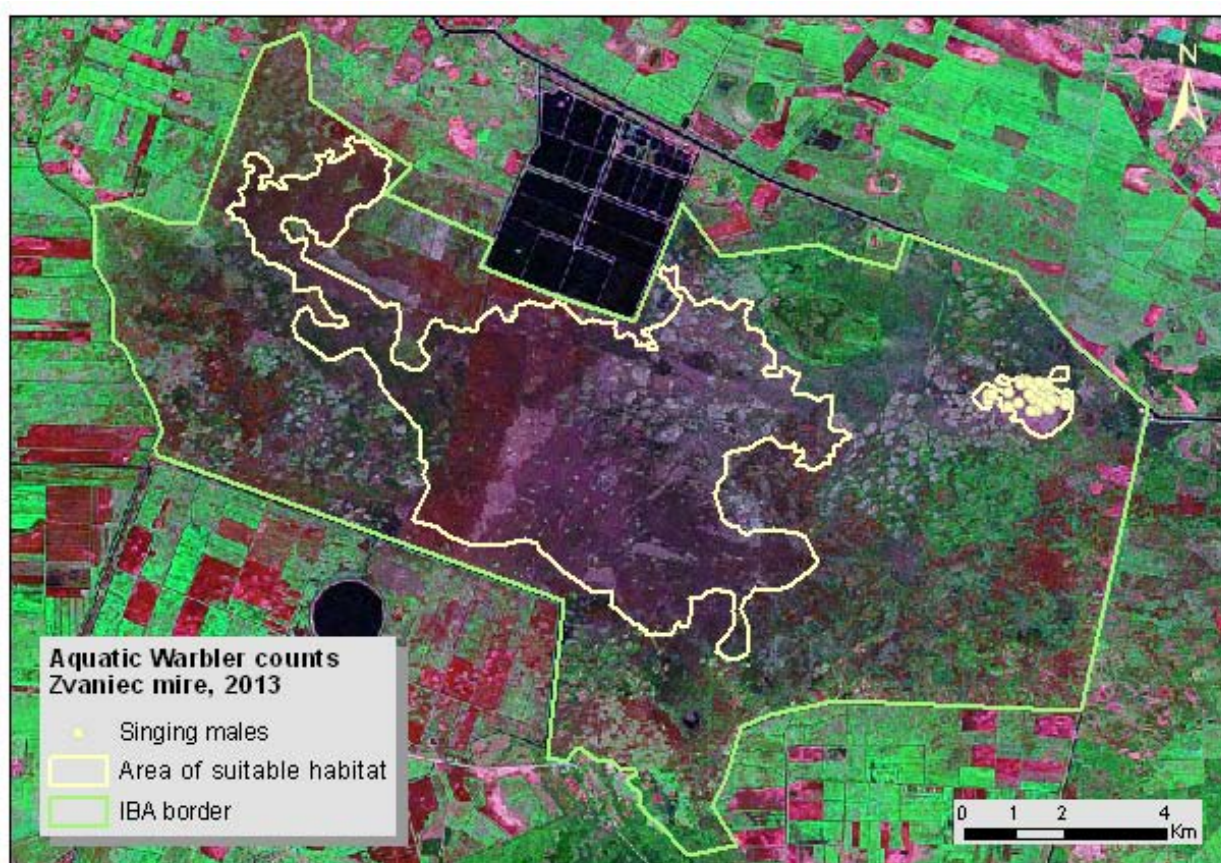


Fig.3: **Area suitable** for Aquatic Warbler in Zvaniec.

The area suitable for the species in the central part of the mire equals to 4,520 ha, the corresponding area located in the eastern part makes 140 ha. No suitable habitat detected in the western part. It should be underlined, that due to mosaic landscape, there might be some 10-50 ha plots of suitable habitat outside these boundaries. And vice versa, the boundaries include a number of 1-50 ha mineral islands which are not suitable for the species.

