INTEGRATED SYSTEM FOR PROTECTION OF BIRDS

REPORT
Monitoring of geese in the territory of Integrated System for Protection of Birds in Winter 2019/2020

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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 habitat disturbance), 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; Drewitt & Langston 2008; Masden et al. 2009, 2010; de Lucas et al. 2004, 2008; Ferrer et al. 2012; Zimmerling et al. 2013; Grünkorn et al. 2016).

Enacting the ISPB includes a combination of radar observations and meteorological data, integrated with field visual observations, which when combined are essential for the accurate risk assessment, ensuring that appropriate action is taken immediately. A Turbine Shutdown System (referred also as Early Warning System (EWS) can deployed at any time in the event of potential bird collisions with turbines.

The monitoring sruveys 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. The most appropriate 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 study area.

This report presents the results of the ornithological monitoring survey at the ISPB in the period 01 December 2019 to 29 February 2020, including period of carcass searches and Turbine Shut Down System applications in winter 2019-2020 (Figure 1). The primary objective of wintering bird studies within the ISPB territory is to investigate the possible effects of the wind farms (114 wind turbines) on geese populations, notably the Red-breasted Goose (*Branta ruficollis)* (RBG) due to its near threatened conservation status in Europe (https://www.iucnredlist.org/species/22679954/59955354).

To date, there have been no indications that wind turbines in Kaliakra region have 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 2019-2020 winter monitoring in the ISPB territory and the Kaliakra SPA BG0002051.

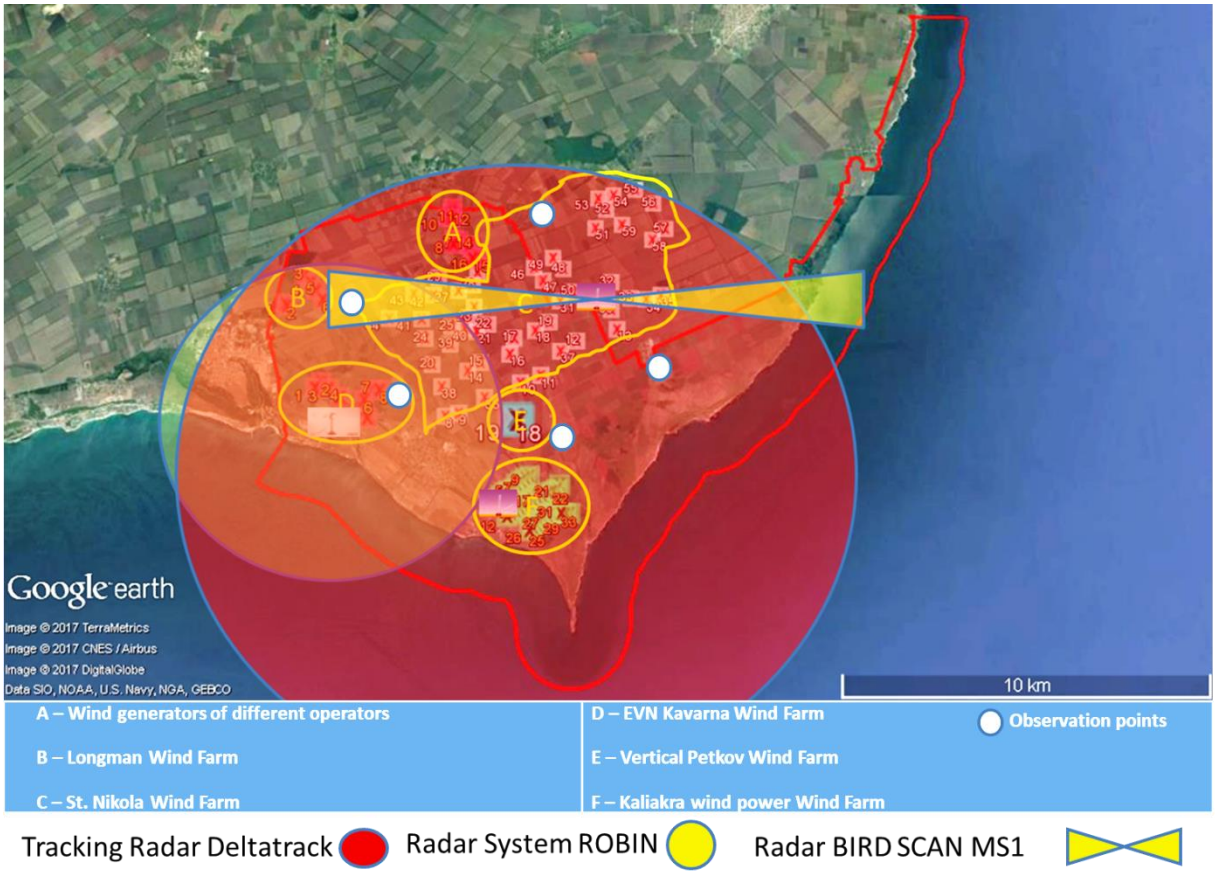

Figure 1. *A satellite photo with the location of the wind turbines covered by the ISPB and the boundaries of Kaliakra SPA.*

1.1 THE GEESE SPECIES OBSERVED IN THE TERRITORY

A detailed revew of the geese species inhabiting and regularly observed in the territory of ISPB is presented in the first report of winter 2018-2019 available at the dedicated web site of the ISPB (https://kaliakrabirdmonitoring.eu/)

The Red-breasted Goose (RBG) *Branta ruficollis* is a species included in the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA) framework agreement. The AEWA is an intergovernmental treaty dedicated to the conservation of migratory waterbirds and their habitats across Africa, Europe, the Middle East, Central Asia, Greenland and the Canadian Archipelago. Over 80 % of the population roosts at only five sites during winter, all of which are in eastern Europe. Due to high-intensity agriculture and monoculture farming, their feeding areas are under constant pressure of changes in land-use (Yrjölä et al. 2017).

