INTEGRATED SYSTEM FOR PROTECTION OF BIRDS

REPORT

Monitoring of geese in the territory of Integrated System for Protection of Birds, Winter 2021-2022

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Sofia
March 2022

Contents

1. INTRODUCTION

The present study was commissioned by AES Geo Energy Ltd., Kaliakra Wind Power, EVN Kavarna, Degrets OOD, Disib OOD, Windex OOD, Long Man Invest OOD, Long Man Energy OOD, Zevs Bonus OOD, Vertikal-Petkov & Sie SD, Wind Park Kavarna East EOOD, Wind Park Kavarna West EOOD, and Millennium Group OOD in order to collect and summarize the information about the performance of the Integrated System for Protection of Birds (ISPB) that includes 114 wind turbines, 95 of which are within the Kaliakra SPA BG0002051 and 19 are in the areas adjacent to the protected zone. Considering the potentially adverse effects on environmental features, notably birds (T-PVS/Inf (2013) 15 https://tethys.pnnl.gov/publications/wind-farms-and-birds-updated-analysis-effects-wind-farms-birds-and-best-practice), the ISPB was implemented in 2018. The ISPB aims to provide a systematic monitoring programme, primarily including fatalities through collision with rotating turbine blades, disturbance leading to the displacement of birds from feeding, drinking, roosting or breeding sites (effectively a form of habitat loss), and turbines presenting a barrier to flight movements, thereby preventing access to areas via those movements or increasing energy expenditure to fly around the turbine locations (Hötker et al. 2006, Madders & Whitfield 2006, Masden et al. 2009, 2010, Ferrer et al. 2012, Grünkorn et al. 2016).

Enacting the ISPB includes a combination of radar observations and meteorological data, integrated with field visual observations, which jointly used are essential for the accurate risk assessment and ensures that appropriate action is taken immediately. So far as potential adverse impacts of turbine collisions on birds, a Turbine Shutdown System (facilitated by an Early Warning System: EWS) is deployed.

The monitoring studies are based on the requirements of basic normative and methodological documents as follows: Environmental Protection Act, Biological Diversity Act, Bulgarian Red Data Book, Directive 92/43/EEC for habitats and species, and Directive 2009/147/EC on the conservation of wild birds, Protected Areas Act and Order RD-94 of 15.02.2018 of the Minister of Environment and Waters. Best international practices are also incorporated (https://www.seo.org/wp-content/uploads/2014/10/Guidelines_for_Assessing_the_Impact_of_Wind_Farms_on_Birds_and_Bats.pdf). Detailed information about the scope, technical rules and monitoring procedure are publicly available at a dedicated website https://kaliakrabirdmonitoring.eu/. A detailed review of the scientific information published in scientific journals and in technical reports was also carried out for the studied area.

This report presents results of the ornithological survey and monitoring at the ISPB (Figure 1) in the period 01 December 2021 to 28 February 2022, including carcass searches and Turbine Shutdown System application. The primary objective of the 2021-2022 wintering bird studies within the ISPB territory was to investigate the possible effects of the wind farms (114 wind turbines) on geese populations, notably the Red-breasted Goose (RBG) (*Branta ruficollis)* due to its conservation status (https://www.iucnredlist.org/species/22679954/59955354).

To date, there have been no indications that wind turbines in Kalaikra region has had any adverse impact on wintering geese, including RBG (http://www.acta-zoologica-bulgarica.eu/downloads/acta-zoologica-bulgarica/2017/69-2-215-228.pdf). This report presents the latest results, from the 2021-2022 winter monitoring in the ISPB territory within Kalikra.

