Annex 41

The Assessment of Effects of Natural and Anthropogenic Factors on the Dynamics of Bird Population and Species Composition in the Coastal Part of the Danube Biosphere Reserve in 2003 – 2005 (based on the results of integrated environmental monitoring)

1. Key Factors Affecting the Bird Life in the Danube Biosphere Reserve

Key factors of natural origin:

- Hydrological regime of the Danube River is the most significant natural factor affecting the ecosystems in the Danube Biosphere Reserve, especially in the wetland areas. Low water levels in combination with higher summer temperatures may dry up extensive areas of wetlands, as was the case in summer 2003.
- Storm events represent the most significant impact factor for bird colonies inhabiting flat coastal islands and spits. A strong storm may almost completely destroy large bird colonies located in the lower areas.
- Weather and climate.
- Natural successions of deltaic ecosystems.

Key direct-effect factors of anthropogenic origin:

- Pyrogenic factor, which is almost exclusively of anthropogenic origin, manifesting itself during the reed burning period in the late winter/early spring. In the majority of cases, fire spreads into the nature reserve area from the buffer zone and anthropogenic landscape zone;
- Commercial fisheries that produce adverse impact on birds due to disturbance and direct loss of some bird species killed by fishing gear;
- Regulated grazing of feral cattle.

2. General Description of Bird Life and Populations in the Bystre Branch Area

The bird life in the Bystre Branch area is characterized by great species diversity and significant populations of certain birds. The area provides habitat for 225 bird species, including permanent residents, migratory visitors and winter residents. This accounts for 86.5% of bird species recorded in the Ukrainian part of the Danube Basin. Its nesting bird community includes 87 species (Table 1).

Colonial birds, especially ground-nesting shorebird (*Charadriiformes*) species, constitute a core of the nesting bird community of the coastal area of the Danube Biosphere Reserve, including the Bystre Branch area. A characteristic feature of *Charadriiformes* species is that their local populations occupy large areas, and their distribution among alternative nesting places varies significantly from year to year. The area of the Danube Biosphere Reserve itself is only part of their nesting habitat.

Table 1 – General Description of Bird Life in the Bystre Branch Area

Indicator	Number of Species
Total number of species	225
Nesting species	87
Wintering species	81
Species from the European Red List	6
Species from the Red Data Book of Ukraine	33
Species protected under the Bern Convention	214
Species protected under the Bonn Convention	87
Species protected under the Washington Convention	15

There are four main types of bird communities found in the Bystre Branch area with different species composition and population number. The most valuable one is the **bird community of flat coastal islands and spits,** mainly represented by the bird population of the Ptashyna Spit. It mainly consists of colonial species from *Laridae* family, including the Danube Delta's largest colonies of *Sterna hirundo* (common tern) and *Thalasseus sandvicensis* (sandwich tern) species. This is followed by the **bird community of desalinated coastal shallows,** mainly consisting of waterfowl and riparian bird species. The population density is especially high in summer and autumn. The **bird community of shrub-covered sand dunes** on the Kuban and Starostambulsky islands comprises the dendrophilic perching bird species (*Passeriformes)*. The **bird community associated with reed and sedge vegetation** is also dominated by the *Passeriformes* species with small groups of waterfowl birds.

The presence of **bird species associated with the floodplain willow woods** is very limited in the Bystre Branch area due to the lack of suitable habitats.

3. The Assessment of Navigation Route Impact on Bird Communities Inhabiting the Coastal Area of the Danube Biosphere Reserve

3.1. Ground-Nesting Birds

The total number of colonial ground-nesting birds in the Danube Biosphere Reserve remained stable in 2003-2004, and almost doubled in 2005. This is mainly attributed to an over threefold increase in population of *Larus cachinnans* (Caspian Gull) species on the Nova Zemlia (New Land) island (Table 2).

Among the typical bird species inhabiting the Ptashyna Spit, the *Sterna hirundo* (common tern) species showed a significant increase in number during 2005, whereas the populations of *Thalasseus sandvicensis* (sandwich tern) and *Larus cachinnans* (Caspian gull) remained stable. Similar situations with the ground-nesting bird populations were repeatedly observed in the Danube Biosphere Reserve in the previous years. Under such circumstances, it is virtually impossible to isolate and measure the impact of navigation route construction and operation in the Bystre Branch on the population and distribution of these bird species over the area of the Danube Biosphere Reserve. This also concerns the dynamics in species composition of bird colonies. The emergence of new (both for the Danube Biosphere Reserve and delta as a whole) bird colonies on the Ptashyna Spit, recorded on several occasions, can be seen as an additional evidence that demonstrates the significance of this area as a habitat for colonial birds.

