National Academy of Sciences of Ukraine
Ministry of Education and Science of Ukraine

Bogdan Khmelnitsky Melitopol State Teachers' Training University, Biorіznomanittia NNC, Research Institute for Biodiversity of Ukraine's Terrestrial and Water Ecosystems, Azov and Black Sea Interdepartmental Ornithological Station at I.I. Shmalgauzen Zoology Institute (the National Academy of Sciences of Ukraine) and at Bogdan Khmelnitsky MSTTU, Non-Governmental Ecological Organization "Laguna"

Expert Opinion and Scientific Report #2

Characteristic of the species composition and territorial distribution of seasonal ornithological complexes within the route of 330 kV OTL between the Wind Park Central Substation and Melitopol Substation

Under the Contract # 03л/07 - 16 of 02.08.2016

"Performance of the studies and processing of the monitoring data as regards adjustment of the expert conclusion and the scientific report on the impact of 500 MW Wind Park in Pryazovske and Melitopol Districts of Zaporizhia Region (hereinafter - the Wind Park), including the route of the 330 kV power transmission line, on seasonal ornithological complexes and migratory birds, and bats in the territory of Divnynske, Dobrivka, Dunaivka, Girsivka, Nadezhdyne Village Councils of Pryazovske District and Mordvynivka, Nove Village Sobory Melitopol Rejonowy w Zaporoże regionu "

Wyniki badań i przetwarzania danych z monitorowania w odniesieniu korektę wniosku, ekspertów oraz sprawozdanie naukowe na temat wpływu 500 MW Wiatrowej Park w Pryazovske i Melitopol Powiatów Zaporoża regionu (dalej - park wiatrowy), w tym trasa linia elektroenergetyczna 330 kV na sezonowych ornitologicznych

kompleksów i ptaków wędrownych i nietoperzy na terenie Divnynske, Dobrivka, Dunaivka, Girsivka, Nadezhdyne sołectwa z Pryazovske District i Mordvynivka, Nové sołectwa z Melitopol Powiatu w Zaporoże regionu "

Melitopol, 2016

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Bogdan Khmelnitsky Melitopol State Teachers' Training University, Bioriznomanittia NNC, Research Institute for Biodiversity of Ukraine's Terrestrial and Water Ecosystems, Azov and Black Sea Interdepartmental Ornithological Station at I.I. Shmalgauzen Zoology Institute of the National Academy of Sciences of Ukraine, Bogdan Khmelnitsky MSTTU, and Non-Governmental Ecological Organization "Laguna"

Expert Opinion

on assessment of the construction of the 330kV overhead transmission line from the Wind Park Central Substation to Melitopol Substation on the species composition and territorial distribution of the seasonal ornithological complexes within the lands of Nadezhdyne Village Council (Pryazovske District), Mordvynivka and Nove Village Councils (Melitopol District) in Zaporizhia Region

Melitopol, 2016

Approved by_____	**Approved by_____**
Rector of Bohdan Khmelnytskyi Melitopol State Teachers' Training University V.V. Molodychenko	**Chairman of the Non-Government Ecological Organization "Laguna"** **V.D. Siokhin**

Melitopol **10 December 2016**

Expert Opinion

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Customers: Vestas Ukraine LLC, Eurocape Ukraine I LLC
Contractor: Bohdan Khmelnytsky Melitopol State Teachers' Training University, Bioriznomanittia NNC, Research Institute for Biodiversity of Ukraine's Terrestrial and Water Ecosystems, Azov and Black Sea Interdepartmental Ornithological Station at I.I. Shmalgauzen Zoology Institute of the National Academy of Sciences of Ukraine, Bogdan Khmelnitsky MSTTU, and Non-Governmental Ecological Organization "Laguna"
Grounds for preparation of the Expert Opinion:

- Contract # 5л/10 – 14 of 29 October 2014 for development of the research and technical products "Performance of the studies and processing of the monitoring data as regards adjustment of the expert conclusion and the scientific report on the impact of the construction of the Wind Park sites on seasonal ornithological complexes and migratory birds, and bats in the territory of Divnynske, Dobrivka, Dunaivka, Girsivka, Nadezhdyne Village Councils of Pryazovske District and Mordvynivka, Nove Village Councils of Melitopol District in Zaporizhia Region";
- Contract # 8н/08-12 of 22 August 2012 for development of the research and technical products "Development of the Expert Opinion as regards the Possible Impact of the Three Routes of the Overhead Power Transmission Line on the Seasonal Bird Complexes in the Territory of Melitopol District of Zaporizhia Region".

(under Contract # 8н/08-12 of 22 August 2012);

- Contract # 03л/07 - 16 of 02.08.2016 "Performance of the studies and processing of the monitoring data as regards adjustment of the expert conclusion and the scientific report on the impact of 500 MW Wind Park in Pryazovske and Melitopol Districts of Zaporizhia Region (hereinafter - the Wind Park), including the route of the 330 kV power transmission line, on seasonal ornithological complexes and migratory birds, and bats in the territory of Divnynske,

Dobrivka, Dunaivka, Girsivka, Nadezhdyne Village Councils of Pryazovske District and Mordvynivka, Nove Village Councils of Melitopol District in Zaporizhia Region";

- State License of I.I. Shmalgauzen Zoology Institute at the National Academy of Sciences of Ukraine and Prescription No. 1 of the same Institute dated 15 October 1998;

- Expert Opinion and Scientific Report of 23 December 2014. (Contract #5л/10 – 14 of 29 October 2014) Regarding the adjustment of the expert conclusion and the scientific report on the impact of the construction of the Wind Park sites on seasonal ornithological complexes and migratory birds in the territory of Divnynske, Dobrivka, Dunaivka, Girsivka, Nadezhdyne Village Councils of Pryazovske District and Mordvynivka Village Council of Melitopol District in Zaporizhia Region;

- Expert Opinion of 30 August 2012. (Contract # 8н/08-12 of 22 August 2012) regarding the Possible Impact of the Three Routes of the Overhead Power Transmission Line on the Seasonal Bird Complexes in the Territory of Melitopol District of Zaporizhia Region;

- Expert Opinion and Scientific Report of 10 December 2016 (Contract # 03л/07 - 16 of 02.08.2016) on assessment of the construction of the 330kV overhead transmission line from the Wind Park Central Substation to Melitopol Substation on the species composition and territorial distribution of the seasonal ornithological complexes within the lands of Nadezhdyne Village Council (Pryazovske District), Mordvynivka and Nove Village Councils (Melitopol District) in Zaporizhia Region;

- Scientific materials, databases and GIS information on the seasonal distribution and quantity of birds from the Azov and Black Sea Interdepartmental Ornithological Station, the Research Institute for Biodiversity of Ukraine's Terrestrial and Water Ecosystems, the Non-Governmental Ecological Organization "Laguna" for the previous years.

Period of execution of works: Year 2012. (under Contract # 8н/08-12 of 22 August 2012); 2014 (under Contract # 5л/10 - 14 of 29 October 2014); 2016 (under Contract # 03л/07 – 16 of 02 August 2016); from 2015 to 2016 (under the scheduled scientific state-budgeted research programs of the scientific divisions of Bohdan Khmelnytskyi Melitopol State Teachers' Training University, scheduled research programs of the Azov and Black Sea Ornithological Station, initiative ornithological studies of the Non-Governmental Ecological Organization "Laguna").

Administrative System of the Territory:

From the administrative point of view, the project area of the 330kV overhead transmission line from the Wind Park Central Substation to Melitopol Substation, 500-meter buffer zones and adjacent territories are located within the lands of Nadezhdyne Village Council (Pryazovske District), Mordvynivka and Nove Village Councils (Melitopol District) in Zaporizhia Region.

General Expert Opinion

General Expert Opinion is based upon the following data presented and discussed in the Scientific Report:

1. Landscape and biotopic characteristic of the project territory with the schematic map of the main vegetation associations;
2. Modern characteristic of the wintering, nesting and post-nesting ornithological complexes (monitoring data on the species composition, number, locations, feeding activity, protected species);
3. Registry of the bird species protected by the national laws and international conventions and treaties;
4. Assessment of the impact of the project territory of the seasonal bird complexes under the international standards;
5. Cartographic materials with the characteristic of the seasonal migrations of birds, wintering, nesting and post-nesting ornithological complexes within the project territory, buffer zones and adjacent territories, which are developed on the basis of the expeditionary visits in AutoCAD format (A3 size).

Pursuant to the Customer-provided cartographic materials and other project documents on the planning pattern of the arrangement of the 330 kV overhead power line between the Wind Park Central Substation and Melitopol Substation, Contractor-performed research, as well as the use of scientific materials, databases and GIS data of the Azov and Black Sea Interdepartmental

Ornithological Station, the Research Institute for Biodiversity of Ukraine's Terrestrial and Water Ecosystems, the Non-Governmental Ecological Organization "Laguna" for the previous years and modern data on the seasonal distribution and number of the birds, their migrations within the project territory and buffer zones, approved without any restrictions construction of the 330 kV OTL between the Wind Park Central Substation and Melitopol Substation in the territory of Nadezhdyne Village Council of Pryazovske District and Mordvynivka and Nove Village Councils of Melitopol District in Zaporizhia Region (Figures 1.1 - 1.2 of the Scientific Report).

National Academy of Sciences of Ukraine
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Non-Governmental Ecological Organization "Laguna", Bohdan Khmelnitsky Melitopol State Teachers' Training University, Bioriznomanittia NNC, Research Institute for Biodiversity of Ukraine's Terrestrial and Water Ecosystems, Azov and Black Sea Interdepartmental Ornithological Station at I.I. Shmalgauzen Zoology Institute of the National Academy of Sciences of Ukraine, and Bohdan Khmelnitsky MSTTU

Approved by_____ Vestas Ukraine I LLC, Director O.M. Goridko	**Approved by**_____ Rector of Bohdan Khmelnytskyi Melitopol State Teachers' Training University V.V. Molodychenko
Approved by_____ Eurocape Ukraine I LLC, Director Peter O'Brien	**Approved by**_____ Chairman of the Non-Government Ecological Organization "Laguna" V.D. Siokhin

Scientific Report

on assessment of the construction of the 330kV overhead transmission line from the Wind Park Central Substation to Melitopol Substation on the species composition and territorial distribution of the seasonal ornithological complexes within the lands of Nadezhdyne Village Council (Pryazovske District), Mordvynivka and Nove Village Councils (Melitopol District) in Zaporizhia Region

Melitopol, 2016

Authors

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- **V.I. Dolynnyi**, Junior Research Fellow, Specialist in the Instrumented Bird Study Methods (Bioriznomanittia NNC, Research Institute for Biodiversity of Ukraine's Terrestrial and Water Ecosystems, NGO "Laguna")
- **O.A. Iliichov**, Lead Engineer, Specialist in the Instrumented Bird Study Methods (Research Institute for Biodiversity of Ukraine's Terrestrial and Water Ecosystems)

For development of the Expert Opinion used was data of the field studies carried out by the employees of the Azov and Black Sea Ornithological Station:

- Y.I. Chernychko, Leading Research Fellow, Correspondent Member of the Ukrainian Ecological Academy of Sciences, Doctor of Biological Science, Specialist in Ornithology and Applied Ecology (Bioriznomanittia NNC, Research Institute for Biodiversity of Ukraine's Terrestrial and Water Ecosystems, Azov and Black Sea Ornithological Station, NGO "Laguna");
- R.M. Chernychko, Candidate of Biological Science, Specialist in Ornithology (I.I. Shmalgauzen Zoology Institute of the National Academy of Sciences of Ukraine, Ecosystems, Azov and Black Sea Ornithological Station, NGO "Laguna");
- O.A. Diadicheva, Research Fellow, Specialist in Ornithology (I.I. Shmalgauzen Zoology Institute of the National Academy of Sciences of Ukraine, Ecosystems, Azov and Black Sea Ornithological Station, NGO "Laguna");
- S.V. Vynokurova, Research Fellow, Specialist in GIS Technologies (Bioriznomanittia NNC, (I.I. Shmalgauzen Zoology Institute of the National Academy of Sciences of Ukraine, Ecosystems, Azov and Black Sea Ornithological Station, NGO "Laguna").

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and biotopic complexes, number and distribution of birds in the wintering period, spring and summer migrations, nesting and post-nesting gatherings within the route of 330 kV OTL between the Wind Park Central Substation and Melitopol Substation, and in the adjacent territories in 2016

Section 1. General Project Characteristic of the 330 kV OTL Route between the Wind Park Central Substation and Melitopol Substation

The project area of construction of the 330kV overhead transmission line from the Wind Park Central Substation to Melitopol Substation is located within the lands of Nadezhdyne Village Council (Pryazovske District), Mordvynivka and Nove Village Councils (Melitopol District) in Zaporizhia Region. The project documentation for construction of the 330kV overhead transmission line from the Wind Park Central Substation to Melitopol Substation has been developed in detail and presented by the Customer for further Contractor's use for territorial assessment of the terrain, landscape and biotopical characteristic of the project area and the general characteristic of the vegetation type, habitats of the recorded birds of various seasonal complexes.

General project scheme of the 330kV overhead transmission line from the Wind Park Central Substation to Melitopol Substation is provided in Fig. 1.1, and the layout plan of the route section is provided in Figure 1.2. The 330 kV OTL layout plan for creation of the cartographic materials with respect to characterizing of the main types of vegetation, seasonal characteristic of the bird location in Autodesk AutoCAD application in given in Figure 1.3.

According to the project documents, the overhead transmission route length is 23.2 km, within which there are 110 poles (towers) and 2 portals are installed. Border width of the designed 330 kV OTL is 56.4 m.

The project documents were developed in accordance with the requirements laid down in the State Sanitary Norms and Rules of the Population Protection from the Impact of the Electromagnetic Interference, the State Standard of Ukraine, DSTU 4 11-2002.

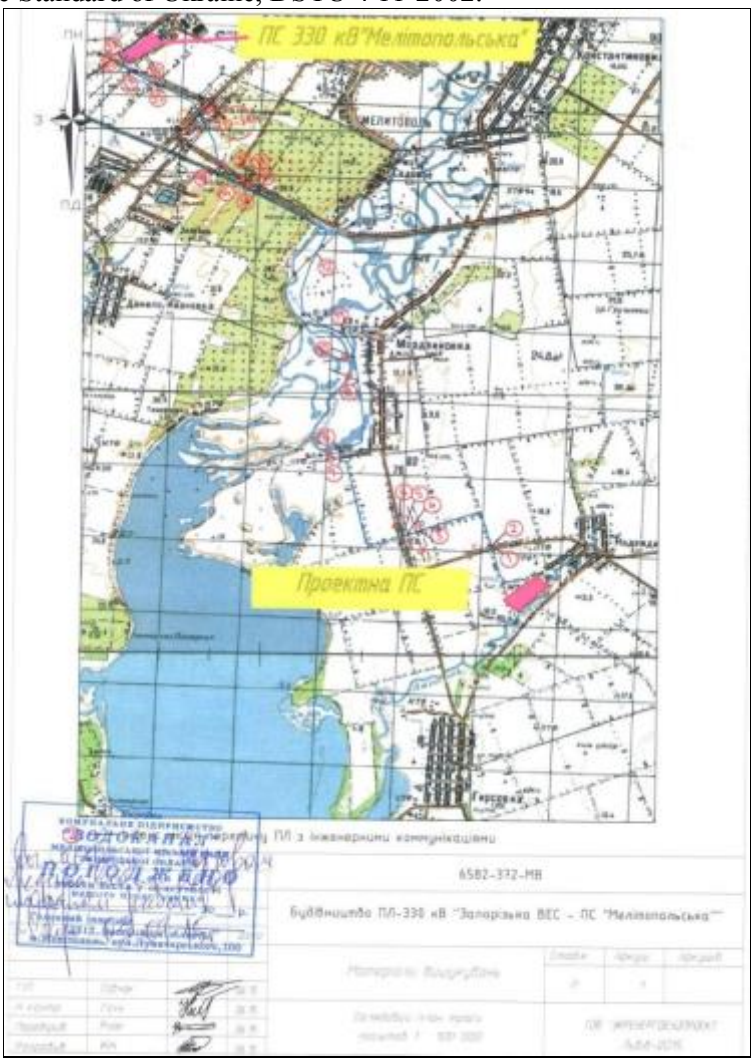
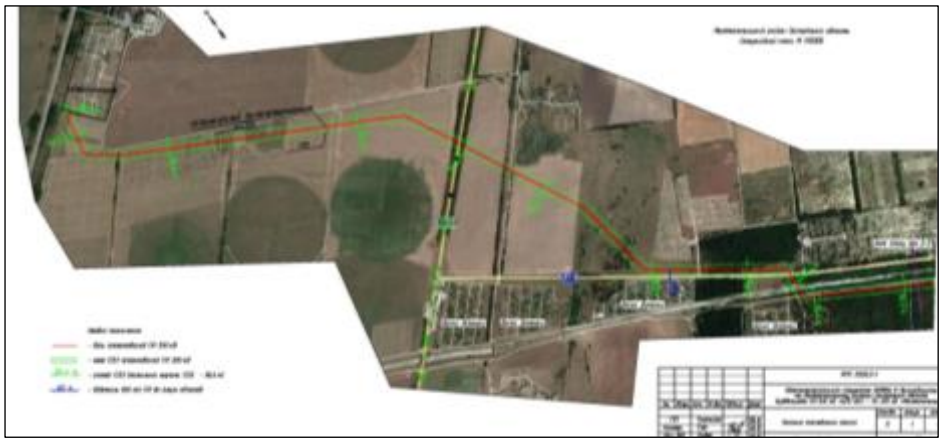


Fig. 1.1. General Project Layout Scheme of the 330 kV OTL Route between the Wind Park Central Substation and Melitopol Substation



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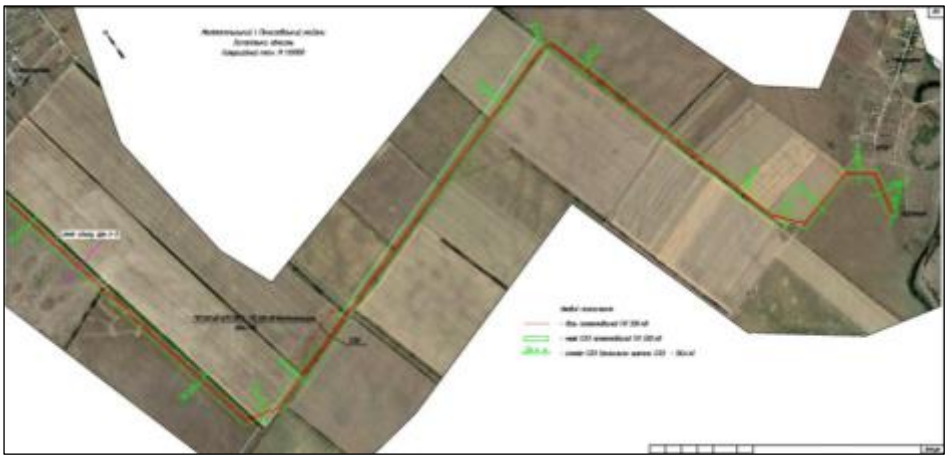


D

Fig. 1.2. Layout Plan of the Route Sections of the 330 kV OTL Route between the Wind Park Central Substation and Melitopol Substation

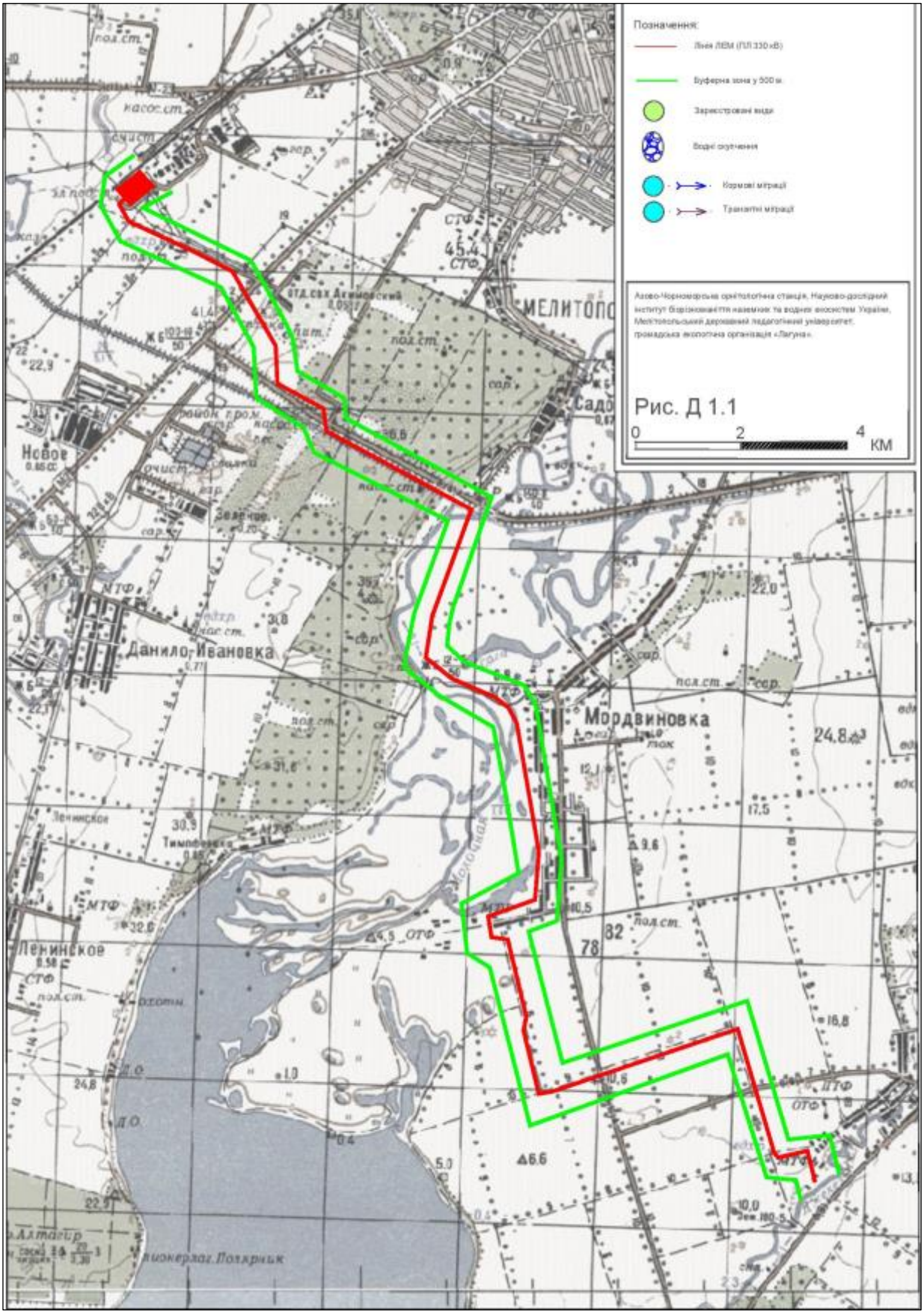


Fig. 1.3. The 330 kV OTL layout plan for creation of the cartographic materials in Autodesk AutoCAD application

Section 2. Landscape and Biotopic Characteristic of the Project Territory

2.1. Main types of landscapes and biotopes.

The project territory belongs to the Sivash-Azov Coast lowland steppe of the dry steppe landscape subzone and is subject to the law of geographical zoning. The territory has generally some of the lowest altitude marks in the steppe zone of Ukraine, the least amount of precipitation, the highest potential rate of evaporation, the least atmospheric moisture capacity and the least run-off.

The landscape structure of the territory consists of 4 areas:

- areas of fluvial terraces (the stows of fluvial terraces 1-6 above the flood plain). The left bank includes terrace 1-2 above the flood plain partially covered with agricultural lands. *Typical biotopes:* clay precipices, remnants of steppe vegetation on the slopes, man-made forest plantations, salt marshes, paddocks and pastures, old orchards;
- floodplain areas (the near-firth part of the Molochna River) with the strips of cutoff lakes and the main stream canal. There occur areas of low seaside plakors covered with agricultural lands. *Typical biotopes:* meadows, shoals, deep water in the main stream canal, thickets of rushes and wetland vegetation, cutoff lakes;
- areas of sea-coast halogenic plains with the stows of depressed loam loess plains, depressed plains with argillo-arenaceous white alkalis combined with saline white alkalis of marshes, argillo-arenaceous and uliginous saline lands. *Typical biotopes:* alkali depressions, thickets of rushes in the coastal part, shoals.
- abrasion halogenic areas (along the left bank of the estuary), which consist of gullies with gentle slopes slightly noticeable in the relief and hollows with wide saline bottoms and diluvial slopes with chestnut and chestnut-pratal dry steppe white alkalis. *Typical biotopes:* scrubs, agricultural hedgerows, stand-alone trees, and white alkalis.

Main landscape and biotopic complexes are represented by the following types (Fig. 2.1 - 2.4, Annex 2, Fig. E 1.1):

- man-made forest plantations (trees and shrubs);
- agricultural hedgerows (trees and shrubs);
- flood-plain biotopes (aquatic and uliginous vegetation);
- salt marshes (meadow and halophytic vegetation);
- farmed ecosystems (agricultural lands);
- laylands;
- urban landscapes (settlements, buildings);
- technical landscapes (waste dump).

2.2. Flora and main plant associations

In accordance with the botanical and geographical zoning, the researched territory is located within the Azov and Black Seaside Subprovince, the Black Seaside Steppe Province, Eurasian Steppe Region.

Synanthropic vegetation. The major part of the territory consists of various agrophytocenoses (agricultural fields, fallow land, pastures, etc.) covered with synanthropic spontaneous plant associations. They include four classes [8]. Here, the prevailing associations of ruderal vegetation are: *Agropyretum repentis (Felf. 1942) Gors 1966; Cardario-Agropyretum Th. Muller et Gors 1969; Convolvulo-Agropyretum repentis Felf. (1942) 1943; Lepidietum drabae Timar. 1950; Xanthietum spinosi Felf. 1942; Melilotetum albi-officinalis Siss 1950; Artemisietum absinthii Schubert et Mahn. ex Elias 1982; Polygonetum avicularis Gams 1927 em. Jehlik in Hejny et al. 1979; Bromo-Hordeetum murini (Allorge 1922) Lohm. 1950; Ambrosio artemisifoliae-Cirsietum setosi Marjushkina et V. Sl. 1985; Erigero-Lactucetum serriolae Lohm. 1950 ap. Oderd. 1957; Cirsio-Lactucetum serriolae Mucina 1978; Cynancho acuti-Convolvuletum arvensis Bagrikova 2002; Bromo-Hordeetum murini (All. 1922) Lohm. 1950; Atriplicetum tataricae Ubrizsy 1949; Plantagini-Polygonetum avicularis (Knapp. 1945) Pass. 1964.* We also registered the above plant associations near settlements, farms, various buildings, etc. (Fig. 2.5).

Fig.2.1. Hedgerows along the bypass road and 330 kV OTL route

Fig.2.2. Farmed ecosystems with the gathering of the black-headed gulls

Fig.2.3. Laylands and trees and shrubs

Fig.2.4. Technical landscape (Melitopol Substation)

The edificators of the above plant associations and the species which make their part are species with wide ecological range extended throughout large areas of natural habitats.

Fig. 2.5. Synanthropic vegetation. Prevailing plant associations of the Molochna River lower floodplain

This type of vegetation does not include any species of plants listed as protected or any rare plant associations.

Therefore, the construction and operation of the 330 kV OTL will not have any negative impact on such plant associations.

Steppe vegetation. The zonal steppe type of vegetation in the researched territory is a narrow strip of slope along the slope of the right bank of the right bank of the Molochna River and traffic routes (Fig. 2.6).

Fig. 2.6. Steppe vegetation has been preserved in narrow strips along roads

The steppe vegetation includes fescue-wheatgrass, stipa-fescue and fescue-stipa associations.

The dominants of the steppe associations are most often xerophilous cereals: crested wheatgrass (Agropyron pectinatum), Volga fescue (Festuca valesiaca), dwarf feather-grass (Stipa capillata), feather grass (S. lessingiana) and needle grass (S. ucrainica).

The following occurs most often among the perennial miscellaneous herbs of steppe associations: yarrow (Achillea leptophylla), Austrian sagebrush (Artemisia austriaca), adpressed cornflower (Centaurea adpressa), pilose crinitaria (Crinitaria villosa), sea grape (Ephedra distachya), globe thistle (Echinops ruthenicus), Seguiers spurge (Euphorbia segueriana), steppe spurge (E. stepposa), lady's bedstraw (Galium ruthenicum), forage kochia (Kochia prostrate), Jerusalem sage (Phlomis tuberose), Astracan cinquefoil (Potentilla astracanica), nodding sage (Salvia nutans), hardy salvia (S. tesquicola), leafy tansy (Tanacetum millefolium), meadow rue (Thalictrum minus), dimorphous thyme (Thymus dimorphus), purple mullein (Verbascum phoeniceum), annual strawflowers (Xeranthemum annuum), etc. The ephemeroids in the steppe plots of the researched territory include Sarmatian Bellevalia (Bellevalia sarmatica), bulbiferous gagea (Gagea bulbifera), dwarf iris (Iris pumila), Gusson ornithogalum (Ornithogalum gussonei), Schrenkii Tulip (Tulipa schrenkii), tuberiferous valerian (Valeriana tuberose), etc.

The steppe shrubs include such species as Russian peashrub (Caragana frutex), blackthorn (Prunus spinosa) and representatives of the brier (Rosa) genus.

In total, there are eight species of higher vascular plants included in various nature-conservation lists in the steppe associations of the researched region (Table 2.1).

Moreover, there are three plant associations put to the Green Data Book of Ukraine, which are found as part of the steppe sections of the studied area (Table 2.2).

Table 2.1. Protected species in the steppe associations of the researched region

Taxon name	RBU*	ERL*	BC*
Stipa capillata L.	+	-	-
Stipa lessingiana Trin. et Rupr.	+	-	-
Stipa ucrainica P. Smirn.	+	-	-
Phlomis hybrida Zelen.	-	+	-
Ferula orientalis L.	-	-	+
Caragana scythica (Kom.) Pojark.	+	+	
Calophaca wolgarica (L. fil.)DC.	+	-	-
Tulipa schrenkii Regel.	+	-	-

*** - RBU** – Red Book of Ukraine; **ERL** – European Red List **BC** - Bern Convention.

Table 2.2. Steppe plant associations included to the Green Book of Ukraine, which are found in the studied area

Item #	English name	Scientific name
1	Feather grass formation	*Stipeta lessengianae*
2	Needle grass formation	*Stipeta ucrainicae*
3	Dwarf feather grass formation	*Stipeta capillatae*

Steppe vegetation does not refer to the 330 kV OTL site construction project. But areas of the steppe vegatation must be preserved during construction and operation of the 330 kV OTL. Generally, the forecast is the 330 kV OTL construction and operation cannot negatively affect the steppe association of the nature protection lists.

Meadow vegetation Meadow vegetation is located in the low plots of the flood plains and former riverbeds in the contact zones of steppes with halophytic vegetation. The typical dominants of such complexes are Elytrigia elongata, Elytrigia repens and Elytrigia preudocaesia and the co-dominants are creeping meadow foxtail (Alopecurus arundinaceus) and others. Chee reedgrass (Calamagrostis epigeos), meadow brome (Bromopsis riparia), Poa angustifolia and others can also be very often observed in these associations. As of the time of observation, the meadow phytocenoses are very degraded plant associations. As a result of great grazing pressure, the gramineous basis is almost absent and its place is taken by annual species with wide ecological range not eaten by cattle. There was very often observed land trampled by cattle.

As a whole, operation of the PTL cannot have a negative impact on the meadow associations.

Generally, the forecast is the 330 kV OTL construction and operation cannot negatively affect the meadow associations.

Halophytic vegetation It occurs on saline soils confined to the low plots of the upper reaches of the Molochnyi Estuary. Most extended species here are: marsh samphire (Salicornia europaea L.), herbaceous seepweed (Suaeda prostrata Pall.), opposite leafed saltwort (Salsola soda L.), verrucous halimione

(Halimione verrucifera (Bieb.) Aell.), stalked halimione (Halimione pedunculata (L.) Aell.), Ausher's saltbrush (Atriplex aucheri Moq.), Meyer's marsh-beet (Limonium meyeri (Boiss.) O. Kuntze), etc.

The halophilic vegetation does not usually have high projective cover here and has a relatively poor species composition. Plant associations with a pronounced role of one species accompanied by several others are common here.

Fig. 2.7. Meyer's marsh-beet *(Limonium meyeri)* – is a typical representative of halophytic vegetation.

Associations of succulent species are generated in a form of narrow belt around the periphery on wet loamy salines and on depressed plots of the coast.

Along the edge of the central part of the depression near the Village of Mordvynivka, associations of marsh samphire are generated accompanied by seepweed, common sea aster (Tripolium vulgare Nees), dwarf mud-grass (Aeluropus littoralis (Gouan) Parl.), verrucous halimione, opposite-leaf petrosimonia (Petrosimonia oppositifolia (Pall.) Litv.) and others.

Towards the periphery of the depression, wet salt marshes are replaced with vif solonchaks, on which the second narrow belt is generated of torose sarzasan (Halocnemum strobilaceum (Pall.) Bieb.) followed by the third belt of Caspian (Limonium caspium (Willd.) Gams.) and Meyer's marsh-beets (Fig.2.7).

No plant associations referred to the Green Book of Ukraine are represented in the area's halophytic vegetation.

Generally, the 330 kV OTL construction and operation cannot negatively affect this vegetation type.

Aquatic vegetation This type of vegetation is confined to the Molochna River and the upper reaches of the Molochnyi Estuary. Due to high salinity of the surface waters, the flora and vegetation is quite poor and in some small landlocked salt embayments (girts) it is actually absent because of high saltiness of water and regular drying up in summer.

Aquatic vegetation. This group includes plant associations growing in water mass or on the surface of water level. The following species are common plants which create stable plant associations:

- fennel-leaved pondweed (Potamogeton pectinatus L.);
- star duckweed (Lemna triscula L.);
- morass-weed (Ceratophyllum demersum L.).

Aquatic and uliginous vegetation. This group includes edaphophytes which have their rootage and the lower part of their stalk in water and the upper part with leaves and generative part above water.