Over the past 10 years, systematic counts of wintering RBG have been carried out by BirdLife partners in Bulgaria, Ukraine and Romania, where their main roosting sites are located. In Bulgaria counts have been conducted once a week at the Shabla and Durankulak lakes: the main

freshwater roosting sites in the Dobrudzha region of NE Bulgaria. Some data are available from local BirdLife partners: www.brantaruficollis.org. The total number of world population counted in the bottleneck of spring migration is around 100,000 individuals (Rozenfeld et al. 2016).

According to IUCN the minimum European population of RBG in winter is estimated at 10,800 – 81,600 individuals, consisting of 7,200 - 54,400 mature geese. The species occurs in the EU27 only in winter and the minimum population is estimated at 9,900 - 74,900 individuals, or 6,600 - 49,900 mature individuals. Within Europe and the EU27, the wintering population of this declining species is restricted to a few locations within a small total area. It is therefore precautionarily listed as Near Threatened (B2ab(iii,v) (BirdLife International 2015).

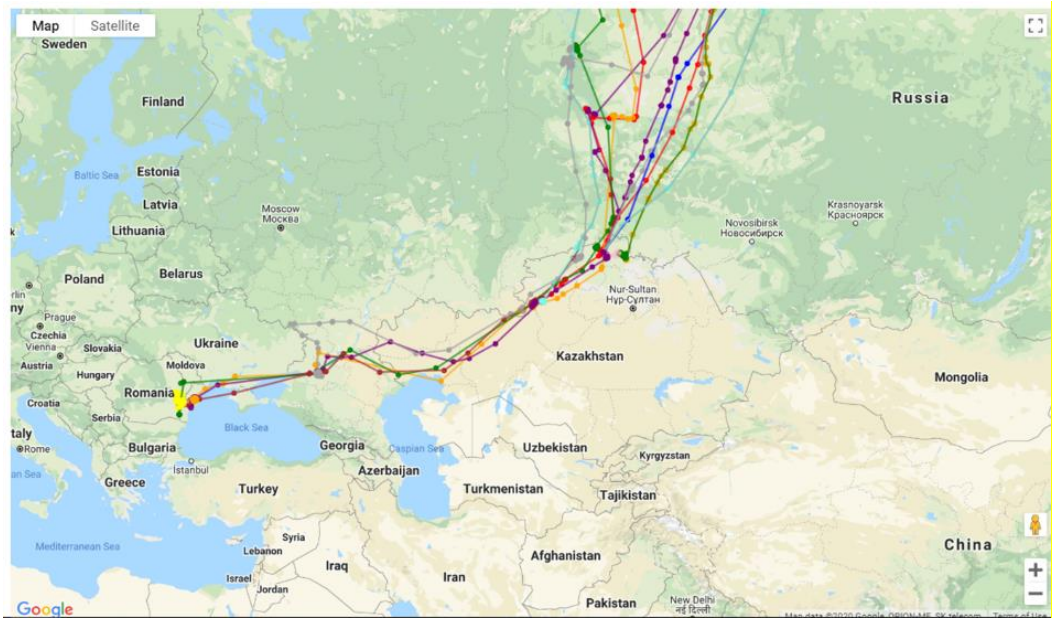

Figure 2 *According to the Life program project website only one of over 10 RBG fitted with transmitters was registered in Bulgaria - in only one day during the winter of 2019-2020 (https://savebranta.org/en/birds-tracker)*

1.2 BEHAVIORAL CHARACTERISTICS OF THE GEESE

Geese in Bulgarian Dobrudzha feed almost exclusively on winter cereals and select strongly for fields close to their roosts at Durankulak and Shabla lakes. This is unsurprising, because short commuting flights result in lower flight energy expenditure. A meso-scale analysis i.e. field selection indicates a strong influence of foraging profitability and avoidance of human disturbance (Harrison et al. 2017). Both Shabla and Durankulak lakes, where all the wintering geese are concentrated, are far from the ISPB territory and therefore outside the scope of the current monitoring report so far as commissioned monitoring observations.

The presence of geese in the ISPB over the set wintering monitoring period was limited to a short time period, likely due to the relatively mild temperatures in winter 2019-2020.

2. DURATION, METHODS AND EQUIPMENT

The study was carried out in the period 01 December 2019 to 29 February 2020, covering a total of 91 days, which included the period of the most intensive movements of wintering geese in the region of northern Bulgarian Black Sea coast in the Dobrudzha region (Dereliev et al. 2000).

All details for data registration and the timing of observations are described in the first report of ISPB winter monitoring published at the website (https://kaliakrabirdmonitoring.eu/)

All observers were qualified specialists who have been carrying out bird migration surveys for many years.

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.
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. Dimitar Dimitrov- Field ornithologist**

Institute of Biodiversity and Ecosystem Research – Bulgarian Academy of Sciences.
Author of over 20 scientific publications in international ornithological journals. Member of BSPB.
5 years of experience in impact monitoring in the region of Kaliakra. Member of BSPB.

- **Veselina Raikova**

Museum of Natural History, Varna.
Member of BSPB. Autor of over 20 scientific publications in international journals.
5 years of experience in impact monitoring in the region of Kaliakra. 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.
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. 7 years of experience in impact monitoring of birds in Wind Park projects in NE Bulgaria. Member of BSPB.

- **Boyan Michev – Field ornithologist**

PhD Student 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.

- **Nikolai Velichkov - Field ornithologist**

Qualification and experience in many conservation programs of BirdLife Bulgaria over 15 last 15 years.

- **Rusi Welichkov – Qualified searcher for collision victim monitoring**
- **Zeliazko Dimitrov – Qualified searcher for collision victim monitoring**
- **Vasil Dimitrov – Qualified searcher for collision victim monitoring**

3. RESULTS

The 91 days of the study encompassed the whole period when geese were recorded in the region during the 2019/20 winter.