Eastern part. There is an isolated 140 ha patch of open fen mire in the eastern part of IBA. **34** singing males were counted at this sub site in the course of full counts in the 10th of June 2013 (Fig.3).

Central part. The estimated area suitable for Aquatic Warbler in the central part of IBA makes 4,520 ha. Considering the scale of this sub site, AW was counted at regularly located sample plots. The data from sample plots was extrapolated to the entire territory covered with sampling (5,400 ha).

In Zvaniec, fixed monitoring plots have been established in the best habitat patches and counted since the mid-1990s. An improved systematic sample plot design has been established in 2006 and further improved in 2009. Since then regularly distributed plots of 10 ha size include also borders of suitable habitat at the edges of the mire, and mineral islands surrounded by bushes inside the mire. Inclusion of such zones into monitoring scheme helps to detect habitat loss due to overgrowing as successions in Zvaniec develop from the edges of the mire as well as from mineral islands in the centre.

In 2013 double counts were performed for all 18 plots (#1-17 and #19). The most detailed counts ever performed for this site. Due to habitat deterioration, the plot #18 was excluded from the survey in 2013 (Fig.4). First counts took place between June 1st and 8th, second counts – between July 1st and 6th.

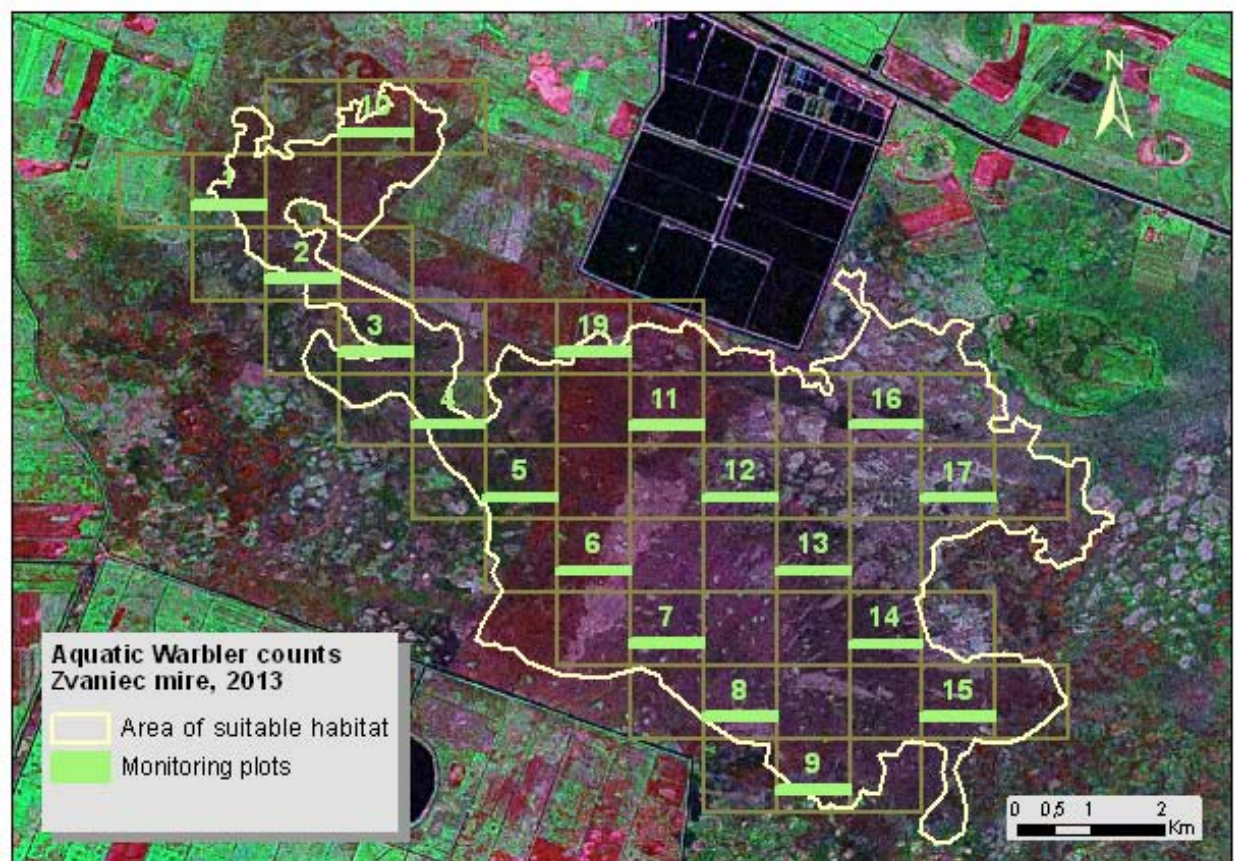


Fig.4: Location of **monitoring plots** in Central part of Zvaniec

Each sample plot was counted by 3 persons. The counters were moving in one row in latitude direction at 50 m distance from each other using GPS navigators. Those located at the edges were moving along Northern and Southern borders of monitoring plot respectively. Only singing males registered within borders of monitoring plots were considered for density estimation. Singing males outside the sample plots as well as all females and other bird species were registered just for reference.

