INTEGRATED SYSTEM FOR PROTECTION OF BIRDS

REPORT

Monitoring of geese in the territory of Integrated System for Protection of Birds, Winter 2022-2023

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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 2022 to 28 February 2023, including carcass searches and Turbine Shutdown System application. The primary objective of the 2022-2023 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). As previously reported repeatedly the more common goose species is the Greater White-Fronted Goose (GWFG: *Anser albifrons*). The present report describes the latest results, from the 2022-2023 winter monitoring of geese occurrence and searches for any collision casualties in the ISPB territory within Kalikra.

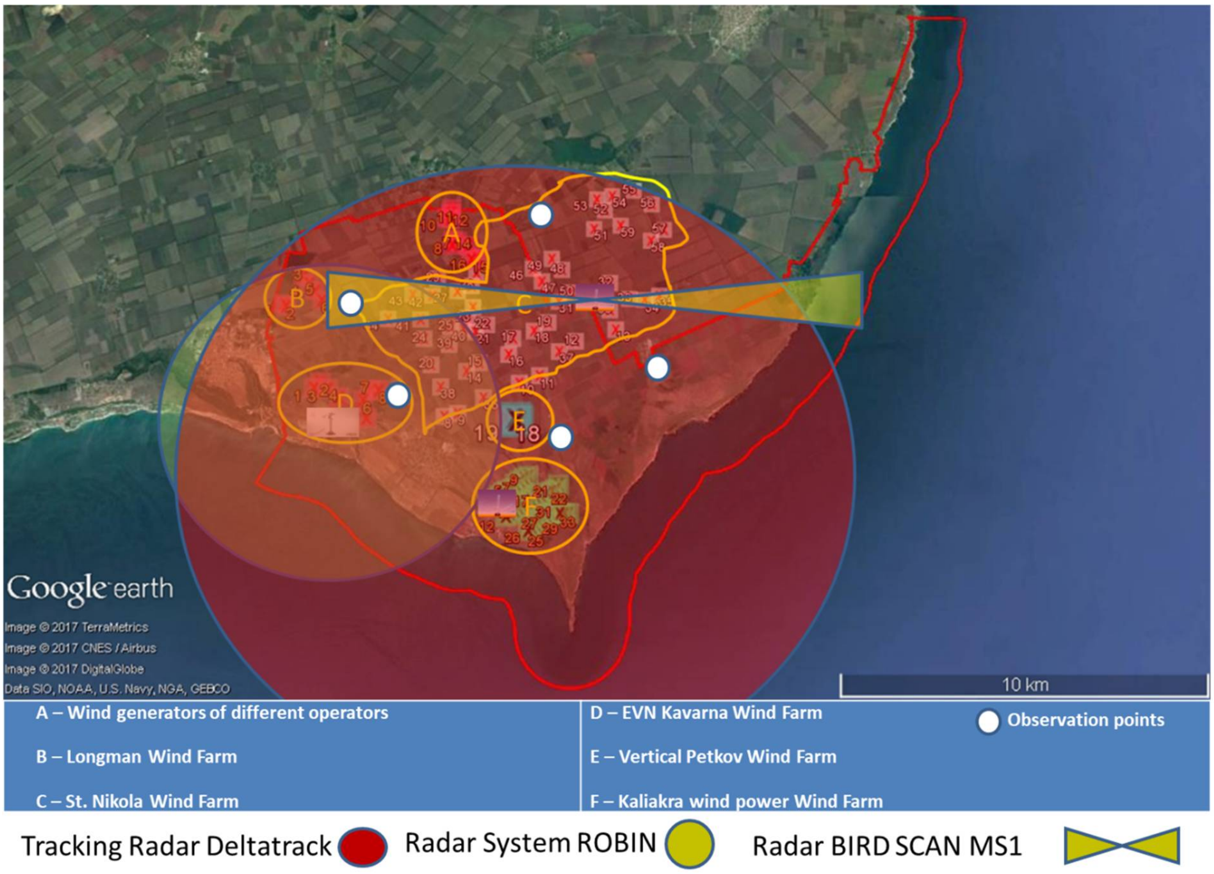

Figure 1. *A satellite photo with the location of the wind turbines covered by the ISPB and the boundaries of Kaliakra SPA.*

The geese species observed in the territory and behavioral characteristics of the records in previous years 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 2022 and 28 February 2023, 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.
Over 6 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 8 years of experience in impact monitoring of wind parks in Bulgaria. Member of Balkani NGO for conservation of birds and nature.

- **Hristo Gardov – Field ornithologists**

Experiences biologist, participant in number of field studies of birds as part of many conservation projects. BSPB active member. Member of The Wildlife Conservation Society (WCS) and member of the management of the organization.