Common reed (Phragmites australis (Cav.) Trin. ex Steud.) is the main dominant here (Fig. 2.8). It is the prevailing plant that creates monodominant thickets in lakes and long the Molochna river banks. Narrowleaf cattail (Typha angustifolia L.) occurs much less often in the reed associations.

Fig. 2.8. Common reed (Phragmites australis (Cav.) is the main dominant of the aquatic and uliginous vegetation

The vegetation becomes uliginous in landlocked damp depressions. Here we can observe such species as saltmarsh bulrush (Bolboschoenus maritimus), flowering rush (Butomus umbellatus), onescale spikerush (Eleocharis uniglumus), sofstem bulrush (Schoenoplectus tabernaemontani) and others.

Aquatic and uliginous vegetation is an important component of the region's wetlands. Therefore, the plots of aquatic and uliginous vegetation have to be preserved during the 330 kV OTL construction and operation.

Trees and shrubs No natural arboreal vegetation is present in the territory of the researched region. Arboreal species only occur as man-made plantations (agricultural hedgerows) on agricultural lands and along roads and in a form of small standing forests (Fig. 2.9).

Fig. 2.9. Trees and shrubs are represented by plantations of black locust *(Robinia pseudoacacia L.)* and Russian (Persian) olive (*Elaeagnus angustifolia)*.

Black locust (Robinia pseudoacacia L.) occurs most often as part of man-made tree plantations. In addition to the above species, the man-made tree plantations include maple ash (Acer negundo L.) and Tatarian maple (A. tataricum L.). Average age of the plantations is 40-50 years. There are virtually no younger plantations. Large portion of the plantations is in extremely poor state. As a result of cutting down, fires and drying up, actually all of them have transferred to a shrubwood state, with low quality of locality and productivity. Shrub species are significantly more numerous. Here we can observe Russian peashrub (Caragana frutex), specients of small-flowered black hawthorn (Crataegus pentagyna), black elderberry (Sambucus nigra L.) and brier (Rosa).

Individual specimens of Russian olive (Elaeagnus angustifolia) occur along the coast of the Molochnyi Estuary and along the Molochna River.

This type of vegetation does not include any protected species or any plant associations from the Green Book of Ukraine. It is also necessary to highligh the extremely important role of this vegetation type for the region. It serves for protection of the arable lands from air erosion, moisture retention during the winter period, as well as plays environment and landscape forming role. Forest stands are also valuable biotope for nesting, feeding and wintering of a great number of birds.

Due to this point, it is important to pose as little influence on these biotopes during the 330 kV OTL construction as possible. It is also advisable to provide for compensatory measures in case of damage to tree plantations (planting of new trees).

2.3. Natural reserve areas

Pursuant the national laws, ares of the natural reserve fund (NRF) are divided to high level NRF areas (natural reserves and national parks) and low level NRF areas (nationwide and local wildlife preserves).

There are no high level NRF areas (natural reserves and national parks) within the 330 kV OTL route and adjacent (up to 500 m wide) territories.

Low level NRF areas (local wildlife preserves) are also absent within the 330 kV OTL route. At the previous phases of the 330 kV OTL the project documentation on the route of construction of the 330 kV OTL from the Wind Park Central Substation to Melitopol Substation was agreed with the Department of Ecology and Natural Resources of Zaporizhia Regional State Administration.

In the territories adjacent to the Wind Park sites there is only one NRF area - Molochnny Estuary Wetland of International Importance - which is a part of the Azov National Natural Park. The Molochnyi Estuary is also a part of IBA territories as important seasonal habitats for waterbirds.

The Molochny Estuary Wetland of International Importance is a key element in the overall structure of ecological network at the regional and Pan-European levels. This territory is included in the Azov and Black-Sea Environmental Corridor, which runs from the Danube in the west to the Don in the east along the coasts of the Black and Azov Seas and covers the seaside parts of Odessa, Mykolayiv, Kherson, Zaporizhia and Donetsk Regions. The most intensive flyway of birds in the Eastern Europe within the African-Eurasian Migration Region runs along this corridor. The Molochny Estuary is connected with the Sivash by general passages. If taken together with the Sivash, the importance of this territory for birds exceeds that of the common Danube Delta (Ukraine and Romania) together with the water bodies of the Bulgarian seaside. But the main territories of the environmental corridor are represented by water biotopes of the Azov and Black Sea coasts.

The uplands and agrocenoses around the estuary are not environmentally significant on their own but their supply of migratory birds with food resources is integral to the overall value of the territory. The agricultural hedgerows and forest plantations are the territories for nesting of small falcon species, long-legged buzzards, etc.

In addition to high level NRF territories there are local importance wildlife preserves on the adjacent territories (Table 2.3).

Table 2.3. List of local importance wildlife preserves located on the territories adjacent to the 330 kv OTL route

Object name	Type	Area, ha	Location
Virgin land	Botanic	332.6	Melitopol district, near the Molochna river course behind Mordvynivka Village
Virgin land	Botanic	10.0	Melitopol district, near Mordvynivka Village
Virgin land	Botanic	502.0	Melitopol district, Molochna River flood plain, near Mordvynivka Village

Therefore, 330 kV OTL route does not fall within the natural reserve fund lands and has no impact on biodiversity of this category, to include the NRF territories on adjacent lands. This is confirmed by the following.

1. The 330 kV OTL route is located primarily on anthropogenic landscape complexes (agricultural hedgerows and agricultural lands, man-made forest plantations) and partially on areas with natural vegetation (flood plain of the Molochna River) - Section 1, Fig.1.1-1.5.

2. Distance from the 330 kV OTL route to the NRF territories is safe for natural components.

3. In the Molochny Estuary Wetland about 95% of the birds population belong to semi-aquatic group, and their seasonal distribution is practically connected to the water territories, therefore this facility (330 kV OTL) will have minimum impact on the birds as only insignificant number of them visits these territories (Section 3 of the Scientific Report).

4. Most transit and feeding migrations within the project territory are characterized by safe altitudes of the birds passage (Section 3 of the Scientific Report).

5. Local importance wildlife preserves located on the territories adjacent to the 330 kv OTL route are all - without any exclusion - botanical. Technological infrastructure of the 330 kV OTL route at construction and operation is located outside the NRF territories.

Section 3. General assessment of the ornithological situation in the studied region

3.1. Methods of the ornithological survey of the area

Studies of the ornithological situation within the 330 kV OTL route were conducted in all seasons of 2016.

Fig. 3.1. GPS-track (▶▶▶) of the classic route of the study of the ornithological situation within the 330kV OTL route (⌐¬) in 2016

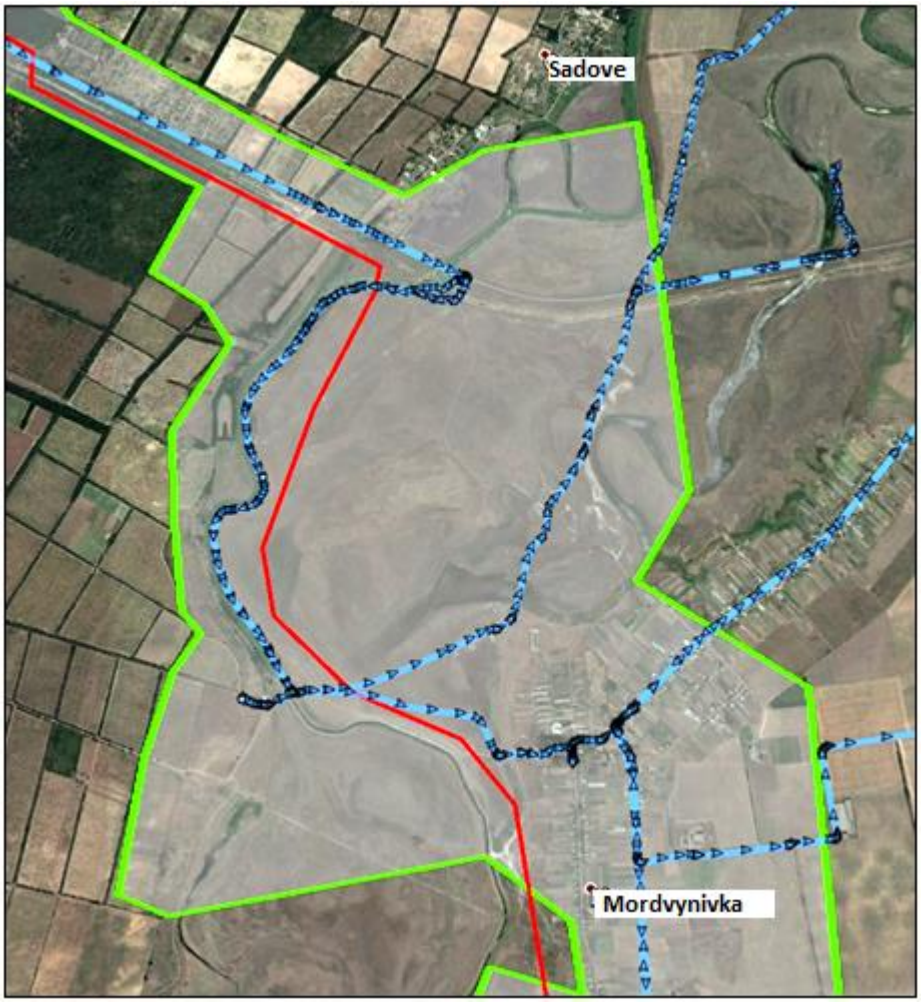
Pedestrian and car-aided methods of the birds recording were used. Area covered by the bird censuses was equal to at least 900% of the designed 330 kV OTL territory, its buffer zones and adjacent territories (Fig. 3.1-3.4). On the wetlands, census was performed within the borders of specially allocated areas on pedestrian and vehicle routes along water basins with stops in locations from which there was a good view of the open water and their inspection through telescopes. Spot censuses, each with duration of 10 to 30 minutes, were performed on the adjacent territories and in the center of the designed 330 kV OTL sections (Fig. 3.5).

Inspections were performed by means of Etherna and Bushnell (10x) binoculars and VIXEN Geoma (20-60x80) telescope. European Bird Guide (Collins Bird Guide / Second edition, 2009) was used to identify species attribution, gender, age of the birds, as well as characteristics of winter and transition plumages. Mapping of the bird gathering locations, as well as spatial characteristic of our movements, were performed by means of GARMIN GPSMAP 78s navigator.

Line dimensions between the objects and passage altitude of the bird flocks were measured by means of a NICON Forestry 550 laser altitude finder. Meteorological data in January 2016 was recorded by a compact LeCrosse 1700 weather station. Photographing of the biotopes and birds was performed by means of Nicon D80 and Canon EOS 450D cameras with compulsory attachment of EXIF metadata to each frame (date, coordinates, shooting conditions). Statistical processing of the obtained data was performed in Microsoft Excel 2007 and Statistica Release 7 applications.

GPS-track; census territory; 330kV OTL (plan)

Fig. 3.2. 330 kV overhead transmission line. Segment A "Nove-Sadove"



GPS-track; census territory; 330kV OTL (plan)

Fig. 3.3. 330 kV overhead transmission line. Segment B "Sadove-Mordvynivka"

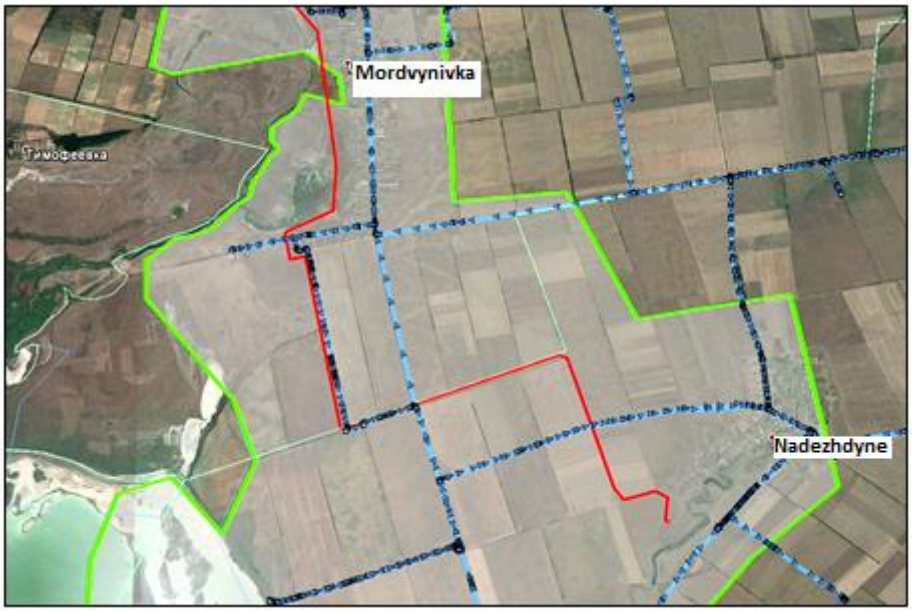


Fig. 3.4. 330 kV overhead transmission line. Segment C "Mordvynivka-Nadezhdyne"

Fig. 3.5. Observation of the whooper swan (*Cygnus cygnus)* gathering in winter of 2016

3.2. Assessment of the ornithological situation in the winter period

Weather and climate characteristics of the studied area display the picture of unstable conditions, which attributes include a big range of daily ambient temperatures, average daily positive temperatures in the second decade of January, absence of the long-lasting snow cover, and ice-free - during almost entire December - water of the Sea of Azov and adjacent estuaries (Molochnyi, Utlyukskyi, Tubalskyi), and ice-covered water after frosts of the first decade of January. At the time of studies ambient temperatures were positive, and wind was western. Main weather indicators are shown in Fig. 3.6.

Generally, the picture of weather conditions of January-February 2016 is quite sharply different from those of the previous year, when at relatively warm January 2015 (positive average daily temperatures were recorded starting from the 10th day of the month), in February the temperature went down and didn't exceed 0°C for a long time, what affected the course of bird passage across the studied area.

In 2016 cold weather of the 3rd decade of January gave way to the temperature rise starting from 27th January, when ambient temperatures in the night went up from -7...-13°C to +1...+5°C. At such

temperatures waters of the Sea of Azov and the Molochnyi Estuary gradually started to release from the ice.

Within the borders of the designed 330 kV OTL territory the fodder base on the agricultural fields was exhausted at that time, so many birds, especially of the synanthropic group, stayed near settlements. First of all, these are passerines (*Passeriformes*): rook (*Corvus frugilegus*), European starling (*Sturnus vulgaris*), hooked crow (*Corvus cornix*), European magpie (*Pica pica*), Eurasian tree sparrow (*Passer montanus*).

Throughout the entire February average daily temperatures remained positive, even at night they didn't go under -3°C. At this time birds started to more actively travel around the territory searching for food, but the water was still partially ice-covered.

There were no negative effects of the weather conditions at the time of ornithological observations. Wind - western, 2 m/s. No precipitations were encountered during the censuses. Cloud amount - from 0 to 25%.

Peculiarities of the weather and climate conditions of the studied territory are given in Fig. 3.6.

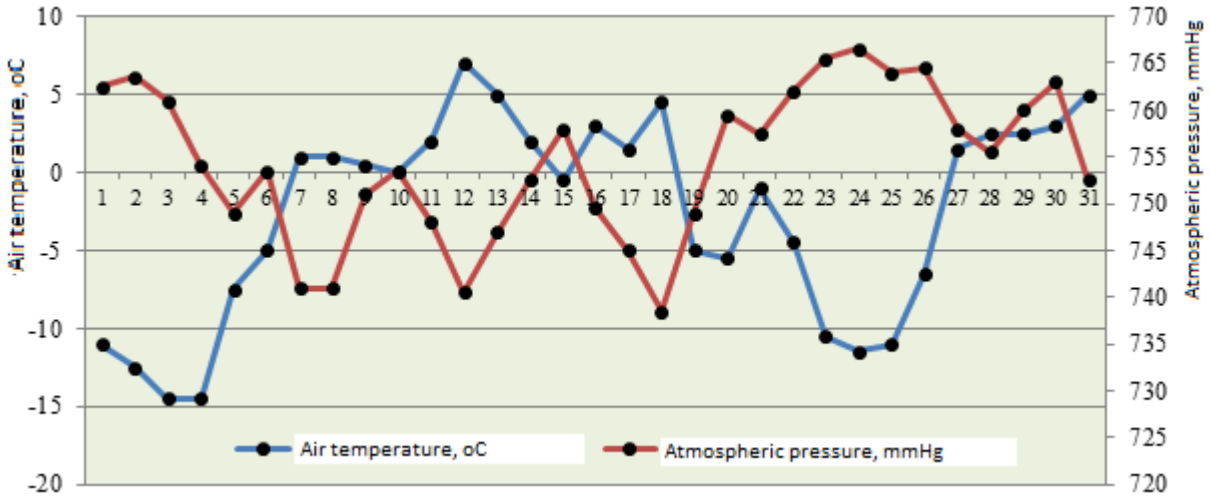


Fig. 3.6. Weather and climate characteristic of January 2016 in Mordvynivka Village

Totally, upon results of the ornithological studies carried out on 30 January 2016, there were 19 bird species with the total number of 642 specimens recorded within the 330 kV OTL, buffer zones and adjacent territories. Species composition of birds, their number and spreading in the studied region are shown in Table 3.1 in Fig. 1 (tables 1.2-1.2.1 and the AutoCAD sketch map, Fig. D 1.2).

Table 3.1. Characteristic of the species diversity of birds within the 330 kV OTL, buffer zones and adjacent territories in January 2016

ITEM #	Species	OTL 330 kV	Buffer zones	Adjacent territories	Total
1	Whooper swan (*Cygnus cygnus*)			7	7
2	Mallard *(Anas platyrhynchos)*			51	**51**
3	Greater scaup (*Aythya marila*)			20	20
4	White-tailed eagle (*Haliaeetus albicilla*)			1	**1**
5	Black-headed gulls (*Larus ridibundus*)			25	**25**
6	Yellow-legged gull (*L. cachinnans*)		7	7	14
7	Common gull (*Larus canus*)		50	96	**146**
8	Eurasian collared dove (*Streptopelia decaocto*)		7	5	**12**
9	Syrian woodpecker (*Dendrocopos syriacus*)	1			**1**
10	Skylark (*Alauda arvensis*)			47	**47**
11	European starling (*Sturnus vulgaris*)	30			**30**
12	European magpie (*Pica pica*)		1	3	4
13	Rook (*Corvus frugilegus*)		25	196	**221**
14	Hooked crow (*Corvus cornix)*			5	5

15	Common raven (*Corvus corax*)				1	**1**
16	Common blackbird (*Turdus merula)*				5	5
17	Great tit (*Parus major*)		5			5
18	Eurasian tree sparrow (*Passer montanus*)			14	8	**22**
19	Chaffinch (*Fringilla coelebs*)				25	**25**
	Total	**species**	**3**	6	**16**	19
		birds	**36**	**104**	**502**	**642**

All recorded birds belonged to 6 taxonomic ranges - *anseriformes*, *falconiformes*, *charadriiformes*, *columbiformes*, *piciformes* and *passeriformes* (Table 3.2, Fig.3.8). The prevailing birds were representatives of the passeriformes with the total number of 365 specimens, subdominant were charadriiformes - 3 species with the number of 185 specimens, and anseriformes - 3 species with the number of 78 specimens. Most numerous taxons, in terms of the species, in addition to the passeriformes, were also charadriiformes and anseriformes. More detailed analysis of the territorial birds distribution showed ambiguousness in the dominance of particular taxons. For example, immediately within the 330 kV OTL route there were observed representatives of only 2 taxons (paciformes and passeriformes), though there were only 36 specimens recorded (5.6%). Buffer zones attracted charadriiformes (black-headed gull and common gull), columbiformes (Eurasian collared dove) and passeriformes (104 specimens or 16.2% were recorded there in total), and on the adjancent territories 502 specimens of 5 taxa (78.2%) were observed - only piciformes were missing.

Such pattern structure is explained by the presence of relevant biotopes which are chosen by a certain group of birds. So, for charadriiformes and anseriformes attractive are mostly adjacent territories where there is a fodder base sufficient for them, by contrast with the territory of the designed 330 kV OTL.

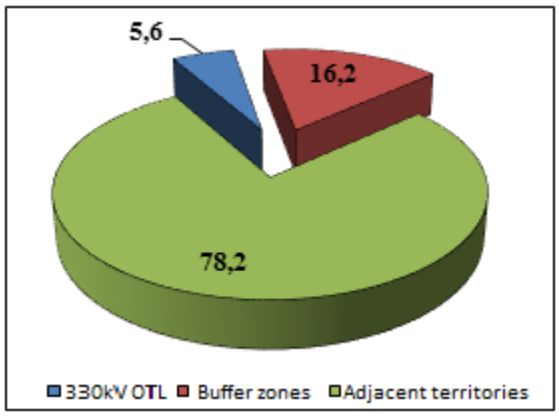


Fig. 3.7. Characteristic of the birds stay within the 330 kV OTL, buffer zones and adjacent territories in January 2016 (numbers in %)

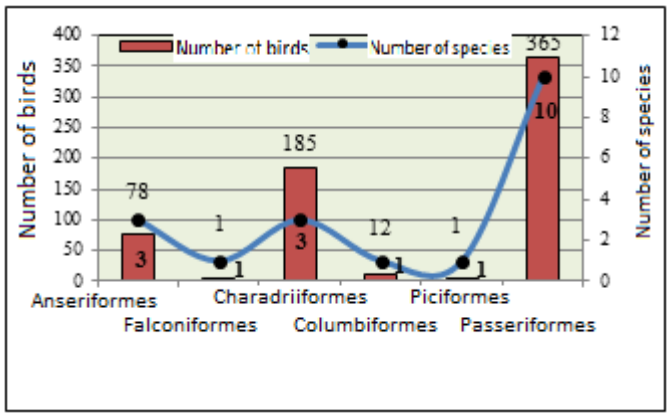


Fig. 3.8. Species representation of the bird taxa registered in winter 2016 within the 330 kV OTL, buffer zones and adjacent territories

Table 3.2. Taxonomic characteristic of the wintering birds complex within the 330 kV OTL, buffer zones and adjacent territories in January 2016

Range	OTL 330 kV		Buffer zones		Adjacent territories		Σ	
	species	specimens	species	specimens	species	specimens	species	specimens
Anseriformes	-	-	-	-	3	78	**3**	**78**
Falconiformes	-	-	-	-	1	1	**1**	**1**
Charadriiformes	-	-	2	57	3	128	**3**	**185**
Columbiformes	-	-	1	7	1	5	**1**	**12**
Piciformes	1	1	-	-	-	-	**1**	**1**
Passeriformes	2	35	3	40	8	290	10	**365**
Total	**3**	**36**	6	**104**	**16**	**502**	19	**642**

Biotopic distribution of birds

Species diversity of birds and their number to a certain extent depend from the number of separated biotopes. In the studied region we found the following landscape and biotopic units: farmed ecosystems (agricultural lands), meadow and pseudosteppe vegetation areas (Mordvynivka hollow), hedgerows and man-made forest plantations and man-made landscape (solid municipal waste range and electric power substation). Each of the biotopes is the habitat for a certain group of birds. For example, birds of agricultural lands, waterfowl, synanthropic species (those in the settlements). Therefore, species diversity of birds depends from the area of each of the biotopes. The research territory is divided by us into farmed ecosystems, hollow, hedgerows and man-made landscapes. Characteristics of the wintering birds stay with breakdown by biotopes are given in Table 3.3.

The research revealed that most visited in the winter period were farmed ecosystems: there were 422 specimens (65.6%) observed, 114 specimens (17.8%) stayed in hedgerows and man-made forests, and Mordvynivka hollow attracted 61 specimens (9.5%). During the censuses we also studied man-made landscape areas (solid municipal waste range on the lands of Nove Village Council and 330kV Melitopol Electric Power Substation) where met 45 specimens (7.1%).

Table 3.3. Biotopic distribution of the wintering birds within the 330 kV OTL, buffer zones and adjacent territories in January 2016

Zones / Habitat		Habitats of birds				∑	
		farmed ecosys.	hollow	hedgerows	man-made	abs.	%
330 kV OTL		8	1	20	7	**36**	**5.6**
Buffer zones		21	22	50	11	**104**	**16.2**
Adjacent territories		393	38	44	27	**502**	**78.2**
Total	**abs.**	**422**	**61**	**114**	**45**	**642**	**100**
	%	**65.6**	**9.5**	**17.8**	**7.1**	**100**	

Passage directions

Among directions of the feeding migrations of the wintering birds prevailing is north-eastern one (Table 3.4, Fig. 3.9). 75 specimens flew in this direction (39.5% of the total number of the migrants). These were mainly gulls. There was also a certain share of birds which flew south-westerly (20.5%) and easterly (17.4%) (these were mainly waterfowl), birds passage in other directions wasn't numerous (Table 3.4).

Such directions of migration is typical and explained by the vector of the Molochnyi Estuary shoreline, weather conditions, and by feeding migratory passages of the passeriformes.

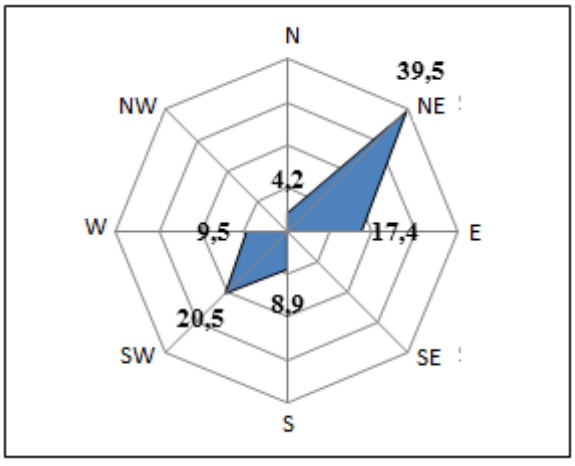


Fig. 3.9. Directions of the feeding migrations of the wintering birds within the 330 kV OTL, buffer zones and adjacent territories in January 2016

Table 3.4. Directions of the feeding migrations of the wintering birds within the 330 kV OTL, buffer zones and adjacent territories

Direction	∑	
	abs.	%
N	8	4.2
NE	75	39.5
E	33	17.4
SE	-	-
S	17	8.9
SW	39	20.5
W	18	9.5
NW	-	-
Total	**190**	**100**

Characteristics of altitude intervals of the birds passage

The majority of the registered birds (642 sp., 100% of the total number of birds) which were recorded in the territory of the designed 330 kV OTL, within buffer zones and adjacent territories were observed either on the ground (452 sp.) or in the flight at the height of up to 50 m (190 sp.) (Fig.3.10).

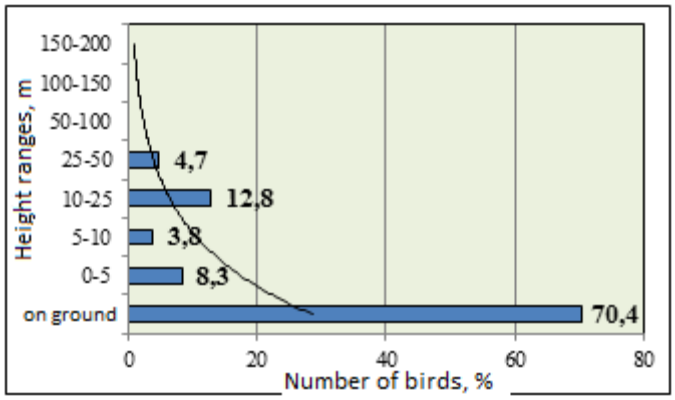


Fig. 3.10. Characteristic of the passage heights of the wintering birds within the 330 kV OTL, buffer zones and adjacent territories in January 2016 (numbers in %)

So, 452 specimens (70.4%) were registered directly on the ground, 53 sp. (8.3%) - at the height of up to 5 m, 25 sp. (3.8%) - at the height of 5 to 10 m, 82 sp. (12.8%) - at the height of 10 to 25 m, 30 specimens (4.7%) - at the height of 25 to 50 m; no birds were registered at greater heights.

Such data is expected, and the nature of birds distribution by passage heights is traditional for the winter period, when birds carry out only feeding migrations in searches for food.

3.2.1. Distribution of the wintering birds by nature protection lists

Among the species listed in the Red Book of Ukraine (2009) only white-tailed eagle (Haliaeetus albicilla) was registered during the January 2016 censuses - 1 specimen on the adjacent territories. Total number of rare birds doesn't exceed 0.2% of the total number of the registered birds (Table 3.5).

Table 3.5. Birds species from the Red Book of Ukraine upon results of January 2016 winter censuses

Item #	Species	330 kV OTL	Buffer zones	Adjacent territories	Σ
1	White-tailed eagle (*Haliaeetus albicilla*)	-	-	1	**1**
	Total number of birds from the Red Book of Ukraine	-	-	1	**1**
	Total birds within the site	**36**	**104**	**502**	**642**
	% of the total number	**-**	**-**	**0.2**	**0.2**

In addition to identification of the ornithological fauna representatives, their number and distribution within the research territory, they were rated according to the international protection lists: Red Book of Ukraine, list of the International Union for Conservation of Nature (IUCN), European Red List, Bonn and Bern Conventions, and the Washington Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (table 3.6).

Table 3.6. Distribution of the winter ornithological fauna by nature protection lists

Item #	English name	Scientific name	Status	ERL	RDB	IUCN	BERN	BONN	CITES
1	Whooper swan	*Cygnus cygnus*	m, w				2	1.2	
2	Mallard	*Anas platyrhynchos*	m, w, n				3	1.2	
3	Greater scaup	*Aythya marila*	m, w	EN			3	1,2	
4	White-tailed eagle	*Haliaeetus albicilla*	m, w, n		RAR	LC	2	1,2	1
5	Black-headed gull	*Larus ridibundus*	m, w, n				3		
6	Yellow-legged gull	*Larus cachinnans*	m, w, n						
7	Common gull	*Larus canus*	m, w				3		
8	Eurasian collared dove	*Streptopelia decaocto*	m, w, n				3		
9	Syrian woodpecker	*Dendrocopos syriacus*	m, n				2		
10	Skylark	*Alauda arvensis*	m, w, n				3		

Item #	English name	Scientific name	Status	ERL	RDB	IUCN	BERN	BONN	CITES
11	European starling	*Sturnus vulgaris*	m, w, n				2		
12	European magpie	*Pica pica*	m, w, n				2		
13	Rook	*Corvus frugilegus*	m, w, n				2		
14	Hooded crow	*Corvus cornix*	m, w, n				2		
15	Common raven	*Corvus corax*	m, w, n				3		
16	Common blackbird	*Turdus merula*	m, w, n				3	2	
17	Great tit	*Parus major*	m, w, n				2		
18	Eurasian tree sparrow	*Passer montanus*	m, w, n				3		
19	Chaffinch	*Fringilla coelebs*	m, w, n				3		

Notes: **Status**: m – species found during seasonal migrations; w - species found in the winter period; n - species found in the nesting period.

RBU - protected by the Red Book of Ukraine: **EN -** endangered; **VU** - vulnerable; **RAR** - rare; **PL -** priceless.

IUCN - conservation status of the International Union for Conservation of Nature: **EN** – endangered; **NT** – near threatened; **VU** – vulnerable; **LC** – least concern.

ERL - conservation status of the European Red List: **VU – (Vulnerable)** species which can be in a nearest future referred to endangered category if the factors affecting their status will continue to act; **EN – (Endangered) -** species which are under danger of vanishing; their conservation is hardly possible and reproduction is impossible with special actions and measures.

BONN - Bonn Convention: **Annex I (1)** includes species which are under the danger of vanishing; **Annex II (2)** includes species which condition is unfavorable and which conservation and management requires international treaties, as well as species which condition would significantly improve as a result of international cooperation that may be achieved based on international treaties. The same species may be referred both to Annex 1 and Annex II.

BERN - The Bern Convention or Convention on the Conservation of European Wildlife and Natural Habitats, includes **Annex II (2)** - list of fauna species subject to special protection; **Annex III (3)** - fauna species subject to conservation.

CITES - The Washington Convention on International Trade in Endangered Species of Wild Fauna and Flora: **Annex I** includes "endangered species the trade in which causes or may cause negative impact on their existence. Trade in specimens of such species shall be subject to extremely strict regulation in order not to further endanger their survival, and shall be allowed only in exclusive cases"; **Annex II (2)** includes: a) "all species that are not necessarily threatened with extinction, but may become so unless trade in specimens of such species is subject to strict regulation in order to avoid utilization incompatible with the survival of the species in the wild"; and b) "other species which must be subject to regulation in order that trade in specimens of certain species referred to in sub-paragraph (a) of this paragraph may be brought under effective control".

As can be seen from Table 3.6, representatives of the wintering ornithological complex in the area of 330 kV OTL, buffer zones and adjacent territories are put to 6 nature conservation lists. Most of them were referred to the Bern Convention (18 species out of 19, or 94.7%) of which 8 species are subject to the special protection and 10 are subject to protection. Interesting is the situation with inclusion to the Bonn Convention: out of 5 species of the ornithological complex, which are included into this Convention, 1 species refers to Annex II (existence condition is unfavorable) and 4 species are included both to Annex II and Annex I (endangered species) (which is possible within the scope of this nature conservation document). 1 species is a part of the Red Data Book of Ukraine (2009) and refers to the rare category. Another 1 species was included into the IUCN Red List (LC category). Moreover, 1 species belongs to the Washington Convention on International Trade in Endangered Species of Wild Fauna and Flora (Annex I), and 1 species - to the European Red List.

As regarding the degree of inclusion of birds to the nature conservation lists, the following situation manifests. Of 19 species, 1 species (5.3%) does not belong to any of the nature conservation documents (yellow-legged gull - *Larus cachinnans)*. The great majority of the spring ornithological complex representatives belongs to List 1 or List 2 (13 and 3 species respectively), and 1 species (5.3%) belongs to 3 documents. There was also 1 species simultaneously belonging to 5 nature conservation acts (white-tailed eagle – *Haliaeetus albicilla*).

3.2.2. Assessment of impacts conditioned by the 330 kV OTL construction and operation in the winter period

1. Construction-conditioned impacts

1a – hazardous substances emissions. During the construction hazardous substances emissions will not exceed allowable limits due to insignificant number of machinery and equipment, absence of stationary pollution sources, and short period of construction works. No negative impact on birds is observed.