Total number of observed goose species

In total, very low numbers of geese of all species were observed in the ISPB territory during the winter 2019-2020. Extremely low numbers of wintering geese were also observed in Bulgaria and Romania in general, throughout the winter season 2018-2019 and more so, in 2019-2020.

Less than 2,000 individual geese were observed during the surveys (Table 1). Three species of goose were observed: RBG, Great White fronted Goose (GWFG) and Greylag Goose (GG). No Lesser White-fronted Goose (LWFG) were seen in winter 2019/2020.

Table 1. *The number of observed geese of each species. Data are based on visual observations. Days with no observations of geese were excluded.*

Date	GWFG	*RBG*	*GG*	*Mix of geese*	Grand Total
11.01.2020	292	0	0	0	292
15.01.2020	624	0	33	45	702
16.01.2020	49	0	0	150	199
21.01.2020	0	0	0	42	42
26.01.2020	218	0	0	45	263
01.02.2020	45	0	0	0	45
07.02.2020	18	0	0	0	18
12.02.2020	0	55	0	0	55
15.2.2020	0	0	0	57	57
Grand total	1246	55	33	339	**1673**

Geese were observed in ISPB territory between 11 January 2020 and 15 February 2020 (Table 1). The first geese recorded were GWFG in the beginning of January.

The proportion of RBG in mixed flocks could not always be precisely evaluated but in all the observations available where the proportions of species could be identified it was consistent with previous winters' records and varied between 10 % and 50 %. Overall, 89 % of all goose

observations were recorded in January; however RBG were only observed in February (Figure 3).

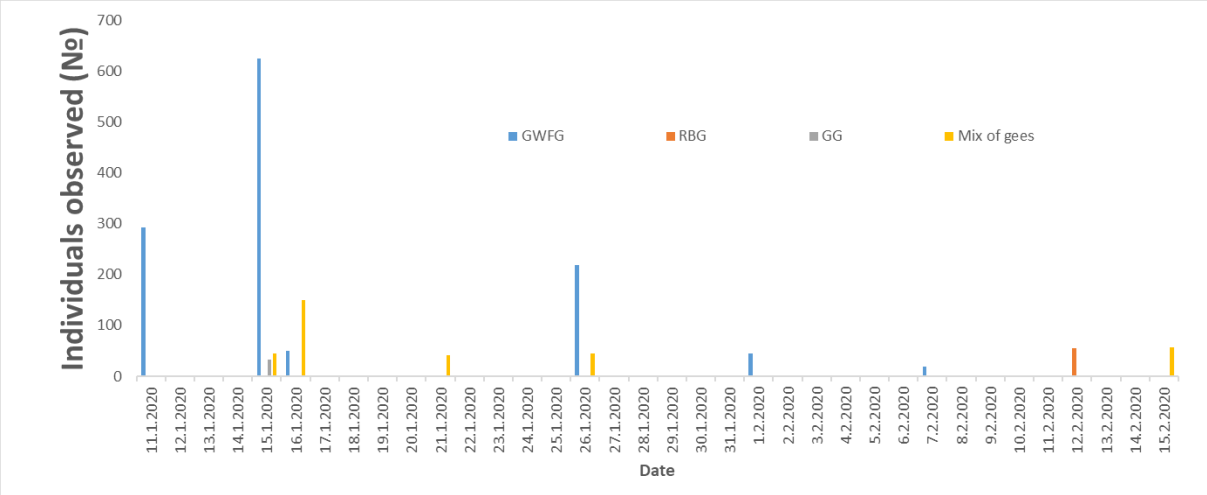

Figure 3. *Temporal dinamics of wintering geese observed in ISPB territory during the winter season 2019-2020.*

The reason for the relatively low number of wintering geese in Bulgaria in general was likely due to the exceptionally mild winter of 2019-2020. Detailed analyses of correlation between ambient temperature and number of geese in a part of the same territory (Saint Nikola Wind Farm (SNWF) in the last 10 years, and discussion of the role of temperature, are presented in a previous report for the same territory:

(http://www.aesgeoenergy.com/site/images/Winter%20Report%202016-2017.pdf)

The winters of 2018-2019 and 2019-2020 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 the RBG in their wintering grounds along the western Black Sea coast and very low numbers compared to previous seasons.

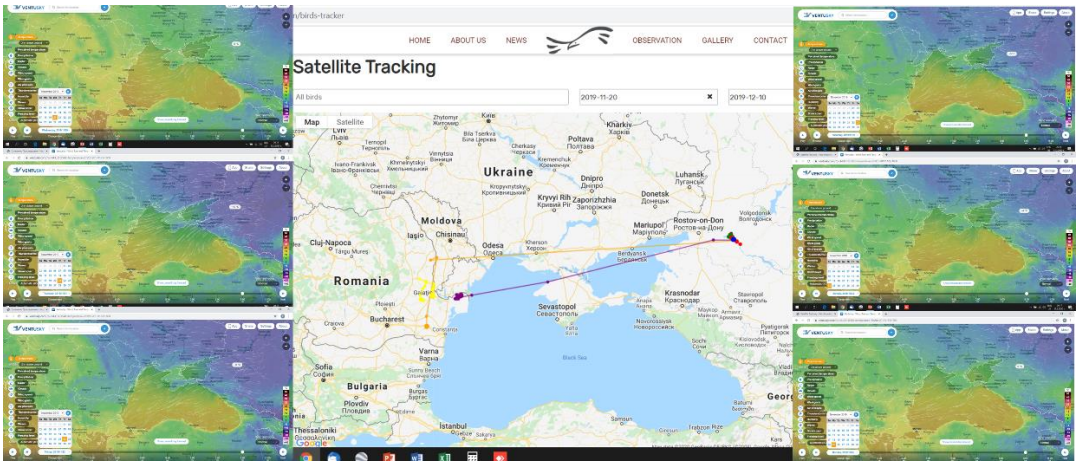

Figure 4. *Ambient temperature and location of RBG with satellite transmiters in November, December 2019 according to web site information (https://www.ventusky.com/and https://savebranta.org/en/birds-tracker)*