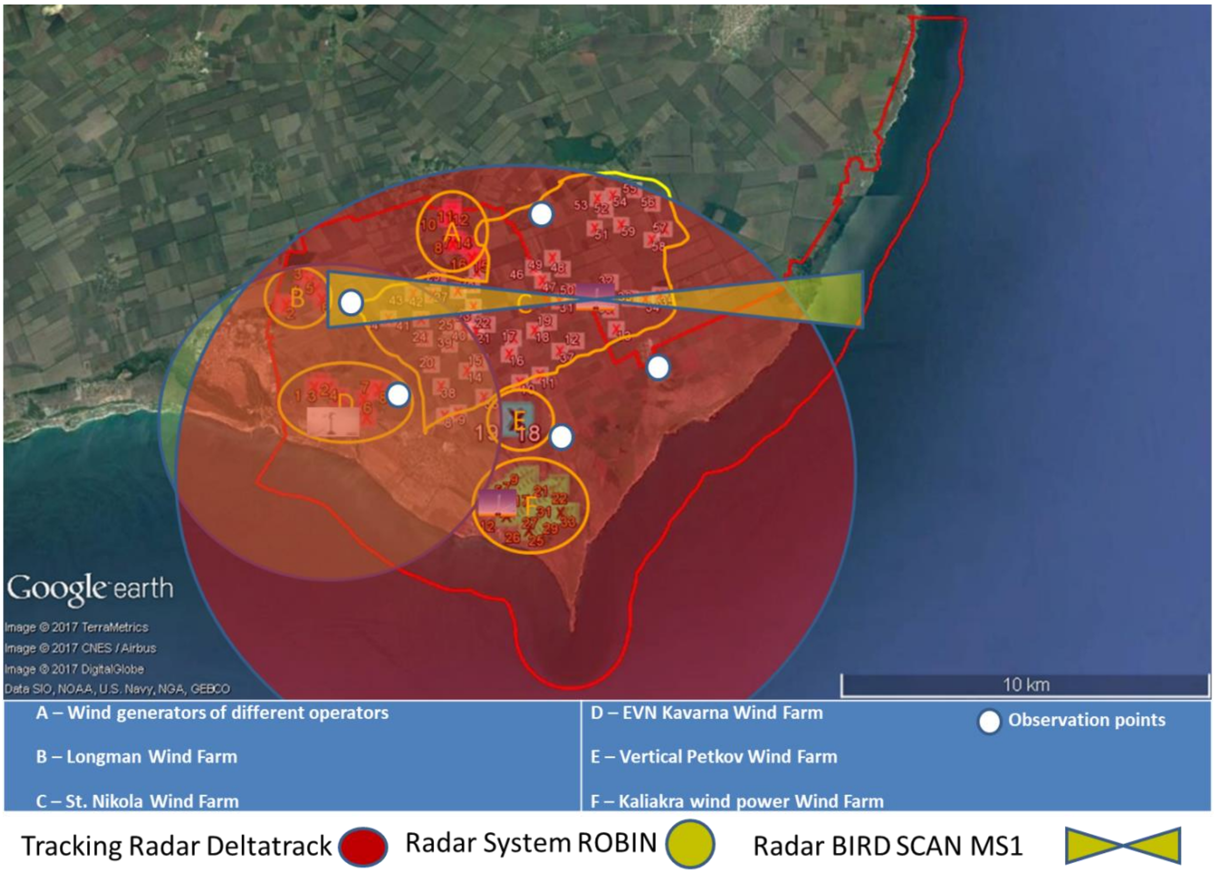

Figure 1. *A satellite photo with the location of the wind turbines covered by the ISPB and the boundaries of Kaliakra SPA.*

The geese species observed in the territory and behavioral characteristics of the geese are described in detail in previous reports available at the web site of ISPB (https://kaliakrabirdmonitoring.eu/)

2. DURATION, METHODS, AND EQUIPMENT

The study was carried out between 01 December 2021 and 28 February 2022, covering a total of 90 days, which involved the period of the most intensive movements of wintering geese in the region of northern Bulgarian Black Sea coast (Dereliev et al. 2000).

The counts of the geese were performed in early mornings at take-offs from the roosting sites. The teams were also separated in couples on predetermined counting points at the plots including the ISPB territory and surrounding fields (Figure 1).

The daily routines and all methodological details are described in previous reports available at the web site of ISPB (https://kaliakrabirdmonitoring.eu/).

Ornithologists who carried out the survey

- **Prof. Dr. Pavel Zehtindjiev - Senior Field Ornithologist**

Over 25 years of research in ornithology. Over 85 scientific publications in international ornithological journals. Member of European Ornithologists Union and number of conservation organisations. Winner of the Revolutionary Discovery Award for the Ornithology of the American Ornithological Society in 2016 – The Cooper Ornithological Society.
over 10 years of experience in impact monitoring of wind turbines on breeding, migrating and wintering bird species in the region of Kaliakra. Former longtime member of BSPB.