1b – hazing by visual effects and noise. Noise hazing factor is almost absent due to extremely low number of birds along the power transmission line in the winter period. The land plot planned for construction of 330 kV OTL has low fodder value, and adjacent farmed ecosystems serve as an alternative option for the feeding birds.

Noise and visual effects impact is characterized as low, and for most wintering birds it is absent at all.

1c – occupation of the territory by working sites and equipment. Impact of this factor in the winter period is evaluated as low, and it is absent during operation of 330 kV OTL.

1d – loss of the breeding places. This factor has no negative impact in the winter period.

1e – loss of individual specimens of the protected species. Only white-tailed eagle (Haliaeetus albicilla) was reported within the territories adjacent to the future power transmission line in the winter period of 2016. Since this species in the winter period leans toward waterfowl (ducks) gatherings where eagles find food, it is unlikely to meet the species within the 330 kV OTL area and if the meeting happened, it is occasional. The literature states that eagles and other large carnivorous birds (buzzards, falcons, hawks) can use OTL poles for rest. Due to this fact, it is necessary to make a provision in the design of 330 kV OTL poles ornithological protective gear that disables birds death from electrical shocks.

Negative impact is found to be moderate.

2. Equipment-conditioned impacts

2a – lasting occupation of the territory and alteration of the environment characteristics. Since the project territory is represented almost exclusively by man-made types of biotopes (agricultural lands, hedgerows, man-planted forest, and garden), creation of the Wind Park site infrasturcture won't become dangerous for birds passages in the winter period. No significant changes in the dominant biotopes are forecasted.

The impact is evaluated as low.

2b – hazing by vertical mast structures. For insignificant number of birds found in the winter period and use 5-10 altitude corridor during their passages this factor is not dangerous (technical characteristics of the wind turbines may pose potential threat due to the rotor motion for birds flying at the height of 50-170 m, but no birds were found at these heights in the winter 2016. Birds quickly get used to the existing structures, therefore negative impact on birds is low, and is absent for most bird species.

2c – barrier impact and obstacles for passage. Birds, which use the Wind Park site as their fodder territories, travel primarily at the heights under 50 m, so the negative impact on them is estimated as low, and for most species there is no such impact.

3. Impacts conditioned by the operation of the overhead power transmission line.

3a – additional development of the territories. Due to extremely low attractiveness of the fedding territories and absence of safe onshore habitats for roosting, this factor will not affect the wintering birds and is characterized as low.

3b – annoyance due to night illumination. There is no lighting along the bigger section of the overhead line. Power substations are illuminated during a lasting time but we are not aware about cases of the birds deaths due to it. Moreover, illumination in settlements and on motor roads is significantly larger in terms of scale. Impact of this factor within the 330 kV OTL territories is estimated as very low.

3c – collisions with the 330 kV OTL infrastructure elements. Insignificant number of birds in the winter period on the Wind Park sites and abscence of feeding gatherings and roosts enables to forecast that negative impact on birds will be very low. For preventing collisions of birds with horizontal elements (traverses, wires) and poles, it is necessary to utilize birdscaring methods in potentially dangerous places. Such place is a run of the Molochna River on the southern edge of Sadove village, across which the OTL route passes. According to our recommendations, 500-meter run of the 330 kV OTL is subject to ornithological management.

3.3. Assessment of the ornithological situation during the spring migration

Main tasks of the observations were study of the species composition of birds, their number, analysis of the taxonomic distribution of the whole ornithological complex, recording of directions and heights of the passage of the bird flocks. Important task was also to study birds which are mentioned in the Red Book of Ukraine or which are rare for the region, as well as to distribute the spring ornithological fauna by such nature conservation lists as the list of the International Union for Conservation of Nature (IUCN), European Red List, Bonn and Bern Conventions, and the Washington Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Such analysis was performed according to requirements of the Ukrainian laws and the modern trend to approximate the national nature conservation laws to the international laws, primarily to the Birds Directive and the Habitat Directive as components of All-European Network Natura-2000.

Weather conditions

Analysis of the weather conditions in the researched area is very important due to dependence of the majority of the birds life events from such indicators as ambient temperature, wind directions and strength, atmospheric pressure, and precipitations.

Obvious is the fact of relation of the migratory processes phenology from the dynamics of weather and climate indicators. Exactly because of it we have analyzed not only the period during which the censuses were conducted (March and April, when active migratory processes were observed) but also the month precedent to the migration start (February).

In general, weather of February 2016 is characterized by quite high ambient temperatures as compared to previous years (e.g., average values of February 2015 temperature made +1.25°C, and +3.53°C in February 2016). Minimum temperatures of February were not critical for the birds, and average daily temperature below 0°C was reported only on 08.02.2016 (while minimum last year's temperatures were -5°C on 18.02.2015, and the number of days with the temperature below 0°C equalled to 7). As soon as from 09 February, average daily ambient temperatures passed 0°C and were in a plus range further on.

Average daily ambient temperatures in March varied from 0.5°C to 9.5°C, making the average of 6.56°C. The situation changed in April: the temperature varied from 8.0 to 16.5°C, making the average of 13.5°C (Table 3.7), which almost doesn't differ from the same period of the last year. All this undoubtedly affected the course of the migratory process. More detailed characteristic of the weather and climate conditions is provided in Table 3.7 and Figure 3.11.

Table 3.7. Characteristic of the weather conditions in February-April 2016

Indicator	n	M±m	min	max	Cv
Air temperature February	29	3.53±2.36	-0.5	8.5	66.8
Atmospheric pressure. February	29	765.5±5.33	756.5	775.0	0.7
Air temperature. March	31	6.56±1.93	0.5	9.5	29.5
Atmospheric pressure. March	31	761.1±4.64	749.0	767.0	0.6
Air temperature. April	30	13.53±2.32	8.0	16.5	17.14
Atmospheric pressure. April	30	759.4±4.19	748.5	766.0	0.55

After the first non-intensive wave of migration of anseriformes, charadriiformes and other bird species (end of March), there was the second wave in mid-April, which characterized by a larger species diversity at a larger number (586 specimens of 14 species vs 189 specimens of 9 species, respectively).

Such difference was caused by the increase of average monthly temperature (13.5°C), improvement of feeding conditions for the birds, and also by the diversity of the migratory bird species. In the end of April, active migratory processes started to slow down as the larger part of the birds began to get prepared to nesting.

Interesting is the observation of the change of typical winter climate conditions for which characteristic is reverse dependence of air temperatures from atmospheric pressure, for the spring weather when increase of the atmospheric pressure also results in the increase of the air temperature. We observed such situation both in February and March 2016.

However, more characteristic for the migratory start of the birds is anticyclonic type of the weather, when high atmospheric pressure leads to air temperature fall. Such periods were reported on 15-18 February, 9-12 and 23-26 March, and also on 7-14 and 21-26 April (Fig. 3.11). Exactly this period saw active passage of the anseriformes, charadriiformes, passeriformes and other species of the birds.

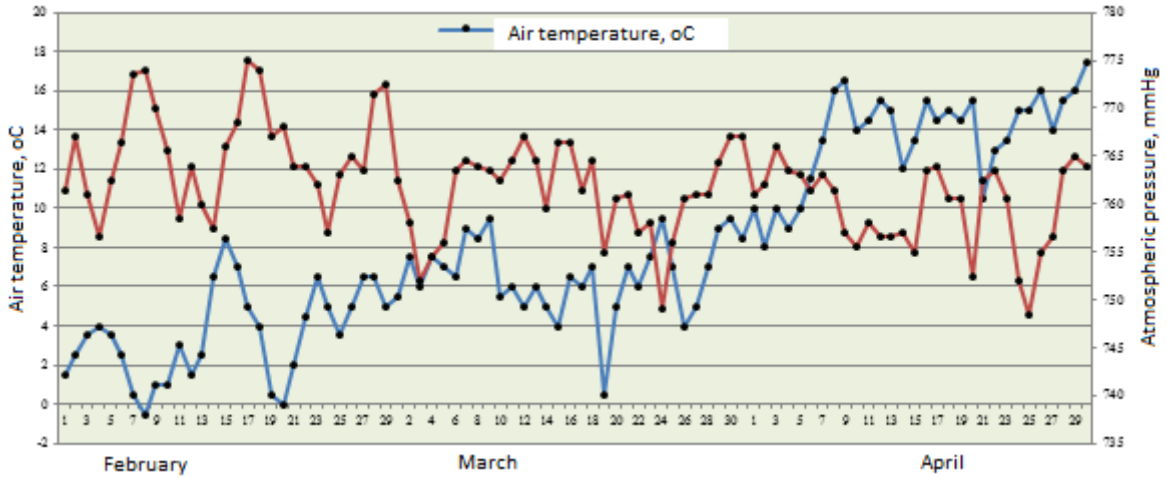


Fig. 3.11. Weather and climate characteristic of February-April 2016 according to Mordvynivka weather station data

Taxonomic characteristic of the ornithological complex of birds within the 330 kV OTL, buffer zones and adjacent territories during the spring migration in 2016

All birds registered at the spring passage belong to 8 taxonomic ranges - *podicipediformes, anseriformes*, *falconiformes*, *galliformes, gruiformes, charadriiformes*, *columbiformes*, and *passeriformes* (Tables 3.8 - 3.10, Fig.3.12). The dominant were representatives of passeriformes – 16 species, subdominants were charadriiformes – 6 species and falconiformes – 4 species (Table 3.10, Fig. 3.12). High species diversity resulted also in a large number of birds of a particular group. So, first position belongs to passeriformes (839 specimens), which are followed by charadriiformes (99 specimens), and anseriformes (77 specimens) (Table 3.10, Fig. 3.13).

More detailed analysis of the territorial birds distribution showed a different trend in the dominance of particular taxons. For example, within the very area of the designed 330 kV OTL highest species diversity in March belonged to passeriformes which then dominated in numbers (6 species, 161 specimens), the second position was occupied by charadriiformes (1 species, 3 specimens), while there were no representatives of other taxons (Table 3.8). In the adjacent territories in March the dominant group was also passeriformes (8 species, 206 specimens), while the subdominant - anseriformes (1 species, 22 specimens).

The situation altered in April. Within the 330 kV OTL and buffer zones first position was occupied by charadriiformes (1 species, 67 specimens), and the second - by passeriformes (3 species, 33 specimens) (Table 3.9). In the adjacent territories the dominant group was passeriformes (11 species, 439 specimens), while the subdominant - anseriformes (2 species, 55 specimens).

If we consider the Spring 2016 situation in general, we can see that the dominating group within the 330 kV OTL area was passeriformes (8 species, 194 specimens), while the subdominant group was charadriiformes (2 species, 70 specimens). The situation looked similar in the adjacent territories: the dominant group here was also passeriformes (13 species, 645 specimens), followed by anseriformes (2 species, 77 specimens), charadriiformes (5 species, 29 specimens) and gruiformes (1 species, 25 specimens), while the other taxa were insignificant (Table 3.10).

In each taxonomic group there were bird species which prevailed over the other in numbers. So, among passeriformes European starling - *Sturnus vulgaris* – reached 41.1% of the number, rook - *Corvus frugilegus* – 19.3%; in the other groups the dominant species were: among anseriformes: greater white-fronted goose – *Anser albifrons* (64.9%), among charadriiformes: ruff – *Philomachus pugnax* (67.7%).

Table 3.8. Taxonomic characteristic of the migratory ornothological complex within the 330 kV OTL, buffer zones and adjacent territories in March 2016

Range	OTL and BZ		Adjacent territories		∑	
	n species	n specimens	n species	n specimens	n species	n specimens
Anseriformes	-	-	1	22	**1**	**22**
Falconiformes	-	-	2	2	**2**	**2**

Charadriiformes	1	3	2	8	**2**	11
Columbiformes	-	-	1	3	**1**	**3**
Passeriformes	6	161	8	206	15	**367**
Total	7	**164**	14	**241**	**21**	**405**

Table 3.9. Taxonomic characteristic of the migratory ornithological complex within the 330 kV OTL, buffer zones and adjacent territories in April 2016

Range	OTL and BZ		Adjacent territories		∑	
	n species	n specimens	n species	n specimens	n species	n specimens
Podicipediformes	-	-	1	5	**1**	5
Anseriformes	-	-	2	55	**2**	**55**
Falconiformes	1	1	2	3	**3**	4
Galliforms	1	9	-	-	**1**	9
Gruiformes	-	-	1	25	**1**	**25**
Charadriiformes	1	67	3	21	4	**88**
Columbiformes	-	-	1	6	**1**	**6**
Passeriformes	3	33	11	439	**13**	**472**
Total	**6**	**110**	**21**	**554**	**26**	**664**

Table 3.10. Taxonomic characteristic of the migratory ornithological complex within the 330 kV OTL, buffer zones and adjacent territories in Spring 2016

Range	OTL and BZ		Adjacent territories		∑	
	n species	n specimens	n species	n specimens	n species	n specimens
Podicipediformes	-	-	1	5	**1**	**5**
Anseriformes	-	-	2	77	**2**	**77**
Falconiformes	1	1	3	5	**4**	**6**
Galliforms	1	9	-	-	**1**	**9**
Gruiformes	-	-	1	25	**1**	**25**
Charadriiformes	2	70	5	29	**6**	**99**
Columbiformes	-	-	1	9	**1**	**9**
Passeriformes	8	194	13	645	**16**	**839**
Total	**12**	**274**	**26**	**795**	**32**	**1,069**

Notes: OTL and BZ - the designed 330 kV overhead power transmission line and its buffer zones within 500 m;

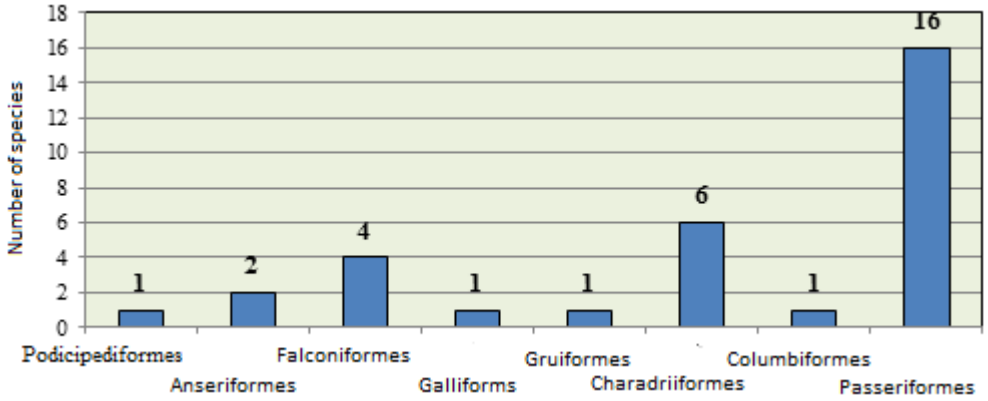
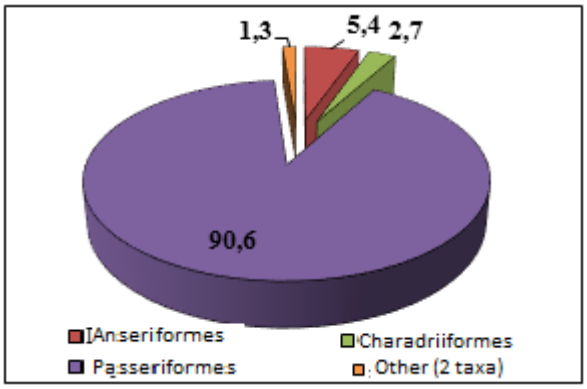
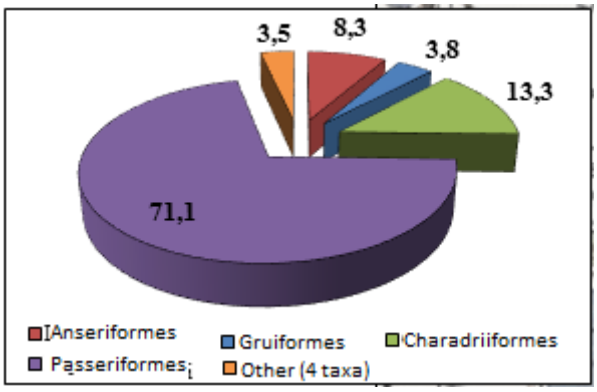


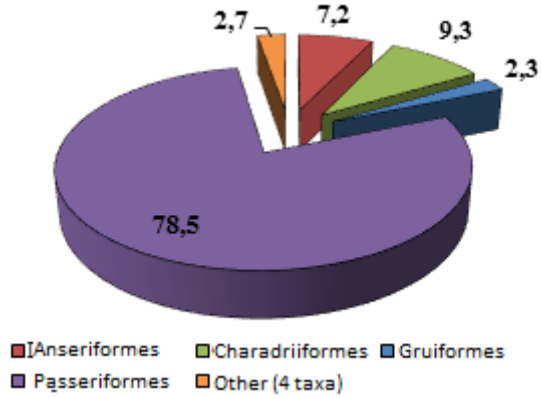
Fig. 3.12. Species representation of the bird taxa registered in spring 2016 within the 330 kV OTL, buffer zones and adjacent territories



A. March



B. April



C. Spring, 2016

Fig. 3.13. Taxonomic characteristic of the ornithological complex within the 330 kV OTL, buffer zones and adjacent territories in March (A), April (B) and Spring (C) 2016 (number of birds in %)

When comparing the ornithological situation which developed within the area of 330 kV OTL, its buffer zones and adjacent territories, we surely identified trends which are proving that birds are leading toward certain habitats. Analyzing the materials represented as diagrams in Fig.3.13, we see that the dominant in terms of the bird numbers during the entire spring were representatives of the range of passeriformes, which depends primarily from the habitats existing in the territory.

Quantitative Characteristic.

Total number of the registered 32 species of birds equals to 1069 specimens, of which 71 specimens (or 6.6% of all registered birds) were observed directly within the 330 kV OTL, 203 specimens (18.9%) were observed in the buffer zones within 500-meter range, and 795 specimens (74.5%) were observed in the adjacent territories. Such distribution of birds by different territories is understandable due to a small area of the power transmission line compared with the area of the adjacent plots, and larger diversity of habitats located on the latter (Tables 3.11-3.12).

Most numerous within the area of 330 kV OTL and in the buffer zones were European starling (Sturnus vulgaris), ruff (*Philomachus pugnax*) and Chaffinch (Fringilla coelebs), which were counted 183 specimens or 66.8%. Number of other bird species counted 91 specimens. Semi-aquatic birds counted 70 specimens, upland birds - 204 specimens.

Since near the research territory there are primarily farmed ecosystems and hedgerows and, in a lesser degree, Molochnyi Estuary Wetland, we would expect the dominance of upland bird species in the adjacent territories; the analysis of the obtained results shows exactly this trend. So, during the entire period of spring observations we registered 659 specimens (or 82.9%) of the bird species which lead toward upland habitats.

The dominant here were European starling (Sturnus vulgaris), rook (Corvus frugilegus) and white wagtail (*Motacilla alba*). Number of the semi-aquatic species in the adjacent territories over the entire period of observations was 136 specimens. Most numerous of them were greater white-fronted goose (*Anser albifrons*), Mallard (Anas platyrhynchos) and Eurasian coot (*Fulica atra*).

More detailed characteristic of the species composition and distribution of birds during the spring migration within the area of 330 kV OTL, in buffer zones and in adjacent territories is given in Tables 3.11-3.12 and in Annex 1 (Tables 1.3-1.4 and AutoCAD schematic map Fig. D 1.3 - D 1.4).

Table 3.11. Characteristic of the spring migration of birds within the area of 330 kV OTL, buffer zones and adjacent territories in 2016

Indicators		Date		Total	
		20.03	8.04	abs.	%
Total species		**17**	**26**	**32**	**100**
Absolute number		**359**	**710**	**1,069**	**100**
Migrants Total	species	9	14	**19**	**-**
	number	189	586	**775**	**72.50**
Feeding migrants	species	5	10	**14**	**-**
	number	124	197	**321**	**41.42**
Transit migrants	species	4	7	**7**	**-**
	number	65	389	**454**	**58.58**
Censuses	species	11	17	**21**	**-**
	number	170	124	**294**	**27.50**
Semi-aquatic	species	3	8	**10**	**31.25**
	number	33	173	**206**	**19.27**
Land	species	14	18	**22**	**68.75**
	number	326	537	**863**	**80.73**
Direction	N	26	114	**140**	**18.06**
	NE	33	301	**334**	**43.09**
	E	1	-	**1**	**0.13**
	SE	50	80	**130**	**16.77**
	S	29	4	**33**	**4.26**
	SW	20	78	**98**	**12.65**
	W	-	9	**9**	**1.16**
	NW	30	-	**30**	**3.88**
Heights	0-10	152	206	**358**	**46.19**
	10-25	14	-	**14**	**1.81**
	25-50	1	352	**353**	**45.55**
	50-100	-	-	**-**	**-**
	100-150	-	-	**-**	**-**
	150-200	-	-	**-**	**-**
	> 200	22	28	**50**	**6.45**

Total number of birds which were registered at the spring passage is 1069 specimens. Major part of these birds was in the state of migration (775 specimens) which is divided into the transit migration when birds pass big distances without stopping within the project area, and the feeding migration when birds pass small distances searching for the food. Analysis of such distribution shows the dominance of transit migrants (454 specimens or 58.6% of the total number of migratory birds) over feeding migrants (321 specimens or 41.4%).

Table 3.12. General characteristic of the migratory ornithological complex within the area of 330 kV OTL, buffer zones and adjacent territories in Spring 2016

Item #	Species	OTL and BZ		AT		Total
		20.03	8.04	20.03	8.04	
1	Great crested grebe (*Podiceps cristatus)*				5	**5**
2	Greater white-fronted goose (*Anser albifrons*)			22	28	**50**
3	Mallard *(Anas platyrhynchos)*				27	**27**
4	Goshawk (*Accipiter gentilis*)		1			**1**
5	Rough-legged buzzard (*Buteo lagopus*)			1	1	**2**
6	Common buzzard (*Buteo buteo*)			1		**1**

Item #	Species		OTL and BZ		AT		Total
			20.03	8.04	20.03	8.04	
7	Common kestrel (*Falco tinnunculus*)					2	**2**
8	Grey partridge (*Perdix perdix*)			9			**9**
9	Eurasian coot (*Fulica atra*)					25	**25**
10	Northern lapwing (*Vanellus vanellus*)					2	**2**
11	Pied avocet (*Recurvirostra avosetta*)					7	**7**
12	Ruff (*Philomachus pugnax*)			67			**67**
13	Eurasian curlew (*Numeniusarquata*)				2		**2**
14	Yellow-legged gull (*Larus cachinnans*)		3		6		**9**
15	*Terns* (*Chlidonias spp.*)					12	**12**
16	Woodpigeon (*Columba palumbus*)				3	6	**9**
17	Skylark (*Alauda arvensis*)					25	**25**
18	White wagtail (*Motacilla alba*)				20	24	**44**
19	European starling (*Sturnus vulgaris*)		70		8	266	**344**
20	European magpie (*Pica pica*)				1	1	**2**
21	Rook (*Corvus frugilegus*)		21	6	103	32	**162**
22	Hooked crow (*Corvus cornix)*		3			8	**11**
23	Common raven (*Corvus corax*)		1				**1**
24	Winter wren (*Troglodytes troglodytes*)				1	2	**3**
25	Black redstart (*Phoenicurus ochruros*)					3	**3**
26	Fieldfare (*Turdus pilaris*)				4		**4**
27	Common blackbird (*Turdus merula)*				3	12	**15**
28	Eurasian tree sparrow (*Passer montanus*)			7	36		**43**
29	Chaffinch (*Fringilla coelebs*)		46			12	**58**
30	European greenfinch (*Chloris chloris*)					4	**4**
31	European goldfinch (*Carduelis carduelis*)			20			**20**
32	Corn bunting (*Emberiza calandra*)		20				**20**
	Passeriformes (*Passer spp.*)				30	50	**80**
	Total	**species**	**7**	**6**	**14**	**21**	**32**
		birds	**164**	**110**	**241**	**554**	**1,069**

Notes: OTL and BZ - the designed 330 kV overhead power transmission line and its buffer zones within 500 m; **AT** - adjacent territories.

Biotopic distribution of birds

Species diversity of birds and their number to a certain extent depend from the number of separated biotopes (Figures 3.14 - 3.15). In the studied region we found the following landscape and biotopic units: farmed ecosystems (agricultural lands), meadow and pseudosteppe vegetation areas (Mordvynivka hollow), hedgerows and man-made forest plantations and man-made landscape (solid municipal waste range and electric power substation). Each of the biotopes is the habitat for a certain group of birds (Table 3.13).

Table 3.13. Biotopic distribution of birds within the 330 kV OTL, buffer zones and adjacent territories in Spring 2016

Zones / Habitat		Habitats of birds				∑	
		farmed ecosys.	hollow	hedgerows	man-made	abs.	%
330 kV OTL		20	35	11	5	**71**	**6.6**
Buffer zones		55	48	78	22	**203**	**18.9**
Adjacent territories		499	176	77	43	**795**	**74.5**
Total	**abs.**	**574**	**259**	**166**	**70**	**1,069**	**100**
	%	**53.7**	**24.2**	**15.5**	**6.6**	**100**	

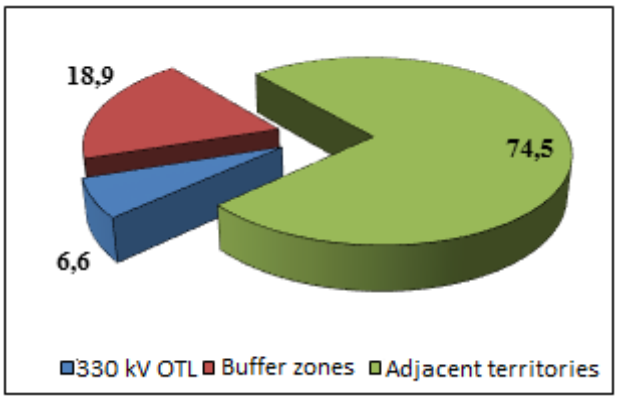


Fig. 3.14. Expansion of birds within the functional zones of the project territory, %

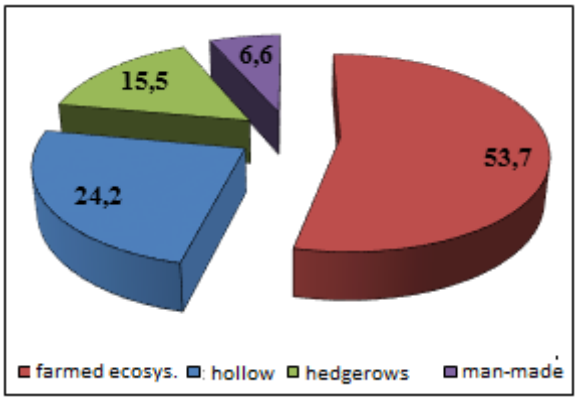


Fig. 3.15. Biotopic distribution of birds within the project territory, %

Since the project territory is located primarily among farmed ecosystems, hedgerows and other upland biotopes, it would be logical to expect the dominance of upland species; analysis of the field results revealed exactly this regularity. We registered 22 species of the upland birds with the number of 863 specimens or 80.7%, the majority of which was observed in the buffer zones and adjacent territories. Most often we observed European starling (Sturnus vulgaris), rook (Corvus frugilegus) and small passeriformes (*Passer spp.*). In addition to it, 206 specimens of 10 semi-aquatic species were registered. The dominant species were ruff (*Philomachus pugnax*), greater white-fronted goose (*Anser albifrons*), mallard (*Anas platyrhynchos*) and Eurasian coot (*Fulica atra*), which made up 82.1% of all semi-aquatic birds subjected to census.

The research revealed that most visited in the winter period were farmed ecosystems (574 specimens or 53.7%), Mordvynivka Hollow (259 specimens or 24.2%), and hedgerows and man-made forests, which attracted 166 specimens or 15.5%. During the censuses we also studied man-made landscape areas (solid municipal waste range on the lands of Nove Village Council and 330kV Melitopol Electric Power Substation) where met 70 specimens (6.6%) (Table 3.13)

Directions of Spring 2016 migration.

Among the spring passage directions the dominant was north-eastern - 43.1% of all migrants (Table 3.14, Figure 3.16). 334 specimens flew in this direction. These were mainly semi-aquatic birds (gulls, ruff and greater white-fronted goose), and small passeriformes (corn bunting, wagtail, and starling). Moreover, we observed migratory passages of the birds in the northern (140 specimens, 18.1%), south-eastern (130 specimens, 16.8%), and south-western (98 specimens or 12.7%) directions. Bird passages in other directions were insignificant (Table 3.14).

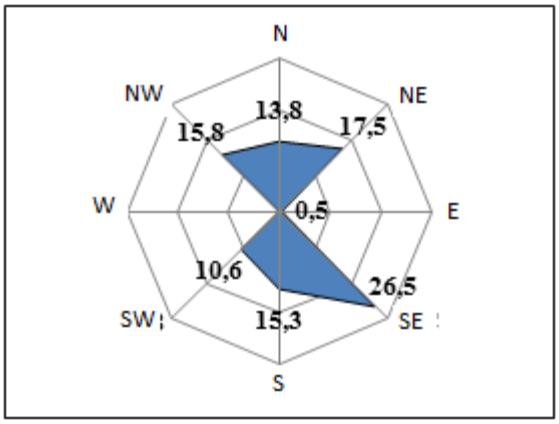
Table 3.14. Characteristic of the main directions of the spring migration within the area of 330 kV OTL in 2016

Compass Point	March		April		Spring, 2016	
	abs.	%	abs.	%	abs.	%
N	26	13.8	114	19.5	**140**	**18.06**
NE	33	17.5	301	51.4	**334**	**43.09**
E	1	0.5	-	-	**1**	**0.13**
SE	50	26.5	80	13.7	**130**	**16.77**
S	29	15.3	4	0.7	**33**	**4.26**
SW	20	10.6	78	13.2	**98**	**12.65**
W	-	-	9	1.5	**9**	**1.16**
NW	30	15.8	-	-	**30**	**3.88**
Total	**189**	**100**	**586**	**100**	**775**	**100**

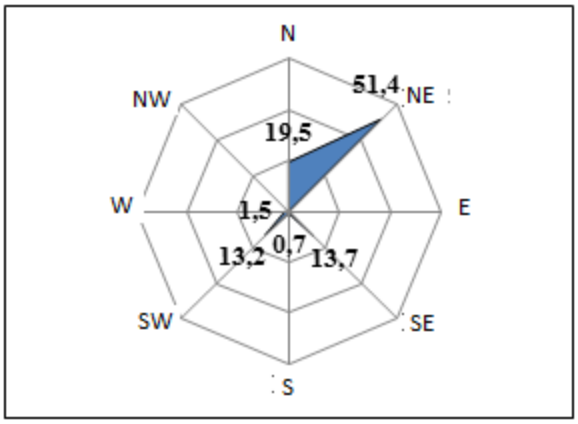
Such directions are typical for this area and season, and a certain percentage of the migrants flying in the south-eastern and south-western directions can be explained by the feeding relocations of passeriformes and charadriiformes.

Analyzing the migration directions in different months of the observations, we talk about the typical passage picture in April (most birds headed to the north and north-east) and not very typical picture in March (almost same percentage of the birds heading both to the northern and southern directions, what can be explained by the dominance of feeding migrants in March which lean towards flying to various directions with various levels of intensity) (Figure 3.16).

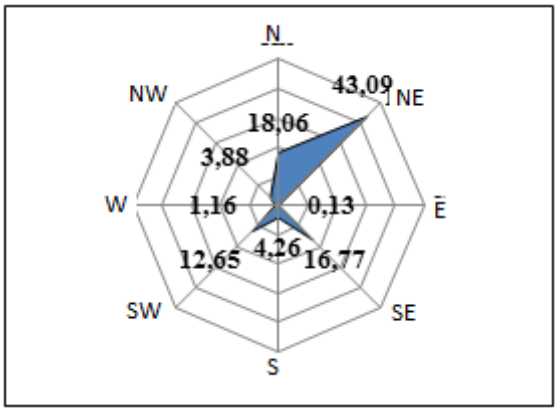
More detailed characteristic of the spring migration directions is provided in Table 3.14 and Figure 3.16.



A. All migrants, March



B. All migrants, April



C. All migrants, Spring 2016

Fig. 3.16. Characteristic of the bird passage directions in spring 2016 within the 330 kV OTL (number in %)

Upon comparing the bird passage directions during the feeding and transit migration we can suggest about narrow orientation of the transit migrants (north east and north) and wide range of expansion of the feeding migrants (with different levels of intensity in all directions). This fact can be explained by daily activity of different groups of migrants. Hence, peculiarity of the transit passage of the birds is the mass character of the process with involvement of quite large number of birds and species, targeted active type of the passage (wingbeat and soaring) in a respective direction, big distance of a single passage (up to 600 km), no delays and stops on the migration route.

Instead, the feeding migrants demonstrate some other type of behavior which is characterized by a lasting stay of birds within the region, everyday feeding passages from the roost places to the feeding locations, the entire range of migration directions conditioned only by searches for food, creation of various in scale gatherings, short passage distances.

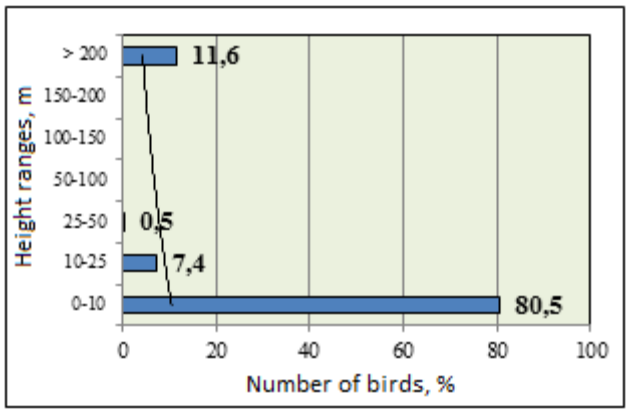
Exactly this picture was observed during observations in Spring 2016 within the 330 kV OTL (Fig. 3.16).