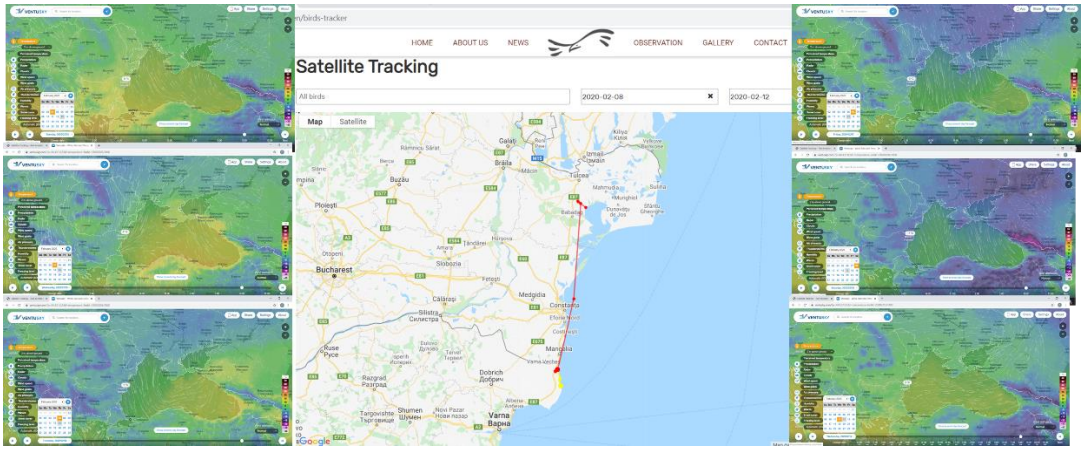

Figure 5. *Ambient temperature and location of RBG with satellite transmiters in the days of February 2020 when the majority of geese were observed in ISPB territory (*https://www.ventusky.com/ *and https://savebranta.org/en/birds-tracker)*

In general, low numbers of geese were observed in Bulgaria during the winter 2019-2020: https://greenbalkans.org/pomorielake/indexdetails.php?menu_id=79&elem_id=505&c_lang=2

Although, despite the relatively high temperatures and mild weather for the season, 15,000 GWFG were observed grazing in the wider region of Dobrudzha: https://greenbalkans.org/en/Monitoring_of_Coastal_Dobrudzha_and_Burgas_lakes-p7426-y2020

Just for reference: The highest total count of RBG from their wintering grounds came in January 2013 during the International Waterfowl Count, when around 56,000 birds were counted in Bulgaria, Romania and Ukraine. This is believed to be around the current population of the species (AEWA). The greatest number of RBG in 2013 was observed in the middle of the season when geese traditionally pass through or use the territory of ISPB. Not a single collision was observed during that winter season despite the major influx of the species in a territory with many operating wind turbines. There have been no recorded collisions of RBG, nor the more abundant GWFG, in any of the other many winters monitored under the auspices of SNWF programme or the wider more recent ISPB monitoring.

At the same time, many observations across the European continent suggest a recent expansion of the species to the wintering areas further north, most likely as a result of global warming. This shift of wintering ranges has been observed in various bird taxa (Estrada *et al.*, 2016).

Spatial distribution of feeding geese in the territory of ISPB

The density of goose flocks tracked by the radar systems and confirmed visually presented in the maps below indicate that the prevalence of geese activity (flights and feeding fields) was highest in NE part of the studied territory. Our results of winter 2019-2020 support the selective behaviour of wintering here geese; i.e. in favour of fields that were near to major roosts – the lakes Durankulak and Shabla (Harrison et al. 2017). The same conclusion was found and published after eight years of wintering geese monitoring at SNWF, one of the wind farms included in ISPB (see http://www.aesgeoenergy.com/site/Studies.html)