As a result of disturbance, the success of nesting effort on the Ptashyna Spit in 2004 was at minimum for all *Charadriiformes* colonies, except *Larus cachinnans* species that start their nesting period earlier and are tolerant to disturbance.

Table 2 – The Record of Ground-Nesting Colonies of *Charadriiformes* Species in the Outer Delta of the Chilia Branch of the Danube River in 2003–2005 (pairs)

Colony location / Species	Ptashyna Spit			New Land			Total		
	2003	2004	2005	2003	2004	2005	2003	2004	2005
Larus cachinnans	460	430	480	1200	1350	4500	1660	1780	4980
Larus ichthyaetus			23						23
Larus genei	8						8		
Sterna hirundo	1300	1250	2340			1030	1300	1250	3370
Thalasseus sandvicensis	1900	2230	2160			0	1900	2230	2160
Gelochelidon nilotica	45	25	32			0	45	25	32
Sterna albifrons	5	32	6			0	5	32	6
Recurviristra avosetta	95	3	2			0	95	3	2
Haemantopus ostralegus	2	1	2			3	2	1	5
Charadrius alexandrinus	2	2	3			5	2	2	8
Charadrius dubius	1	1	1			0	1	1	1
TOTAL	3818	3974	5049	1200	1350	5538	5018	5324	10587

In 2005, tern colonies moved further away from the navigation route to the lower areas of the Ptashyna Spit. As a result of heavy storm, which is not unusual in the outer delta, two colonies were almost completely destroyed and the third one, located in the elevated area, was severely damaged. Due to this storm event, the ultimate success of nesting effort was at 13.5% for *Sterna hirundo* species, and 10.3% for *Thalasseus sandvicensis* species (as compared to the average of 60%-80%, recorded in the Danube Biosphere Reserve in the recent years (Table 3)).

Table 3 – Colony Size and Nesting Effort Success for *Charadriiformes* Species Inhabiting the Ptashyna Spit (2005)

Species	Number of pairs	Nesting Effort Success (%)
Riparian Colony		
Larus cachinnans	480	about 86.0%
Larus ichthyaetus	23	100.0%
Northern Colony		
Thalasseus sandvicensis	664	36.4%
Sterna hirundo	957	32.9%
Central Colony		
Thalasseus sandvicensis	851	0.0%
Sterna hirundo	1104	0.0%
Sterna albifrons	6	0.0%
Gelochelidon nilotica	32	0.0%
Southern Colony		
Thalasseus sandvicensis	645	0.0%
Sterna hirundo	279	0.0%
All Colonies		
Larus cachinnans	480	about 86.0%
Larus ichthyaetus	23	100.0%
Thalasseus sandvicensis	2160	10.3%
Sterna hirundo	2340	13.5%
Sterna albifrons	6	0.0%
Gelochelidon nilotica	32	0.0%

It appears that a large colony of *Larus cachinnans* species and new small colony of *Larus ichthyaetus* species that set their nests on the Ptashyna Spit for the first time were not affected to any noticeable extent by the navigation route construction and operation in 2005.

As can be seen from the above, in 2005 the Ptashyna Spit continued to play the role of major habitat for ground-nesting bird colonies, both in the Danube Biosphere Reserve and Danube Delta as a whole.

In order to minimize the effect of disturbance, a suite of mitigation measures was developed and implemented within the framework of the Monitoring Programme and with the involvement of the Danube Biosphere Reserve specialists. These measures, designed to control and limit the speed of smaller vessels in the locations of nesting grounds, included the installation of two protective buoys, updating of the electronic map to include the information on the 150 m prohibited area for equipment operated in the sandbar area. There was no record and/or indication of any direct adverse impact on bird colonies in 2005. Assuming that the bird colonies can move back closer to the navigation route in 2006, the above mentioned mitigation measures remain valid and relevant.

3.2. Waterfowl and Riparian Birds

The seasonal dynamics in species composition and population of waterfowl and riparian birds in the coastal area of the Danube Biosphere Reserve (including the sandbar section of the Bystre Branch) is influenced by a wide range of various factors. Given that the migratory visitors from various parts of Europe and, partially, North-Western Asia constitute a core of these bird populations, it is very difficult to disentangle and measure the contribution of each specific factor. Table 4 provides the 2005 monitoring data on seasonal distribution and species composition of bird populations in the Bystre Branch area that reflect the characteristic pattern for the outer delta. The comparison of seasonal abundances between 2004 and 2005 is shown in Table 5, both for the Bystre Branch and entire Danube Biosphere Reserve.