Characteristics of altitude intervals of the birds passage

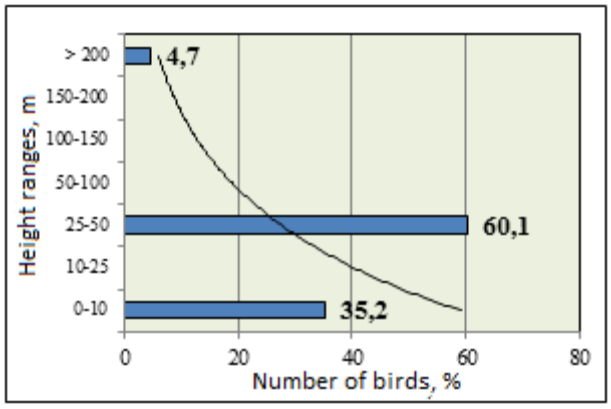
Height passages of the birds in Spring 2016 broke down as follows. In March, the majority of the birds (166 sp., 87.9% of the total number of migrants) which were recorded in the territory of the designed 330 kV OTL, within buffer zones and adjacent territories were observed either near the ground (152 sp.) or in the flight at the height of up to 25 m (14 sp.). Additionally, 22 specimens (11.6%) of the birds were registered at heights over 200 m (Table 3.15, Figure 3.17).

Table 3.15. Characteristic of the main heights of the spring migration within the area of 330 kV OTL in 2016

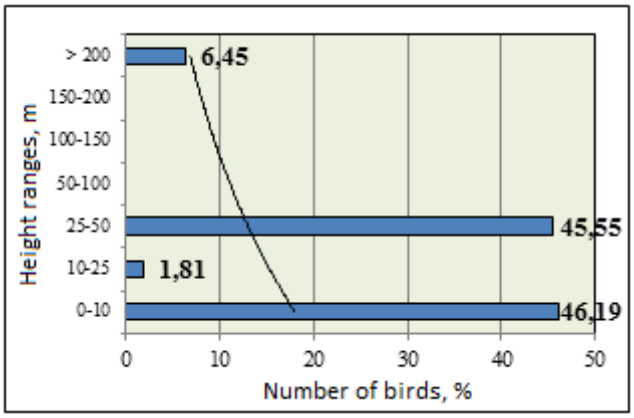
Height ranges	March		April		Spring, 2016	
	abs.	%	abs.	%	abs.	%
0-10	152	80.5	206	35.2	**358**	**46.19**
10-25	14	7.4	-	-	**14**	**1.81**
25-50	1	0.5	352	60.1	**353**	**45.55**
50-100	-	-	-	-	-	-
100-150	-	-	-	-	-	-
150-200	-	-	-	-	-	-
> 200	22	11.6	28	4.7	**50**	**6.45**
Total	**189**	**100**	**586**	**100**	**775**	**100**



A. March, 2016



B. April, 2016



C. Spring, 2016

Fig. 3.17. Characteristic of the heights of the birds passages during the spring migration within the 330 kV OTL (number in %)

The trend went down in April. In the height range 0-10 m 206 specimens or 35.2% of the birds were observed, while no birds were registered at the heights from 10 to 25 m, and 352 specimens (60.1%) were observed in the height range 25-50 m. Another 28 specimens (4.7%) were registered at heights over 200 m. There also are certain trend in the passage of feeding and transit migrants. While the transit migrants chose heights in the range 0-10 m (small passeriformes), 25-50 m (gulls, cormorant, rook) and over 300 m (greater white-fronted goose), the feeding migrants were mainly observed near the

ground or at heights 10-25 m. This data is expected, and the nature of distribution of birds by passage heights is traditional for this region and season.

When comparing the passage heights of various groups of birds, we need to mention that transit migrants were flying higher than the feeding ones. This is especially obvious in March, when large-sized birds (swans, geese, cormorants, gulls etc.) are migrating over large distances. Due to this fact passage heights are quite significant, and most birds choose ranges above 200 m. In April, when the species composition of the migrants changes toward the dominance of passeriformes, passage heights go down both for transit and for feeding migrants.

3.3.1. Distribution of birds counted during the spring 2016 migration by nature conservation lists

In spring 2016 in the research territory there were registered 2 species of the birds referred to the Red Book of Ukraine (Table 3.16 - 3.18): Pied avocet (*Recurvirostra avosetta*) and Eurasian curlew (*Numenius arquata*). All they were observed in the adjacent territories. What is interesting is that the number of rare species were different in different months: if there were 2 specimens of 1 species registered in March, then in April there were 7 species of 1 species reported.

Number of the rare species is not large everywhere, they were mainly registered as single specimens or as small flocks consisting of several specimens. Overall, the number of rare ornithological fauna in spring 2016 didn't exceed 0.8% of all birds encountered.

Table 3.16. Birds species from the Red Book of Ukraine upon results of March 2016 censuses

Item #	Species	OTL 330 kV	Buffer zones	Adjacent territories	∑
1	Eurasian curlew (*Numenius arquata*)	-	-	2	**2**
	Total number of birds from the Red Book of Ukraine	-	-	2	**2**
	Total birds within the site	**20**	**98**	**241**	**359**
	% of the total number	**-**	**-**	**0.8**	**0.6**

Table 3.17. Birds species from the Red Book of Ukraine upon results of April 2016 censuses

Item #	Species	OTL 330 kV	Buffer zones	Adjacent territories	∑
1	Pied avocet (*Recurvirostra avosetta*)	-	-	7	**7**
	Total number of birds from the Red Book of Ukraine	-	-	7	**7**
	Total birds within the site	**51**	**105**	**554**	**710**
	% of the total number	**-**	**-**	**1.3**	**1.0**

Table 3.18. Birds species from the Red Book of Ukraine upon results of Spring 2016 censuses

Item #	Species	OTL 330 kV	Buffer zones	Adjacent territories	∑
1	Pied avocet (*Recurvirostra avosetta*)	-	-	7	**7**
2	Eurasian curlew (*Numenius arquata*)	-	-	2	**2**
	Total number of birds from the Red Book of Ukraine	-	-	9	**9**
	Total birds within the site	**71**	**203**	**795**	**1,069**
	% of the total number	**-**	**-**	**1.1**	**0.8**

In addition to identification of the ornithological fauna representatives during the spring migration, as well as their number and distribution within the research territory, there appeared a necessity to rate them by nature protection lists: Red Book of Ukraine, list of the International Union for Conservation of Nature (IUCN), European Red List, Bonn and Bern Conventions, and the Washington Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (table 3.19).

Table 3.19. Distribution of the ornithological fauna of the spring 2016 migration by nature conservation lists

Item #	English name	Scientific name	Status	ERL	RDBU	IUCN	BERN	BONN	CITES
1	Great crested grebe	*Podiceps cristatus*	m, w, n				3		
2	Greater white-fronted goose	*Anser albifrons*	m, w				3	1.2	
3	Mallard	*Anas platyrhynchos*	m, w, n				3	1.2	
4	Goshawk	*Accipiter gentilis*	m, w				2	1.2	2
5	Common buzzard	*Buteo buteo*	m, w, n				2	1.2	2
6	Rough-legged buzzard	*Buteo lagopus*	m, w				2	1.2	2
7	Common kestrel	*Falco tinnunculus*	m, w, n				2	2	2
8	Grey partridge	*Perdix perdix*	m, w, n	VU			3		
9	Eurasian coot	*Fulica atra*	m, w, n				3	2	
10	Northern lapwing	*Vanellus vanellus*	m, w, n	VU			3	2	
11	Pied avocet	*Recurvirostra avosetta*	m, n		RAR	LC	2	2	
12	Ruff	*Philomachus pugnax*	m				3	1.2	
13	Eurasian curlew	*Numenius arquata*	m, w		EN	NT	3	1.2	
14	Yellow-legged gull	*Larus cachinnans*	m, w, n						
15	Woodpigeon	*Columba palumbus*	m, w, n						
16	Skylark	*Alauda arvensis*	m, w, n				3		
17	White wagtail	*Motacilla alba*	m, w, n				2		
18	European starling	*Sturnus vulgaris*	m, w, n				2		
19	European magpie	*Pica pica*	m, w, n				2		
20	Rook	*Corvus frugilegus*	m, w, n				2		
21	Hooded crow	*Corvus cornix*	m, w, n				2		
22	Common raven	*Corvus corax*	m, w, n				3		
23	Winter wren	*Troglodytes troglodytes*	m, w, n				2		
24	Black redstart	*Phoenicurus ochruros*	m, n				2	2	
25	Fieldfare	*Turdus pilaris*	m, w				3	2	
26	Common blackbird	*Turdus merula*	m, w, n				3	2	
27	Eurasian tree sparrow	*Passer montanus*	m, w, n				3		
28	Chaffinch	*Fringilla coelebs*	m, w, n				3		
29	European greenfinch	*Chloris chloris*	m, w, n				2		
30	European goldfinch	*Carduelis carduelis*	m, w, n				2		
31	Corn bunting	*Emberiza calandra*	m, w, n				3		

Notes: **Status**: m – species found during seasonal migrations; w - species found in the winter period; n - species foundin in the nesting period.

RDBU - protected by the Red Book of Ukraine: **EN -** endangered; **VU** - vulnerable; **RAR** - rare; **PL -** priceless.

IUCN - conservation status of the International Union for Conservation of Nature: **EN** – endangered; **NT** – near threatened; **VU** – vulnerable; **LC** – least concern.

ERL - conservation status of the European Red List: **VU – (Vulnerable)** species which can be in a nearest future referred to endangered category if the factors affecting their status will continue to act; **EN – (Endangered) -** species which are under danger of vanishing; their conservation is hardly possible and reproduction is impossible with special actions and measures.

BONN - Bonn Convention: **Annex I (1)** includes species which are under the danger of vanishing; **Annex II (2)** includes species which condition is unfavorable and which conservation and management requires international treaties, as well as species which condition would significantly improve as a result of international cooperation that may be achieved based on international treaties. The same species may be referred both to Annex 1 and Annex II.

BERN - The Bern Convention or Convention on the Conservation of European Wildlife and Natural Habitats, includes **Annex II (2)** - list of fauna species subject to special protection; **Annex III (3)** - fauna species subject to conservation.

CITES - The Washington Convention on International Trade in Endangered Species of Wild Fauna and Flora: **Annex I (1)** includes species "which are endangered and trade in which has or may have negative impact on their existence. Trade in specimens of such species shall be subject to extremely strict regulation in order not to further endanger their survival, and shall be allowed only in exclusive cases"; **Annex II (2)** includes: a) "all species that are not necessarily threatened with extinction, but may become so unless trade in specimens of such species is subject to strict regulation in order to avoid utilization incompatible with the survival of the species in the wild"; and b) "other species which must be subject to regulation in order that trade in specimens of certain species referred to in sub-paragraph (a) of this paragraph may be brought under effective control".

As can be seen from Table 3.19, representatives of the spring ornithological complex in the area of 330 kV OTL, buffer zones and adjacent territories are put to 6 nature conservation lists. Most of them were referred to the Bern Convention (29 species out of 31, or 93.6%) of which 14 species are subject to the special protection and 15 are subject to protection. Interesting is the situation with inclusion to the

Bonn Convention: out of 13 species of the ornithological complex, which are included into this Convention, 6 species refer to Annex II (existence condition is unfavorable) and 7 species are included both to Annex II and Annex I (endangered species) (which is possible within the scope of this nature conservation document). 2 species are a part of the Red Data Book of Ukraine (2009), of which 1 species is rated as *endangered* and 1 species - *rare*. 2 other species fell within the IUCN Red List (LC - 1 species, NT - 1 species). Moreover, 4 species belong to the Washington Convention on International Trade in Endangered Species of Wild Fauna and Flora, and 2 species - to the European Red List.

As regarding the degree of inclusion of birds to the nature conservation lists, the following situation manifests. Of 31 species, 2 species (6.5%) do not belong to any of the nature conservation documents: yellow-legged gull (*Larus cachinnans)* and woodpigeon (*Columba palumbus*). The great majority of the spring ornithological complex representatives belongs to List 1 or List 2 (14 and 8 species respectively), and 5 species (16.1%) -to 3 documents. Moreover, there were species simultaneously falling within 4 nature conservation acts: pied avocet (*Recurvirostra avosetta*) and Eurasian curlew (*Numenius arquata*).

More detailed description of the distribution of the spring ornithological complex representatives by nature conservation lists is given in Tables 3.20 - 3.21.

Table 3.20. Distribution of bird species encountered during the spring 2016 migration by categories of nature conservation lists

ERL		RDBU		IUCN		BONN		BERN		CITES	
category	N	category	N	category	N	category	N	category	N	category	N
VU	**2**	EN	**1**	LC	**1**	1	**-**	2	**14**	1	**-**
		RAR	**1**	NT	**1**	2	**6**	3	**15**	2	**4**
						1 and 2	**7**				
∑	**2**	∑	**2**	∑	**2**	∑	**13**	∑	**29**	∑	**4**

Table 3.21. Distribution of bird species encountered during the spring 2016 migration by number of nature conservation lists

Inclusion into nature conservation lists	species	%
0	2	6.5
1	14	45.2
2	8	25.7
3	5	16.1
4	2	6.5
5	-	-
6	-	-
Total	**31**	**100**

3.3.2. Assessment of impacts conditioned by the 330 kV OTL construction and operation during the spring migration

1. Construction-conditioned impacts

1a – hazardous substances emissions. During the construction hazardous substances emissions will not exceed allowable limits due to the absence of stationary pollution sources and short period of construction works. No negative impact on migratory birds is observed.

1b – hazing by visual effects and noise. Noise hazing factor is almost absent for migratory birds. Visual effects and noise have no influence at all on the transit migrants which pass at large heights (over 200 m). Feeding migrants which relocate at small heights may enter specific areas with construction in progress but scale of such event in physical figures is insignificant (hundreds meters), and action of these man-induced factors is dropped out if there are large alternative areas. Moreover, hazing by visual effects and noise during migration may have positive effect as the birds need to choose open spaces.

1c – occupation of the territory by working sites and equipment. Physical dimensions of the 330 kV OTL construction sites are not large thus allowing the birds to freely pass by the work sites with the equipment during the construction period. Moreover, insignificant density of the work sites and equipment will not obstruct feeding passages of the birds because of a large overall length of 330 kV OTL and significant distances between the power poles. As own observations conducted on the installed overhead power lines showed birds quickly get used to their infrastructure, therefore their negative impact on the migratory birds during the construction period is low.

1d – loss of the breeding places. No negative impact on transit migratory birds is observed, and it is low for the feeding migrants. As regards the species which after the end of migration remain for nesting within the 330 kV OTL, the loss of the breeding places is not significant for them. Low density of the birds nesting, insignificant species composition enable to freely choose nesting places. Insignificant loss of the nesting places due to construction of the overhead power line will have not a continuous but a mosaic nature thus leaving a larger part of the area free for selecting the nesting places. Moreover, most

species registered at nesting are common and widely spread in the region, with large numbers. Negative impact of this factor is estimated as low.

1e – loss of individual specimens of the protected species. In spring 2016 in the research territory there were registered 2 species of the birds referred to the Red Book of Ukraine (Table 3.16 - 3.18): Pied avocet (Recurvirostra avosetta) and Eurasian curlew (Numenius arquata). All they were observed in the adjacent territories. Probability of the loss of individual specimens during migration exists only for periods with adverse weather and climate characteristics (fog, strong wind), but in the light of extremely low number of rare birds in general, and especially of those which may use sections of 330 kV OTL, and short duration of adverse weather periods, we find this factor to have low impact.

2. Equipment-conditioned impacts

2a – lasting occupation of the territory and alteration of the environment characteristics. Since the project area is represented primarily by man-made types of biotopes (arable lands, hedgerows), creation of insignificant by area infrastructure will not become dangerous for gatherings of the transit and feeding passages of the birds, as the larger part of the territory will remain unchanged.

Analysis of the field studies points at the absence of migratory gatherings of the birds within 330 kV OTL. Our observations of seasonal migrations in the area of already existing OTLs show quite high maneuvering skills of the larger part of the birds which freely pass the overhead lines by. Increased risk of birds collision with 330 kV OTL poles and wires exists only during short periods with bad weather conditions (fog and strong wind).

Negative impact on migratory birds is average.

2b – hazing by vertical mast structures. For the migratory birds vertical structures are a signal for a short-time change of the route, and the large area of territories adjacent to 330 kV OTL will allow to make it without any obstacles. Moreover, insignificant density of equipment placement will not obstruct feeding passages of the birds because of significant distances between the power poles. Powerful power transmission lines pass near the project territory. Special observations revealed no negative effect on the migratory birds both from the side of vertical structures (towers/poles) and horizontal structures (electrical wires). Negative impact on migratory birds is estimated as low.

2c – barrier impact and obstacles for passage.

According to spring 2016 observations results, 48% of birds migrating within 330 kV OTL area and in the buffer zone (500 m) use height ranges from 0 to 25 m, which is a safe height. Approximately other 7% are flying at heights over 200 m (transit migrants). Therefore, a group of birds which received no negative effect at all makes up 55%. For other bird species in the project territory there are no factors which would condition birds passages along fixed routes, so they use alternative spaces to freely pass by the obstacles and avoid the barrier impact.

Based on the summarized analysis of potential threats, we need to state that the barrier impact for migratory birds is low.

3. Impacts conditioned by the operation of the overhead power transmission line.

3a – additional development of the territories. Negative impact is low for migratory birds.

3b – annoyance due to night illumination. A percentage of birds migrating within the 330 kV OTL in the night is insignificant. And small by the number and species diversity transit migrants will not sense night illumination within the sites thanking to illumination of the adjacent settlements. Parallel studies of the activity of bats in the dark time in the project territory made it possible to observe the night ornithological situation. As a result of the performed work we found no cases of creation of dangerous situation due to night migrations of birds.

Negative impact of this factor is estimated as very low.

3c – collisions with the 330 kV OTL infrastructure elements. Estimating the data from observations of the migration in the spring 2016, in particular such important aspects as total number of birds, dynamics of the passage intensity, characteristic of the migration height and directions, daily activity, we may tell that negative impact on the migrants was low. We recorded no cases of collisions on the existing power networks. Potential threat for birds is present in the periods of bad weather and climate conditions (fog, strong wind). For minimizing this effect it is necessary to make a provision in the design of the power transmission line poles for ornitho-protective gear to disable bird deaths from electrical

shock, as well as for visual hazing devices at certain sections of 330 kV OTL (southern outskirts of Sadove Village).

3.4. Assessment of the ornithological situation in the nesting period 2016

In the nesting period birds were studied during several expeditionary visits which covered the territory of the designed 330 kV OTL, 500-meter buffer zones, with compulsory study of the adjacent territories. Please note that phenological terms of the nesting period for different species are very time-stretched, so first observations of the nesting behavior started during the study of the migratory state of the birds in April, when nesting behavior is typical for majority of species (herons, cormorants, gulls, larks, starlings etc.). In May, the observations produced unconditional proof of the nesting of various species in the research territory since almost all birds were sitting in their nests. Therefore, collection of the information about ornithological situation in the nesting period was performed 23 to 25 April and 10 to 15 May.

Assessment of the nesting situation in the territory of 330 kV OTL

Out of 19 bird species for which nesting in the research area is proved only 1 (or 5.3%) species was encountered directly within the area of 330 kV OTL, and 3 species – in the buffer zones (Table 3.22).

Table 3.22. Distribution of nests within the 330 kV OTL, buffer zones and adjacent territories in the nesting period 2016

Item #	Species		Number*			
			OTL	BZ	AT	Total
1	Common kestrel (*Falco tinnunculus*)				3	**3**
2	Common quail (*Coturnix coturnix*)				1	**1**
3	Woodpigeon (*Columba palumbus*)				3	**3**
4	Turtle dove (*Streptopelia turtur*)				1	**1**
5	Long-eared owl (*Asio otus*)				1	**1**
6	Little owl (*Athene noctua*)				1	**1**
7	Tawny pipit (*Anthus campestris*)				1	**1**
8	Red-backed shrike (*Lanius collurio*)				2	**2**
9	Lesser grey shrike (*Lanius minor*)			2	3	**5**
10	European magpie (*Pica pica*)			1	1	**2**
11	Hooked crow (*Corvus cornix)*		1	1	3	**5**
12	Barred warbler (*Sylvia nisoria*)				1	**1**
13	Garden warbler (*Sylvia borin*)				3	**3**
14	Common whitethroat (*Sylvia communis*)				1	**1**
15	Thrush nightingale (*Luscinia luscinia*)				1	**1**
16	Chaffinch (*Fringilla coelebs*)				2	**2**
17	European greenfinch (*Chloris chloris*)				1	**1**
18	European goldfinch (*Carduelis carduelis*)				1	**1**
19	Yellowhammer (*Emberiza citrinella*)				2	**2**
	Total	**species**	**1**	**3**	**19**	**19**
		nests	**1**	**4**	**32**	**37**

Notes: * – number includes all registered nesting couples; **OTL**– 330 kV OTL territory; **BZ** – buffer zones; **AT** – adjacent territories.

Under the proven nesting we mean availability of nests, nestlers, nesting behavior (mating call, drawing away from the nest, display, aggressive behavior etc.) or cases when destroyed nests, died nestlers, eggs were found. Total number of nests in the territory reaches as many as 37. Considering extremely covert behavior of certain bird species (lark, partridge, quail, owls, warblers etc.), we estimate that the undercount is around 20% what allows us to claim about the presence in the project area of approximately 50 nests belonging to at least 20-25 bird species (Table 3.23 and Figure 3.18, as well as Annex 1, AutoCAD diagram map, Figure 1.5).

The dominant species were lesser grey shrike (Lanius minor) – 5 nests and hooked crow (Corvus cornix) – also 5 nests. No colonial settlements of birds were found within the project territories, although in the man-made forest plantation located in the adjacent territories near Mordvynivka Village we observed 9 nests of 8 species which were situated close to each other.

Table 3.23. Results of the censuses of birds nesting in the area of 330 kV OTL, conducted on 23-25 April and 10-15 May 2016 (numbering IAW the diagram map, Figure D 1.5)

Item #	Species	Nests
1	Little owl (*Athene noctua*)	1
	Hooked crow (*Corvus cornix)*	1
2	Yellowhammer (*Emberiza citrinella*)	1*
	Barred warbler (*Sylvia nisoria*)	1*
	Garden warbler (*Sylvia borin*)	2*
	Common whitethroat (*Sylvia communis*)	1
	Long-eared owl (*Asio otus*)	1*
	European greenfinch (*Chloris chloris*)	1*
	Red-backed shrike (*Lanius collurio*)	1
	Chaffinch (*Fringilla coelebs*)	1
3	Turtle dove (*Streptopelia turtur*)	1
4	Woodpigeon (*Columba palumbus*)	1
5	Common kestrel (*Falco tinnunculus*)	1
6	Thrush nightingale (*Luscinia luscinia*)	1*
7	Hooked crow (*Corvus cornix)*	1
8	Lesser grey shrike (*Lanius minor*)	1
9	Common quail (*Coturnix coturnix*)	1*
10	Tawny pipit (*Anthus campestris*)	1
11	Chaffinch (*Fringilla coelebs*)	1
	Red-backed shrike (*Lanius collurio*)	1
	European goldfinch (*Carduelis carduelis*)	1*
12	Woodpigeon (*Columba palumbus*)	1
	Garden warbler (*Sylvia borin*)	1
	Common kestrel (*Falco tinnunculus*)	1
	Yellowhammer (*Emberiza citrinella*)	1
13	European magpie (*Pica pica*)	1
14	Woodpigeon (*Columba palumbus*)	1
15	Hooked crow (*Corvus cornix)*	1
16	Common kestrel (*Falco tinnunculus*)	1
17	Hooked crow (*Corvus cornix)*	1
18	Lesser grey shrike (*Lanius minor*)	1
19	Lesser grey shrike (*Lanius minor*)	1
20	Hooked crow (*Corvus cornix)*	1
21	Lesser grey shrike (*Lanius minor*)	1
22	European magpie (*Pica pica*)	1
23	Lesser grey shrike (*Lanius minor*)	1
Total (species/nests)		**19/37**

Note: * - nesting behavior

As regards representatives of the Corvidae family which nest in the project territory, we found nests of hooked crow (*Corvus cornix*) (5 nests) and European magpie (*Pica pica*) (2 nests). They all were located individually except for one nest near which we also registered a little owl (Athene noctua) nest. The birds built their nests in hedgerows on trees of black locust (*Robinia pseudoacacia L.*).

Number of other bird species is extremely low and finds itself within the range from individual nests of a particular species (kestrel, yellowhammer, shrikes, chaffinch etc.) to several couples (garden warbler).

Overall composition of the ornithological complex of 330 kV OTL includes 19 species of 5 taxa, of which 13 species (68.4%) belong to the passeriformes range, with the number of 54 specimens or 73.0% (Table 3.24).

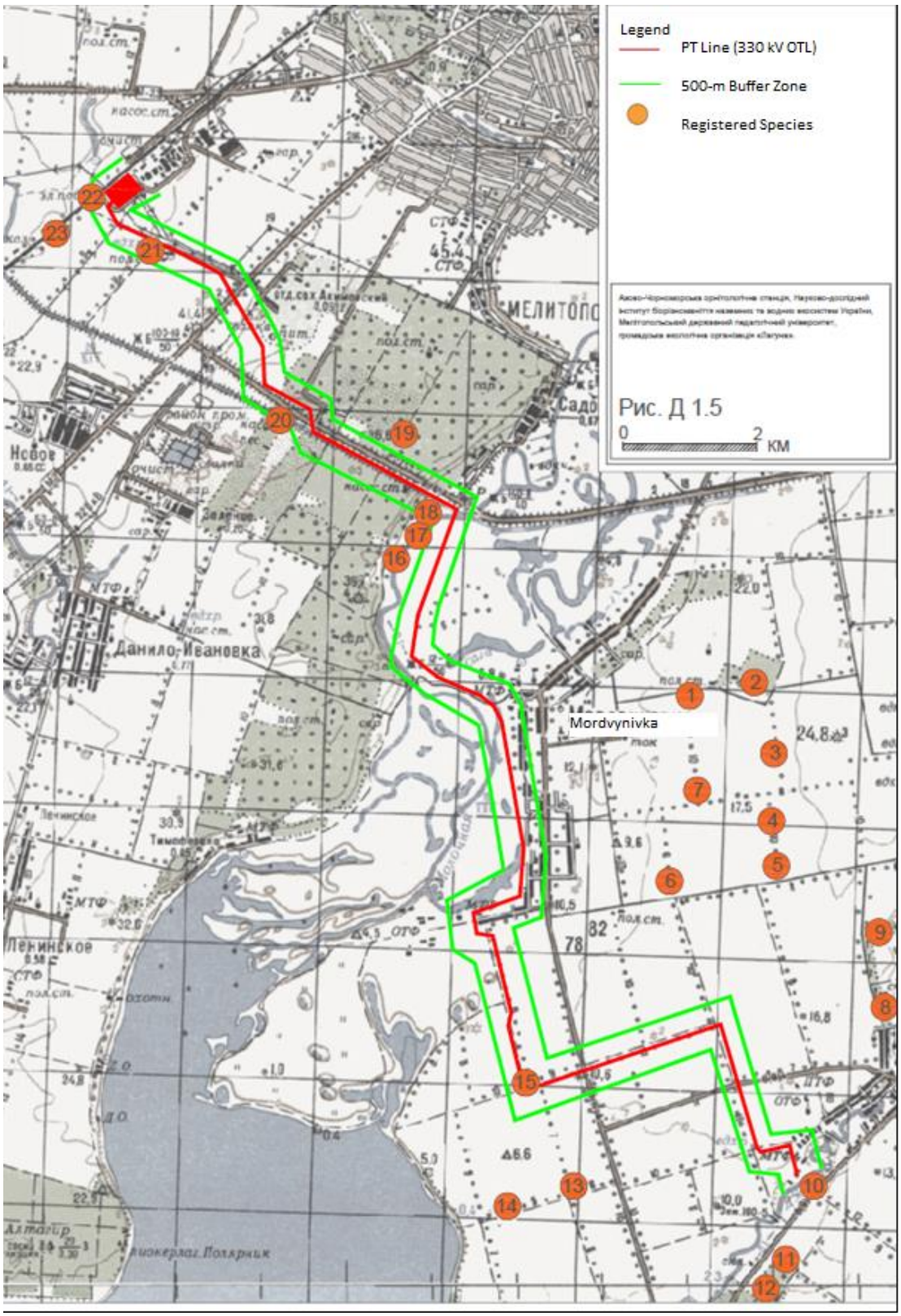


Fig. 3.18. Distribution of bird nests within the territory of 330 kV OTL in the nesting period 2016 (legend can be found in Table 3.23)

Table 3.24. Taxonomic characteristic of the nesting ornithological complex within the 330 kV OTL, buffer zones and adjacent territories in 2016

Range	OTL 330 kV		Buffer zones		Adjacent territories		Σ	
	species	specimens	species	specimens	species	specimens	species	specimens
Falconiformes	-	-	-	-	1	6	1	**6**
Galliforms (*galliformes*)	-	-	-	-	1	2	1	**2**
Columbiformes	-	-	-	-	2	8	2	8
Owls (*strigiformes*)	-	-	-	-	2	4	2	**4**
Passeriformes	1	2	3	8	13	44	13	**54**
Total	**1**	**2**	**3**	**8**	**19**	**64**	**19**	**74**

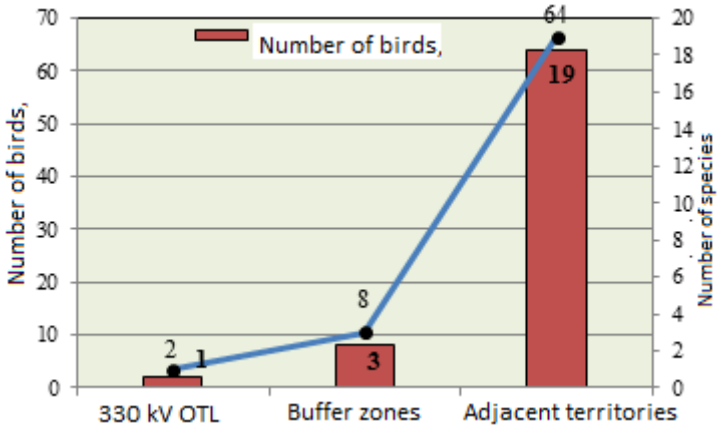


Fig. 3.19. Diversity and number of birds within the 330 kV OTL, buffer zones and adjacent territories in the nesting period

After comparing the species diversity and number of birds in particular areas we have to state that the designed 330 kV OTL, in addition to the lowest indicators of the species diversity (1 species), has the lowest indicators of the number of birds (2 specimens, 2.7%) as well. In its turn, obvious situation was created in the adjacent territories: we observed there both the biggest species diversity and the highest number of birds. Characteristic of the diversity and number of birds is shown in Figure 3.19. Nesting complex of the birds within the project territory is represented primarily by man-induced complex birds.

Man-induced complexes, which are the bird nesting places, in their turn, are represented by two (2) types: village settlements and agricultural lands with hedgerows.

Village settlements. Nesting ornithological complex of the village settlements partially located within the project buffer zones is typical for coastal villages of the region, with the same species composition of birds. These are usually such species as European starling (Sturnus vulgaris), sparrows (house – *Passer domesticus* and Eurasian tree sparrow– *Passer montanus*), barn swallow (*Hirundo rustica*), crested lark (*Galerida cristata*), white wagtail (*Motacilla alba*), European greenfinch (Chloris chloris), hoopoe (*Upupa epops*). Among them there are no species referred to the national or international conservation lists.

Agricultural lands with hedgerows. In the man-made complex of agricultural lands within the adjacent project territories prevail open spaces (agricultural lands) and hedgerows with various condition of trees and shrubs (intensity and age). We registered here individual nesting couples of common quail (*Coturnix coturnix*) and tawny pipit (*Anthus campestris*). Trees and shrubs complex of the birds within the buffer zones is insignificant in terms of the species composition and number. We observed here during the nesting: common kestrel (Falco tinnunculus), woodpigeon (Columba palumbus), turtle dove (Streptopelia turtur), long-eared owl (Asio otus), little owl (Athene noctua), lesser grey shrike (*Lanius minor*) red-backed shrike (*Lanius collurio*), European magpie (Pica pica), hooked crow (Corvus cornix), garden warbler (*Sylvia borin*), common whitethroat (*Sylvia communis*) тand barred warbler (*Sylvia nisoria*), thrush nightingale (Luscinia luscinia), chaffinch (Fringilla coelebs), European greenfinch (Chloris chloris), European goldfinch (Carduelis carduelis) and yellowhammer (Emberiza citrinella). Strong multirow hedgerows with shrubs are the places where primarily passeriformes nest. Other hedgerows without shrubs but with tall trees host mainly small carnivorous birds and Corvidae, while the number of passeriformes goes down significantly. We didn't observed any birds listed in the national or international red lists in the ornithological complex of this type of habitats. Generally, out of 37 nests of 19 species in the buffer zones we counted 4 nests of 3 species, while in the adjacent territories –32 nests of 19 species (Table 3.22, Figure 3.18).

3.4.1. Distribution of birds counted in the nesting period of 2016, by the international and national nature conservation lists

In 2016 in the nesting period no birds listed in the Red Book of Ukraine were registered in the research territory (Table 3.25).

Distribution of birds counted in the nesting period of 2016, by the international nature conservation lists and conventions

In addition to identification of the ornithological fauna representatives during the nesting period, as well as their number and distribution within the research territory, there appeared a necessity to rate them by nature protection lists: Red Book of Ukraine, list of the International Union for Conservation of Nature (IUCN), European Red List, Bonn and Bern Conventions, and the Washington Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (table 3.25).