- **Dr. Victor Vasilev - Field ornithologist**

Senior researcher in the Faculty of Biology, University of Shumen.
Member of BSPB and participant in number of conservation projects in Bulgaria.
Author of over 20 scientific publications in international journals. Member of BSPB.

- **Ivaylo Antonov Raykov - Field ornithologist**

Museum of Natural History, Varna
Member of BSPB. Autor of over 20 scientific publications in international journals.
Ожер 5 years of experience in impact monitoring in the region of Kaliakra. Member of BSPB.

- **Kiril Ivanov Bedev - Field ornithologist**

Researcher in Institute of Biodiversity and Ecosystem Research at the Bulgarian Academy of Sciences.
Active member of conservation organization Green Balkans. Long term study on migrating birds and biodiversity of Burgas lakes. Author of three articles in Bulgarian Red Data Book. Expertise in biotechnology, conservation biology and environmental monitoring. Over 7 years of experience in impact monitoring of wind parks in Bulgaria. Member of Balkani NGO for conservation of birds and nature.

- **Yanko Yankov - Field ornithologist**

Student in Biology, University of Shumen. 8 years of experience in impact monitoring of birds in Wind Park projects in NE Bulgaria. Member of BSPB.

- **Dr. Boyan Michev – Field ornithologist**

Researcher in Institute of Biodiversity and Ecosystem Research at the Bulgarian Academy of Sciences, Department of Ecosystem Research, Environmental Risk Assessment and Conservation Biology.
Expert in radar ornithology and analysis of the radar data for bird monitoring. Member of the European Network for Weather radar application in ornithology.

- **Minko Madjarov – Field ornithologist**

Participant in the projects Safe grounds for Red-reasted geese LIFE 09/NAT/BG/000230 and Conservation of Lesser white fronted geese LIFE 10 NAT/GR/000638. Over 15 years experience in bird whatching. Profetional ornithologists. BirdLife member since 2004.

- **Zeliazko Dimitrov – Qualified searcher for collision victim monitoring**

- **Vasil Dimitrov – Qualified searcher for collision victim monitoring**

Types of data collected

During the survey in winter 2021-2022 the same standard data were recorded in order to be comparable with previous winter monitoring studies' results. All details concerning the data collected as well as the utililized protocols for collision monitoring and visual observations are given in previously published reports lodged at the ISPB web site (https://kaliakrabirdmonitoring.eu/).

3. RESULTS

The 90 days of the study encompassed the whole period when geese were recorded in the region during 2021-2022.

Total number of observed goose species and their numbers

In total very low numbers of geese of all observed species were present in the ISPB territory during the winter 2021-2022.

According to the coordinated counting of the wintering geese in Ukraine, Southeastern Romania and Bulgaria, the numbers of the wintering geese is lowest in Bulgaria. (https://bspb.org/en/over-500-000-greater-white-fronted-geese-counted-in-february/)

Only 80 individual geese were observed during the surveys in winter 2021-2022. One mixed flock of RBG (*Branta ruficollis*) and GWFG (*Anser albifrons)* were recorded by observers in the territory at 1 January 2022. The birds were in far distance and the species identification of every individual was not possible.

No flocks of geese were observed in December 2021 and February 2022.

The reason for the relatively low number of wintering geese in Bulgaria in general was likely due to the exceptionally mild winter of 2021-2022. Detailed analyses of correlation between ambient temperature and number of geese in Saint Nikola Wind Farm (SNWF) territory in the last 11 years, and discussion of the role of temperature, are presented in a previous report for part of the same territory (http://www.aesgeoenergy.com/site/images/Winter%20Report%202016-2017.pdf).

The five winters (2017-2018, 2018-2019, 2019-2020, 2020-2021 and 2021-2022) were very mild with day temperatures reaching over 10^0 C even in January. The milder winter conditions and the lack of snow, which allowed good grazing for the birds further north-east in Ukraine and Russia, resulted in a very late arrival of RBG in their wintering grounds along the western Black Sea coast and very low numbers compared to previous seasons.

The day by day tracking via satellite transmiters of 16 tagged RBG available at the internet site of Life for safe flights "conservation of Red-breasted Goose along the global Flyway" project LIFE 16/NAT/BG000847 resulted in clear evidence for winter distribution of wintering RBG along Danube river and in the Danube delta in the winter 2021-2022 (https://savebranta.org/en/transmiters).