The results of the counts at sample plots are presented in Table 2. The data received from the first counts was used for further calculations. The number of birds counted during second counts was lower reflecting seasonal variations.

Table 2: Estimation of AW numbers in the Central part of Zvaniec

	Sample plot	Density, males/km ²	
		1 st counts (22 nd - 23 th May)	2 nd counts (30 th June-2 nd July)
	1	55	15
	2	25	15
	3	20	20
	4	25	10
	5	50	50
	6	10	20
	7	65	70
	8	40	0
	9	0	10
	10	80	60
	11	105	70
	12	65	20
	13	20	10
	14	115	40
	15	145	85
	16	155	130
	17	40	5
	19	80	20
Mean		61	36
SD		45	35
SE		11	8
Area, km²		57	57
LCI* (min), singing males		2,115	1,065
UCI* (max), singing males		4,425	2,730

* Lower and upper confidence limits were calculated by Johannes Kamp (Universität Münster, Germany) through bootstrapping (n=1,000) using R-statistics software.

Western part. This part of the mire is heavily overgrown with shrubs and highly fragmented. Due to its limited accessibility, AW counts were not performed at this area until 2013. Then good satellite images became available, allowing proper planning. As a result the most promising plots in a western part were surveyed in July 2013. No suitable habitat detected – most of the area was overgrown with dense reeds. However there might be some singing males in late May, when the vegetation is lower.

The total number of AW in Zvaniec is estimated at **2,149-4,459** singing males (Tab.3).

Table 3: Estimation of the total number of AW in Zvaniec.

Part of the mire	Type of counts	Area of suitable habitat, ha	Mean number, males	Min number, males	Max number, males
Eastern (Sielišča)	full counts	140 (3%)	34	34	34
Central (2 nd counts)	counts at regular sample plots	4520 (97%)	3285	2115	4425
Western	full counts	0	0	0	0
TOTAL		4560 (100%)	3319	2149	4459

3.1.2 Sporava mire.

Full single counts of Aquatic Warbler covered c. **40%** (c. 510 ha) of known area of open fen mire suitable for the species (Fig.5). For reference, 100% of the area was covered with the counts in 2011.