Table 3.25. Distribution of birds counted in the nesting period of 2016, by the nature conservation lists

Item #	English name	Scientific name	Status	ERL	RDBU	IUCN	BERN	BONN	CITES
1	Common kestrel	*Falco tinnunculus*	m, w, n				2	2	2
2	Common quail	*Coturnix coturnix*	m, w, n				3	2	
3	Woodpigeon	*Columba palumbus*	m, w, n						
4	Turtle dove	*Streptopelia turtur*	m, n				3		
5	Long-eared owl	*Asio otus*	m, w, n				2		2
6	Little owl	*Athene noctua*	m, w, n				2		2
7	Tawny pipit	*Anthus campestris*	m, n				2		
8	Red-backed shrike	*Lanius collurio*	m, n				2		
9	Lesser grey shrike	*Lanius minor*	m, n				2		
10	European magpie	*Pica pica*	m, w, n				2		
11	Hooded crow	*Corvus cornix*	m, w, n				2		
12	Barred warbler	*Sylvia nisoria*	m, n				2		
13	Garden warbler	*Sylvia borin*	m, n				2		
14	Common whitethroat	*Sylvia communis*	m, n				2		
15	Thrush nightingale	*Luscinia luscinia*	m				2	2	
16	Chaffinch	*Fringilla coelebs*	m, w, n				3		
17	European greenfinch	*Chloris chloris*	m, w, n				2		
18	European goldfinch	*Carduelis carduelis*	m, w, n				2		
19	Yellowhammer	*Emberiza citrinella*	m, w, n				2		

Notes: **Status**: m – species found during seasonal migrations; w - species found in the winter period; n - species found in the nesting period.

RDBU - protected by the Red Book of Ukraine: **EN -** endangered; **VU** - vulnerable; **RAR** - rare; **PL -** priceless.

IUCN - conservation status of the International Union for Conservation of Nature: **EN** – endangered; **NT** – near threatened; **VU** – vulnerable; **LC** – least concern.

ERL - conservation status of the European Red List: **VU – (Vulnerable)** species which can be in a nearest future referred to endangered category if the factors affecting their status will continue to act; **EN – (Endangered) -** species which are under danger of vanishing; their conservation is hardly possible and reproduction is impossible with special actions and measures.

BONN - Bonn Convention: **Annex I (1)** includes species which are under the danger of vanishing; **Annex II (2)** includes species which condition is unfavorable and which conservation and management requires international treaties, as well as species which condition would significantly improve as a result of international cooperation that may be achieved based on international treaties. The same species may be referred both to Annex 1 and Annex II.

BERN - The Bern Convention or Convention on the Conservation of European Wildlife and Natural Habitats, includes **Annex II (2)** - list of fauna species subject to special protection; **Annex III (3)** - fauna species subject to conservation.

CITES - The Washington Convention on International Trade in Endangered Species of Wild Fauna and Flora: **Annex I (1)** includes species "which are endangered and trade in which has or may have negative impact on their existence. Trade in specimens of such species shall be subject to extremely strict regulation in order not to further endanger their survival, and shall be allowed only in exclusive cases"; **Annex II (2)** includes: a) "all species that are not necessarily threatened with extinction, but may become so unless trade in specimens of such species is subject to strict regulation in order to avoid utilization incompatible with the survival of the species in the wild"; and b) "other species which must be subject to regulation in order that trade in specimens of certain species referred to in sub-paragraph (a) of this paragraph may be brought under effective control".

As can be seen from Table 3.25, representatives of the nesting period complex in the area of 330 kV OTL, buffer zones and adjacent territories are put to 3 of 6 nature conservation lists. Most of them were referred to the Bern Convention (18 species out of 19, or 94.7%) of which 15 species – subject to the special protection and 3 are subject to protection. 3 species of the ornithological comples are listed in the Bonn Convention - Annex II (which condition is unfavorable). Moreover, 3 species belong to the Washington Convention on International Trade in Endangered Species of Wild Fauna and Flora (Annex II).

No species listed in the Red Book of Ukraine, European Red List and IUCN List were registered.

As regarding the degree of inclusion of birds to the nature conservation lists, the following situation manifests. Of 19 species, 1 species (5.3%) does not belong to any of the nature conservation documents (yellow-legged gull – *Larus cachinnans).* The great majority of the nesting period ornithological complex representatives belongs to List 1 or List 2 (13 and 4 species respectively), 1 species (5.3%) - to 3 documents, and no species which belong to 4, 5 and 6 documents.

3.4.2. Assessment of impacts conditioned by the 330 kV OTL construction and operation on the nesting ornithological complexes

1. Construction-conditioned impacts

During the construction of wind turbines negative impacts can be conditioned by the following factors:

1a – hazardous substances emissions. During the construction hazardous substances emissions will not exceed allowable limits due to insignificant number of machinery and equipment, and absence of stationary pollution sources. No negative impact on the nesting birds is observed.

1b – hazing by visual effects and noise. Presence of machinery and people on the site, as well as noise they generate, may have insignificant negative effect on the birds if such activity is carried out within the nesting areas or near them. This is primarily applicable to larks and hedgerow birds (European magpie - *Pica pica*, common kestrel – *Falco tinnunculus*). This factor action decreases due availability of alternative nesting places not only in the project territory but also outside it (even more suitable), what allows the birds to choose safe nesting stations. Therefore, negative effect of this factor can be estimated as very low.

1c – occupation of the territory by working sites and equipment. During construction fo 330 kV OTL the infrastructure has local nature by the scale and is characterized by short period of technological works. Despite of a significant number of power poles, their density, location of the work sites and equipment - are characterized by low indicators, so they do not obstruct the feeding migrations of the birds and placement of nests. This negative impact on birds during the construction period is estimated as low, and it is absent during the Wind Park operation.

1d – loss of the breeding places. As regards the birds which nest within the 330 kV OTL, the loss of the breeding places is not significant for them. Insignificant species composition and their low number enable to freely choose nesting places. Expected area to be occupied by the equipment will be small in term of the size. Insignificant loss of the nesting places will have not a continuous but a mosaic nature thus leaving a larger part of the project territory free for choosing the nesting places. Moreover, most species registered at nesting are common and widely spread in the region.

Let us stop for a moment on some aspects of the biology of certain species which may be positively affected by the 330 kV OTL construction and operation. The point is about bird species which may use 330 kV OTL poles for nesting. These are primarily representatives of the Corvidae family (common raven - *Corvus corax*, hooded crow - *Corvus cornix*, jackdaw - *Corvus monedula*) and certain falcons (saker falcon - *Falco cherrug*). In the niches of the poles we registered nesting of such species as Eurasian tree sparrow (*Passer montanus*) and common kestrel (*Falco tinnunculus*).

Negative impact of this factor is estimated as low and as such that may have positive effect.

1e – loss of individual specimens of the protected species.

During the nesting period of 2016 we registered within the project territory no nesting of the bird species included to the nature conservation lists.

The negative impact is evaluated as low.

2. Equipment-conditioned impacts

2a – lasting occupation of the territory and alteration of the environment characteristics. Since the project area is represented exclusively by man-made types of biotopes (arable lands, hedgerows), creation of the 330 kV OTL infrastructure will not become dangerous for nesting and feeding passages of the birds. Machinery and personnel which will operate at the construction during a certain period of time will create insignificant man-induced load on the birds and their nesting places. No significant changes in the dominant nesting biotopes (hedgerows) are forecasted.

The impact is evaluated as insignificant.

2b – hazing by vertical mast structures. For the nesting birds vertical structures are a signal to choose other place for nesting, and large area of alternative plots allows to make it freely. Moreover, there is a high-voltage power transmission line nearby. Special observations revealed no negative effect on the birds both from the side of vertical structures (towers/poles) and horizontal structures (electrical wires). Negative impact on the birds during the nesting period is low.

2c – barrier impact and obstacles for passage. During the nesting period when there is no task to travel large distances and the birds switch to enhanced precautiousness, passage heights go down and are characterized by the range 0-15 m. Species composition of the birds which replicate during the nesting period within the project territory or visit it for feeding is lower than during the migrations. The design distance between the power poles is sufficient not to create linear barriers. Local birds quickly get used to the existing structures, therefore negative impact on the birds is low, and is absent for most nesting bird species.

3. 330 kV OTL operation conditioned impacts

3a – additional development of the territories. Since there will be no significant alterations to the dominating landscapes during the construction, nesting capacity of the biotopes will remain unchanged. Increase or decrease in the number of birds during the nesting period to a great extent depends on the population waves and man-induced factor from the side of permanent agricultural works during the year, which are several times higher than the degree of the wind park impact.

3b – annoyance due to night illumination. Majority of the birds stop their activity for the night hours during the nesting period. Observations of the bird nests near the illuminated buildings revealed no negative effect of the light on success of replication. There is no negative effect from the annoyance of birds due to the night illumination.

3c – collisions with the 330 kV OTL infrastructure elements. Upon evaluating the data of observations over the birds behavior near the high-voltage power transmission line, we can confirm their free passage through this uninterrupted linear barrier. Special studies also show that infrastructural elements of 330 kV OTL are not considered as obstacles for the majority of the birds. The negative impact is low.

3.3.2. Monitoring of the autumn 2016 migration.

Characteristic of the ornithological complex of birds within the 330 kV OTL, buffer zones and adjacent territories during the summer migration in 2016

Main methods to collect the data were vehicle-aided censuses and censuses conducted from the observation posts; these censuses were conducted on 7 August 2016. Cartographic materials are presented in AutoCAD application (Annex 1, Fig. D 1.6, Tables 1.6 - 1.6.1). Due to quite intense heat in summer 2016, censuses were conducted only in the morning (before noon) and evening hours of the day, when the birds were most active. During the observation period we researched the larger part of the 330 kV OTL project territory, buffer zones and adjacent territories.

Upmost attention we paid to location of the mass waterfowl species and carnivorous birds, presence/absence of those listed in the Red Book of Ukraine, and we also determined the inclusion of the registered birds to the other nature conservation documents.

It's worth mentioning that construction and operation of 330 kV OTL will pose almost no threat for the overwhelming majority of the birds during the post-nesting period, especially for those belonging to the habitants of open spaces, trees and shrubs and synanthropic group. There are many other operating power transmission lines in the area of installation of the design one, and the birds get used to them quite quickly and freely pass them by.

Taxonomic characteristic of the ornithological complex of birds within the 330 kV OTL, buffer zones and adjacent territories in summer 2016

All birds registered during creation of post-nesting and pre-migratory gatherings belong to 7 taxonomic ranges - *podicipediformes, ciconiiformes, falconiformes*, *charadriiformes*, *columbiformes*, *upupiformes and passeriformes* (Tables 3.26 - 3.27, Fig.3.20).

Table 3.26. Taxonomic characteristic of the ornithological complex within the 330 kV OTL, buffer zones and adjacent territories in summer 2016

Range	OTL and BZ		Adjacent territories		∑	
	n species	n specimens	n species	n specimens	n species	n specimens
Podicipediformes	-	-	1	17	**1**	**17**
Ciconiiformes	-	-	2	3	**2**	**3**
Falconiformes	1	5	4	12	**4**	**17**
Charadriiformes	-	-	3	6	**3**	**6**
Columbiformes	1	50	2	5	**3**	**55**
Upupiformes	1	2	-	-	**1**	**2**
Passeriformes	14	334	6	152	**17**	**486**
Total	**17**	**391**	**18**	**195**	**31**	**586**

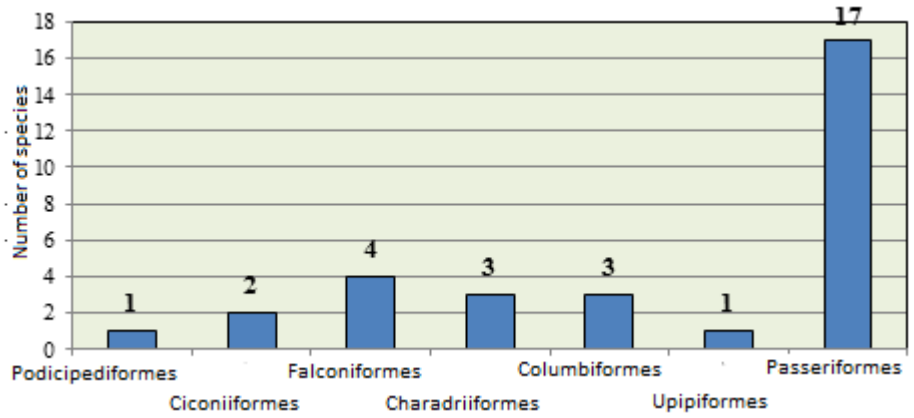


Fig. 3.20. Species representation of the bird taxa registered in summer 2016 within the 330 kV OTL, buffer zones and adjacent territories

Absolute dominants were representatives of passeriformes – 17 species. High species diversity cause also high number of birds belonging to a particular group: first position belongs to passeriformes (486 specimens), then follow columbiformes (55 specimens), and then - podicipediformes and falconiformes (17 speciments of each group) - Table 3.26.

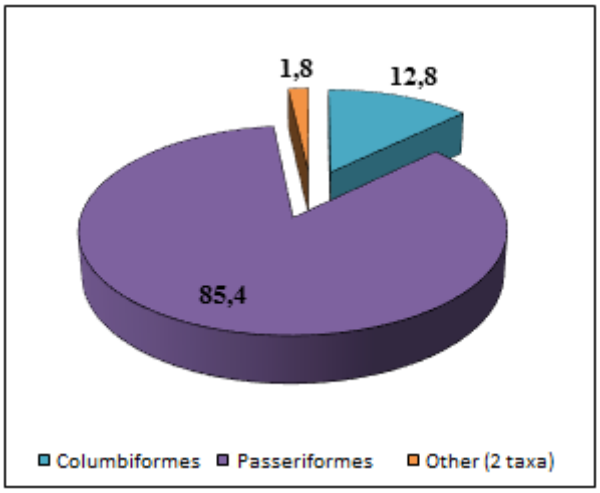
More detailed analysis of the territorial birds distribution showed the following trend in the dominance of particular taxa. It should be emphasized in the very beginning that there were only 2 specimens of 1 falconiformes species observed directly within the designed 330 kV OTL. Within 500-meter buffer zones largest species diversity in the summer belonged to passeriformes, which were also dominating that time in terms of the number (14 species, 334 specimens or 85.4%), then followed columbiformes (1 species, 50 specimens); other taxa were small both in species and in number (Table 3.26, Figure 3.21A).

The situation was slightly different in the adjacent territories. In summer 2016 the dominant group in terms of number and taxa here was also passeriformes (6 species, 152 specimens), while the subdominating were podicipediformes (1 species, 17 specimens) and falconiformes (4 species, 12 specimens) (Table 3.26, Figure 3.21B).

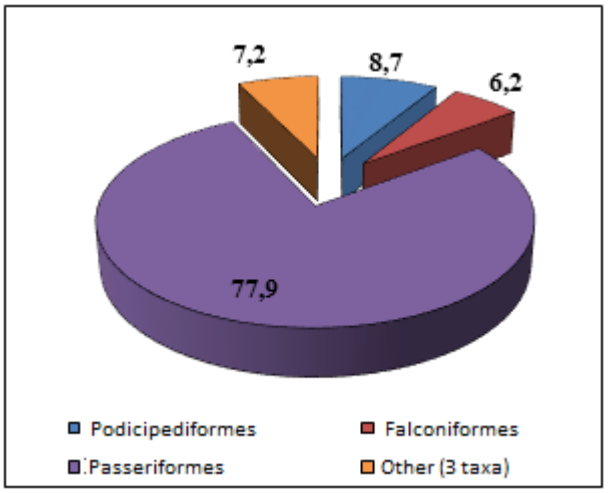
Such pattern structure is explained by the presence of relevant biotopes which are chosen by a certain group of birds. It is difficult to expect a large number of representatives of podicipediformes,

ciconiiformes or charadriiformes within 330 kV OTL and its buffer zones due to complete agricultural development of the territory.

In each taxonomic group there were bird species which prevailed over the other in numbers. So, among passeriformes - small passeriformes – *Passer spp.* reached 35.4% of the number, barn swallow – *Hirundo rustica* – 31.9%, and rook (Corvus frugilegus) – 11.3%, in other groups the dominant were: among columbiformes - rock pigeon – *Columba livia varia domestica* (90.9%), among falconiformes - common kestrel (Falco tinnunculus (76.5%), and among podicipediformes - great crested grebe – *Podiceps cristatus* – compiled 100% of the number (17 specimens).



A. Summer 2016, OTL and BZ



B. Summer 2016, adjacent territories

Fig. 3.21. Comparative taxonomic characteristic of the ornithological complex within the 330 kV OTL, buffer zones and adjacent territories in summer 2016 (number of birds in %)

Quantitative Characteristic.

Total number of the registered 31 species of birds equals to 586 specimens, of which 2 specimens only (or 0.3% of all registered birds) were observed in directly within 330 kV OTL, 389 specimens (66.4%) were observed in 500-meter buffer zones, and 195 specimens (33.3%) - in the adjacent territories. Such distribution of birds by different territories is understandable due to a small area of 330 kV OTL compared with the area of the adjacent plots, and larger diversity of habitats located on the latter (Table 3.27).

Most numerous in the buffer zones were barn swallow (*Hirundo rustica*), small passeriformes (*Passer spp.*) and rock pigeon (*Columba livia varia domestica*), which were found 327 specimens or 84.1%. Number of other bird species was 62 specimens. No semi-aquatic birds were registered here, all 398 specimens were land birds.

Since near the research territory there are primarily farmed ecosystems and hedgerows and, in a lesser degree, Molochnyi Estuary Wetland, we would expect the dominance of upland bird species in the adjacent territories; the analysis of the obtained results shows exactly this trend. So, during the observations we registered 148 specimens (or 75.9%) of the bird species which lead toward upland habitats.

The dominant here were rook (Corvus frugilegus), small passeriformes (*Passer spp.*) and lesser grey shrike (Lanius minor). Number of the semi-aquatic species in the adjacent territories was 47 specimens. Most numerous of them were sand martin (*Riparia riparia*) and great crested grebe (*Podiceps cristatus*).

More detailed characteristic of the species composition and distribution of birds during post-nesting and pre-migratory gatherings within the designed 330 kV OTL, in buffer zones and in adjacent territories is given in Table 3.27 and in Annex 1 (Tables 1.6-1.6.1 and AutoCAD schematic map Fig. D 1.6).

It should be noted that only 14.3% of the registered birds (84 specimens) made feeding migratory passages within the 330 kV OTL, buffer zones and adjacent territories, searching for the food.

Table 3.27. General characteristic of the ornithological complex within the designed 330 kV OTL, buffer zones and adjacent territories in summer 2016

Item #	Species		OTL	BZ	AT	Total
1	Great crested grebe (*Podiceps cristatus)*				17	**17**
2	Little egret (*Egretta garzetta*)				1	**1**
3	Grey heron (*Ardea cinerea*)				2	**2**
4	Western marsh-harrier (*Circus aeruginosus*)				1	**1**
5	Long-legged buzzard (*Buteo rufinus*)				2	**2**
6	Common buzzard (*Buteo buteo*)				1	**1**
7	Common kestrel (*Falco tinnunculus*)		2	3	8	**13**
8	Mediterranean gull *(Larus melanocephalus)*				3	**3**
9	Black-headed gulls (*Larus ridibundus*)				1	**1**
10	Yellow-legged gull (*Larus cachinnans*)				2	**2**
11	Woodpigeon (*Columba palumbus*)				1	**1**
12	Rock pigeon (*Columba livia var. domestica*)			50		**50**
13	Turtle dove (*Streptopelia turtur*)				4	**4**
14	Hoopoe (*Upupa epops*)			2		**2**
15	Barn swallow (*Hirundo rustica*)			155		**155**
16	Sand martin (*Riparia riparia*)				20	**20**
17	Skylark (*Alauda arvensis*)			2		**2**
18	White wagtail (*Motacilla alba*)			5		**5**
19	Red-backed shrike (*Lanius collurio*)			2	4	**6**
20	Lesser grey shrike (*Lanius minor*)			7	21	**28**
21	Golden oriole (*Oriolus oriolus*)			1		**1**
22	Rook (*Corvus frugilegus*)				55	**55**
23	Hooded crow (*Corvus cornix)*			1		**1**
24	Common raven (*Corvus corax*)			1		**1**
25	Northern wheatear (*Oenanthe oenanthe*)				1	**1**
26	Thrush nightingale (*Luscinia luscinia*)			1	1	**2**
27	House sparrow (*Passer domesticus*)			10		**10**
28	Eurasian tree sparrow (*Passer montanus*)			20		**20**
29	European greenfinch (*Chloris chloris*)			1		**1**
30	Corn bunting (*Emberiza calandra*)			1		**1**
31	Yellowhammer (*Emberiza citrinella*)			5		**5**
	Passeriformes (*Passer spp.*)			122	50	**172**
Total		**species**	**1**	**17**	**18**	**31**
		birds	**2**	**389**	**195**	**586**

Notes: OTL - the designed 330 kV overhead power transmission line; **BZ -** its 500-meter buffer zones; **AT** - adjacent territories.

Biotopic distribution of birds

Species diversity of birds and their number to a certain extent depend from the number of separated biotopes (Figures 3.22 - 3.23). In the studied region we found the following landscape and biotopic units: farmed ecosystems (agricultural lands), meadow and pseudosteppe vegetation areas (Mordvynivka hollow), hedgerows and man-made forest plantations and man-made landscape (solid municipal waste range and electric power substation). Each of the biotopes is the habitat for a certain group of birds (Table 3.28).

Table 3.28. Biotopic distribution of birds within the 330 kV OTL, buffer zones and adjacent territories in Summer 2016

Zones / Habitat	Habitats of birds	∑

		farmed ecosys.	hollow	hedgerows	man-made	abs.	%
330 kV OTL		2	-	-	-	**2**	**0.3**
Buffer zones		196	105	70	18	**389**	**66.4**
Adjacent territories		60	41	33	61	**195**	**33.3**
Total	**abs.**	**258**	**146**	**103**	**79**	**586**	**100**
	%	**44.1**	**24.9**	**17.6**	**13.4**	**100**	

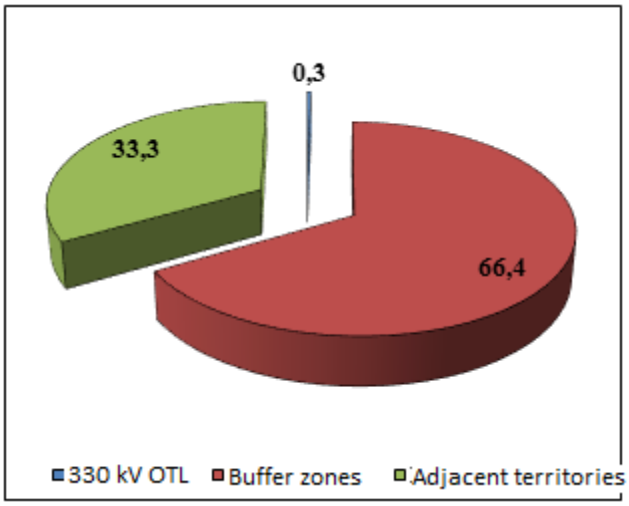


Fig. 3.22. Expansion of birds within the functional zones of the project territory, %

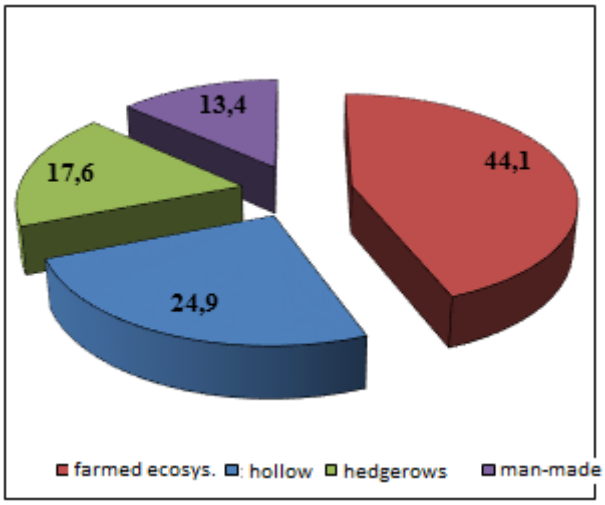


Fig. 3.23. Biotopic distribution of birds within the project territory, %

Since the project territory is located primarily among farmed ecosystems, hedgerows and other upland biotopes, it would be logical to expect the dominance of upland species; analysis of the field results revealed exactly this regularity. We registered 23 species of birds with the number of 539 specimens or 92.0%, the majority of which was observed in the buffer zones. Most often we observed barn swallow (*Hirundo rustica*), small passeriformes (*Passer spp.*), rook (*Corvus frugilegus*) and rock pigeon (*Columba livia varia domestica*). In addition to it, 47 specimens of 8 semi-aquatic species (8.0%) were registered. Most numerous of them were sand martin (*Riparia riparia*) and great crested grebe (*Podiceps cristatus*), which made 78.7% of all registered semi-aquatic birds.

The research revealed that most visited during post-nesting and pre-migratory gatherings were farmed ecosystems (258 specimens or 44.1%), Mordvynivka Hollow attracted 146 specimens (24.9%), and hedgerows and man-made forests attracted 103 specimens (17.5%). During the censuses we also studied man-made landscape areas (solid municipal waste range on the lands of Nove Village Council and 330kV Melitopol Electric Power Substation) where met 79 specimens (13.4%) (Table 3.28).

Passage directions of the birds which form post-nesting and pre-migratory gatherings

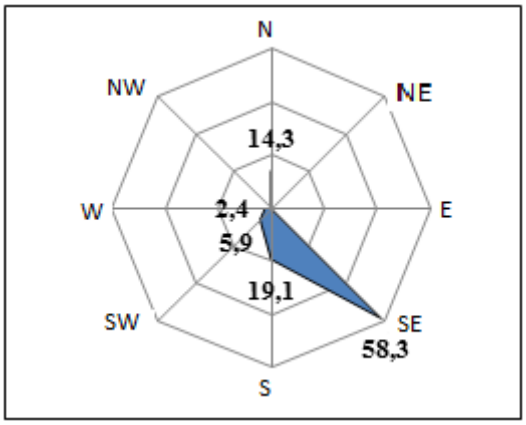


Fig. 3.24. Directions of the migration of birds within the 330 kV OTL in summer 2016

The south-eastern direction of the passages prevailed over other directions (Figure 3.24). 49 specimens flew in this direction. (58.3% of the total number of the feeding migrants). These were mainly semi-aquatic birds (gulls and sand martin) and small passeriformes which made their daily feeding passages toward the Molochnyi Estuary or to the farmed ecosystems. Moreover, we observed migratory passages of the birds in the southern (16 specimens, 19.1%), northern (12 specimens, 14.3%), south-western (5 specimens or 5.9%) and western (2 specimens or 2.4%) directions; we didn't observed birds passing in other directions in this time of the year.

Passage heights of the birds which form post-nesting and pre-migratory gatherings

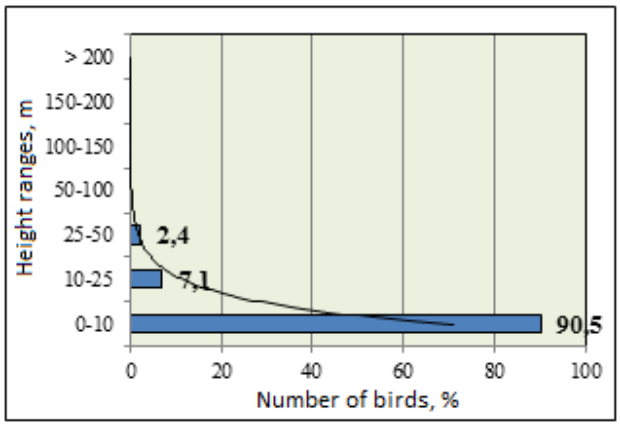


Fig. 3.25. Characteristic of the heights of the birds passage within the 330 kV OTL in summer 2016

Analysis of the research results showed that all birds (84 specimens or 100% of the total number of migrants) which make feeding migratory passages in the summer, flew at heights under 50 m (Fig. 3.25). These are primarily small passeriformes and rooks which advance along the hedgerows and through the open space at a small height. Most of them were registered in the near-ground range under 10 m (90.5%). In the height range 10-25 m we registered 6 specimens (7.1%) and in the range 25-50 m - only 2 specimens of yellow-legged gull (2.4%) (Figure 3.25).

Characteristic of the autumn migration based on the results of observations in 2016

Main tasks of the observations were study of the species composition of birds, their number, analysis of the taxonomic distribution of the whole ornithological complex, recording of directions and heights of the passage of the bird flocks. Important task was also to study birds which are mentioned in the Red Book of Ukraine or which are rare for the region, as well as to distribute the autumn migratory ornithological complex by other nature conservation documents.

Peculiarities of the study of the ornithological situation in the project territory in the autumn 2016 are shown in Figures 3.26 - 3.27.

Weather conditions

Analysis of the weather conditions in the researched area is very important due to dependence of the majority of the birds life events from such indicators as ambient temperature, wind directions and strength, atmospheric pressure, and precipitations.

Obvious is the fact of relation of the migratory processes phenology from the dynamics of weather and climate indicators. Generally, the weather in the autumn 2016 is characterized by quite abrupt temperature fluctuations and atmospheric pressure fluctuations. It was not uncommon that the temperature went down by 6-7 ^{o}C during just 1-2 days. Later, in the beginning of November, temperature reduction trend preserved. During first days of the month such values didn't exceed 8^{o}C what coincided with the end of autumn migration in the project territory.

Fig. 3.26. Studies of the autumn migration of birds within the 330 kV Melitopol substation in 2016

Fig. 3.27. Existing power transmission lines in the project territory

Average daily ambient temperatures in late August varied from 20.0 to 29.5°C, making the average of 24.8°C. The situation changed later: in September the temperature varied from 9.5 to 26.0°C, making the average of 18.3°C, in October - from 1.5 to 19.0°C, what made the average of 9.3°C (Table 3.29). Such abrupt temperature decrease undoubtedly affected the course of the migratory process. More detailed characteristic of the weather and climate conditions is provided in Table 3.29 and Figure 3.28.

Table 3.29. Characteristic of the weather conditions in late August - October 2016

Indicator	n	M±m	min	max	C_v
Air temperature. August	7	24.8±3.68	20.0	29.5	14.86
Atmospheric pressure. August	7	754.1±2.27	751.0	757.0	0.30
Air temperature. September	30	18.3±5.04	9.5	26.0	27.54
Atmospheric pressure. September	30	754.7±3.55	742.0	760.0	0.47
Air temperature. October	31	9.3±5.01	1.5	19.0	53.7
Atmospheric pressure. October	31	759.8±6.03	749.0	770.5	0.79

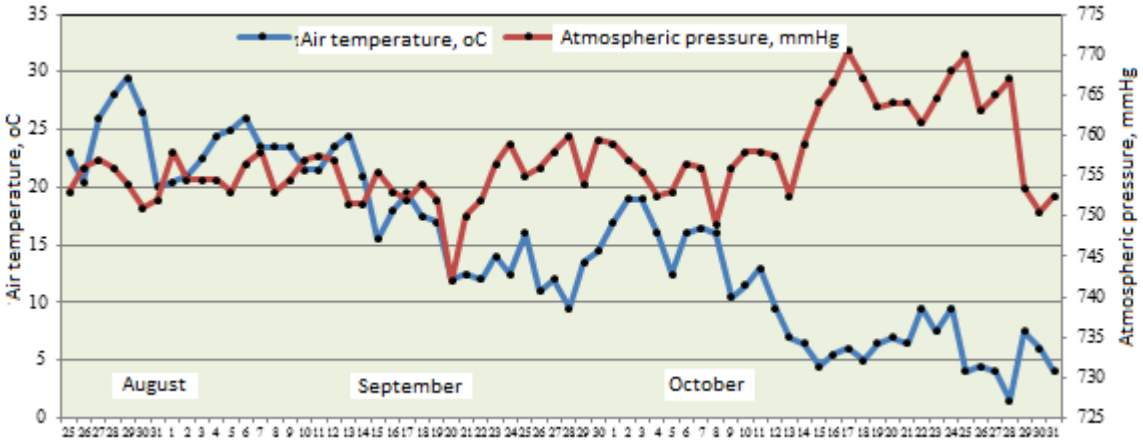


Fig. 3.28. Weather and climate characteristic of late August - October 2016 according to Mordvynivka weather station data

Taxonomic characteristic of the ornithological complex of birds within the 330 kV OTL, buffer zones and adjacent territories during the autumn migration in 2016

All birds registered during the autumn passage belong to 6 taxonomic ranges - *podicipediformes, ciconiiformes, anseriformes,*, *charadriiformes*, *columbiformes*, and *passeriformes* (Tables 3.30, Fig.3.28). The dominants were representatives of passeriformes – 14 species (Fig. 3.29). High species diversity resulted also in a large number of birds of a particular group. So, first position belongs to passeriformes (7163 specimens), then follow charadriiformes (687 specimens), anseriformes (641 specimens (641 specimens), and finally columbiformes (144 specimens) (Table 3.30).

More detailed analysis of the territorial birds distribution showed a different trend in the dominance of particular taxa. For example, within the 330 kV OTL area the highest species diversity belonged to passeriformes which then didn not dominate in numbers (2 species, 90 specimens). First position here was occupied by columbiformes (2 species, 122 specimens). We also registered here 7 specimens of 1 anseriformes species (Table 3.30, Figure 3.30A).

The situation was different in the buffer zones: first position here occupied by passeriformes (9 species, 202 specimens), and the second by ciconiiformes (2 species, 14 specimens). No representatives of other taxonomic groups were observed (Table 3.30, Figure 3.30B).

And the adjacent territories in the autumn 2016 were characterized both by the highest taxonomic and number diversity. The prevailing birds here were also passeriformes (11 species, 6871 specimens), subdominants were charadriiformes - 2 species with the number of 687 specimens, and anseriformes - 3 species with the number of 634 specimens (Table 3.30, Figure 3.30C).

If we study the situation we observed in the project territory in the autumn 2016, we may state the following. Absolute dominants were representatives of passeriformes (14 species, 7163 specimens, or 82.8%), the second place went to charadriiformes (2 species with the number of 687 specimens) and anseriformes (3 species, 641 specimens), while the third position was occupied by columbiformes (2 species, 144 specimens) (Table 3.30, Figure 3.30D).

Such pattern structure is explained by the presence of relevant biotopes which are chosen by a certain group of birds. It is difficult to expect a representatives of podicipediformes, ciconiiformes or charadriiformes exactly within 330 kV OTL due to complete agricultural development of the territory; representatives of these taxa are observed primarily in the adjacent territories and, to a lesser extent, in the buffer zones.