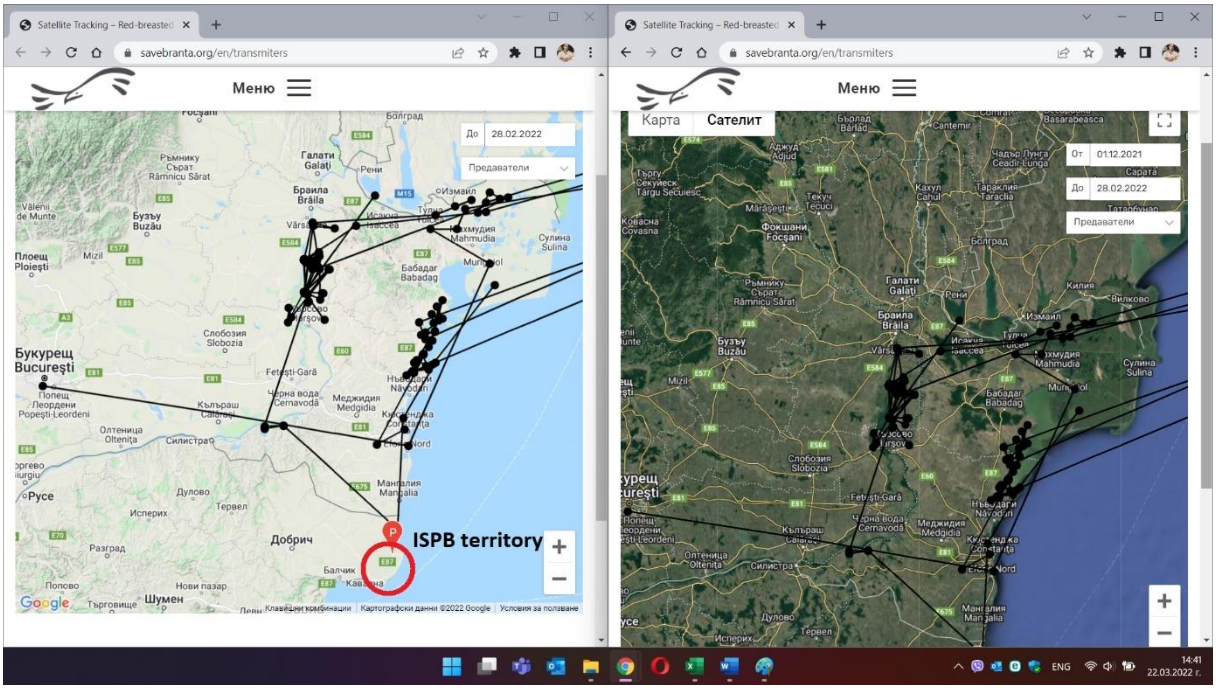

Figure 2. *According to the Life program project site Bulgaria was visited only for one day by one of 26 GPS-tracked Red breasted geese; to the north of ISPB. (*https://savebranta.org/en/transmiters*)*

Recent research cited in previous reports has shown that both GWFG and RBG are not ‘traditional’ in their choice of wintering areas but react to annual variations and changing conditions within a wintering season on food availability, driven largely by weather (and hence climatic trends over the longer-term). The underlying strategy of the geese appears to be to winter as far north (and as close to the breeding grounds) as possible. In milder winters or mild periods within a winter, geese are recorded further north: in colder winters or cold periods within a winter they are forced further south. The ISPB territory is in the south of the putative wintering possibilities, and to the south of roost/freshwater drinking locations (Durankulak and Shabla lakes) used as focal sites when geese use the wider Dobroudzha region. As well as a reduction in geese being recorded at ISPB territory (and SNWF) recent mild winters have been accompanied by many observations across the European continent suggesting a recent increase in the focal species using wintering areas further north, most likely as a result of global climate warming. This shift of wintering ranges has been observed in various bird taxa (Estrada et al., 2016).

Spatial distribution of feeding geese in the ISPB territory

The flock of geese tracked and confirmed visually are presented in maps below (Figure 3). Due to the low number of wintering geese in this winter spatial analysis was not possible. In general, only one flock was observed in WNW part of the ISPB territory in winter 2021-2022. More detailed analysis of the feeding preferences of wintering geese in ISPB territory are presented in previous reports available at the web site of ISPB (https://kaliakrabirdmonitoring.eu/).