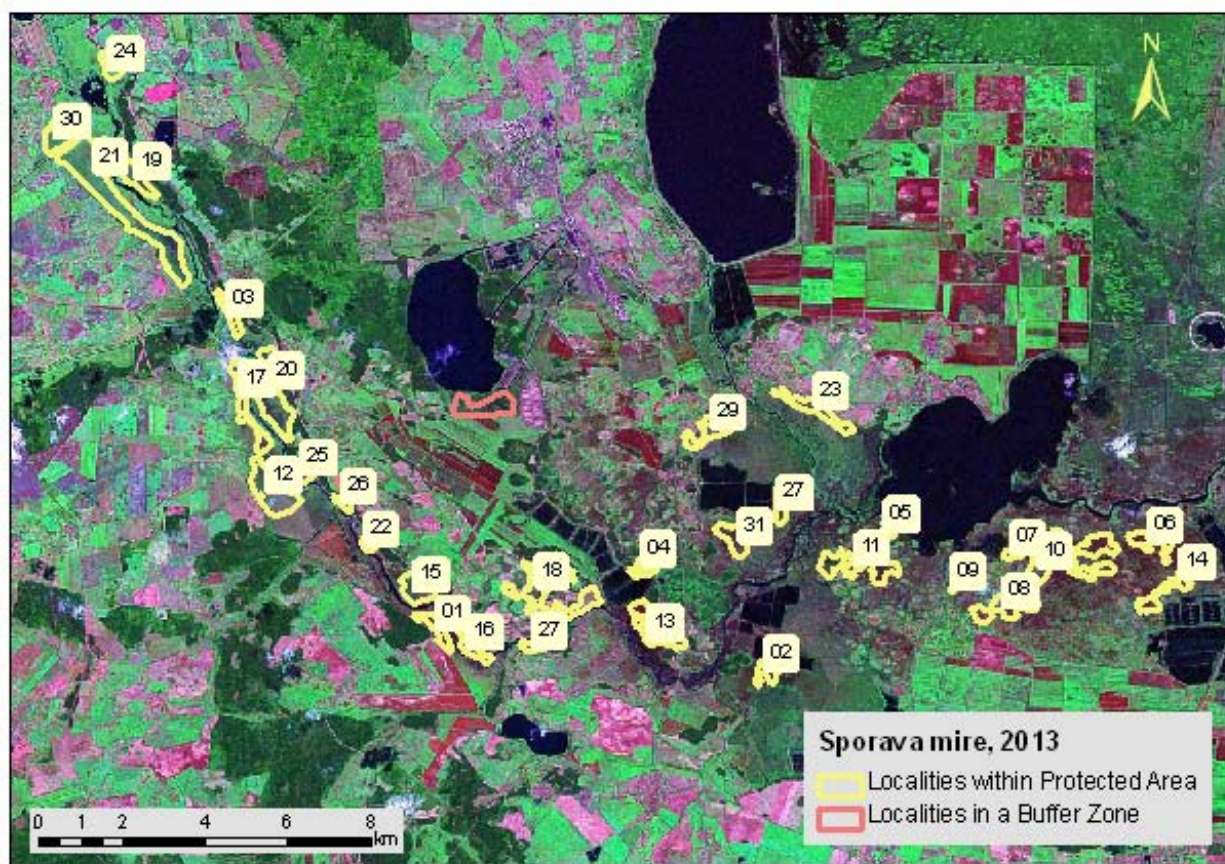


Fig.5 – Area suitable for AW in Sporava

In 2013 the counts took place between June 19th and 21st. The results are presented in the table below.

Table 4: Results of Aquatic Warbler full counts in Sporava

№	Name of locality	AW numbers, singing males						
		2013 counted (bold) + Min estimate	2010 counted	2011		2012		Habitat changes (apart succession)
				Min counted	Max counted + potentially missed ^(c)	Min counted	Max counted + potentially missed ^(c)	
1	Čarniejevičy	6	-	6	6	-	-	-
2	Chomsk	1	1	2	2	-	-	-
3	Halavickija	2	5	2	2	4	4	no