- **Svetoslav Stoyanov - Field ornithologist**

Bachelor in Biology diploma from Shumen University. Participant in numerouse conservation projects of BSPB – BirdLife Bulgaria. Midwinter counts of waterfowl birds in Bulgaria nad white stork census expert. Monitoring the migration of birds species composition and the number of nesting fauna 2007-2012 "Ecotan" EOOD. Over 10 years of experience in impact monitoring study of wind turbines in the study area

- **Vasil Panayotov Dimitrov - Field ornithologist**

Trained to monitor the severity of collisions of birds with wind turbines. Representative of local conservation organization in Balgarevo, Kavrna.

- **Jelyazko Dimitrov - Field ornitologist**

Member of BSPB from 31.12.2006 to 31.12.2010. Trained to monitor the severity of collisions of birds with wind turbines.

Types of data collected

During the survey in winter 2022-2023 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 2022-2023.

Total number of observed goose species and their numbers

In total no birds of any goose species were observed in the ISPB territory during the winter 2022-2023. Unusually low numbers of wintering geese were also observed in Bulgaria and Romania in general in the winter season 2022-2023. https://bspb.org/

No flocks or individuals of geese were observed in the study area between December 2022 and February 2023.

The reason for the relatively low number of wintering geese in Bulgaria in general was likely due to the exceptionally mild winter of 2022-2023. Detailed analyses of correlation between ambient temperature and number of geese in Saint Nikola Wind Farm (SNWF) territory in the last 12 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 six winters (2017-2018, 2018-2019, 2019-2020, 2020-2021, 2021-2022 and 2022-2023) 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.

In the 2022-2023 winter this was confirmed by the dailytracking via satellite transmiters of 16 tagged RBG documented at the internet site of Life for safe flights "conservation of Red-breasted Goose along the global Flyway" project LIFE 16/NAT/BG000847 that demonstrated clear evidence for winter distribution of wintering RBG along Danube river and in the Danube delta in the winter 2022-2023 http://bspb-redbreasts.org/files/docs/1477652409_184.pdf. To reiterate, with another line of evidence, RBG stayed away from the ISPB study area in the 2022-2023 winter. As also apparently did the more abundant GWFG.