Figure 3. *Mixed flock of CWFG (Anser albifrons) and RBG (Branta ruficollis) (Green) observed during the monitoring period in winter 2021-2022 in ISPB territory.*

Carcass monitoring results

All 114 turbines were programmed to be searched every seventh day in the periods of autumn and spring migration as well as during the wintering period of geese. The rest of the time during the whole year every turbine was searched once per month if the areas under turbines were accessible. During the winter monitoring (subject of this report) all 114 turbines were searched for carcasses during the whole winter survey period (01 December 2021 –28 February 2022) when more birds were at risk of collision. The frequencies of searches are presented in Table 1.

The mild weather in the 2021-2022 winter did not limit the programmed searches in the study period due to snow cover (as noted in some previous reports regarding SNWF). In a limited number of days with strong rain, however, the plots of 200 x 200 metres under turbines were searched from the turbine base (stairs and platform around 3 metres high) by binoculars. The large size with substantial white plumage of any geese carcases renders them clearly visible, especially in the predominant agricultural habitat at this time of year (largely bare soil): the elevated observation points using binoculars at turbine base stairs/platform will have increased their potential detection. On the other hand, with a rain-saturated soil the programme was aware that walked transects in these muddy conditions could affect the local farmers’ plans for the following growing and harvesting season. Nevertheless, over 95 % of the programmed searches under the 7 day-interval protocol using walked transects in the 200 x 200 metres plots were completed.

Table 1. *Number of searches per turbine during the winter monitoring 2021-2022*

Turbine code	December	January	February	Total
ABBalgarevo	3	4	4	11
ABГ1	2	5	4	11
ABГ2	2	5	4	11
ABГ3	2	5	4	11
ABГ4	2	5	4	11
ABMillenium group	5	6	6	17
ABMillenium group Mikon	1	2	2	5
AE10	3	4	4	11
AE11	3	4	4	11
AE12	2	3	4	9
AE13	2	4	4	10
AE14	2	5	4	11
AE15	2	5	4	11
AE16	3	4	4	11
AE17	3	4	4	11
AE18	2	3	4	9
AE19	2	3	4	9
AE20	2	5	4	11
AE21	3	4	4	11
AE22	3	4	4	11
AE23	3	4	4	11
AE24	2	5	4	11
AE25	2	5	4	11
AE26	3	4	4	11
AE27	3	4	4	11
AE28	3	4	4	11
AE29	2	5	4	11
AE31	2	4	4	10
AE32	2	4	4	10
AE33	2	4	4	10
AE34	2	4	4	10
AE35	2	4	4	10
AE36	2	5	4	11
AE37	2	3	4	9
AE38	2	5	4	11
AE39	2	5	4	11
AE40	2	5	4	11
AE41	2	5	4	11
AE42	2	5	4	11
AE43	2	5	4	11
AE44	2	5	4	11
AE45	3	4	4	11
AE46	2	3	4	9
AE47	2	3	4	9
AE48	2	3	4	9
AE49	2	3	4	9
AE50	2	4	4	10
AE51	2	4	4	10
AE52	2	4	4	10
AE53	2	4	4	10
AE54	2	4	4	10
AE55	2	4	4	10
AE56	2	4	4	10
AE57	2	4	4	10
AE58	2	4	4	10
AE59	2	4	4	10
AE60	2	4	4	10
AE8	2	5	4	11
AE9	2	5	4	11
DBГ1	2	5	4	11
DBГ1HSW250	2	5	4	11
DBГ2	2	5	4	11
DBГ2MN600	2	5	4	11
DBГ3	2	5	4	11
DBГ4	3	4	4	11
DBГ5	3	4	4	11
DC1	3	4	4	11
DC2	3	4	4	11
E00	3	4	4	11
E01	2	5	4	11
E02	2	5	4	11
E04	2	5	4	11
E05	2	5	4	11
E07	2	5	4	11
E08	2	5	4	11
E09	3	4	4	11
M1	3	4	4	11
M10	2	4	4	10
M11	2	4	4	10
M12	2	4	4	10
M13	2	4	4	10
M14	2	4	4	10