In each taxonomic group there were bird species which prevailed over the other in numbers. So, among passeriformes rook - *Corvus frugilegus* - reached 84.9% of the total number, European starling - *Sturnus vulgaris* – reached 9.1%; in the other groups the dominant species were: among charadriiformes - black-headed gull - Larus ridibundus – *Anser albifrons* (93.2%), among anseriformes - ducks - *Anas spp.* (70.2%) and mallard - *Anas platyrhynchos* (24.5%), and among columbiformes - rock pigeon - *Columba livia varia domestica* (83.3%)

Table 3.30. Taxonomic characteristic of the migratory ornithological complex within the 330 kV OTL, buffer zones and adjacent territories in Autumn 2016

Range	OTL 330 kV		Buffer zones		Adjacent territories		Σ	
	species	specimens	species	specimens	species	specimens	species	specimens
Podicipediformes	-	-	-	-	1	5	**1**	**5**
Ciconiiformes	-	-	2	14	-	-	**2**	**14**
Anseriformes	1	7	-	-	3	634	**3**	**641**
Charadriiformes	-	-	-	-	2	687	**2**	**687**
Columbiformes	2	122	-	-	1	22	**2**	**144**
Passeriformes	2	90	9	202	11	6871	**14**	**7,163**
Total	**5**	**219**	**11**	**216**	**18**	**8,219**	24	**8,654**

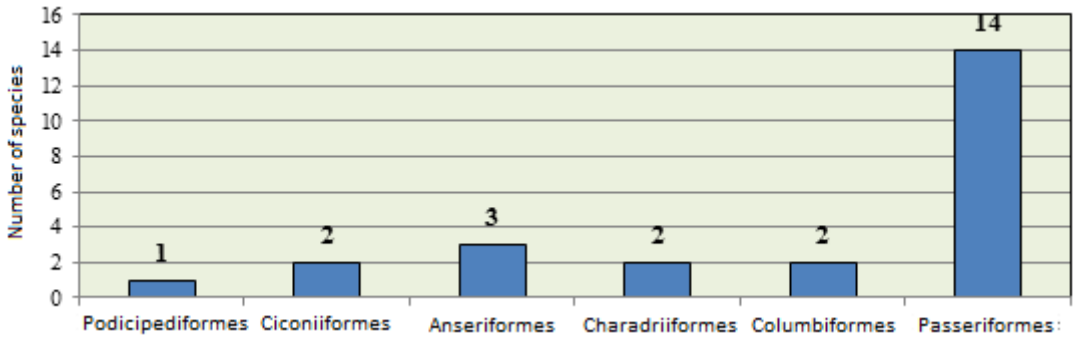
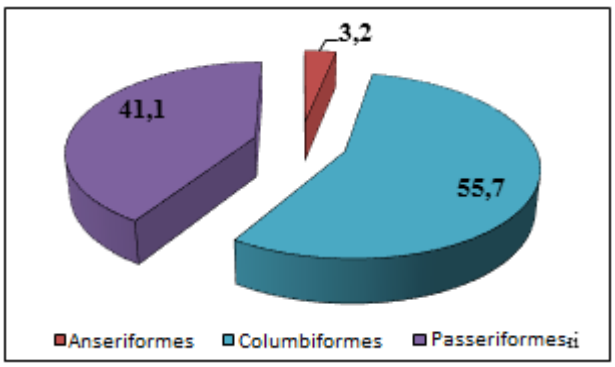
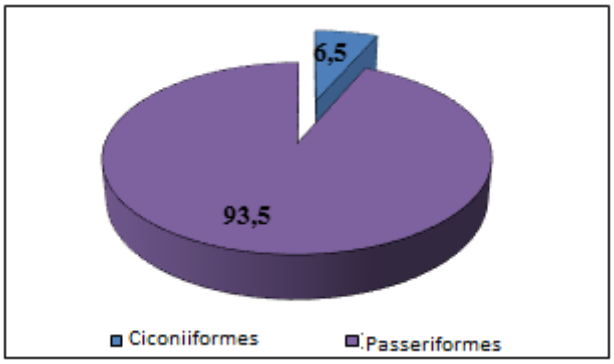


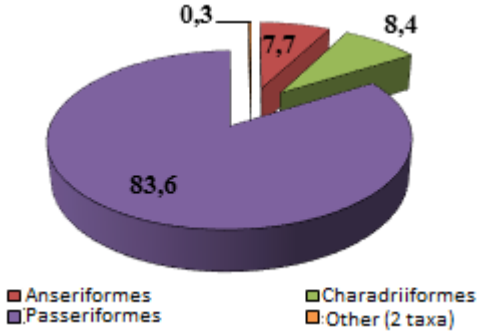
Fig. 3.29. Species representation of the bird taxa registered in autumn 2016 within the 330 kV OTL, buffer zones and adjacent territories



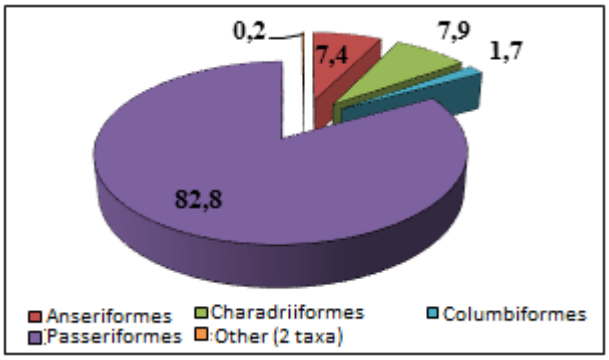
A. 330 kV OTL



B. Buffer zones



C. Adjacent territories



D. Autumn, 2016

Fig. 3.30. Taxonomic characteristic of the ornithological complex of the project territory: 330 kV OTL (A), buffer zones (B), adjacent territories (C) and the general situation in autumn 2016 (D) (number of birds in %)

Quantitative Characteristic.

Total number of the registered 24 species of birds equals to 8654 specimens, of which 219 specimens (or 2.5% of all registered birds) were observed in the very 330 kV OTL project area, 216 specimens (2.5%) - in 500-meter buffer zones, and other 8219 specimens (95.0%) - in the adjacent territories. Such distribution of the birds by different territories is understandable due to a large biotopic

diversity in the adjacent territories (Table 3.31). Most numerous in the area of 330 kV OTL and in the buffer zones were rock pigeon (*Columba livia varia domestica*), rook (*Corvus frugilegus*), and small passeriformes (*Passer spp.*) which were found 305 specimens or 70.2%. Number of other bird species was 130 specimens. In the area of 330 kV OTL and in the buffer zones we registered 414 specimens of land birds and 21 specimens of semi-aquatic birds.

Since near the research territory there are primarily farmed ecosystems and hedgerows and, in a lesser degree, Molochnyi Estuary Wetland, we would expect the dominance of upland bird species in the adjacent territories; the analysis of the obtained results shows exactly this trend. So, during the entire period of the autumn observations we registered 6893 specimens (or 83.9%) of the bird species which lead toward upland habitats.

The dominants here were European starling (Sturnus vulgaris) and rook (Corvus frugilegus). Number of the semi-aquatic species in the adjacent territories over the entire period of observations was 1326 specimens. Most numerous of them were black-headed gulls (*Larus ridibundus*), ducks (*Anas spp.*) and mallard (*Anas platyrhynchos*). More detailed characteristic of the species composition and distribution of birds during the autumn migration within the designed 330 kV OTL, in buffer zones and in adjacent territories is given in Table 3.31 and in Annex 1 (Tables 1.7.-1.8 and AutoCAD skematic map Fig. D 1.7 - D 1.8).

Total number of birds which were registered at the autumn passage is 8654 specimens. Major part of these birds was in the state of migration (5425 specimens, 62.7%) which is divided into the transit migration when birds pass big distances without stopping within the project area, and the feeding migration when birds pass small distances searching for the food. Analysis of such distribution showed that all migratory birds were just making their feeding passages.

Table 3.31. General characteristic of the migratory ornithological complex within the area of 330 kV OTL, buffer zones and adjacent territories in autumn 2016

Item #	Species		OTL	BZ	AT	Total
1	Great crested grebe (*Podiceps cristatus)*				5	**5**
2	Great white egret (*Egretta alba*)			11		**11**
3	Grey heron (*Ardea cinerea*)			3		**3**
4	Mallard *(Anas platyrhynchos)*		7		150	**157**
5	Northern pintail (*Anas acuta*)				9	**9**
6	Garganey (*Anas querquedula*)				25	**25**
	Ducks (*Anas spp.*)				450	**450**
7	Black-headed gulls (*Larus ridibundus*)				640	**640**
8	Yellow-legged gull (*Larus cachinnans*)				47	**47**
9	Rock pigeon (*Columba livia var. domestica*)		120			**120**
10	Eurasian collared dove (*Streptopelia decaocto*)		2		22	**24**
11	European starling (*Sturnus vulgaris*)				650	**650**
12	Eurasian jay (*Garrulus glandarius*)			1	1	**2**
13	European magpie (*Pica pica*)		2	3	3	**8**
14	Rook (*Corvus frugilegus*)			100	5980	**6,080**
15	Hooded crow (*Corvus cornix)*		3	2	15	**20**
16	Common raven (*Corvus corax*)				2	**2**
17	African stonechat (*Saxicola torquata*)				2	**2**
18	Fieldfare (*Turdus pilaris*)			12		**12**
19	Common blackbird (*Turdus merula)*				1	**1**
20	Eurasian tree sparrow (*Passer montanus*)			25	50	**75**
21	Chaffinch (*Fringilla coelebs*)				55	**55**
22	European goldfinch (*Carduelis carduelis*)			52	70	**122**
23	Linnet (*Acanthis cannabina*)			5		**5**
24	Corn bunting (*Emberiza calandra*)			2		**2**
	Passeriformes (*Passer spp.*)		85		42	**127**
	Total	**species**	**5**	**11**	**18**	**24**
		birds	**219**	**216**	**8,219**	**8,654**

Notes: OTL - the designed 330 kV overhead power transmission line; **BZ -** its 500-meter buffer zones; **AT** - adjacent territories.

Biotopic distribution of birds

Species diversity of birds and their number to a certain extent depend from the number of separated biotopes (Figures 3.31 - 3.32). In the studied region we found the following landscape and biotopic units: farmed ecosystems (agricultural lands), meadow and pseudosteppe vegetation areas (Mordvynivka hollow), hedgerows and man-made forest plantations and man-made landscape (solid municipal waste range and electric power substation). Each of the biotopes is the habitat for a certain group of birds (Table 3.32).

Table 3.32. Biotopic distribution of birds within the 330 kV OTL, buffer zones and adjacent territories in autumn 2016

Zones / Habitat		Habitats of birds				∑	
		farmed ecosys.	hollow	hedgerows	man-made	abs.	%
330 kV OTL		22	7	120	70	**219**	**2.5**
Buffer zones		101	17	69	29	**216**	**2.5**
Adjacent territories		139	634	169	7277	**8,219**	**95.0**
Total	**abs.**	**262**	**658**	**358**	**7,376**	**8,654**	**100**
	%	**3.1**	**7.6**	**4.1**	**85.2**	**100**	

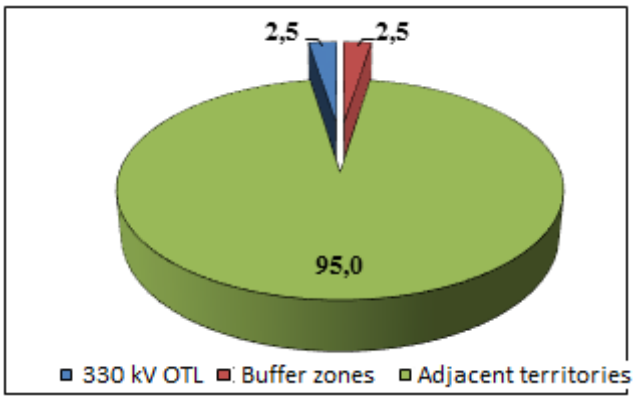


Fig. 3.31. Expansion of birds within the functional zones of the project territory, %

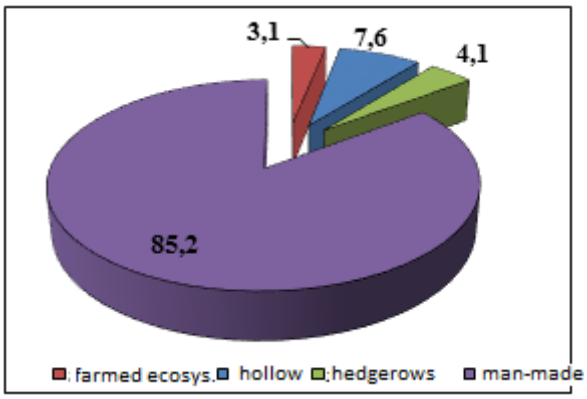


Fig. 3.32. Biotopic distribution of birds within the project territory, %

Since the project territory is located primarily among farmed ecosystems, hedgerows and other upland biotopes, it would be logical to expect the dominance of upland species; analysis of the field results revealed exactly this regularity. We registered 16 species of birds with the number of 7307 specimens or 84.4%, the majority of which was observed in the adjacent territories. Most often we observed rook (*Corvus frugilegus*), European starling (*Sturnus vulgaris*), small passeriformes (*Passer spp.*), European goldfinch (*Carduelis carduelis*), and rock pigeon (*Columba livia varia domestica*). In addition to it, 1347 specimens of semi-aquatic species (15.6%) were registered. The dominants here were black-headed gulls (*Larus ridibundus*), ducks (*Anas spp.*) and mallard (*Anas platyrhynchos*), which made up 92.6% of all registered semi-aquatic birds.

During the research we found that most visited places during the autumn migration were man-made landscape areas (solid municipal waste range on the lands of Nove Village Council and 330kV Melitopol Electric Power Substation) - 7376 specimens (85.2%), area of Mordvynivka Hollow - 658 specimens (7.6%), hedgerows and man-made forest plantations attracted 358 specimens (4.1%), and the farmed ecosystems attracted 262 specimens (3.1%) (Table 3.32).

Interesting is that we observed the main mass of the birds (85.2%) in the man-made landscape areas. This is primarily the solid municipal waste range near Nove Village. This fact is explained by the point that in the autumn most birds we observed there (rook, European starling and gulls) use the range as their feeding place due to poor fodder base in other habitats.

Directions of the autumn 2016 migration.

Among the passage directions the prevailing was north-western - 40.6% of all migrants (Table 3.33, Figure 3.33). 2200 specimens flew in this direction, and these were relocations of the flocks of European starlings (*Corvus frugilegus*). Moreover, we observed migratory passages of the birds in the south-western (1781 specimens, 32.8%) and south-eastern (1110 specimens, 20.5%) directions; these were also mainly rook, European starling, black-headed gull and small passeriformes (chaffinch and European goldfinch). Bird passages in other directions were insignificant (Table 3.33). Such directedness is not very typical for the given terrain and can be explained by feeding relocations of the flocks of rooks between the solid municipal waste range and Melitopol Town.

More detailed characteristic of the autumn migration directions is provided in Table 3.33 and Figure 3.33.

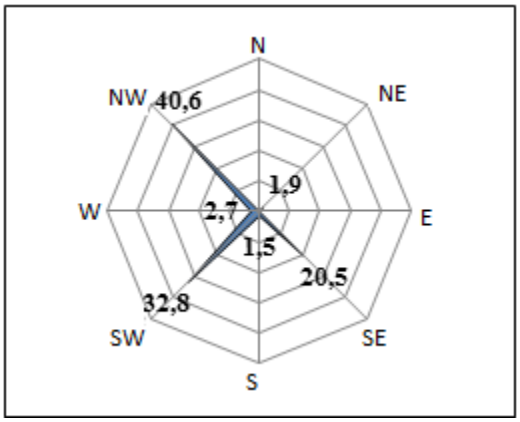


Fig. 3.33. Directions of the feeding migrations of the birds within the 330 kV OTL, buffer zones and adjacent territories in autumn 2016

Table 3.33. Directions of the feeding migrations of the birds within the 330 kV OTL, buffer zones and adjacent territories in autumn 2016

Direction	∑	
	abs.	%
N	-	-
NE	102	1.9
E	-	-
SE	1110	20.5
S	82	1.5
SW	1781	32.8
W	150	2.7
NW	2200	40.6
Total	**5,425**	**100**

Characteristics of altitude intervals of the birds passage

The majority of the registered birds (5355 sp., 98.7% of the total number of birds) which were recorded in the territory of the designed 330 kV OTL, within buffer zones and adjacent territories were observed in the flight at the height of up to 50 m (Fig.3.34). Moreover, one flock of black-headed gulls (*Larus ridibundus*) was reported at the height of 200 m (70 specimens, 1.3%).

At the height under 10 m we registered 281 specimens (5.2%), at heights from 10 to 25 m - 652 specimens (12.1%), and at heights from 25 to 50 m we observed the main number of the migratory birds (4422 specimens, 81.4%).

Such data is expected, and the nature of birds distribution by passage heights is traditional for this period, when birds already begin to stop active transit passages in the project territory and carry out only feeding migrations in searches for food.

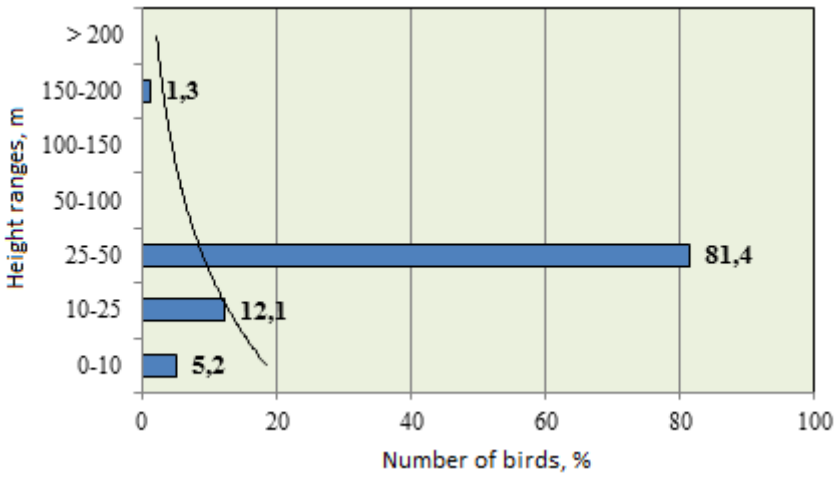


Fig. 3.34. Characteristic of the passage heights of the birds within the 330 kV OTL, buffer zones and adjacent territories in autumn 2016 (numbers in %)

3.5.1. Distribution of birds counted during the autumn 2016 migration by nature conservation lists

Distribution of birds counted in summer 2016, by the international and national nature conservation lists

Representatives of the rare ornithological fauna.

In summer 2016 in the research territory there was registered 1 species of the birds listed in the Red Book of Ukraine (Table 3.34) - long-legged buzzard (*Buteo rufinus*) - with the number of 2 species (0.3% of the number of registered birds). Therefore, we can claim about a small degree of attractiveness of the project territory for rare birds.

Table 3.34. Rare ornithological fauna within the 330 kV OTL, buffer zones and adjacent territories (summer 2016)

Item #	Species	OTL 330 kV	Buffer zones	Adjacent territories	∑
1	Long-legged buzzard (*Buteo rufinus*)	-	-	2	**2**
	Total number of birds from the Red Book of Ukraine	-	-	2	**2**
	Total birds within the site	**2**	**389**	**195**	**586**
	% of the total number	**-**	**-**	**1.0**	**0.3**

In addition to identification of the ornithological fauna representatives during post-nesting and pre-migratory gatherings, as well as their number and distribution within the research territory, there appeared a necessity to rate them by nature protection lists: Red Book of Ukraine, list of the International Union for Conservation of Nature (IUCN), European Red List, Bonn and Bern Conventions, and the Washington Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (table 3.35).

Table 3.35. Distribution of ornithological fauna counted in summer 2016, by the international and national nature conservation lists

Item #	English name	Scientific name	Status	ERL	RDBU	IUCN	BERN	BONN	CITES
1	Great crested grebe	*Podiceps cristatus*	m, w, n				3		
2	Little egret	*Egretta garzetta*	m, n				2		
3	Grey heron	*Ardea cinerea*	m, w, n				3		
4	Western marsh-harrier	*Circus aeruginosus*	m, w, n				2	1.2	2
5	Long-legged buzzard	*Buteo rufinus*	m, w, n	VU	RAR	LC	2	1.2	2
6	Common buzzard	*Buteo buteo*	m, w, n				2	1.2	2
7	Common kestrel	*Falco tinnunculus*	m, w, n				2	2	2
8	Mediterranean gull	*Larus melanocephalus*	m				2	2	
9	Black-headed gull	*Larus ridibundus*	m, w, n				3		
10	Yellow-legged gull	*Larus cachinnans*	m, w, n						
11	Woodpigeon	*Columba palumbus*	m, w, n						
12	Rock pigeon	*Columba livia*	m, n				3		
13	Turtle dove	*Streptopelia turtur*	m, n				3		
14	Hoopoe	*Upupa epops*	m, n				2		
15	Barn swallow	*Hirundo rustica*	m, n				2		
16	Bank swallow	*Riparia riparia*	m, n				2		
17	Skylark	*Alauda arvensis*	m, w, n				3		
18	White wagtail	*Motacilla alba*	m, w, n				2		
19	Red-backed shrike	*Lanius collurio*	m, n				2		

Item #	English name	Scientific name	Status	ERL	RDBU	IUCN	BERN	BONN	CITES
20	Lesser grey shrike	*Lanius minor*	m, n				2		
21	Golden oriole	*Oriolus oriolus*	m, n				2		
22	Rook	*Corvus frugilegus*	m, w, n				2		
23	Hooded crow	*Corvus cornix*	m, w, n				2		
24	Common raven	*Corvus corax*	m, w, n				3		
25	Northern wheatear	*Oenanthe oenanthe*	m, n				2		
26	Thrush nightingale	*Luscinia luscinia*	m				2	2	
27	House sparrow	*Passer domesticus*	m, w, n				2		
28	Eurasian tree sparrow	*Passer montanus*	m, w, n				3		
29	European greenfinch	*Chloris chloris*	m, w, n				2		
30	Corn bunting	*Emberiza calandra*	m, w, n				3		
31	Yellowhammer	*Emberiza citrinella*	m, w, n				2		

Notes: **Status**: m – species found during seasonal migrations; w - species found in the winter period; n - species found in the nesting period.

RDBU - protected by the Red Book of Ukraine: **EN -** endangered; **VU** - vulnerable; **RAR** - rare; **PL -** priceless.

IUCN - conservation status of the International Union for Conservation of Nature: **EN** – endangered; **NT** – near threatened; **VU** – vulnerable; **LC** – least concern.

ERL - conservation status of the European Red List: **VU – (Vulnerable)** species which can be in a nearest future referred to endangered category if the factors affecting their status will continue to act; **EN – (Endangered) -** species which are under danger of vanishing; their conservation is hardly possible and reproduction is impossible with special actions and measures.

BONN - Bonn Convention: **Annex I (1)** includes species which are under the danger of vanishing; **Annex II (2)** includes species which condition is unfavorable and which conservation and management requires international treaties, as well as species which condition would significantly improve as a result of international cooperation that may be achieved based on international treaties. The same species may be referred both to Annex 1 and Annex II.

BERN - The Bern Convention or Convention on the Conservation of European Wildlife and Natural Habitats, includes **Annex II (2) -** list of fauna species subject to special protection; **Annex III (3)** - fauna species subject to conservation.

CITES - The Washington Convention on International Trade in Endangered Species of Wild Fauna and Flora: **Annex I (1)** includes species "which are endangered and trade in which has or may have negative impact on their existence. Trade in specimens of such species shall be subject to extremely strict regulation in order not to further endanger their survival, and shall be allowed only in exclusive cases"; **Annex II (2)** includes: a) "all species that are not necessarily threatened with extinction, but may become so unless trade in specimens of such species is subject to strict regulation in order to avoid utilization incompatible with the survival of the species in the wild"; and b) "other species which must be subject to regulation in order that trade in specimens of certain species referred to in sub-paragraph (a) of this paragraph may be brought under effective control".

As can be seen from Table 3.35, birds which form post-nesting and pre-migratory gatherings in the area of 330 kV OTL, buffer zones and adjacent territories are put to 6 nature conservation lists. Most of them were referred to the Bern Convention (29 species out of 31, or 93.6%) of which 20 species – are subject to the special protection and 9 are subject to protection. Interesting is the situation with inclusion to the Bonn Convention: out of 6 species of the ornithological complex, which are included into this Convention, 3 species refer to Annex II (existence condition is unfavorable) and 3 species are included both to Annex II and Annex I (endangered species) (which is possible within the scope of this nature conservation document). 1 species is a part of the Red Data Book of Ukraine (2009) and refers to the rare category. Another 1 species was included into the IUCN Red List (LC category). Moreover, 4 species belong to the Washington Convention on International Trade in Endangered Species of Wild Fauna and Flora, and 1 species - to the European Red List.

As regarding the degree of inclusion of birds to the nature conservation lists, the following situation manifests. Of 31 species, 2 species (6.5%) do not belong to any of the nature conservation documents:

yellow-legged gull (*Larus cachinnans)* and woodpigeon (*Columba palumbus*). The great majority of the ornithological complex representatives belongs to 1 of the documents (23 species), 2 documents list – 2 species (6.5%), 3 documents list - 3 species (9.7%); and there are no species which belong to 4 and 5 documents. Long-legged buzzard (*Buteo rufinus*) is under protection of all 6 nature conservation documents.

More detailed description of the distribution of the birds which form post-nesting and pre-migratory gatherings, by nature conservation lists is given in Tables 3.36-3.37.

Table 3.36. Distribution of bird species encountered during the summer 2016, by categories of nature conservation lists

ERL		RDBU		IUCN		BONN		BERN		CITES	
category	N	category	N	category	N	category	N	category	N	category	N
VU	**1**	RAR	**1**	LC	**1**	1	**-**	2	**20**	1	**-**
						2	**3**	3	**9**	2	**4**
						1 and 2	**3**				
∑	**1**	∑	**1**	∑	**1**	∑	**6**	∑	**29**	∑	**4**

Table 3.37. Distribution of bird species encountered during the summer 2016, by number of nature conservation lists

Inclusion into nature conservation lists	species	%
0	2	6.5
1	23	74.1
2	2	6.5
3	3	9.7
4	-	-
5	-	-
6	1	3.2
Total	**31**	**100**

Distribution of birds counted during the autumn 2016 migration by nature conservation lists

No representatives of the Red Book of Ukraine were observed in the research territory in autumn 2016.

In addition to identification of the ornithological fauna representatives during the autumn migration, as well as their number and distribution within the research territory, there appeared a necessity to rate them by nature protection lists: Red Book of Ukraine, list of the International Union for Conservation of Nature (IUCN), European Red List, Bonn and Bern Conventions, and the Washington Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (table 3.38).

Table 3.38. Distribution of the ornithological fauna of the autumn 2016 migration by nature conservation lists

Item #	English name	Scientific name	Status	ERL	RDBU	IUCN	BERN	BONN	CITES
1	Great crested grebe	*Podiceps cristatus*	m, w, n				3		
2	Great white egret	*Egretta alba*	m, w, n				2	2	
3	Grey heron	*Ardea cinerea*	m, w, n				3		
4	Mallard	*Anas platyrhynchos*	m, w, n				3	1.2	
5	Northern pintail	*Anas acuta*	m, w				3	1.2	
6	Garganey	*Anas querquedula*	m, w				3	1.2	
7	Black-headed gull	*Larus ridibundus*	m, w, n				3		
8	Yellow-legged gull	*Larus cachinnans*	m, w, n						
9	Rock pigeon	*Columba livia*	m, n				3		
10	Eurasian collared dove	*Streptopelia decaocto*	m, w, n				3		
11	European starling	*Sturnus vulgaris*	m, w, n				2		
12	Eurasian jay	*Garrulus glandarius*	m, w, n				2		
13	European magpie	*Pica pica*	m, w, n				2		
14	Rook	*Corvus frugilegus*	m, w, n				2		
15	Hooded crow	*Corvus cornix*	m, w, n				2		
16	Common raven	*Corvus corax*	m, w, n				3		
17	*African stonechat*	*Saxicola torquata*	m, n				2	2	
18	Fieldfare	*Turdus pilaris*	m, w				3	2	

Item #	English name	Scientific name	Status	ERL	RDBU	IUCN	BERN	BONN	CITES
19	Common blackbird	*Turdus merula*	m, w, n				3	2	
20	Eurasian tree sparrow	*Passer montanus*	m, w, n				3		
21	Chaffinch	*Fringilla coelebs*	m, w, n				3		
22	European goldfinch	*Carduelis carduelis*	m, w, n				2		
23	Linnet	*Acanthis cannabina*	m, w, n				2		
24	Corn bunting	*Emberiza calandra*	m, w, n				3		

Notes: **Status**: m – species found during seasonal migrations; w - species found in the winter period; n - species found in the nesting period.

RDBU - protected by the Red Book of Ukraine: **EN** - endangered; **VU** - vulnerable; **RAR** - rare; **PL** - priceless.

IUCN - conservation status of the International Union for Conservation of Nature: **EN** – endangered; **NT** – near threatened; **VU** – vulnerable; **LC** – least concern.

ERL - conservation status of the European Red List: **VU – (Vulnerable)** species which can be in a nearest future referred to endangered category if the factors affecting their status will continue to act; **EN – (Endangered)** - species which are under danger of vanishing; their conservation is hardly possible and reproduction is impossible with special actions and measures.

BONN - Bonn Convention: **Annex I (1)** includes species which are under the danger of vanishing; **Annex II (2)** includes species which condition is unfavorable and which conservation and management requires international treaties, as well as species which condition would significantly improve as a result of international cooperation that may be achieved based on international treaties. The same species may be referred both to Annex 1 and Annex II.

BERN - The Bern Convention or Convention on the Conservation of European Wildlife and Natural Habitats, includes **Annex II (2)** - list of fauna species subject to special protection; **Annex III (3)** - fauna species subject to conservation.

CITES - The Washington Convention on International Trade in Endangered Species of Wild Fauna and Flora: **Annex I (1)** includes species "which are endangered and trade in which has or may have negative impact on their existence. Trade in specimens of such species shall be subject to extremely strict regulation in order not to further endanger their survival, and shall be allowed only in exclusive cases"; **Annex II (2)** includes: a) "all species that are not necessarily threatened with extinction, but may become so unless trade in specimens of such species is subject to strict regulation in order to avoid utilization incompatible with the survival of the species in the wild"; and b) "other species which must be subject to regulation in order that trade in specimens of certain species referred to in sub-paragraph (a) of this paragraph may be brought under effective control".

As can be seen from Table 3.38, representatives of the autumn ornithological complex in the area of 330 kV OTL, buffer zones and adjacent territories are put to 2 of 6 nature conservation lists. Most of them were referred to the Bern Convention (23 species out of 24, or 95.8%) of which 9 species – are subject to the special protection and 14 are subject to protection. Interesting is the situation with inclusion to the Bonn Convention: out of 7 species of the ornithological complex, which are included into this Convention, 4 species refer to Annex II (existence condition is unfavorable) and 3 species are included both to Annex II and Annex I (endangered species) (which is possible within the scope of this nature conservation document).

Interesting is the point that no representatives of other conservation documents, namely the Red Book of Ukraine (2009), IUCN Red List, the Washington Convention on International Trade in Endangered Species of Wild Fauna and Flora, and the European Red List were observed at all.

As regarding the degree of inclusion of birds to the nature conservation lists, the following situation manifests. Of 24 species, 1 species (4.2%) does not belong to any of the nature conservation documents (yellow-legged gull – *Larus cachinnans)*. The great majority of the autumn ornithological complex representatives belongs to List 1 or List 2 (16 and 7 species respectively).

3.5.2. Assessment of impacts conditioned by the 330 kV OTL construction and operation during the autumn migration

The main purpose for birds during formation of post-nesting and pre-migratory autumn gatherings is to enhance physical abilities through intensive feeding and improvement of flying characteristics. As a result, the birds are concentrated in locations/places with sufficient food, forming various in size gatherings. Resting and feeding places for main gatherings by number and diversity are distant from the

project area (up to 10-18 km).

Most numerous of the waders in 2016 was ruff (*Philomachus pugnax*), all its registrations, like other waders, were made exclusively off the project area. As regards the gulls and terns, they were also observed in the adjacent territories.

Generally, we may state that impact of 330 kV OTL on the birds during their post-nesting gatherings is low.

Conclusion on the impact of 330 kV OTL during the autumn migration of birds.

1. Construction-conditioned impacts

1a – hazardous substances emissions. During the construction hazardous substances emissions will not exceed allowable limits due to the absence of stationary pollution sources and short period of construction works. No negative impact on migratory birds is observed.

1b – hazing by visual effects and noise. Noise hazing factor is almost absent since there are not large migratory gatherings of birds in the wind park sites. Feeding migrants quickly travel throughout the territory and have large areas of alternative feeding territories within a 500-meter buffer zone and outside it. There are larger noise sources (agricultural machinery, local motor roads) in the adjacent zones. In addition to it, feeding territories for birds are connected more with rotation of crops than with project works.

Hazing by visual effects is not a threat so impact of these factors on birds is considered as low.

1c – occupation of the territory by working sites and equipment. Physical dimensions of the project territory allow the birds to freely pass by the work sites with the equipment during the construction period. Territory to be occupied by the work sites and equipment will not exceed 1% of the total area. Moreover, insignificant density of the work sites and equipment will not obstruct feeding passages of the birds because of a large overall length of 330 kV OTL and significant distances between the power poles. Negative impact on migratory birds during the construction period is estimated as low, and it is absent during the Wind Park operation.

1d – loss of the breeding places. No negative impact on migratory birds is observed in the autumn. Negative impact of this factor is estimated as low.

1e – loss of individual specimens of the protected species. No representatives of the Red Book of Ukraine were observed in the research territory in autumn 2016.

Probability to find rare species is rather low. At registration of the species in the project territory, negative impacts on them are very low. This relates to the point that carnivorous birds have good sense of direction with respect to power poles, other tall structures available in the adjacent territories and are not characterized by migratory relocations at night. Other rare birds registered in the adjacent territories are mainly bound to semi-aquatic habitats within which their main transit relocations and feeding migrations occur.

Probability of the loss of individual specimens during migration exists only for periods with adverse weather and climate characteristics (fog, strong wind), but in the light of extremely low number of rare birds in general, and especially of those which may use sections of 330 kV OTL, and short duration of adverse weather periods, we find this factor to have low impact.