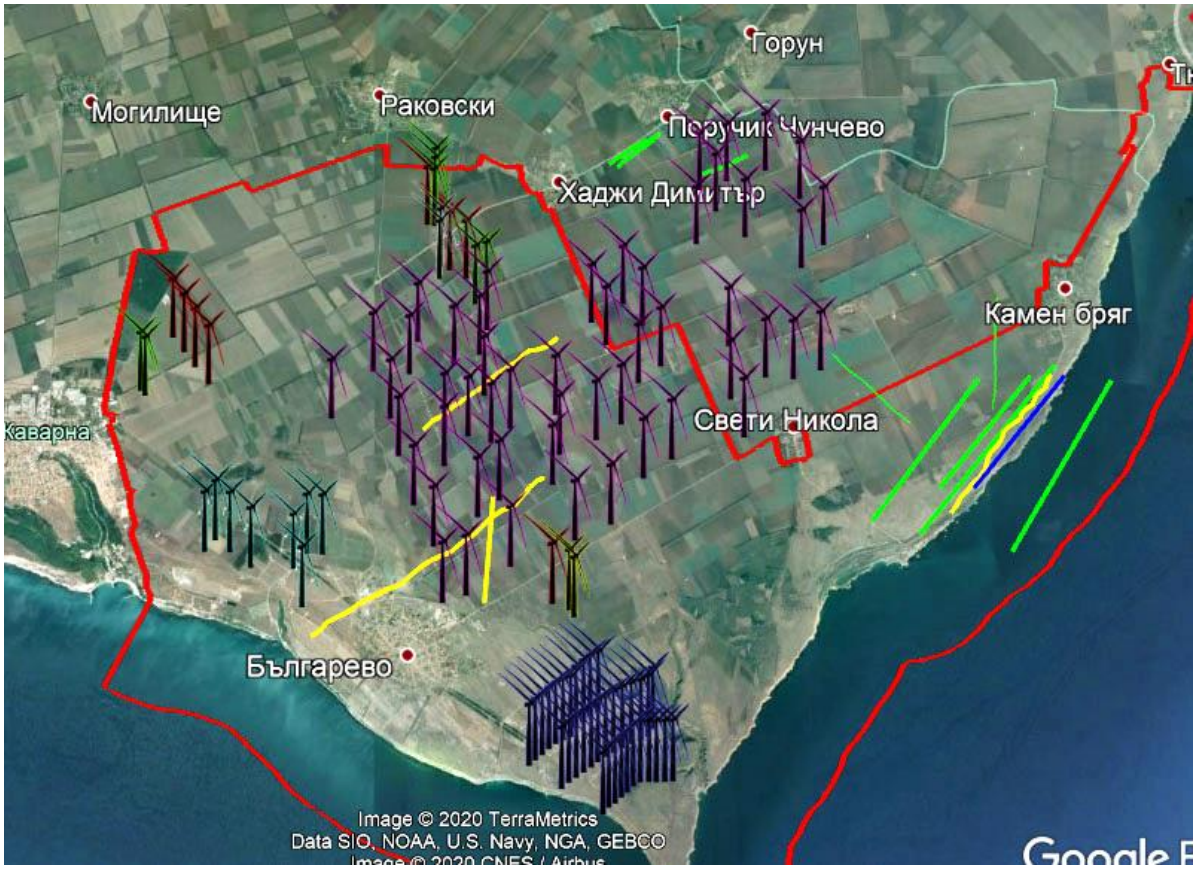

***Figure 6**. Flocks of GWFG A. albifrons (green), GG A. anser (blue) and mixed geese (yellow) observed in January 2020*