Turbine code	December	January	February	Total
M15	2	4	4	10
M16	2	4	4	10
M17	2	4	4	10
M18	2	4	4	10
M19	2	4	4	10
M2	3	4	4	11
M20	2	3	4	9
M21	2	3	4	9
M22	2	3	4	9
M23	2	3	4	9
M24	2	3	4	9
M25	2	3	4	9
M26	2	3	4	9
M27	2	3	4	9
M28	2	4	4	10
M29	2	4	4	10
M3	3	4	4	11

Turbine code	December	January	February	Total
M30	2	4	4	10
M31	2	4	4	10
M32	2	4	4	10
M33	2	4	4	10
M34	2	4	4	10
M35	2	4	4	10
M4	2	4	4	10
M5	2	4	4	10
M6	2	4	4	10
M7	2	4	4	10
M8	2	4	4	10
M9	2	4	4	10
VP1	3	4	4	11
VP2	3	4	4	11
ABZevs	2	5	4	11
Grand Total	**253**	**472**	**456**	**1181**

Figure 4. *Locations of turbines searched for collision victims according to codes for turbines given in Table 2.*

Systematic searches under 114 turbines covered by ISPB (Table 2) in the period 01 December 2021 – 28 February 2022 resulted in four intact carcases which can be associated with collision with wind turbines. Details of the collision victims recorded in the ISPB during winter 2021-2022 are presented in Table 2.

Table 2. *Collision victims in ISPB in winter 2021-2022.*

Date	Latin name	Red Data book	IUCN
13.12.2021	*Sturnus vulgaris*	Not Listed	Least Consern
02.01.2022	*Accipiter nisus*	Endangered	Least Consern
23.01.2022	*Perdix perdix*	Not Listed	Least Consern
03.02.2022	*Pluvialis apricaria*	Not Listed	Least Consern

No body parts or intact remains of geese which could be considered as collision victims were detected after an accumulation of 1181 searches under 114 turbines in the period 01 December 2021 – 28 February 2022. Therefore, no evidence for collision of any goose species, including RBG, has been found in the winter 2021 – 2022 when geese were present, and turbines were operating.

There were no circumstances in the 2021-2022 winter which required the Turbine Shutdown System (TSS).

Experiment on searcher efficiency: winter 2021-2022

Searcher efficiency and carcass persistence has been examined twice previously during winter monitoring within a part of the ISPB territory in February 2010 and in January 2016 (see SNWF monitoring reports). For the third time the efficiency of the searchers and removal rate of the carcasses by scavengers was investigated; within the wider area of ISPB in winter 2021-2022. Results are presented below

All three ornithologists searching for dead birds in winter 2021-2022 participated in the experiments for efficiency of searches. Searchers had no information about the exact location of the carcasses, or the number of carcasses placed around every turbine, but were notified that they were being tested prior to the searches and that the surroundings of the six turbines constituted the test area.

Search protocols under the experimental provisions were the same as those used for basic and routine searches around turbines for collision casualties; so that transects of 20 m intervals were traversed over an area of 200 x 200 m around each turbine during each search. The results of searcher efficiency from searches in the same day immediately after carcass placements are presented in Table 4.

Table 4. *Summary of searchers' efficiency*

Wind Farm	Tirbine	Number of chickens	K.B.	V.V.	V.D.	Average efficiency per turbine
AES	AE39	5	5	5	4	93,3
AES	AE41	5	5	4	5	93,3
EVN	E02	5	4	5	4	86,7
EVN	E04	5	5	4	3	80,0
KWP	M5	5	3	5	4	80,0
KWP	M6	5	4	5	4	86,7
Personal efficiency in %			86,7	93,3	80,0	**86,7**

Previous similar trials were conducted at SNWF in winter 2010 and 2016 and in autumn 2009, 2010, 2014 and 2018, with a searcher efficiency which ranged between 72.0 % and 89 %. In