№	Name of locality	AW numbers, singing males						
		2013 counted (bold) + Min estimate	2010 counted	2011		2012		
				Min counted	Max counted + potentially missed ^(c)	Min counted	Max counted + potentially missed ^(c)	Habitat changes (apart succession)
4	Hieľčyka Kašyľ	0	1	0	0	-	-	-
5	Kakoryca_Bochancava	2	-	3	3	-	-	-
6	Kakoryca_Chiža	8	-	9	^(c) 12	-	-	-
7	Kakoryca_North	1	7	1	1	-	-	-
8	Kakoryca_Opaľskaje	16	9	^(b) 30	^(c) 34	-	-	-
9	Kakoryca_Pliesa ^(a)	0	-	1	1	0	0	no
10	Kakoryca_Voučyja_nory	44	62	^(b) 36	36	52	^(c) 62	fire
11	Kakoryca_West	14	29	14	^(c) 19	-	-	-
12	Kasciuki	25	45	35	35	25	25	no
13	Kašyľ	1	-	1	1	1	1	fire
14	Liadovičy	10	-	10	^(c) 16	-	-	-
15	Mastyki	11	-	26	26	8	8	no
16	Mastyki_chutar	16	2	9	9	3	3	no
17	Matviejevičy ^(a)	8	-	8	^(c) 12	-	-	-
18	Mitraŭka ^(d)	33	14	^(b) 61	61	33	33	fire
19	Novaje	5	6	5	5	7	7	no
20	Pierasudavičy	58	48	29	29	19	19	mowing
21	Piasčanka_Šylin	141	146	108	108	-	-	no
22	Puzi	0	-	0	0	0	0	no
23	Sporava	6	39	16	16	6	6	no
24	Stryhiń	5	8	11	11	-	-	-
25	Vysokaje	4	2	1	1	0	0	mowing
26	Vysokaje_farm	0	-	0	0	0	0	mowing
27	Žabier	0	-	0	0	-	-	-
28	Zašešnieŭ	3	10	3	3	-	-	-
29	Zdzitava	31	37	34	34	31	31	no
30	Zdzitava_Biaroza	11	18	21	21	-	-	-
31	Zdzitava_chutar	13	12	14	^(c) 18	-	-	-
Total		475-650^(h)	501 – 640^(e)	496	^(c)522	^(f)345	^(f)380	

a) Subsites included into monitoring scheme in 2011.

b) Subsites that were surveyed in detail in 2011, therefore bigger numbers do not reflect population increase. For the rest of subsites the surveyed area in 2010 and 2011 was equal.

c) The figure is calculated as a sum of birds counted and an estimate produced for birds potentially not counted due to the subsite complicated geometry.

d) The subsite is partly located outside of zakaznik.

e) Full counts were executed for the biggest part of the site in 2010 and minimum figure corresponds to the number of counted males, maximum figure represents an estimation that was produced for the rest of the site.

f) The minimum figure is calculated as a sum of birds counted at surveyed localities and an estimate based either on average density or on numbers counted in 2011 whatever in smaller for localities which were not surveyed.

The maximum figure is calculated as a sum of birds counted at surveyed localities and an estimate based on average density for not surveyed localities.

h) The minimum figure is calculated as a sum of birds counted at surveyed localities (bold). For localities which were not surveyed in 2013 an estimate was produced basing on minimum number of birds counted at those localities in former years (2010-2012) whatever in smaller.

The total maximum for 2013 is calculated as a proportion between number of males at surveyed localities in 2013 (bold), number of males at the same localities in 2011 (year of the most complete survey) and a total counted for 2011. $650 = (496 * 274) / 209$



Fig.6 – Location of singing males.

As detailed annual Aquatic Warbler counts took place in Sporava between 2010 and 2012, the counts 2013 did not target performing detailed survey of the area. The counts took place at the areas covered with habitat management, plus at a couple of other localities.

3.1.3 Dzikoje mire.

Aquatic Warbler breeding site Dzikoje consists of 4 localities: the core locality of the same name and 3 peripheral ones Hlybokaje, Lomaŭka and Naraŭ (Fig.7). In 2013 Aquatic Warbler numbers and distribution were assessed for the core locality. Peripheral localities were not checked within this survey, their population numbers were taken from previous years (Tab.1).