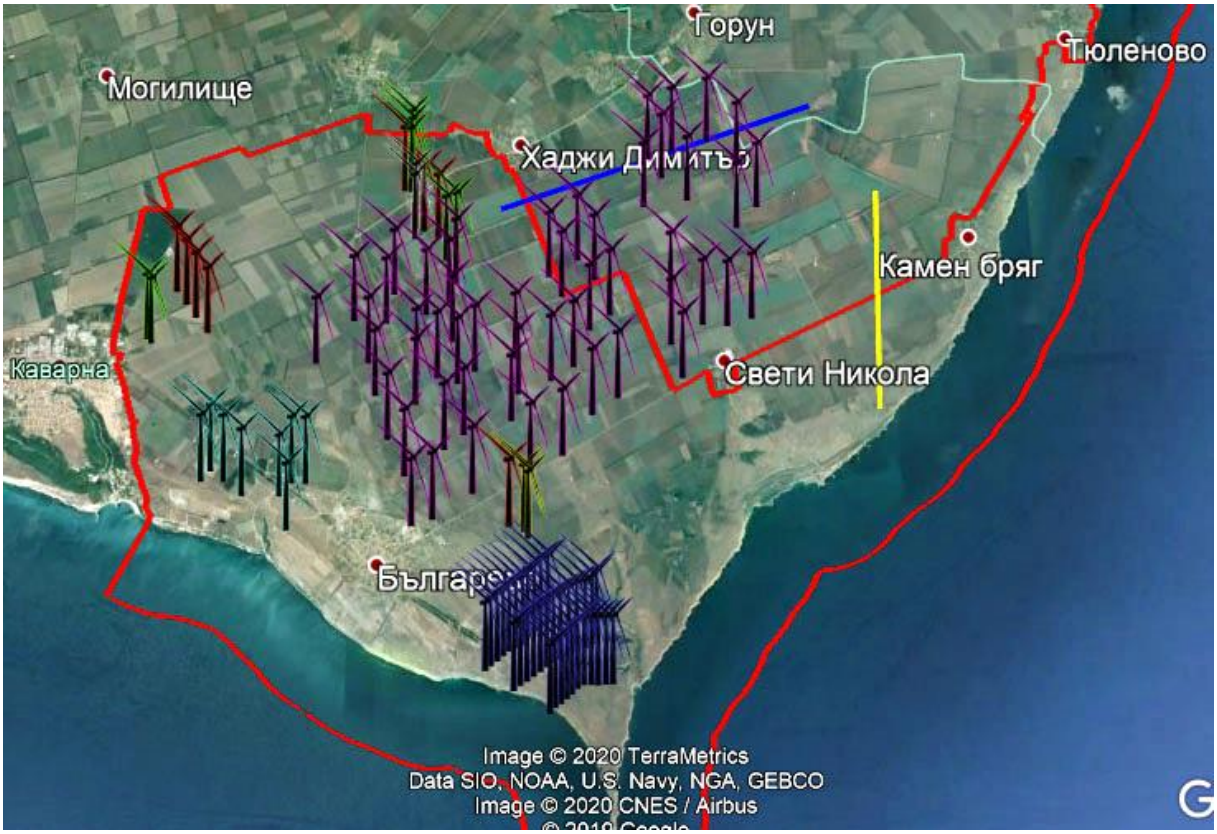

***Figure 7**. A flock of GWFG A. albifrons (blue) and C. cygnus (yellow) observed on 01 February 2020.*

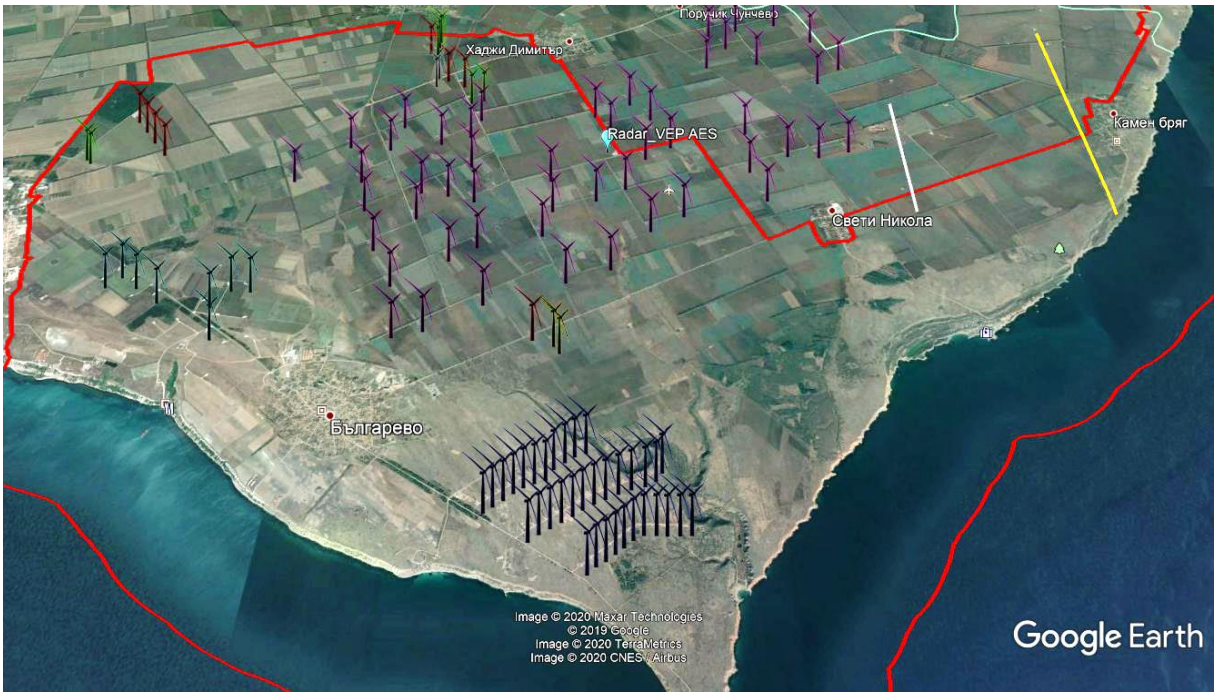

***Figure 8**. A flock of GWFG A. albifrons (white) observed on 07 February and C. cygnus (yellow) observed on 03 February 2020.*

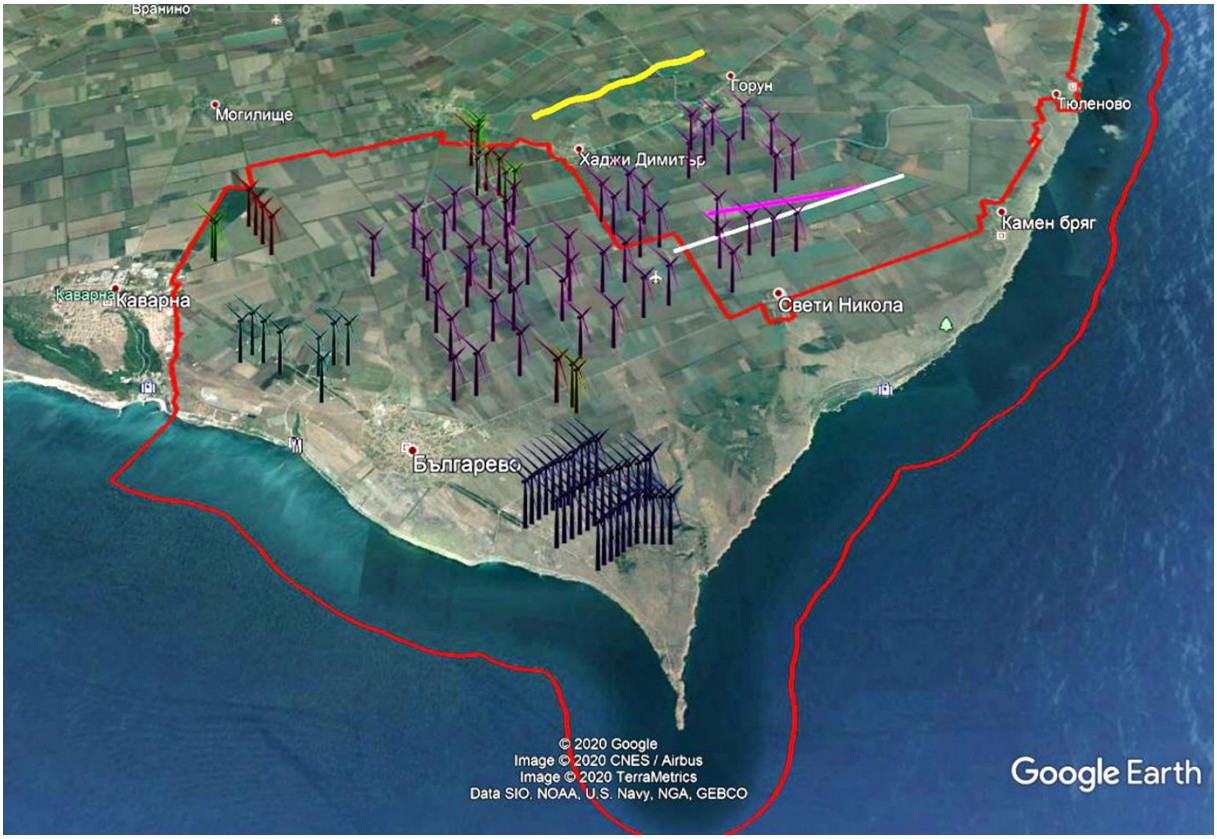

***Figure 9**. Flocks of 12 C. cygnus (white) observed on 13 February, 55 B. ruficollis (pink) observed on 12 February and 57 mixed geese (yellow) observed on 15 February 2020.*