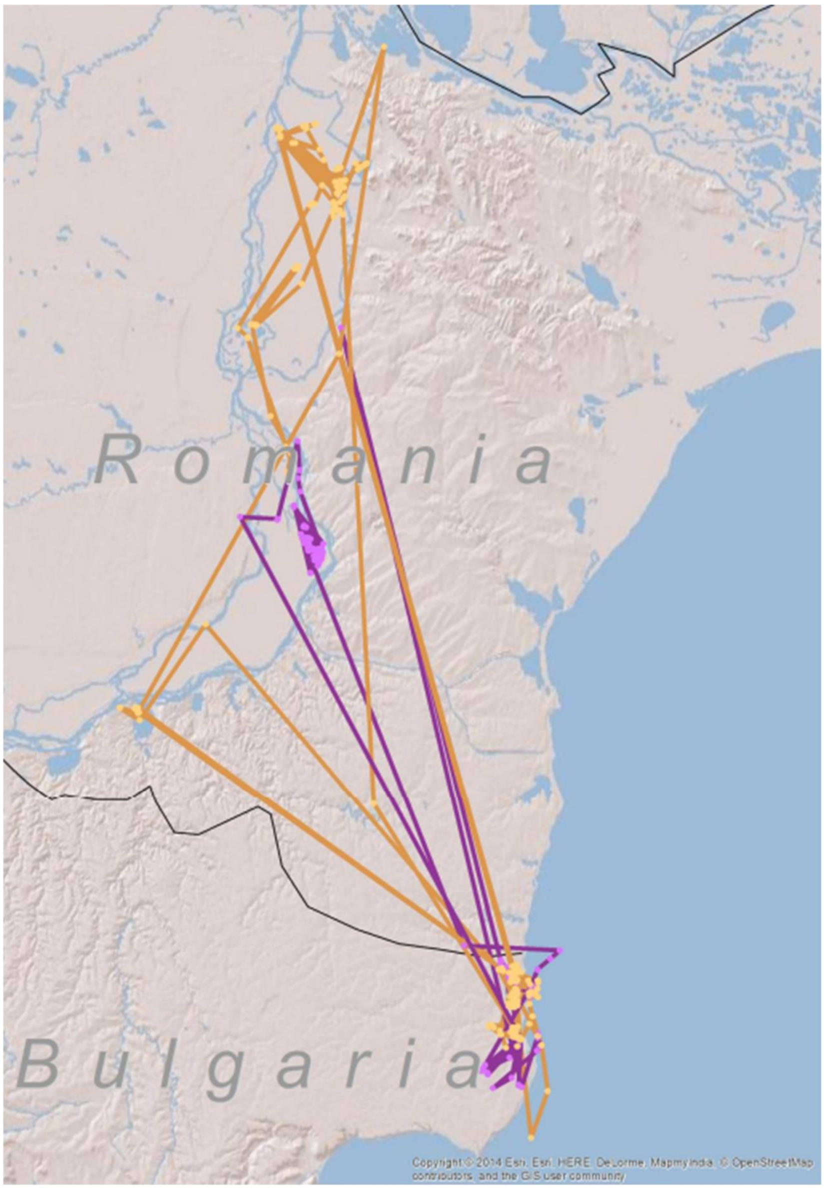

Figure 2. *Winter fixes in Romania from two Red-breasted Geese fitted with GPS loggers according to the Life program project (*http://bspb-redbreasts.org/files/docs/1477652409_184.pdf*)*

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 climatic 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

No flocks of geese were observed in the survey period in the study area. Due to the lack of wintering geese in this winter spatial analysis was not possible.

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 2022 –28 February 2023) when more birds were at risk of collision. The frequencies of searches are presented in Table 2.

The mild weather in the 2022-2023 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. Use of binoculars, with a potentially obvious target of extensive white plumage remains in search areas of bare soil make it easy to detect such remains at distance.

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.

Critically and additionally, in the 2022-2023 winter there were no observed records of geese, of any species, using the study area which could have generated a potential collision victim. And, therefore, any observable remains from collision.

Searcher efficiency and carcass persistence has been examined three times during winter monitoring at the part of the ISPB territory – in February 2010, in January 2016 and in January 2022 (see SNWF monitoring reports http://www.aesgeoenergy.com/site/Studies.html and Report Winter 2021-2022). The results were similar and broadly confirm the efficiency in searches and carcass removal rates under turbines for a programme of searches every seven days.

Table 2. *Number of searches per turbine during the winter monitoring 2022-2023*

Turbine code	December	January	February	Total
ABBalgarevo	2	4	4	10
ABГ1	2	4	4	10
ABГ2	2	4	4	10
ABГ3	2	4	4	10
ABГ4	2	4	4	10
ABMillenium group	3	10	6	19

Turbine code	December	January	February	Total
ABMillenium group Mikon	1	2	2	5
AE10	2	4	4	10
AE11	2	4	4	10
AE12	2	5	4	11
AE13	3	4	4	11

Turbine code	December	January	February	Total
AE14	2	4	4	10
AE15	2	4	4	10
AE16	2	4	4	10
AE17	2	4	4	10
AE18	2	5	4	11
AE19	2	5	4	11
AE20	2	4	4	10
AE21	2	4	4	10
AE22	2	4	4	10
AE23	2	4	4	10
AE24	2	4	4	10
AE25	2	4	4	10
AE26	2	4	4	10
AE27	2	6	4	12
AE28	2	6	4	12
AE29	2	4	4	10
AE31	3	4	4	11
AE32	3	4	4	11
AE33	3	4	4	11
AE34	3	4	4	11
AE35	3	4	4	11
AE36	2	4	4	10
AE37	2	5	4	11
AE38	2	4	4	10
AE39	2	4	4	10
AE40	2	4	3	9
AE41	2	4	4	10
AE42	2	4	4	10
AE43	2	4	4	10
AE44	2	4	4	10
AE45	2	6	4	12
AE46	2	5	4	11
AE47	2	5	4	11
AE48	2	5	4	11
AE49	2	5	4	11
AE50	3	4	4	11
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

Turbine code	December	January	February	Total
AE58	2	4	4	10
AE59	2	4	4	10
AE60	3	4	4	11
AE8	2	4	4	10
AE9	2	4	4	10
DBГ1	2	4	4	10
DBГ1HSW250	2	4	4	10
DBГ2	2	4	4	10
DBГ2MN600	2	4	4	10
DBГ3	2	4	4	10
DBГ4	2	6	4	12
DBГ5	2	6	4	12
DC1	2	6	4	12
DC2	2	6	4	12
E00	2	4	4	10
E01	2	4	4	10
E02	2	4	4	10
E04	2	4	4	10
E05	2	4	4	10
E07	2	4	4	10
E08	2	4	4	10
E09	2	4	4	10
M1	2	4	4	10
M10	3	4	4	11
M11	3	4	4	11
M12	3	4	4	11
M13	3	4	4	11
M14	3	4	4	11
M15	3	4	4	11
M16	3	4	4	11
M17	3	4	4	11
M18	3	4	4	11
M19	3	4	4	11
M2	2	4	4	10
M20	2	5	4	11
M21	2	5	4	11
M22	2	5	4	11
M23	2	5	4	11
M24	2	5	4	11
M25	2	5	4	11
M26	2	5	4	11
M27	2	5	4	11
M28	2	4	4	10