The negative impact of the wind park is evaluated as low.

2. Equipment-conditioned impacts

2a – lasting occupation of the territory and alteration of the environment characteristics. Since the project area is represented primarily by man-made types of biotopes (arable lands, hedgerows), creation of insignificant by area infrastructure will not become dangerous for gatherings of the transit and feeding passages of the birds, as the larger part of the territory will remain unchanged.

Analysis of the field studies points at the absence of autumn migratory gatherings of the birds within 330 kV OTL. Our observations of seasonal migrations in the area of already existing OTLs show quite high maneuvering skills of the larger part of the birds which freely pass the overhead lines by. Increased risk of birds collision with 330 kV OTL poles and wires exists only during short periods with bad weather conditions (fog and strong wind).

Negative impact on migratory birds is average.

2b – hazing by vertical mast structures. For the migratory birds vertical structures are a signal for a short-time change of the route, and the large area of territories adjacent to 330 kV OTL will allow to make it without any obstacles. Moreover, insignificant density of equipment placement will not obstruct

feeding passages of the birds because of significant distances between the power poles. Powerful power transmission lines pass near the project territory. Special observations revealed no negative effect on the migratory birds both from the side of vertical structures (towers/poles) and horizontal structures (electrical wires). Negative impact on migratory birds is estimated as low.

2c – barrier impact and obstacles for passage.

The majority of the registered birds (5355 sp., 98.7% of the total number of birds) which were recorded in the territory of the designed 330 kV OTL, within buffer zones and adjacent territories were observed in the flight at the height of up to 50 m. However, the number of birds registered in the direct vicinity of the 330 kV OTL planned for construction is extremely low. Observations of the birds behavior revealed trends when passage heights depend from the visual openness of the space. Hence, larger part of the birds in the open spaces used significantly lower heights than near hedgerows, standalone trees, buildings, motor roads and existing overhead transmission line, at approaching to which birds tend to gain height. This behavior is explained by the flight safety what will also have positive effect on overcoming of possible barrier impact of 330 kV OTL.

For other bird species in the project territory there are no factors which would condition birds passages along fixed routes, so they use alternative spaces to freely pass by the obstacles and avoid the barrier impact.

Based on the summarized analysis of potential threats, we need to state that the barrier impact for migratory birds is low.

3. Impacts conditioned by the operation of the overhead power transmission line.

3a – additional development of the territories. Negative impact is low for migratory birds.

3b – annoyance due to night illumination. Percentage of birds which migrate within 330 kV OTL at night is some larger than that of the spring period, but almost all night migrants belong to the transit ones which use heights over 200 m. Transit migrants will not sense the night illumination within 330 kV OTL route due to illumination of the adjacent settlements. Parallel studies of the activity of bats in the dark time in the project territory made it possible to observe the night ornithological situation. As a result of the performed work we found no cases of creation of dangerous situation due to night migrations of birds.

Negative impact of this factor is estimated as very low.

3c – collisions with the 330 kV OTL infrastructure elements. Estimating the data from observations of the migration in the autumn 2016, in particular such important aspects as total number of birds, dynamics of the passage intensity, characteristic of the migration height and directions, daily activity, we may tell that negative impact on the migrants was low. We recorded no cases of collisions on the existing power networks. Potential threat for birds is present in the periods of bad weather and climate conditions (fog, strong wind). For minimizing this effect it is necessary to make a provision in the design of the power transmission line poles for ornitho-protective gear to disable bird deaths from electrical shock, as well as for visual hazing devices at certain sections of 330 kV OTL (southern outskirts of Sadove Village).

Section 4. Environmental Aspects of the Existence of Ornithological Complexes under Influence of Overhead Power Transmission Lines

Assessment of the Bird Hazard for the Overhead Power Transmission Line

Criteria for allocation of areas most suitable for monitoring of bird deaths from electrical shock and collision with electrical wires:

- high overall number and species diversity of the birds;
- presence of large gatherings (concentrations) of the birds throughout the year or in its particular periods (nesting, post-nesting, migration, wintering);
- significant mobility of most birds near OTL - frequent passages of a large number of specimens;
- potentially high threat for species listed in the Red Book of Ukraine;
- high landscape and habitat diversity (especially ecotones - boundaries of water basins and land, forests and hedgerows with meadows and steppes, settlements with agricultural lands etc.);
- availability of locations for mass feeding or rest of the birds (edible by-product disposal site, agricultural waste disposal sites, places where fresh water fall into salty (sea) waters etc.);
- OTL proximity to paved roads to enable free access for the researchers to the OTL during all seasons of the year, to include in case of adverse weather conditions;
- absence of substantial obstacles for free passage along the OTL (ploughed fields, bushes, ditches, buildings etc.);
- low and loose grass cover (which obstructs searches for died and injured birds) or its absence (pastures, field roads etc.).

When choosing the census time it is necessary to be guided by the point that census shall be carried out after adverse weather, in good natural light, during the hunting season - after the hunt. Therefore, it's better to coincide the censuses with hunting days as the probability of collision of the disturbed birds with OTL is substantially higher, especially under adverse weather conditions (fog, rain, snowfall). When choosing the day and time of the census, it is also necessary to consider weather condition before inspecting the OTL, when the visibility is poor and does not allow birds to timely notice the OTL wires in order to manage avoid collision with them. Apparently, the birds become more vulnerable to contacts with OTL during migrations and wintering, due to the inflow of a large number of specimens unfamiliar with availability and location of the OTL, and scaring during the hunt causes their spontaneous and chaotic relocations. Therefore, when planning the frequency of OTL inspections, it is necessary to remember that most critical are migratory periods of a yearly cycle of the majority of the bird species, while the winter period is some less critical [27].

Inspections shall result, at least, in the following:

- annotated list of the species of birds injured or died because of contacts with the OTL;
- list of most OTL-vulnerable birds;
- materials to proposals on the actions aimed to prevent or mitigate bird deaths from contacts with OTL, as well as to perform further study of the OTL threat for the birds.

Usage of the OTLs by birds and avoidance of collissions with them

Man-induced alteration of the landscape causes alteration of the bird existence conditions (number of places suitable for nesting, diversity, quantity and availability of food, availability and quality of protective conditions etc.), and, respectively, behavioral peculiarities of the birds. Species, whose behavioral strategies vary within a wide range, successfully adapt to existence under new conditions and even extend their home ranges, while the birds with a limited set of behavioral strategies - vice versa - go down in number down to complete extinction. For instance, in the south of Ukraine at apparent threat of birds collision with OTLs or in case of effect of the electrical current on them, quite many species obtained certain benefits using OTL wires and poles in their living activity, especially under conditions of the dominating open terrains [19, 20, 22-25]. Exactly due to it, in parallel with monitoring of the OTL impact on birds, it is also necessary to study ways of usage and avoidance by them of the overhead power transmission lines [13, 14, 27, 16]. Preliminary studies allow to claim about positive meaning of overhead transmission lines for many rare species, first of all - for carnivorous birds especially as artificial analogues of the tree vegetation on open terrains

prevailing in southern Ukraine. Most often, and sometimes massively, OTL is used by the Corvidae family birds, first of all jackdaw (Corvus monedula): wires are used as roosts and hollow-type poles are used as a nesting place. For this species, like for ravens (*Corvus corax*), OLT poles here serve as the main nesting place. Quite often power transmission lines are also used by small passeriformes, especially common rook (Sturnus vulgaris) - as roost and nesting place, and corn bunting (Emberiza calandra) - as roosts [29].

That's why during the census of the birds and searches for died specimens along the OTL, it is also necessary to record cases when the poles and wires are used for nesting or as roosts (for rest, hunting, display etc.). Special attention shall be paid to the peculiarities of that how birds from different systematic groups react to the OTL. For identifying species most vulnerable to the OTL, it is necessary to record strategies of avoidance by the birds of collisions with wires and poles.

Inspections shall result in the following:

- list of most OTL-tolerant bird species;
- list of birds using the OTL in their living activity;
- materials about the nature of OTL usage by different species;
- materials to the proposals on actions aimed to attract birds which can be used as repellents for hazing of OTL-vulnerable species.

Environmental Aspects of the Existence of Ornithological Complexes under Influence of Overhead Power Transmission Lines

Studies of the ornithological status of the territory of future 330 kV OTL, 500-meter buffer zone and in places of increased species diversity (Molochny Estuary and Sea of Azov), which were carried out during the year, allow us to state about presence in the region of over 70 bird species unevenly broken down by seasons. As we expected, highest species diversity is peculiar to the periods of seasonal migrations, when during the spring passage we registered 32 species (or 45.7% of the total species composition), and in the autumn, including August pre-migratory gatherings, - 46 species or 65.7%. Substantially lower is the diversity of birds which winter and nest in the project territory (19 species each, or 27.1%).

Therefore, we managed to determine the number and species composition of the birds (Table 4.1).

Table 4.1. Characteristic of the ornithological complex within the future 330 kV OTL, buffer zones and adjacent territories

Item #	Species	Number (specimens)					
		winter	spring	nesting	summer	autumn	Total
1	Great crested grebe (*Podiceps cristatus)*		5		17	5	**27**
2	Great white egret (*Egretta alba*)					11	**11**
3	Little egret (*Egretta garzetta*)				1		**1**
4	Grey heron (*Ardea cinerea*)				2	3	**5**
5	Whooper swan (*Cygnus cygnus*)	7					**7**
6	Greater white-fronted goose (*Anser albifrons*)		50				**50**
7	Mallard **(***Anas platyrhynchos)*	51	27			157	**235**
8	Northern pintail (*Anas acuta*)					9	**9**
9	Garganey (*Anas querquedula*)					25	**25**
	Ducks (*Anas spp.*)					450	**450**
10	Greater scaup (*Aythya marila*)	20					**20**
11	Western marsh-harrier (*Circus aeruginosus*)				1		**1**
12	White-tailed eagle (*Haliaeetus albicilla*)	1					**1**
13	Goshawk (*Accipiter gentilis*)		1				**1**
14	Rough-legged buzzard (*Buteo lagopus*)		2				**2**
15	Long-legged buzzard (*Buteo rufinus*)				2		**2**
16	Common buzzard (*Buteo buteo*)		1		1		**2**
17	Common kestrel (*Falco tinnunculus*)		2	6	13		**21**
18	Grey partridge (*Perdix perdix*)		9				**9**
19	Common quail (*Coturnix coturnix*)			2			**2**

Item #	Species		Number (specimens)					
			winter	spring	nesting	summer	autumn	Total
20	Eurasian coot (*Fulica atra*)			25				**25**
21	Northern lapwing (*Vanellus vanellus*)			2				**2**
22	Pied avocet (*Recurvirostra avosetta*)			7				**7**
23	Ruff (*Philomachus pugnax*)			67				**67**
24	Eurasian curlew (*Numeniusarquata*)			2				**2**
25	Mediterranean gull *(Larus melanocephalus)*					3		**3**
26	Black-headed gull (*Larus ridibundus*)		25			1	640	**666**
27	Yellow-legged gull (*Larus cachinnans*)		14	9		2	47	**72**
28	Common gull (*Larus canus*)		146					**146**
29	*Terns* (*Chlidonias spp.*)			12				**12**
30	Woodpigeon (*Columba palumbus*)			9	6	1		**16**
31	Rock pigeon (*Columba livia var. domestica*)					50	120	**170**
32	Eurasian collared dove (*Streptopelia decaocto*)		12				24	**36**
33	Turtle dove (*Streptopelia turtur*)				2	4		**6**
34	Syrian woodpecker (*Dendrocopos syriacus*)		1					**1**
35	Long-eared owl (*Asio otus*)				2			**2**
36	Little owl (*Athene noctua*)				2			**2**
37	Hoopoe (*Upupa epops*)					2		**2**
38	Barn swallow (*Hirundo rustica*)					155		**155**
39	Sand martin (*Riparia riparia*)					20		**20**
40	Skylark (*Alauda arvensis*)		47	25		2		**74**
41	White wagtail (*Motacilla alba*)			44		5		**49**
42	European starling (*Sturnus vulgaris*)		30	344			650	**1,024**
43	Red-backed shrike (*Lanius collurio*)				4	6		**10**
44	Lesser grey shrike (*Lanius minor*)				10	28		**38**
45	Golden oriole (*Oriolus oriolus*)					1		**1**
46	Eurasian jay (*Garrulus glandarius*)						2	**2**
47	European magpie (*Pica pica*)		4	2	4		8	**18**
48	Rook (*Corvus frugilegus*)		221	162		55	6080	**6,518**
49	Hooded crow (*Corvus cornix)*		5	11	10	1	20	**47**
50	Common raven (*Corvus corax*)		1	1		1	2	**5**
51	Winter wren (*Troglodytes troglodytes*)			3				**3**
52	Northern wheatear (*Oenanthe oenanthe*)					1		**1**
53	Black redstart (*Phoenicurus ochruros*)			3				**3**
54	Tawny pipit (*Anthus campestris*)				2			**2**
55	African stonechat (*Saxicola torquata*)						2	**2**
56	Fieldfare (*Turdus pilaris*)			4			12	**16**
57	Common blackbird (*Turdus merula)*		5	15			1	**21**
58	Great tit (*Parus major*)		5					**5**
59	House sparrow (*Passer domesticus*)					10		**10**
60	Eurasian tree sparrow (*Passer montanus*)		22	43		20	75	**160**
61	Barred warbler (*Sylvia nisoria*)				2			**2**
62	Garden warbler (*Sylvia borin*)				6			**6**
63	Common whitethroat (*Sylvia communis*)				2			**2**
64	Thrush nightingale (*Luscinia luscinia*)				2	2		**4**
65	Chaffinch (*Fringilla coelebs*)		25	58	4		55	**142**
66	European greenfinch (*Chloris chloris*)			4	2	1		**7**
67	European goldfinch (*Carduelis carduelis*)			20	2		122	**144**
68	Linnet (*Acanthis cannabina*)						5	**5**
69	Yellowhammer (*Emberiza citrinella*)				4	5		**9**
70	Corn bunting (*Emberiza calandra*)			20		1	2	**23**
	Passeriformes (*Passer spp.*)			80		172	127	**379**
Total		**species**	**19**	**32**	**19**	**31**	**24**	**70**
		birds	**642**	**1,069**	**74**	**586**	**8,654**	**11,025**

This data is a basis for analyzing the entire ornithological complex by its distribution to ecological groups which differently use overhead power transmission lines.

According to our data and literature sources we established that birds can be divided into the following ecological groups with respect to the infastructure of overhead power transmission lines:

- species which do not use overhead lines at all (a group of waterfowl which in their life cycle almost always remain in the surface area of water bodies: grebes, cormorants, herons, and terns);
- species which usuall don't use overhead lines but sometimes can stay in the area of wire line run (some species of ducks, swans, herons, harriers, pied avocet, pied stilt, waders etc.);
- species for which horizontal structures of the power poles and available cavities serve as a nest arrangement place (hooded crow, jackdaw, common rave, sparrows, tits, certain species of falcons);
- species for which OTL poles and wires serve as a roost (almost all species of passeriformes, small falcons, pigeons etc.);
- species which during their seasonal migrations use overhead lines for mass stops and rest (swallows, European starling, European goldfinch, pigeons).

Quantitative characteristic built upon results of the studies performed in 2016 is shown in Table.

Table 4.2. Characteristics of the ornithological complex by its distribution into ecological groups

Item #	Ecological group	Number			
		species		birds	
		abs.	%*	abs.	%*
1	Not using OTL at all	24	34.3	983	8.9
2	Usually don't use OTL	6	8.6	834	7.6
3	May nest on OTL	10	14.3	1276	11.6
4	Use OTL as roost	41	58.6	9208	83.5
5	Use OTL in mass	12	17.1	8238	74.7
	Total**	**70**		**11,025**	

Notes: * - percent of the total number of species or birds; ** some species fell within 2 categories (for example, they may use OTL as a nesting place, and as a roost), and due to this there's no digit in %

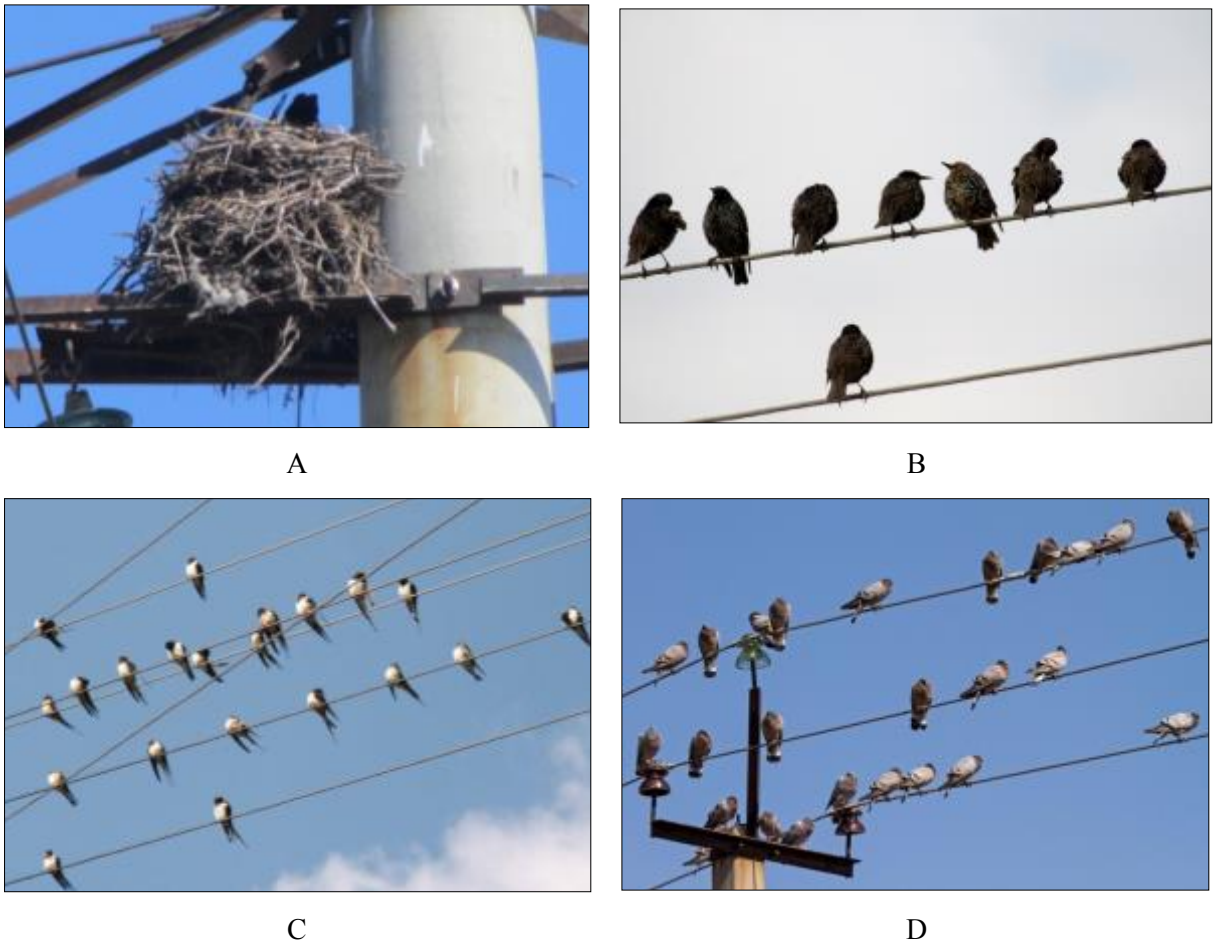
Analyzing Table 4.2 we see that of the entire ornithological complex which counted 70 species, 41 species (or 58.6%), which number made 83.5% of the total number of birds, use overhead power transmission lines as their roosting place. Such picture can be explained by the dominance of open terrains (mainly farmed ecosystems) with the lack of tree plantation, and due to this birds have to use man-made structures for roosting. The birds may experience negative impact of such behavior only in case of electrical shock which usually happens to large specimens - eagles, buzzards, cranes, herons, which are used to land onto most dangerous sections of overhead power transmission lines. There's no such threat for small passeriformes.

Quite large part of the birds (24 species or 34.3%) doesn't use overhead power lines at all. If we add to this group species which usually avoid territories with power transmission lines (6 species or 8.6%), then almost a half of the entire ornithological complex is outside the risk zone with respect to collision with overhead line poles and wires.

We have to mentioned also that 12 species are referred to a group of birds which during their seasonal migrations form mass gatherings and may use power line wires for roosting (rest). This group includes European starling, bank swallow, fieldfare, piegeons, European goldfinch, linnet, Eurasian tree sparrow etc. We are not aware of the cases of bird deaths due to their rest on the wires, but such behavior requires some management of hazing actions.

And finally, at least 10 bird species nest on OTL poles, using horizontal structures and cavities of vertical masts. Such species include common raven, hooded crow, jackdaw, common kestrel, European tree sparrow, great tit etc. In most cases the nesting is successful but the scheduled maintenance works on overhead power lines require the personnel to remove bird nests from the OTL structures.

Some examples of the use of overhead power transmission lines by birds are presented in Fig. 4.1.



A B

C D

Fig. 4.1. Birds on overhead power transmission lines
(A – common raven nest; B – european starling; C – barn swallow; D – rock pigeon)

Proposals on the actions aimed to prevent or mitigate bird deaths from contacts with OTL

To prevent birds dying from contacts with the reference OTLs, such OTLs shall be equipped with the hazing means on their most dangerous sections. Moreover, prevention of the bird deaths can be facilitated by installing on the OTL artificial nests of some carnivorous birds which apt to oust large birds from their nesting territory, which will scare away most small birds which are potential trophy. Moreover, this will also facilitate recovery of home areas of these species which are listed in the Red Book of Ukraine (2009) and a number of International Conventions on Nature Conservation, and through this - creation of the positive image of the energy production industry, aimed at the greening (environmentalization) of its activity.

For example, considering the fact that according to the results of inspection of the reference OTL at Syvash conducted in 2013-2014, 75.8% of the dead birds died at 2 sections, a proposal was made to equip wires at these 2 sections with bird-scaring devices with movable and shining elements which would intensively move, shine and produce noise thus scaring the birds away. Moreover, the proposal was made to install, on the anchor line support, an artificial nest for saker falcon to scare other birds away from most bird-vulnerable sections of the overhead power transmission line.

Required type of bird-scaring means, schemes and methods of their installation shall be determined individually for each separate bird-vulnerable section of the power line (with consideration of local terrain peculiarities, vegetation, buildings/structures, nature of the economic use of the territories etc.) and with the participation of experts experienced in conducting such actions and measures. It is desirable, during performance of such works, to conduct trainings for local experts (engineers, ecologists, ornithologists) to allow them gain their own experience in this area of nature conservation activity.

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Table 2.1 Bird species which are found within the regional territory and have protected status .

No.	English name	Scientific name	Status	ERL	RDBU	IUCN	BERN	BONN	CITES
1	Black-throated loon	*Gavia arctica*	m				2	2	
2	Little grebe	*Tachibabtus ruficollis*	m, w				2		
3	Great crested grebe	*Podiceps cristatus*	m, w, n				3		
4	Cormorant	*Phalacrocorax carbo*	m, w, n				3		
5	Eurasian bittern	*Botaurus stellaris*	m, w, n				2	2	
6	Little bittern	*Ixobrychus minutus*	m, n				2	2	
7	Black-crowned night heron	*Nycticorax nycticorax*	m, n				2		
8	Great white egret	*Egretta alba*	m, w, n				2	2	
9	Little egret	*Egretta garzetta*	m, n				2		
10	Grey heron	*Ardea cinerea*	m, w, n				3		
11	Purple heron	*Ardea purpurea*	m, n				2	2	
12	Glossy ibis	*Plegadis falcinellus*	m		VU	LC	2	2	
13	White stork	*Ciconia ciconia*	m, n				2	2	
14	Black stork	*Ciconia nigra*	m		RAR	LC	2	2	2
15	Red-breasted goose	*Rufibrenta ruficollis*	m, w	VU	VU	EN	2	1.2	2
16	Greylag goose	*Anser anser*	m, w, n				3	1.2	
17	Greater white-fronted goose	*Anser albifrons*	m, w				3	1.2	
18	Mute swan	*Cygnus olor*	m, w, n				3	1.2	
19	Whooper swan	*Cygnus cygnus*	m, w				2	1.2	
20	Ruddy shelduck	*Tadorna ferruginea*	m, n	VU	VU	LC	2	1.2	
21	Common shelduck	*Tadorna tadorna*	m, w, n				2	1.2	
22	Mallard	*Anas platyrhynchos*	m, w, n				3	1.2	
23	Common teal	*Anas crecca*	m, w				3	1.2	
24	Gadwall	*Anas strepera*	m, w, n		RAR	LC	3	1.2	
25	Eurasian wigeon	*Anas penelope*	m, w				3	1.2	
26	Northern pintail	*Anas acuta*	m, w				3	1.2	
27	Garganey	*Anas querquedula*	m, w				3	1.2	
28	Northern shoveler	*Anas clypeata*	m				3	1.2	
29	Common pochard	*Aythya ferina*	m, w, n				3	1.2	
30	Ferruginous duck	*Aythya nyroca*	m, n	VU	VU	NT	3	1.2	
31	Tufted duck	*Aythya fuligula*	m, w				3	1.2	
32	Red-breasted merganser	*Mergus serrator*	m, w		VU	LC	3	1.2	
33	Osprey	*Pandion haliaetus*	m		EN	LC	2	2	2
34	Honey buzzard	*Pernis apivorus*	m				2	1.2	2
35	Hen harrier	*Circus cyaneus*	m, w		RAR	LC	2	1.2	2
36	Pallid harrier	*Circus macrourus*	m	EN	EN	NT	2	1.2	2
37	Montagu's harrier	*Circus pygargus*	m		VU	NT	2	1.2	2
38	Western marsh-harrier	*Circus aeruginosus*	m, w, n				2	1.2	2
39	Goshawk	*Accipiter gentilis*	m, w				2	1.2	2
40	Eurasin sparrowhawk	*Accipiter nisus*	m, w				2	1.2	2
41	Rough-legged buzzard	*Buteo lagopus*	m, w				2	1.2	2
42	Long-legged buzzard	*Buteo rufinus*	m, w, n	VU	RAR	LC	2	1.2	2
43	Common buzzard	*Buteo buteo*	m, w, n				2	1.2	2
44	Short-toed eagle	*Circaetus gallicus*	m		RAR	LC	2	1.2	2
45	Greater spotted eagle	*Aquila clanga*	m	EN	RAR	VU	2	1.2	2
46	Eastern imperial eagle	*Aquila heliaca*	m		RAR	VU	2	1.2	1
47	Golden eagle	*Aquila chrysaetos*	m		VU	LC	2	1.2	2
48	White-tailed eagle	*Haliaeetus albicilla*	m, w, n		RAR	LC	2	1.2	1
49	Saker falcon	*Falco cherrug*	m, w, n	EN	VU	VU	2	2	2
50	Duck hawk	*Falco peregrinus*	m, w, n		RAR	LC	2	2	1
51	Eurasian hobby	*Falco subbuteo*	m, n				2	2	2

No.	English name	Scientific name	Status	ERL	RDBU	IUCN	BERN	BONN	CITES
52	Merlin	*Falco columbarius*	m, w				2	2	2
53	Red-footed falcon	*Falco vespertinus*	m, n	VU			2	2	2
54	Common kestrel	*Falco tinnunculus*	m, w, n				2	2	2
55	Grey partridge	*Perdix perdix*	m, w, n	VU			3		
56	Common quail	*Coturnix coturnix*	m, w, n				3	2	
57	Ring-necked pheasant	*Phasianus colchicus*	m, w, n				3		
58	Common crane	*Grus grus*	m, w		RAR	LC	2	1.2	2
59	Demoiselle crane	*Anthropoides virgo*	m, n		EN	LC	2	2	2
60	Water rail	*Rallus aquaticus*	m, w, n				3		
61	Spotted crake	*Porzana porzana*	m, w, n				2	2	
62	Little crake	*Porzana parva*	m, n				2	2	
63	Corncrake	*Crex crex*	m				2		
64	Common moorhen	*Gallinula chloropus*	m, w, n				3		
65	Eurasian coot	*Fulica atra*	m, w, n				3	2	
66	Great bustard	*Otis tarda*	m	VU	EN	VU	2	1.2	2
67	Eurasian stone-curlew	*Burhinus oedicnemus*	m, n	VU	PL	LC	2	2	
68	Golden plover	*Pluvialis apricaria*	m				3	2	
69	Ringed plover	*Charadrius hiaticula*	m		RAR	LC	2	2	
70	Little ringed plover	*Charadrius dubius*	m, n				2	2	
71	Kentish plover	*Charadrius alexandrinus*	m, n		VU	LC	2	2	
72	Eurasian dotterel	*Eudromias morinellus*	m				2	2	
73	Northern lapwing	*Vanellus vanellus*	m, w, n	VU			3	2	
74	Black-winged stilt	*Himantopus himantopus*	m, n		VU	LC	2	2	
75	Pied avocet	*Recurvirostra avosetta*	m, n		RAR	LC	2	2	
76	Green sandpiper	*Tringa ochropus*	m				2	1.2	
77	Wood sandpiper	*Tringa glareola*	m				2	1.2	
78	Common greenshank	*Tringa nebularia*	m				3	1.2	
79	Common redshank	*Tringa totanus*	m, n				3	1.2	
80	Spotted redshank	*Tringa erythropus*	m				3	1.2	
81	Marsh sandpiper	*Tringa stagnatilis*	m		EN	LC	2	1.2	
82	Common sandpiper	*Actitis hypoleucos*	m				2	1.2	
83	Terek sandpiper	*Xenus cinereus*	m				2	1.2	
84	Ruff	*Philomachus pugnax*	m				3	1.2	
85	Little stint	*Calidris minuta*	m				2	1.2	
86	Temminck's stint	*Calidris temminckii*	m				2		
87	Dunlin	*Calidris alpina*	m				2	1.2	
88	Common snipe	*Gallinago gallinago*	m, w				3	1.2	
89	Great snipe	Gallinago media	m		VU		2	2	
90	Eurasian woodcock	*Scolopax rusticola*	m				3	1.2	
91	Eurasian curlew	*Numenius arquata*	m, w		EN	NT	3	1.2	
92	Whimbrel	*Numenius phaeopus*	m		EN	LC	3	1.2	
93	Black-tailed godwit	*Limosa limosa*	m	VU			3	1.2	
94	Collared pratincole	*Glareola pratincola*	m, n		RAR	NT	2	2	
95	Great black-headed gull	*Larus ichthyaetus*	m, w, n		EN	LC	3	2	
96	Mediterranean gull	*Larus melanocephalus*	m				2	2	
97	Little gull	*Larus minutus*	m, n				2		
98	Black-headed gull	*Larus ridibundus*	m, w, n				3		
99	Slender-billed gull	*Larus genei*	m, n				2	2	
100	Lesser black-backed gull	*Larus fuscus*	m				-	-	-
101	Yellow-legged gull	*Larus cachinnans*	m, w, n				-	-	-
102	Common gull	*Larus canus*	m, w				3		
103	Black tern	*Chlidonias niger*	m				2	2	
104	White-winged tern	*Chlidonias leucopterus*	m				2	2	

No.	English name	Scientific name	Status	ERL	RDBU	IUCN	BERN	BONN	CITES
105	Whiskered tern	*Chlidonias hybrida*	m				2		
106	Gull-billed tern	*Gelochelidon nilotica*	m, n	VU			2	2	
107	Common tern	*Sterna hirundo*	m, n				2	2	
108	Little tern	*Sterna albifrons*	m, n		RAR	LC	2	2	
109	Woodpigeon	*Columba palumbus*	m, w, n						
110	Stock pigeon	*Columba oenas*	m, w, n		VU	LC	3		
111	Rock pigeon	*Columba livia*	m, n				3		
112	Eurasian collared dove	*Streptopelia decaocto*	m, w, n				3		
113	Turtle dove	*Streptopelia turtur*	m, n				3		
114	Common cuckoo	*Cuculus canorus*	m, n				3		
115	Long-eared owl	*Asio otus*	m, w, n				2		2
116	Short-eared owl	*Asio flammeus*	m, w, n		RAR	LC	2		2
117	Common scops owl	*Otus scops*	m, n		RAR	LC	2		2
118	Little owl	*Athene noctua*	m, w, n				2		2
119	European nightjar	*Caprimulgus europaeus*	m, n				2		
120	Common swift	*Apus apus*	m, n				3		
121	European roller	*Coracias garrulus*	m, n	VU	EN	NT	2	2	
122	Common kingfisher	*Alcedo atthis*	m, n				2		
123	European bee-eater	*Merops apiaster*	m, n				2	2	
124	Hoopoe	*Upupa epops*	m, n				2		
125	Eurasian wryneck	*Jynx torquilla*	m				2		
126	European green woodpecker	*Picus viridis*	m		VU	LC	2		
127	Grey-headed woodpecker	*Picus canus*	m				2		
128	Great-spotted woodpecker	*Dendrocopos major*	m, n				2		
129	Syrian woodpecker	*Dendrocopos syriacus*	m, n				2		
130	Middle spotted woodpecker	*Dendrocopos medius*	m				2		
131	Lesser spotted woodpecker	*Dendrocopos minor*	m, n				2		
132	Bank swallow	*Riparia riparia*	m, n				2		
133	Barn swallow	*Hirundo rustica*	m, n				2		
134	Common house martin	*Delichon urbica*	m, n				2		
135	Crested lark	*Galerida cristata*	m, w, n				3		
136	Red-capped lark	*Calandrella cinerea*	m, w, n				3		
137	Lesser short-toed lark	*Calandrella rufescens*	m, w, n		PL	LC	2		
138	Calandra lark	*Melanocorypha calandra*	m, w, n				2		
139	Skylark	*Alauda arvensis*	m, w, n				3		
140	Tawny pipit	*Anthus campestris*	m, n				2		
141	Tree pipit	*Anthus trivialis*	m, n				2		
142	Red-throated pipit	*Anthus cervinus*	m				2		
143	Yellow wagtail	*Motacilla flava*	m, n				2		
144	Black-headed wagtail	*Motacilla feldegg*	m, n				2		
145	Citrine wagtail	*Motacilla citreola*	m				2		
146	White wagtail	*Motacilla alba*	m, w, n				2		
147	Red-backed shrike	*Lanius collurio*	m, n				2		
148	Lesser grey shrike	*Lanius minor*	m, n				2		
149	Great grey shrike	*Lanius excubitor*	m, w		RAR	LC	2		
150	Golden oriole	*Oriolus oriolus*	m, n				2		
151	European starling	*Sturnus vulgaris*	m, w, n				2		
152	Rosy starling	*Sturnus roseus*	m, n		RAR	LC	2		
153	Eurasian jay	*Garrulus glandarius*	m, w, n				2		
154	European magpie	*Pica pica*	m, w, n				2		
155	Jackdaw	*Corvus monedula*	m, w, n				2		
156	Rook	*Corvus frugilegus*	m, w, n				2		
157	Hooded crow	*Corvus cornix*	m, w, n				2		