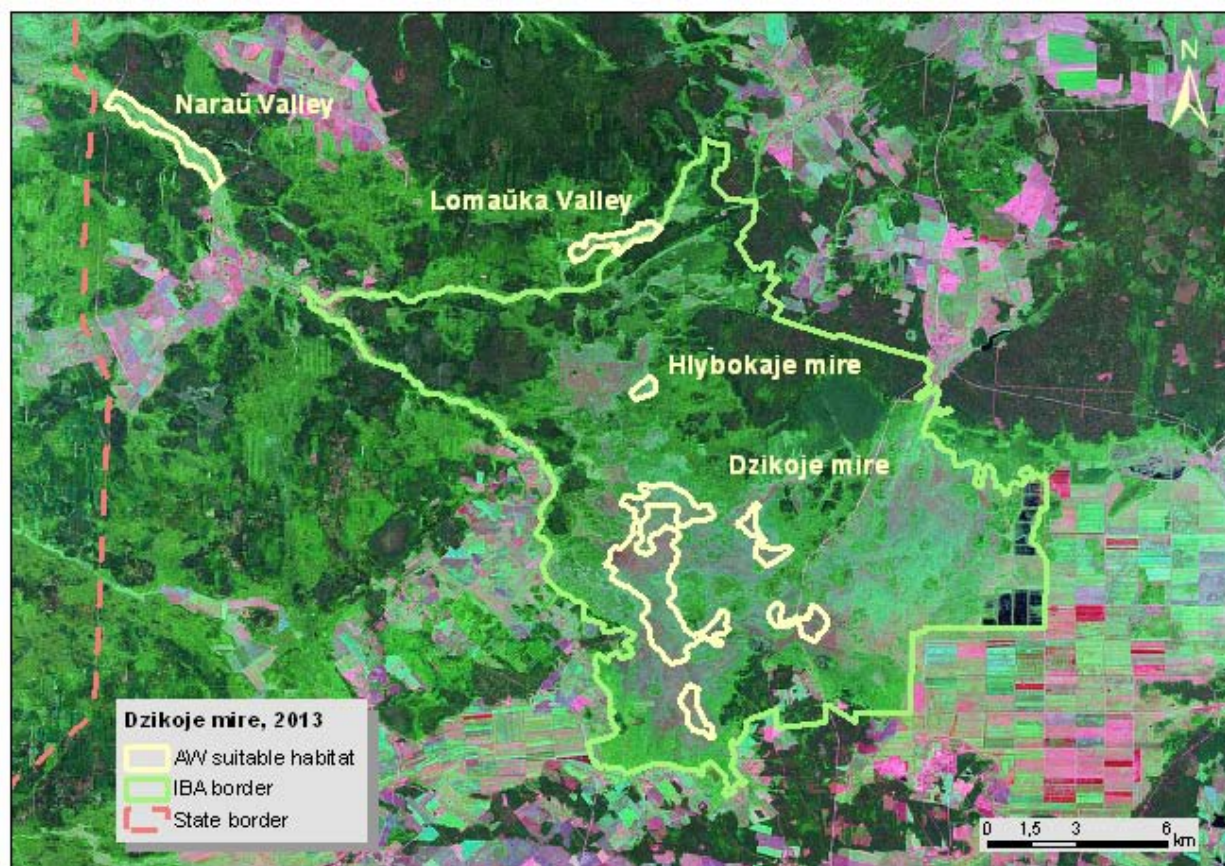


Fig.7 – Localities within breeding site Dzikoje.

The total area of IBA “Dzikoje mire” equal to 23,145 ha. It is located within National Park “Bielaviežškaja Pušča”. Satellite images analysis with subsequent field checks made during Aquatic Warbler census in the year 2013 allowed allocating the area suitable for AW roughly. The area makes about 1,155 ha in total for the core locality.

Aquatic Warbler males were counted at c.70% of suitable habitat, for the remaining suitable areas population estimates were produced (Fig. 8).