Table 4 – The 2005 Monitoring Data on Seasonal Distribution and Species Composition of Bird Populations in the Ptashyna Spit Area (number of individuals)

Date / Species	26.04.05	21.05.05	26.05.05	01.06.05	07.06.05	22.06.05	11.08.05	20.12.05
Pelecanus onocrotalus	11	13	0	6	35	48	19	0
Pelecanus crispus	2	3	2	4	3	5	6	0
Phalacrocorax carbo	0	32	12	17	30	125	390	6
Phalacrocorax pygmaeus	2	4	0	1	0	5	0	8
Egretta alba	3	6	4	9	7	12	6	2
Egretta garzetta	2	0	7	5	3	9	9	0
Ardea cinerea	1	0	4	0	3	5	0	1
Platalea leucorodia	0	2	0	0	0	0	5	0
Anser anser	9	0	0	0	0	12	123	0
Cygnus olor	7	12	13	7	8	6	53	0
Tadorna tadorna	5	5	7	6	4	7	0	0
Anas platyrhynchos	0	6	24	28	60	95	735	75
Anas strepera	0	0	0	0	14	16	8	0
Anas querquedula	9	0	0	0	2	6	210	0
Anas crecca	0	0	0	0	0	0	47	280

Table 5 – Specific Shares Accounted for by Some Typical Bird Species Recorded in the Sandbar Section of the Bystre Branch in 2004-2005 (after-nesting (August) count data, number of individuals

Species	Sandbar Area of the Bystre Branch, including the Ptashyna Spit				Marine Delta of the Chilia Branch	
	Number of Individuals		%			
	2004	2005	2004	2005	2004	2005
Pelecanus onocrotalus	120	19	3.94	1.14	3.049	1.664
Pelecanus crispus	16	6	13.56	13.04	118	46
Phalacrocorax carbo	7.325	390	48.38	1.61	15.142	24.188
Phalacrocorax pygmaeus	0	30	0.00	11.11	431	270
Egretta alba	5	6	1.11	1.99	451	302
Cygnus olor	40	53	1.51	4.60	2.641	1.153
Anser anser	227	123	7.77	6.96	2.922	1.768
Anas platyrhynchos	2.460	735	7.66	8.33	32.124	8.821
Anas querquedula	66	210	2.36	15.15	2.796	1.386
Anas strepera	28	8	4.84	1.59	579	504
Limosa limosa	316	60	23.51	10.70	1.344	561
Larus ridibundus	40	70	1.07	4.73	3.728	1.479
Larus cachinnans	339	270	8.13	14.89	4.172	1.813

These data indicate that the population change in the Ptashyna Spit area was largest in the *Phalacrocorax carbo* species, which shown a nearly 30-fold decrease in 2005. From our point of view, this was mainly caused by the change/redistribution of its food base (anchovies, sprats) in the coastal zone near the delta. For example, the *Phalacrocorax carbo* population of the Ptashyna Spit in mid-August 2004 mainly fed on prey stocks concentrated in the sea near the spit, though this situation changed in 2005. Certain changes in spatial distribution of birds over the area of the Danube Biosphere Reserve (including the Bystre Branch sandbar) were recorded in other bird species. However, they can hardly be attributed to the construction and operation of navigation route along the Bystre Branch. It is obvious that the abnormally and continuously high water levels, recorded in the delta in 2005, had played a much stronger role in this respect.

3.3. Wintering Birds

The species composition and population of birds wintering in the Danube Delta are greatly influenced by weather and climatic conditions, especially the character of freezing process. It is therefore very difficult to disentangle and assess the impact of navigation route reopening on wintering birds. Moreover, data provided in Table 6 indicate that the Bystre Branch sandbar area has a relatively minor significance as a wintering bird habitat as compared to other areas of the Danube Biosphere Reserve.

Table 6 – Number of Typical Wintering Birds in the Marine Delta of the Chilia Branch and the Bystre Branch Sandbar Area in 2005-2006 (based on bird count of 18-19.01.06, number of individuals)

Species	Bystre Branch Sandbar (including Ptashyna Spit area)		Marine Delta of the Chilia Branch
	Number of Individuals	%	
Phalacrocorax carbo	4	1,59	251
Phalacrocorax pygmaeus	2	0,87	230
Ardea cinerea	2	6,90	29
Egretta alba	3	6,12	49
Cygnus olor	5	0,21	2.402
Cygnus cygnus	7	0,36	1.964
Anser anser	37	0,96	3.858
Anas platyrhynchos	485	2,12	22.869
Anas crecca	95	12,91	736
Bucephala clangula	15	0,36	4.166
Mergus albellus	8	0,42	1.924
Aythya ferina	20	0,62	3.220
Fulica atra	3	0,43	705
Haliaeetus albicilla	3	23,08	13
Circus aeruginosus	2	4,44	45
Larus cachinnans	12	1,00	1.197