No.	English name	Scientific name	Status	ERL	RDBU	IUCN	BERN	BONN	CITES
158	Common raven	*Corvus corax*	m, w, n				3		
159	Bohemian waxwing	*Bombycilla garrulus*	m, w				2		
160	Winter wren	*Troglodytes troglodytes*	m, w, n				2		
161	Dunnock	*Prunella modularis*	m, w				2		
162	Savi's warbler	*Locustella luscinioides*	m, n				2		
163	River warbler	*Locustella fluviatilis*	m, n				2		
164	Common grasshopper warbler	*Locustella naevia*	m				2		
165	Sedge warbler	*Acrocephalus schoenobaenus*	m, n				2		
166	Paddyfield warbler	*Acrocephalus agricola*	m, n				2		
167	Eurasian reed warbler	*Acrocephalus scirpaceus*	m, n				2		
168	Great reed warbler	*Acrocephalus arundinaceus*	m, n				2		
169	Icterine warbler	*Hippolais icterina*	m				2		
170	Barred warbler	*Sylvia nisoria*	m, n				2		
171	Blackcap	*Sylvia atricapilla*	m, n				2		
172	Garden warbler	*Sylvia borin*	m, n				2		
173	Common whitethroat	*Sylvia communis*	m, n				2		
174	Lesser whitethroat	*Sylvia curruca*	m				2		
175	Willow warbler	*Phylloscopus trochilus*	m				2		
176	Chiffchaff	*Phylloscopus collybita*	m				2		
177	Wood warbler	*Phylloscopus sibilatrix*	m				2		
178	Goldcrest	*Regulus regulus*	m				2		
179	European Pied flycatcher	*Ficedula hypoleuca*	m				2		
180	Collared flycatcher	*Ficedula albicollis*	m				2		
181	Red-breasted flycatcher	*Ficedula parva*	m				2		
182	Spotted flycatcher	*Muscicapa striata*	m, n				2		
183	Whinchat	*Saxicola rubetra*	m, n				2	2	
184	African stonechat	*Saxicola torquata*	m, n				2	2	
185	Northern wheatear	*Oenanthe oenanthe*	m, n				2		
186	Pied wheatear	*Oenanthe pleschanka*	m, n				2		
187	Isabelline wheatear	*Oenanthe isabellina*	m, n				2		
188	Common redstart	*Phoenicurus phoenicurus*	m, n				2	2	
189	Black redstart	*Phoenicurus ochruros*	m, n				2	2	
190	European robin	*Erithacus rubecula*	m, n						
191	Nightingale	*Luscinia megarhynchos*	m, n				2	2	
192	Thrush nightingale	*Luscinia luscinia*	m				2	2	
193	Bluethroat	*Luscinia svecica*	m, n				2	2	
194	Fieldfare	*Turdus pilaris*	m, w				3	2	
195	Common blackbird	*Turdus merula*	m, w, n				3	2	
196	Redwing	*Turdus iliacus*	m, w				3	2	
197	Song thrush	*Turdus philomelos*	m, w, n				3	2	
198	Mistle thrush	*Turdus viscivorus*	m, w				3	2	
199	Bearded reedling	*Panurus biarmicus*	m, w, n				2		
200	Long-tailed tit	*Aegithalos caudatus*	m				3		
201	Penduline tit	*Remiz pendulinus*	m, n				2		
202	Blue tit	*Parus caeruleus*	m, w, n				2		
203	Great tit	*Parus major*	m, w, n				2		
204	Eurasian treecreeper	*Certhia familiaris*	m				2		
205	House sparrow	*Passer domesticus*	m, w, n				2		
206	Eurasian tree sparrow	*Passer montanus*	m, w, n				3		
207	Chaffinch	*Fringilla coelebs*	m, w, n				3		
208	Brambling	*Fringilla montifringilla*	m, w				2		
209	European greenfinch	*Chloris chloris*	m, w, n				2		

No.	English name	Scientific name	Status	ERL	RDBU	IUCN	BERN	BONN	CITES
210	Eurasian siskin	*Spinus spinus*	m, w				2		
211	European goldfinch	*Carduelis carduelis*	m, w, n				2		
212	Linnet	*Acanthis cannabina*	m, w, n				2		
213	Eurasian bullfinch	*Pyrrhula pyrrhula*	m				3		
214	Hawfinch	*Coccothraustes coccothraustes*	m, w, n				2		
215	Corn bunting	*Emberiza calandra*	m, w, n				3		
216	Yellowhammer	*Emberiza citrinella*	m, w, n				2		
217	Reed bunting	*Emberiza schoeniclus*	m, w, n				2		
218	Ortolan bunting	*Emberiza hortulana*	m, n				3		

Notes: Status: m - species found during seasonal migrations; w - species found in the winter period; n - species foundin in the nesting period.

ERL - conservation status of the European Red List: VU – (Vulnarable) species which can be in a nearest future referred to endangered category if the factors affecting their status will continue to act; EN – (Endangered) - species which are under danger of vanishing; their conservation is hardly possible and reproduction is impossible with special actions and measures.

RBU - protected by the Red Book of Ukraine: EN - endangered; VU - vulnerable; RAR - rare; PL - priceless.

IUCN - conservation status of the International Union for Conservation of Nature: LC - least concern.

BERN - The Bern Convention or Convention on the Conservation of European Wildlife and Natural Habitats, includes 4 annexes: II (2) - list of fauna species subject to special protection; Annex III (3) - fauna species subject to conservation.

BONN - Bonn Convention **Annex II (2)** includes species which condition is unfavorable and which conservation and management requires international treaties, as well as species which condition would significantly improve as a result of international cooperation that may be achieved based on international treaties.

CITES - The Washington Convention on International Trade in Endangered Species of Wild Fauna and Flora, includes 3 annexes: Annex II (2) includes: a) “all species that are not necessarily threatened with extinction, but may become so unless trade in specimens of such species is subject to strict regulation in order to avoid utilization incompatible with the survival of the species in the wild”; and b) “other species which must be subject to regulation in order that trade in specimens of certain species referred to in sub-paragraph (a) of this paragraph may be brought under effective control”.

Legend

PT Line (330kV OTL)

500-m Buffer Zone.

Vegetation Types

- hedgerows
- trees and shrubs
- wetland vegetation
- meadow and pseudosteppe vegetation
- laylands
- urban landscapes
- farmed ecosystems
- man-made landscapes

Azov and Black Sea Ornithological Station, Research Institute for Biodiversity of Ukraine's Terrestrial and Water Ecosystems, Melitopol State Teachers' Training University, Non-Governmental Organization "Laguna".

Fig. D 1.1

0 2 km

Legend

PT Line (330kV OTL)

500-m Buffer Zone.

Registered Species

Water gatherings

Feeding migrations

Transit migrations

Azov and Black Sea Ornithological Station, Research Institute for Biodiversity of Ukraine's Terrestrial and Water Ecosystems, Melitopol State Teachers' Training University, Non-Governmental Organization "Laguna".

Fig. D 1.2

0 2 km

29 19 28 18 17 16 27 15 26 14 13 20 25 12 1 21 11 2 24 10 9 8 7 23 6 22 3 4 5

Legend

PT Line (330kV OTL)

500-m Buffer Zone.

Registered Species

Water gatherings

Feeding migrations

Transit migrations

Azov and Black Sea Ornithological Station, Research Institute for Biodiversity of Ukraine's Terrestrial and Water Ecosystems, Melitopol State Teachers' Training University, Non-Governmental Organization "Laguna".

Fig. D 1.3

0 2 km

10 22 9 21 20 19 8 18 7 17 16 6 15 14 5 4 3 13 12 11 1 2

Legend

PT Line (330kV OTL)

500-m Buffer Zone.

Registered Species

Water gatherings

Feeding migrations

Transit migrations

Azov and Black Sea Ornithological Station, Research Institute for Biodiversity of Ukraine's Terrestrial and Water Ecosystems, Melitopol State Teachers' Training University, Non-Governmental Organization "Laguna".

Fig. D 1.4

0 2 km

Legend

PT Line (330kV OTL)

500-m Buffer Zone.

Registered Species

Azov and Black Sea Ornithological Station, Research Institute for Biodiversity of Ukraine's Terrestrial and Water Ecosystems, Melitopol State Teachers' Training University, Non-Governmental Organization "Laguna".

Fig. D 1.5

0 2 km

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23

Legend

PT Line (330kV OTL)

500-m Buffer Zone.

Registered Species

Water gatherings

Feeding migrations

Transit migrations

Azov and Black Sea Ornithological Station, Research Institute for Biodiversity of Ukraine's Terrestrial and Water Ecosystems, Melitopol State Teachers' Training University, Non-Governmental Organization "Laguna".

Fig. D 1.6

0 2 km

Legend

PT Line (330kV OTL)

500-m Buffer Zone.

Registered Species

Water gatherings

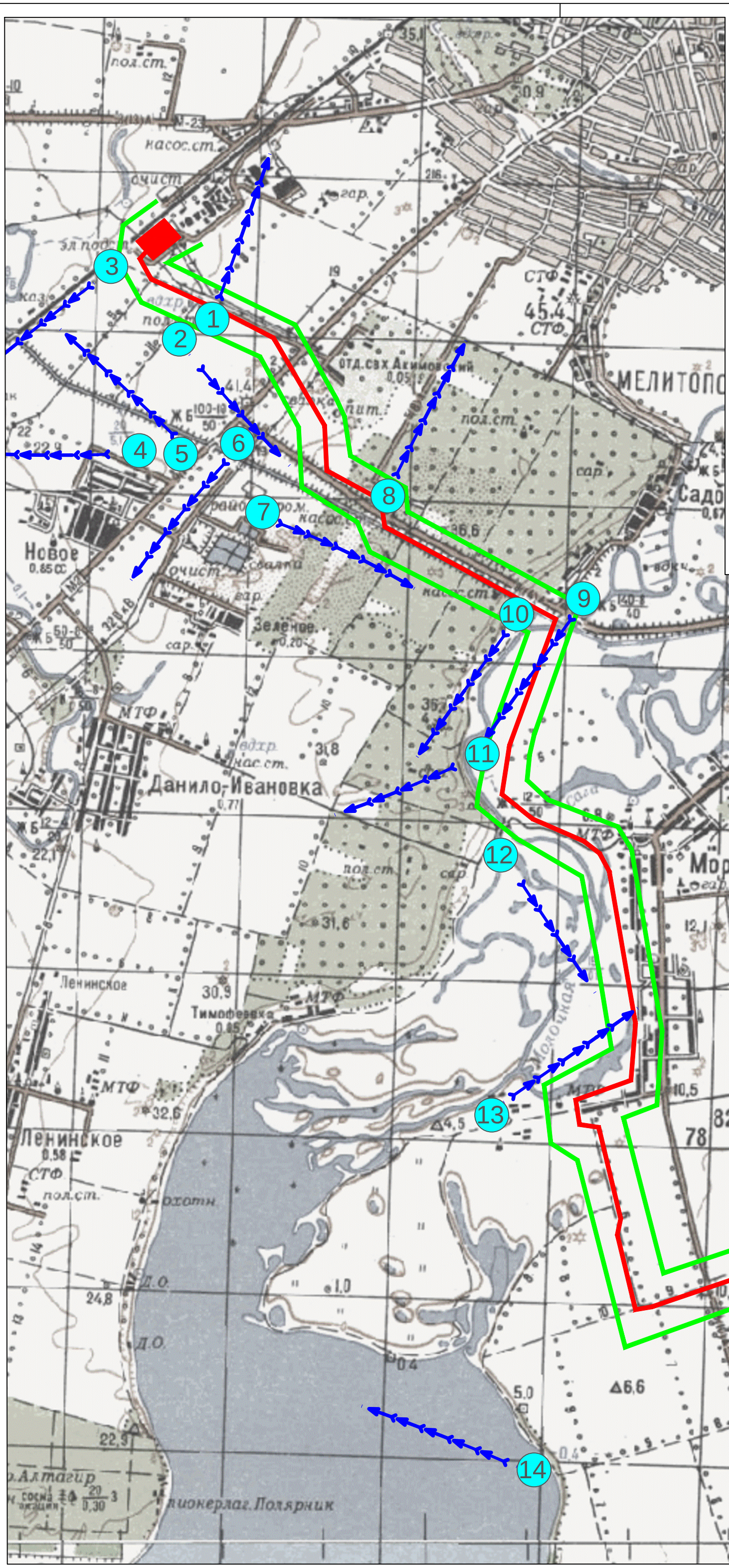
Feeding migrations

Transit migrations

Azov and Black Sea Ornithological Station, Research Institute for Biodiversity of Ukraine's Terrestrial and Water Ecosystems, Melitopol State Teachers' Training University, Non-Governmental Organization "Laguna".

Fig. D 1.7

0 2 km



Legend

PT Line (330kV OTL)

500-m Buffer Zone.

Registered Species

Water gatherings

Feeding migrations

Transit migrations

Azov and Black Sea Ornithological Station, Research Institute for Biodiversity of Ukraine's Terrestrial and Water Ecosystems, Melitopol State Teachers' Training University, Non-Governmental Organization "Laguna".

Fig. D 1.8

0 2 km

Table 1.2.1 Results of the census of migratory bird passages within the 330 kV OTL, buffer zones and adjacent territories on 30.01.2016 (IAW the schematic map, Fig. D 1.2).

Item #	Time	Species	Number	Migration type	Height (m)	Direction
20	10.00	Rook (*Corvus frugilegus*)	11	feeding	10	S
21		European magpie (*Pica pica*)	3	feeding	5	E
22	11.00	Eurasian tree sparrow (*Passer montanus*)	8	feeding	5	N
23	13.00	Mallard *(Anas platyrhynchos)*	6	feeding	5	S
24		European starling (*Sturnus vulgaris*)	18	feeding	5	W
25		Rook (*Corvus frugilegus*)	25	feeding	15	SW
26		Chaffinch (*Fringilla coelebs*)	18	feeding	5	NE
27		Skylark (*Alauda arvensis*)	30	feeding	30	E
28		Common gull (*Larus canus*)	50	feeding	20	NE
		Yellow-legged gull (*Larus cachinnans*)	7	feeding	20	NE
29	14.00	Eurasian tree sparrow (*Passer montanus*)	14	feeding	7	SW
Total specimens (9 species) - *during the feeding migrations*			**190**			

Note: N - north; NE - north-east; NW - north-west; W - west; SW - south-west; E - east; SE - south-east; S - south.

Table 1.2. Results of the bird census within the 330 kV OTL, buffer zones and adjacent territories on 30.01.2016 (IAW the schematic map, Fig. D 1.2).

Item #	Time	Species	Number
1	10.00	Eurasian collared dove (*Streptopelia decaocto*)	**5**
2		Skylark (*Alauda arvensis*)	**17**
3		Chaffinch (*Fringilla coelebs*)	**7**
4		Hooded crow (*Corvus cornix)*	**2**
5	11.00	Common blackbird (*Turdus merula)*	**5**
6		Mallard *(Anas platyrhynchos)*	**45**
7		Common gull (*Larus canus*)	**7**
8		Whooper swan (*Cygnus cygnus*)	***7***
8		Greater scaup (*Aythya marila*)	**20**
8		Common gull (*Larus canus*)	**14**
9		White-tailed eagle (*Haliaeetus albicilla*)	**1**
10		Great tit (*Parus major*)	**5**
11		European starling (*Sturnus vulgaris*)	**12**
12		Eurasian collared dove (*Streptopelia decaocto*)	**7**
13	13.00	Black-headed gull (*Larus ridibundus*)	**25**
14		Common raven (*Corvus corax*)	**1**
15		Hooded crow (*Corvus cornix)*	**3**
16		European magpie (*Pica pica*)	**1**
17		Rook (*Corvus frugilegus*)	**150**
		Common gull (*Larus canus*)	**50**
		Yellow-legged gull (*Larus cachinnans*)	**5**
18		Rook (*Corvus frugilegus*)	**35**
		Common gull (*Larus canus*)	**25**
		Yellow-legged gull (*Larus cachinnans*)	**2**
19	14.00	Syrian woodpecker (*Dendrocopos syriacus*)	**1**
Total specimens (18 species) - *during the censuses*			**452**

Table 1.3.1. Results of the census of migratory bird passages within the 330 kV OTL, buffer zones and adjacent territories on 20.03.2016 (IAW the schematic map, Fig. D 1.3).

Item #	Time	Species	Number	Migration type	Direction	Height (m)
11	8.00	Eurasian tree sparrow (*Passer montanus*)	6	Feeding	S	5
12		Greater white-fronted goose (*Anser albifrons)*	22	Transit	NE	400
13		Common blackbird (*Turdus merula)*	3	Transit	S	5
14	9.00	Yellow-legged gull (*Larus cachinnans*)	6	Feeding	N	10
15		Rook (*Corvus frugilegus*)	11	Feeding	NE	20
16		Corn bunting (*Emberiza calandra*)	20	Transit	N	5
17		European starling (*Sturnus vulgaris*)	50	Feeding	SE	10
18		White wagtail (*Motacilla alba*)	20	Transit	S	10
19	10.00	Common raven (*Corvus corax*)	1	Feeding	E	50
20		Small passeriformes (*Passer spp.*)	30	Feeding	NW	7
21		Yellow-legged gull (*Larus cachinnans*)	3	Feeding	SW	15
22	11.00	Rook (*Corvus frugilegus*)	17	Feeding	SW	10
Total specimens (9 species) - *during the migrations*			**189**			

Note: N - north; NE - north-east; NW - north-west; W - west; SW - south-west; E - east; SE - south-east; S - south.

Table 1.3. Results of the bird census within the 330 kV OTL, buffer zones and adjacent territories on 20.03.2016 (IAW the schematic map, Fig. D 1.3).

Item #	Time	Species	Number
1	8.00	European starling (*Sturnus vulgaris*)	**8**
2		Winter wren (*Troglodytes troglodytes*)	**1**
2		Fieldfare (*Turdus pilaris*)	**4**
3		Rough-legged buzzard (*Buteo lagopus*)	**1**
4		Woodpigeon (*Columba palumbus*)	**3**
5	9.00	Eurasian curlew (*Numenius arquata*)	**2**
6		European magpie (*Pica pica*)	**1**
7		Rook (*Corvus frugilegus*)	**21**
		European starling (*Sturnus vulgaris*)	**20**
		Hooded crow (*Corvus cornix)*	**3**
8	10.00	Common buzzard (*Buteo buteo*)	**1**
9		Rook (*Corvus frugilegus*)	**75**
10	11.00	Eurasian tree sparrow (*Passer montanus*)	**30**
Total specimens (11 species) - *during the censuses*			**170**

Table 1.4.1. Results of the census of migratory bird passages within the 330 kV OTL, buffer zones and adjacent territories on 08.04.2016 (IAW the schematic map, Fig. D 1.4).

Item #	Time	Species	Number	Migration type	Direction	Height (m)
17		European starling (*Sturnus vulgaris*)	6	Feeding	NE	10
18		Hooded crow (*Corvus cornix)*	4	Feeding	S	10
19		Woodpigeon (*Columba palumbus*)	3	Feeding	SW	5
20		European starling (*Sturnus vulgaris*)	260	Transit	NE	50
21		Common blackbird (*Turdus merula)*	6	Transit	SE	10
22		Greater white-fronted goose (*Anser albifrons)*	28	Transit	N	300
23		*Chlidonias niger*	12	Transit	NE	5
24		Chaffinch (*Fringilla coelebs*)	16	Transit	N	5
25		Mallard *(Anas platyrhynchos)*	25	Feeding	N	30
26		Ruff (*Philomachus pugnax*)	45	Transit	N	50
27		Ruff (*Philomachus pugnax*)	22	Transit	NE	30
28		Chaffinch (*Fringilla coelebs*)	30	Feeding	SW	7
		European goldfinch (*Carduelis carduelis*)	20	Feeding	SW	7
29		Skylark (*Alauda arvensis*)	25	Feeding	SW	10
30		Goshawk (*Accipiter gentilis*)	1	Feeding	NE	
31		Small passeriformes (*Passer spp.*)	50	Feeding	SE	7
32		Grey partridge (*Perdix perdix*)	9	Feeding	W	5
33		White wagtail (*Motacilla alba*)	24	Feeding	SE	5
Total specimens (16 species) - *during the migrations*			**586**			

Note: N - north; NE - north-east; NW - north-west; W - west; SW - south-west; E - east; SE - south-east; S - south.

Table 1.4. Results of the bird census within the 330 kV OTL, buffer zones and adjacent territories on 08.04.2016 (IAW the schematic map, Fig. D 1.4).

Item #	Time	Species	Number
1	8.00	Common blackbird (*Turdus merula)*	**6**
1		Winter wren (*Troglodytes troglodytes*)	**2**
1		Common redstart (*Phoenicurus phoenicurus*)	**3**
1		Chaffinch (*Fringilla coelebs*)	**12**
2		Hooded crow (*Corvus cornix)*	**4**
3		Woodpigeon (*Columba palumbus*)	**2**
4		Common kestrel (*Falco tinnunculus*)	**1**
5	9.00	European greenfinch (*Chloris chloris*)	**4**
6		Woodpigeon (*Columba palumbus*)	**1**
7		Great crested grebe (*Podiceps cristatus)*	**5**
7	10.00	Eurasian coot (*Fulica atra*)	**18**
8		Pied avocet (*Recurvirostra avosetta*)	**7**
9		Rough-legged buzzard (*Buteo lagopus*)	**1**
10		Rook (*Corvus frugilegus*)	**6**
11		Eurasian coot (*Fulica atra*)	**7**
		Mallard **(***Anas platyrhynchos)*	**2**
		Northern lapwing (*Vanellus vanellus*)	**2**
12	11.00	Common kestrel (*Falco tinnunculus*)	**1**
13		Rook (*Corvus frugilegus*)	**27**
14		Rook (*Corvus frugilegus*)	**5**
15		Eurasian tree sparrow (*Passer montanus*)	**7**
16	11.50	European magpie (*Pica pica*)	**1**
Total specimens (17 species) - *during the censuses*			**124**

Table D 1.5. Results of the nesting bird censuses within the 330 kV OTL. 23 – 25.04.2016 and 10 - 15.05.2016 (IAW the schematic map, Fig. D 1.5).

Item #	Species	Nests
1	Little owl *(Athene noctua)*	1
1	Hooded crow (*Corvus cornix)*	1
2	Yellowhammer (*Emberiza citrinella*)	1*
2	Barred warbler (*Sylvia nisoria*)	1*
2	Garden warbler (*Sylvia borin*)	2*
2	Common whitethroat (Sylvia communis)	1
2	Long-eared owl (*Asio otus*)	1*
2	European greenfinch (*Chloris chloris*)	1*
2	Red-backed shrike (*Lanius collurio*)	1
2	Chaffinch (*Fringilla coelebs*)	1
3	Turtle dove (*Streptopelia turtur*)	**1**
4	Woodpigeon (*Columba palumbus*)	1
5	Common kestrel (*Falco tinnunculus*)	1
6	Thrush nightingale (*Luscinia luscinia*)	1*
7	Hooded crow (*Corvus cornix)*	1
8	Lesser grey shrike (*Lanius minor*)	1
9	Common quail (*Coturnix coturnix*)	1*
10	Tawny pipit (*Anthus campestris*)	1
11	Chaffinch (*Fringilla coelebs*)	1
11	Red-backed shrike (*Lanius collurio*)	1
11	European goldfinch (*Carduelis carduelis*)	1*
12	Woodpigeon (*Columba palumbus*)	1
12	Garden warbler (*Sylvia borin*)	1
12	Common kestrel (*Falco tinnunculus*)	1
12	Yellowhammer (*Emberiza citrinella*)	1
13	European magpie (*Pica pica*)	1
14	Woodpigeon (*Columba palumbus*)	1
15	Hooded crow (*Corvus cornix)*	1
16	Common kestrel (*Falco tinnunculus*)	1
17	Hooded crow (*Corvus cornix)*	1
18	Lesser grey shrike (*Lanius minor*)	1
19	Lesser grey shrike (*Lanius minor*)	1
20	Hooded crow (*Corvus cornix)*	1
21	Lesser grey shrike (*Lanius minor*)	1
22	European magpie (*Pica pica*)	1
23	Lesser grey shrike (*Lanius minor*)	1
Total (species/nests)		**19/36**

Note: * - nesting behavior

Table 1.6.1. Results of the census of migratory bird passages within the 330 kV OTL, buffer zones and adjacent territories on 07.08.2016 (IAW the schematic map, Fig. D 1.6).

Item #	**Time**	**Species**	**Number**	**Type of migration**	**Direction**	**Height (m)**
15	6.20	Small passeriformes (*Passer spp.*)	12	Feeding	N	5
16		Small passeriformes (*Passer spp.*)	25	Feeding	SE	7
17		Common kestrel (*Falco tinnunculus*)	1	Feeding	SW	25
18		Turtle dove (*Streptopelia turtur*)	3	Feeding	SW	7
19	7.00	Western marsh-harrier (*Circus aeruginosus*)	1	Feeding	SW	15
20		Rook (*Corvus frugilegus*)	15	Feeding	S	10
21		Common kestrel (*Falco tinnunculus*)	1	Feeding	S	7
22		Mediterranean gull *(Larus melanocephalus)*	3	Feeding	SE	25
		Black-headed gull (*Larus ridibundus*)	1	Feeding	SE	25
23		Bank swallow (*Riparia riparia*)	20	Feeding	SE	10
24	9.00	Yellow-legged gull (*Larus cachinnans*)	2	Feeding	W	30
Total specimens (9 species) - *during the migrations*			**84**			

Note: N - north; NE - north-east; NW - north-west; W - west; SW - south-west; E - east; SE - south-east; S - south.

Table 1.6. Results of the bird census within the 330 kV OTL, buffer zones and adjacent territories on 07.08.2016 (IAW the schematic map, Fig. D 1.6).

Item #	Time	Species	Number
1	6.20	Eurasian tree sparrow (*Passer montanus*)	**15**
2		Rook (*Corvus frugilegus*)	**25**
3		Rook (*Corvus frugilegus*)	**15**
4		Lesser grey shrike (*Lanius minor*)	**1**
5		Common kestrel (*Falco tinnunculus*)	**1**
6	7.00	Common kestrel (*Falco tinnunculus*)	**3**
		Rock pigeon (*Columba livia var. domestica*)	**50**
		Barn swallow (*Hirundo rustica*)	**155**
		Lesser grey shrike (*Lanius minor*)	**2**
		Eurasian tree sparrow (*Passer montanus*)	**5**
		House sparrow (*Passer domesticus*)	**10**
		European greenfinch (*Chloris chloris*)	**1**
		Thrush nightingale (*Luscinia luscinia*)	**1**
7		Northern wheatear (*Oenanthe oenanthe*)	**1**
		Common kestrel (*Falco tinnunculus*)	**1**
		Red-backed shrike (*Lanius collurio*)	**2**
		Lesser grey shrike (*Lanius minor*)	**10**
8	8.00	Common kestrel (*Falco tinnunculus*)	**1**
9		Woodpigeon (*Columba palumbus*)	**1**
10		Turtle dove (*Streptopelia turtur*)	**1**
		Common kestrel (*Falco tinnunculus*)	**1**
		Red-backed shrike (*Lanius collurio*)	**2**
		Lesser grey shrike (*Lanius minor*)	**11**
11		Great crested grebe (*Podiceps cristatus)*	**17**
		Little egret (*Egretta garzetta*)	**1**
		Grey heron (*Ardea cinerea*)	**2**
		Long-legged buzzard (*Buteo rufinus*)	**2**
		Common buzzard (*Buteo buteo*)	**1**
		Common kestrel (*Falco tinnunculus*)	**2**
12		Thrush nightingale (*Luscinia luscinia*)	**1**
13	9.00	Hoopoe (*Upupa epops*)	**2**
		Skylark (*Alauda arvensis*)	**2**
		White wagtail (*Motacilla alba*)	**5**
		Red-backed shrike (*Lanius collurio*)	**2**
		Lesser grey shrike (*Lanius minor*)	**4**
		Golden oriole (*Oriolus oriolus*)	**1**
		Hooded crow (*Corvus cornix)*	**1**
		Common raven (*Corvus corax*)	**1**
		Corn bunting (*Emberiza calandra*)	**1**
		Yellowhammer (*Emberiza citrinella*)	**5**
		Small passeriformes (*Passer spp.*)	**85**
14		Common kestrel (*Falco tinnunculus*)	**2**
		Small passeriformes (*Passer spp.*)	**50**
Total specimens (25 species) - *during the censuses*			**502**

Table 1.7 Results of the bird census within the 330 kV OTL, buffer zones and adjacent territories on 26.10.2016 (IAW the schematic map, Fig. D 1.7).

Item #	Time	Species	Number
1	**7.00**	European magpie (*Pica pica*)	**1**
2		European magpie (*Pica pica*)	**2**
3		Hooded crow (*Corvus cornix)*	**2**
4		Eurasian tree sparrow (*Passer montanus*)	**25**
5		Rook (*Corvus frugilegus*)	**250**
		Hooded crow (*Corvus cornix)*	**7**
		Yellow-legged gull (*Larus cachinnans*)	**15**
6		Rook (*Corvus frugilegus*)	**1,800**
		Yellow-legged gull (*Larus cachinnans*)	**20**
		Black-headed gull (*Larus ridibundus*)	**120**
7		Rook (*Corvus frugilegus*)	**50**
		Hooded crow (*Corvus cornix)*	**2**
		Yellow-legged gull (*Larus cachinnans*)	**12**
8		Hooded crow (*Corvus cornix)*	**1**
9		Eurasian jay (*Garrulus glandarius*)	**1**
10	8.00	Eurasian jay (*Garrulus glandarius*)	**1**
11		Rook (*Corvus frugilegus*)	**10**
12		Great egret (*Egretta alba*)	**11**
13		Mallard ***(****Anas platyrhynchos)*	**7**
14		Grey heron (*Ardea cinerea*)	**3**
15		Eurasian collared dove (*Streptopelia decaocto*)	**22**
16	9.00	Rock pigeon (*Columba livia var. domestica*)	**120**
17		Eurasian collared dove (*Streptopelia decaocto*)	**2**
18		Hooded crow (*Corvus cornix)*	**2**
		Corn bunting (*Miliaria calandra*)	**2**
19		Eurasian tree sparrow (*Passer montanus*)	**25**
20		European magpie (*Pica pica*)	**1**
21		Hooded crow (*Corvus cornix)*	**2**
22	10.00	Great crested grebe (*Podiceps cristatus)*	**5**
		Mallard ***(****Anas platyrhynchos)*	**150**
		Northern pintail (*Anas acuta*)	**9**
		Garganey (*Anas querquedula*)	**25**
		Ducks (Anas spp.)	**450**
23		European magpie (*Pica pica*)	**1**
24		Common blackbird (*Turdus merula)*	**1**
25		Hooded crow (*Corvus cornix)*	**2**
26	11.00	European magpie (*Pica pica*)	**1**
27	12.00	African stonechat (*Saxicola torquata*)	**2**
28	13.00	Eurasian tree sparrow (*Passer montanus*)	**25**
29		Passerinae sp.	**42**
Total specimens (18 species) - *during the censuses*			**3,229**

Table 1.8 Results of the census of migratory bird passages within the 330 kV OTL, buffer zones and adjacent territories on 26.10.2016 (IAW the schematic map, Fig. D 1.8).

Item #	Time	Species	Number	Migration type	Direction	Height (m)
1	**7.00**	Passerinae sp.	25, 20, 40 (85)	Feeding	NE	10
2		Chaffinch (*Fringilla coelebs*)	30	Feeding	SE	10
3		European magpie (*Pica pica*)	2	Feeding	SW	15
4		Rook (*Corvus frugilegus*)	50	Feeding	W	50
5		Rook (*Corvus frugilegus*)	2200	Feeding	NW	50
6		Rook (*Corvus frugilegus*)	1200	Feeding	SW	50
		Black-headed gull (*Larus ridibundus*)	350	Feeding	SW	50
7		Rook (*Corvus frugilegus*)	350	Feeding	SE	50
		European starling (*Sturnus vulgaris*)	450	Feeding	SE	15
		Black-headed gull (*Larus ridibundus*)	70	Feeding	SE	200
8		Hooded crow (*Corvus cornix)*	2	Feeding	NE	7
9		European goldfinch (*Carduelis carduelis*)	40	Feeding	SW	7
10	8.00	European goldfinch (*Carduelis carduelis*)	52	Feeding	SW	5
		Rook (*Corvus frugilegus*)	100	Feeding	SW	20
11		Linnet (*Acanthis cannabina*)	5	Feeding	SW	7
12		European starling (*Sturnus vulgaris*)	200	Feeding	SE	50
13	9.00	Chaffinch (*Fringilla coelebs*)	15	Feeding	NE	10
14	10.00	Black-headed gull (*Larus ridibundus*)	100	Feeding	W	15
15		Common raven (*Corvus corax*)	2	Feeding	SW	50
		European goldfinch (*Carduelis carduelis*)	30	Feeding	SW	5
16	13.00	Fieldfare (*Turdus pilaris*)	12	Feeding	S	5
17		Rook (*Corvus frugilegus*)	70	Feeding	S	35
18		Chaffinch (*Fringilla coelebs*)	10	Feeding	SE	10
Total specimens (10 species) - *during the migrations*						

Note: N - north; NE - north-east; NW - north-west; W - west; SW - south-west; E - east; SE - south-east; S - south.