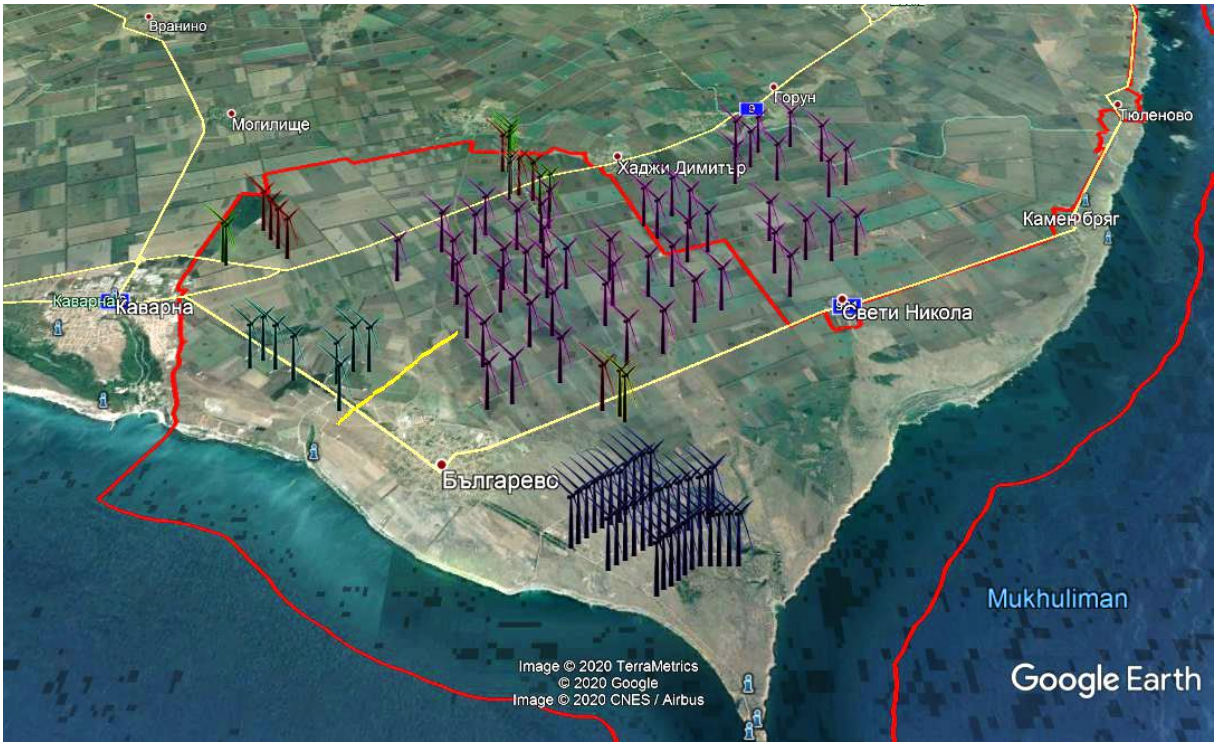

Figure 10. A flock of 12 C. Columbianus (yellow) observed on 19 February 2020.

Carcass monitoring results

All 114 turbines were searched every seventh day (if the areas under turbines were accessible) for carcasses during the whole winter survey period (01 December 2019 – 29 February 2020) when more birds were at risk of collision. The weather condition (ambient temperature, rain and snow coverage) which may have an impact on the frequency and results of the searches has been previously discussed in several winter monitoring reports available at: http://www.aesgeoenergy.com/site/Studies.html.

Searcher efficiency and carcass persistence has been examined twice during winter monitoring at the part of the ISPB territory – in February 2010 and in January 2016 (see SNWF monitoring reports). 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 period 2019-2020*

Turbine code	December	January	February	Total
ABBalgarevo	2	4	4	10
АВГ1	3	3	4	10
АВГ2	3	3	4	10
АВГ3	3	3	4	10
АВГ4	3	3	4	10
ABMillenium group	2	4	4	10
ABMillenium group Micon	2	4	4	10
AE10	2	4	4	10
AE11	2	4	4	10
AE12	2	6	4	12

Turbine code	December	January	February	Total
AE13	2	4	4	10
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

Turbine code	December	January	February	Total
AE23	2	4	4	10
AE24	3	3	5	11
AE25	3	3	5	11
AE26	2	4	4	10
AE27	2	4	4	10
AE28	2	4	4	10
AE29	3	3	5	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	4	4	10
AE37	2	5	4	11
AE38	2	4	4	10
AE39	2	4	4	10
AE40	3	3	5	11
AE41	3	3	5	11
AE42	3	3	5	11
AE43	3	3	5	11
AE44	3	3	5	11
AE45	2	4	4	10
AE46	2	5	4	11
AE47	2	5	4	11
AE48	2	5	4	11
AE49	2	5	4	11
AE50	2	4	4	10
AE51	2	5	4	11
AE52	2	5	4	11
AE53	2	5	4	11
AE54	2	5	4	11
AE55	2	5	4	11
AE56	2	5	4	11
AE57	2	5	4	11
AE58	2	5	4	11
AE59	2	5	4	11
AE60	2	4	4	10
AE8	2	4	4	10
AE9	2	4	4	10
DBГ1	3	3	4	10
DBГ1HSW250	3	3	5	11
DBГ2	3	3	4	10
DBГ2MN600	3	3	5	11
DBГ3	3	3	4	10
DBГ4	2	4	4	10
DBГ5	2	4	4	10
DC1	1	4	4	9
DC2	2	4	4	10

Turbine code	December	January	February	Total
E00	2	4	4	10
E01	3	3	5	11
E02	3	3	5	11
E04	3	3	5	11
E05	3	3	5	12
E07	3	3	5	12
E08	3	3	5	11
E09	2	4	4	10
M1	2	4	4	10
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
M15	2	4	4	10
M16	2	4	4	10
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M35	2	4	4	11
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	2	4	4	10
VP2	2	3	4	10
ABZevs	3	1	4	10
Grand Total	**251**	**466**	**472**	**1189**