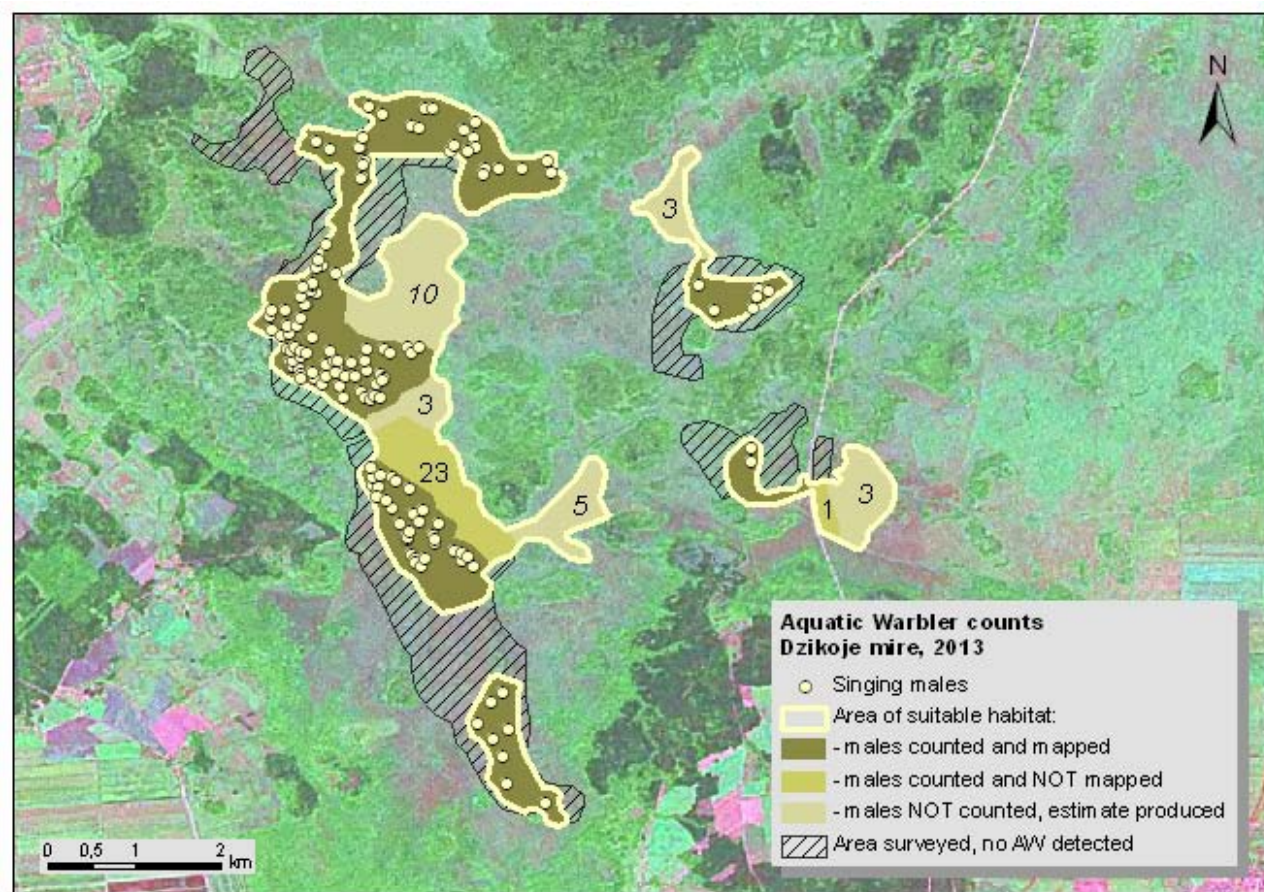


Fig.8 – Estimation of Aquatic Warbler numbers.

Resulting population figures are presented below (Tab.5)

Table 5: Estimation of the total AW number in Dzikoje mire.