Turbine code	December	January	February	Total
M29	2	4	4	10
M3	2	4	4	10
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	3	4	4	11
M5	3	4	4	11
M6	3	4	4	11
M7	3	4	4	11
M8	3	4	4	11
M9	3	4	4	11
VP1	2	4	4	10
VP2	2	4	4	10
ABZevs	2	4	4	10
Grand Total	**252**	**490**	**455**	**1197**

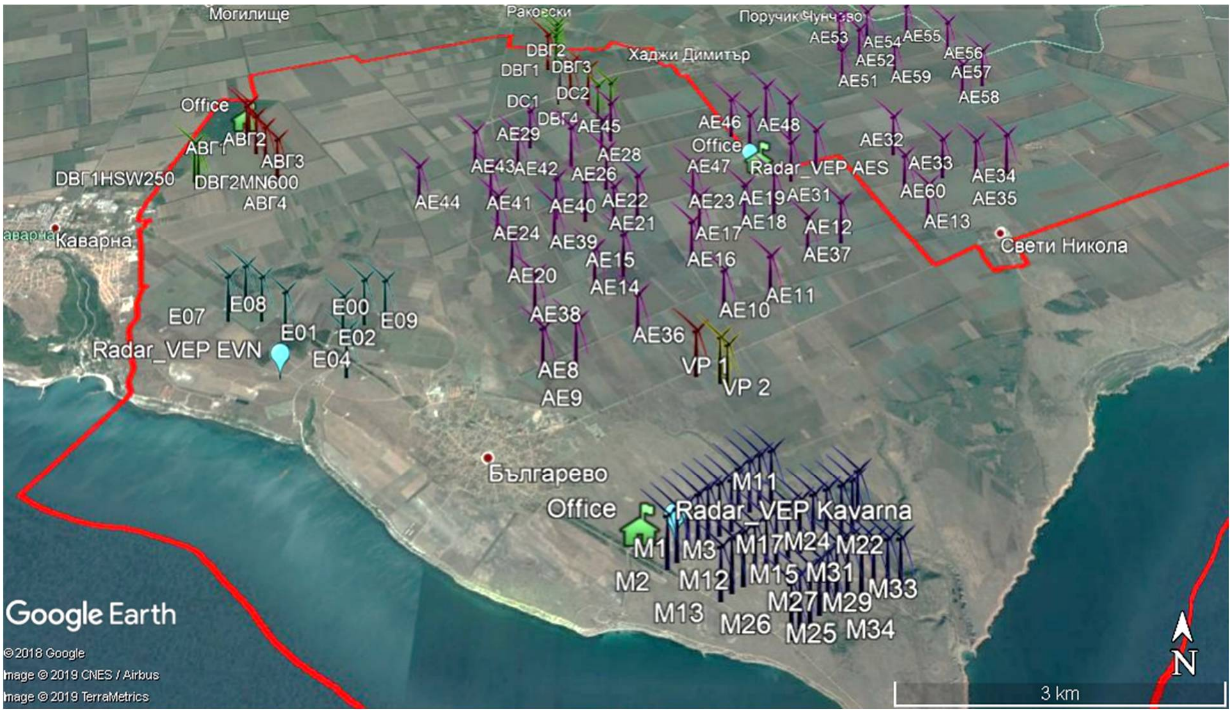

Figure 4. *Locations of turbines searched for collision victims according to codes for turbines given in Table 2.*

Systematic searches under 114 turbines covered by ISPB (Table 2) in the period 01 December 2022 – 28 February 2023 resulted in only one intact carcass which can be associated with collision with wind turbines. Details of the collision victims recorded in the ISPB during winter 2022-2023 are presented in Table 3.

Table 3. *Collision victims in ISPB in winter 2022-2023.*

Date	Latin name	Red Data book	IUCN
25.12.2022	*Falco tinnunculus*	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 1197 searches under 114 turbines in the period 01 December 2022 – 28 February 2023. Therefore, no evidence for collision of any goose species, including

RBG, has been found in the winter 2022 – 2023 when geese can be present according to monitoring results from previous winters in the same territory.

There were no circumstances in the 2022-2023 winter which required the Turbine Shutdown System (TSS).

4. CONCLUSIONS

The mild 2022-2023 winter is the main reason for absence of wintering geese in ISPB territory.

No remains of geese that could be attributed to collision with turbines were found during systematic searches under operational turbines not only in the 2022-2023 winter but also in any of the 15 winters when all 114 turbines or 52 turbines at SNWF (part of ISPB) has been operational and searched systematically every winter season.

From research associated directly with ISPB described in the present and previuse reports (and see previous SNWF winter reports on the AES Geo Energy website, and earlier surveys from this part of the same territory) the study 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. The presence of wintering geese is assotiatete with colder winters when lakes in the northern part of the wintering range of geese is covered by snow and lakes with sweet water are frozen.

Based on previous studies in the same territory when geese were observed, 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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