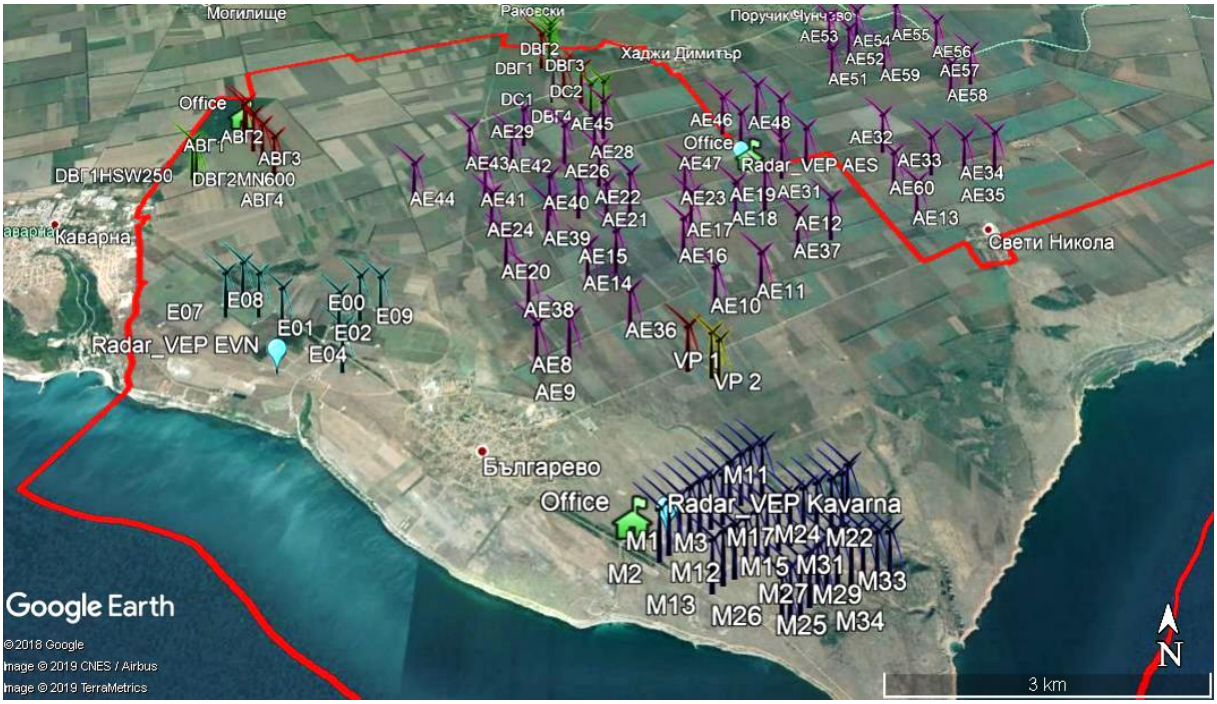

Figure 10. *Locations of turbines searched for collision victims according to thecodes given in Table 2*

Systematic searches under 114 turbines covered by ISPB (Table 2) in the 2019-2020 winter resulted in four collision victims identified as one Common starling (*Sturnus vulgaris*) found on 12 December 2019, two Grey partridges *(Perdix perdix)* found on 22 December 2019 and one Eurasian woodcock (*Scolopax rusticolla*) found on 04 March 2020.

These species are of least concern according to the IUCN criteria and are not listed in Bulgarian Red Data Book. The loss of the four birds can not be considered as a negative impact on the population level of the respective species.

No body parts or intact remains of geese considered as collision victims were detected after an accumulation of 1189 searches under 114 turbines between 01 December 2019 and 29 February 2020 (Table 2). Therefore, no evidence for the collision of any goose species, including RBG, has been found during the winter of 2019 – 2020, when geese were present in the area and turbines were operating continuously.

In the 2019-2020 winter there were no instances when the Turbine Shutdown System was deemed to be required.

4. CONCLUSIONS

A relatively mild 2019 – 2020 winter is likely the main reason for the low number of observed geese in ISPB territory.

Daily observations from December 2019 to February 2020 inclusive revealed that the recorded presence of geese in ISPB territory was compressed into a short time period within the winter, which was essentially the same as already established in studies 2008 – 2018 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. However, the number is

low due to the relatively large distance to their roosting sites at the freshwater lakes Durankulak and Shabla.

The 114 wind turbines within ISPB are not a source of collision mortality for wintering geese, even though they fly through and 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. The same result was also observed in one previous winter for the ISPB territory (2018-2019) and in nine previous winters when 52 turbines which are part of ISPB (SNWF) were operational and searched systematically every winter season.

No displacement (disturbance) reaction from geese have been observed for the period 2008 - 2020 due to the construction and operation of wind turbines in SNWF and ISPB territories. The observed numbers and their registered spatial flight and foraging distribution of all goose species does not indicate gross displacement resulting from the operational turbines or the nearby environment.

Based on research associated directly with ISPB described in the present report (and see previous ISPB winter report) the study area remains a relatively remote feeding ground for RBG as well as the more abundant GWFG. It is important to note, therefore, that the area remains relatively unimportant for both species, as indicated in the pre-construction studies and many post-construction studies at SNWF (and earlier study involving the wider ISPB). Even in some winters when geese were recorded in far greater numbers than in the 2019 – 2020 winter, no substantive adverse effects were documented. Consequently, the investigated 114 wind turbines present no material threat through preventing use of food supplies, especially compared to other agricultural practices such as crop type and field size of the preferred crop of geese. As noted in several previous reports concerning wintering geese at SNWF, hunting disturbance at key freshwater roost sites (in the coastal Dobroudzha region: Durankulak and Shabla lakes to the north of SNWF and ISPB) also would appear to present a greater threat.

5. REFERENCES

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