Part of the mire	Type of counts	Area of suitable habitat, ha	% from total suitable habitat	Min number, males	Max number, males
Surveyed	Full (mapped)	710	60	146	146
	Full (not mapped)	110	10	24	24
Not surveyed	Estimation	340	30	0	24
TOTAL		1,160	100	170	194

4. CONCLUSIONS (*Alexander.Kazulin, Uladzimir Malashevich*)

At present there are only 3 key Aquatic Warbler breeding sites (Zvaniec, Sporava and Dzikoje) in Belarus, holding c. 2 850 - 5 200 singing males (years 2010-2013). The rest of the national population breeds at 5 permanent sites with low numbers (Dzivin, Prostyr, Ščara, Servač and Svislač) resulting in 100 - 200 males and at 7 suboptimal sites holding 50-100 males in total. So, altogether **15 breeding sites** were hosting **3 000 – 5 500 singing males** in the years 2010-2013. Most of Belarusian breeding sites located at considerable distance (50-260 km) from each other. Such remoteness creates barriers for exchanges of birds between the sites.

At the key sites Zvaniec, Sporava and Dzikoje the species rapidly declines due to overgrowth of open fens with reeds and bushes. Comparison population estimates in late 1990-s and recent monitoring data from the years 2010-2013, Aquatic Warbler numbers decreased for Zvaniec from 3 000 – 8 000 until 2 200 – 4 400, for Sporava from 700 – 2 100 until 500 – 600, for Dzikoje from c. 1 500 until 150 – 200. In a certain extend these figures reflect population decline due to habitat loss. Decrease of suitable habitat is clearly seen on satellite images. However it should be emphasized that these numbers also reflect a more detailed level of survey implemented in recent years.

Some other sites (Dzikoje, Servač, Almany and Žadzien) are transforming from fens into bogs. The species occurs only at peripheral parts of such rise bogs, where patches of fens still exist. At such mires Aquatic Warbler numbers decrease due to the changes in vegetation structure from sedge to sphagnum associations and due to overgrowth of open areas with birch trees. There are also vegetation successions at irregularly occupied suboptimal breeding sites presented by wet meadows and small patches of open fens.

Aquatic Warbler numbers might be stabilized and even increased if there is a network of key sites located not far from each other. It might be achieved through both securing optimal habitat conditions at existing sites (Zvaniec, Sporava, Dzikoje, Servač) and restoring new big fen mires (Vyhanaščanskaje, Hryčyna-Starobinskaje and Dakudaŭskaje). It will secure fast population increase at the key sites until their maximum ecological capacity and considerable increase of both distance and numbers of fledglings disseminating to new areas within breeding range (including suboptimal sites) during their post nuptial dispersion. The network of key and suboptimal biotopes will allow exchanging individuals between the sites. This will stabilize population number even under conditions of negative processes at some sites.

ACKNOWLEDGMENTS

Personal thanks to:

Alexander Kazulin (Academy of Science, Belarus) for expert conclusion

Johannes Kamp (Universität Münster, Germany) for statistical analysis of Zvaniec figures.

And of course, this research would not have been possible at all without the help of very nice people, open hearts, those who came to the end of the world, who walked through huge fens, and who made a practical contribution into research and conservation of these mysterious wetlands and their threatened inhabitants.

Albert de Jong	NL	Michiel de Groodt	NL
Alexandra Cielas	DE	Natasha Kulikova	BY
Anatol Kalach	BY	Natasha Savich	BY
Andreas Prott	DE	Oskars Keiss	LV
Ania Trafimchuk	BY	Peter Eekelder	NL
Arend van Dijk	NL	Reinis Priedols	LV
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Britta Kieseewetter	DE	Siarhej Hacki	BY
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Eric Nueling	DE	Tania Kurajeva	BY
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Guido Brouwer	NL	Tania Zhurij	UA
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Kacia Sitkievich	BY	Vlad Ramanienka	BY
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Maris Bazulis	LV	Zhenia Slizh	BY
Max Andruh	UA	Zoja Kienko	BY