2022 the efficiency test (Table 4) repeated practically the same protocol. An independent observer (not included in the team of searchers) placed coloured chickens of the same age and size in random locations around six turbines randomly selected from within 114 wind turbines of ISPB. Those non-searcher observer have checked for the presence of the carcasses before the searchers undertook their first search on day 1 (Table 4). All 30 hen carcasses were located under six randomly selected turbines in ISPB territory on 27 of January 2022. The plots were investigated in the first day for efficiency for every of the searchers. After this first day the experimental plots with experimental carcasses were investigated every day. The plots have been searched every day until the last dead body in our experiment disappeared from the searched plots. Given the several potential influential factors on efficiency (e.g. searcher experience/skill and – notably – habitat being searched) and that these metrics are inevitably low in sample size in such exercises, it is difficult to justify any further analysis. The mean efficiency in the winter 2021-2022 trial, however, apparently revealed efficiency across all searchers of 80 % which was increased from the previous trials' results at ISBP in 2018. Nevertheless, since these trials function to calibrate potential mortality rates from searches for strike fatalities through blade collision then because both searcher experience/skill and the habitat searched were correspondingly representative then this tends to remove a need for such further analysis. If, as persistently recorded for SNWF over many years and in the wider ISPB study area in autumn 2018, there continues to be no indication of any threatening fatality rates through turbine colisions to target species' populations then checks on biases through further searcher efficiency/carcass removal trials may become increasingly moot. Such checks should continue under constant review, however, as part of the wider agreed programme (Introduction).

Experiment on the removal rate: winter 2021-2022.

The carcasses started to disappear (be removed e.g. by scavengers) within the first day of the experiment (Table 5). The removal of carcasses varied between turbine locations but was much faster than established in previous experiments (2009, 2010, 2014 and 2018). Overall, at day one after placement 50 %, of the carcasses remained, and at day 4 all of the carcasses had disappeared. The time of disappearance of the carcasses in winter 2022 experiment varied depending on the location of the five turbines, with most disappearing after the second day of placement (Table 5).

Table 5. *Periodicities for scavenging or removal of carcasses in winter 2021-2022*

Day after corpses disposal	AE39	AE41	E02	E04	M5	M6	Total number of chickens
0th day	5	5	5	5	5	5	**30**
1st day	4	1	5	4	3	5	22
2nd day	0	0	0	1	2	0	3
3rd day	0	0	0	0	0	0	0
4th day	0	4	0	0	0	0	4
5th day	0	0	0	0	0	0	0

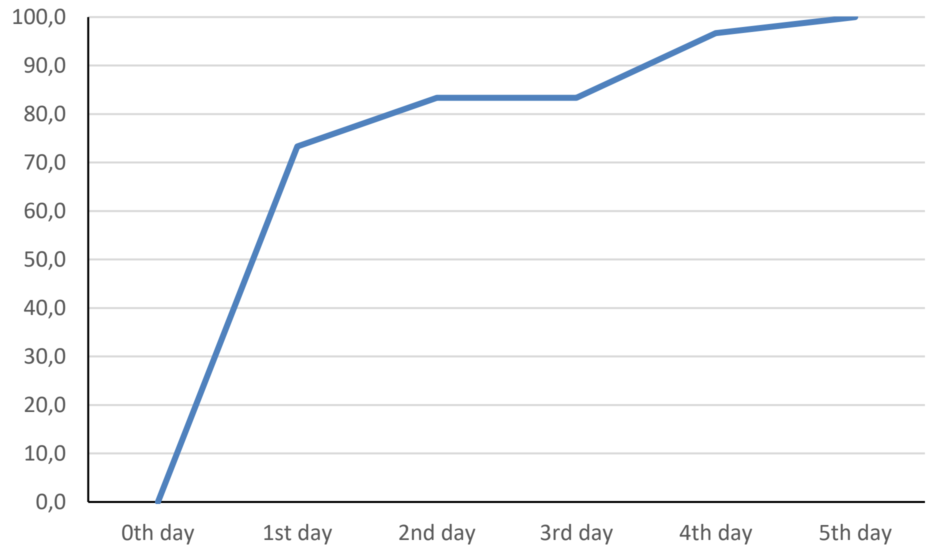

Figure 5*. Removal rate by days during the experiment in winter 2021 - 2022****.***

Such a winter trial at SNWF was first conducted in February 2010 using 25 domestic duck carcasses placed around five turbines. The results of the 2010 trial were very similar to the 2016 (Table 6) trial so far as carcass persistence rate was concerned, despite the difference in the carcass species. The new trial also confirmed that carcasses were apparently removed quicker in winter than in autumn: see several trial results reported in previous autumn monitoring reports: http://www.aesgeoenergy.com/site/Studies.html.

Table 6. *Removal rate of hen carcasses used in a trial of carcass persistence in winter 2015-2016. T42, T43 etc. gives the turbine under which carcasses were placed. All carcasses were put out on 21 January 2016.*

Date	Day	T42	T43	T45	T28	T51	T53	Total	% present
21.1.2016	0	3	2	2	3	2	2	14	100
22.1.2016	1	2	1	1	3	0	2	9	64
23.1.2016	2	1	1	1	3	0	1	7	50
24.1.2016	3	0	0	0	1	0	0	1	14
25.1.2016	4	0	0	0	0	0	0	0	0

The winter 2022 experiment showed higher scavenging (or otherwise removal) rate of carcasses in the ISPB in comparison to those previously estimated in experiments conducted. It could be explained by the increased number of scavengers in the variable habitats which are included in the ISPB.

Taking into account the results of the searchers efficiency which varied between 80 and 93 percent of the experimentally allocated dead chickens and a relatively higher scavenging rate, we have maintained a searching frequency of once per week on each of 114 turbines protected in the territory of ISPB. This frequency is the same as applied in previous monitoring periods in a part of the territory (SNWF) and allows comparision of the results in the long-term. Despite the higher scavenging rate discovered by the 2022 experiment we decided to keep the frequency of the searches at seven days. Practically, this allows coverage with the available resources of experienced ornithologists across all the 114 turbines included in ISPB. Even with increased scavenging rate, this frequency of seven days is also sufficient to allow the estimation of the 'real' mortality, via analyses noted later.

Additionally, to date there has been no indication of any target species' population being remotely affected by collision mortality, as revealed by the numerous weekly searches under all the turbines in last 4 years within the ISPB study area. An increased frequency of search effort may be suggested superficially by the winter 2022 trials with 30 chickens. That superficial indication, however, would only be valid if there was any substantive data from collision fatality data on which any potential search biases should or could apply.

To date, there are no indications of any substantive collision fatality estimates to which corrective factors through searcher efficiency or carcass removal could reasonably apply. In other words, correcting fatality-zeroes is analytically fraught, and will not contribute towards or much-alter the basic finding – undertaken with a relatively frequent search regime of 7 d under every turbine, with no individual of a target species being found as a collision casualty, to date.

Some may argue that there is some circularity in this view, such that if the basic search regime is insufficiently frequent to record collision fatalities of target species, then they will not be recorded. However, this argument can be dismissed in this programme because of the basic necessity for the number of fatalities which would have to be recorded to create an adverse population impact for the target species. The recording of such a fatality level is well within the realms of the search programme to detect potentially adverse levels, and any potential biases (even if detection of fatalities may be lowered by the winter 2022 searcher/removal trial).

4. CONCLUSIONS

The relatively mild 2021-2022 winter is probably the main reason for low number of observed only one flock of geese in ISPB territory.

Daily observations from December 2021 to February 2022 (inclusive) revealed that the geese were present in one day in ISPB territory. This day is in a short time period within the winter, which was essentially the same as already established in 2020 and 2021 winter monitoring of the same territory as well as studies 2008 – 2019 in a part of the ISPB territory (SNWF).

The number of wintering geese observed in ISPB during winter broadly corresponds to the total number of wintering geese in the larger region of coastal Dobroudzha region; but is lower, because of relatively distant roosting sites to ISPB territory of wintering geese at the two freshwater lakes used for roosting – Durankulak and Shabla.

114 wind turbines covered by ISPB were not a source of collision mortality for wintering geese, even though they fly through or feed within ISPB territory. The evidence for this is that no remains of geese that could be attributed to collision with turbines were found during systematic searches under operational turbines not only in the 2021-2022 winter but also in any of the 14 winters when all 114 turbines or 52 turbines at SNWF (part of ISPB) has been operational and searched systematically every winter season.

No displacement (disturbance) reaction from geese has been observed for the period 2008-2022 as a result of construction and operation of wind turbines in the ISPB territory. Observed numbers of geese of all species as well as observed spatial distribution of flying and feeding geese does not indicate gross displacement from the operational turbines or its immediate environs.

From research associated directly with ISPB described in the present and previous reports (and see previous SNWF winter reports on the AES Geo Energy website, and earlier surveys from this part of the same territory) the area continues to be a feeding ground for RBG as well as GWFG, but it also remains an unimportant area for both species, as indicated in pre-construction studies. Consequently, and based on other studies, the investigated 114 wind turbines present no material threat through preventing use of food supplies: especially in light of other agricultural practices such as crop type and field size of the preferred crop of feeding geese.

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