

The Results of Integrated Environmental Monitoring Programme Carried Out in the Deep Navigation Route Area over the First 6 Months of 2005

1. All hydrological measurements, included into the environmental monitoring programme for the first 6 months of 2005, have been completed according to the schedule. Only official techniques and procedures, adopted by the State Hydrometeorological Service of Ukraine, have been employed in the process of measurement and processing of data, therefore the results of monitoring are reliable and can be incorporated into the hydrological data base.
2. The 2005 spring flood was the first largest flooding event in terms of maximum water levels, the second largest in terms of flow discharge, and the third largest in terms of duration over the last 20 years.
3. The initial analysis of flow measurement data indicates that the long-term trend in flow distribution among the Danube Delta branches continues, with the Chilia Branch receiving a progressively smaller proportion of river flow. As a result, flow discharges in the Ochakiv and Starostambulsky Branches (downstream of the Bystre Branch) have continued to decrease. In the Bystre Branch, the measured flow discharges tended to deviate from the historical flow curve $Q=f(H)$ towards the upper end of the range at higher (>450 cm) water levels as measured near Reni.
4. The changes in water chemistry in the Danube River are considered to be closely associated with the hydrometeorological parameters: the dissolved gas levels were in inverse relationship with water temperatures; the concentrations of suspended and dissolved substances tended to increase at higher flow discharges; higher levels of suspended solids appeared to give rise to the elevated levels of organic substances, phosphorus and nitrogen compounds, and silicium.
5. When an upwelling event coincides with the low-water period in the Bystre Branch, it promotes the invasion of marine water into this branch. This results in the elevated levels of chlorides and sulphates, alkaline metals, calcium and magnesium (water hardness), having little or no impact on the concentrations of hydrocarbonates (alkalinity).
6. The concentrations of oil products and surfactants in water samples were low. The average concentrations of phenols were below 0.005 mg/l (with the prescribed MAC limit for phenols being at 0.001 mg/l).
7. The initial analysis of water quality data, collected during the comprehensive field survey, indicates that the actual concentrations of polluting substances measured during the field survey in the Danube Delta were well within the historical range. For the majority of measured variables (including the chlorinated organic pesticides), the measured concentrations were below their respective historical averages over the period of 1997-2004.
8. The results of environmental monitoring suggest that the impact of river-bound dredging operations on changes in water quality was insignificant, and show no evidence of such impact in case of sea-bound dredging operations.
9. The results of routine water quality control, undertaken in the process of dredging operations during the first 6 months of 2005, confirmed a general finding of the 2004 monitoring programme concerning the insignificant local impact of dredging operations on water quality, limited to a 1 km river section downstream of a dredging site.
10. As part of the survey programme, soil quality in the locations of dredging activity was examined, both along the river channel and in the delta area. The riverbed section between the 50th to 77th km marks is formed of sand. This material can be placed at the special storage sites on the river banks, as the actual values of all monitored parameters are below the prescribed MAC values for soils. The aleurite sand, dominating the soil structure in the mouth section of the Bystre Branch, is similar to the naturally clean/conventionally clean

soil material in terms of the levels of polluting substances. This material can be disposed off at the marine spoils dump without the payment of compensation fee for environmental damage. The density of dry soil material is 1.39-1.42 g/cm⁻³, and the fraction of fine-grain material (with particle size below 0.005 mm), that creates the turbid plume, is as small as 1.06%. The riverbed of the Starostambulsky Branch (at the 11th km) is composed of fine-grain aleurite silt, coarse aleurite, fine sand and pelite, with pollution levels similar to those in the moderately polluted to polluted soil. This material can be disposed off at the marine spoils dump without the payment of compensation fee for environmental damage. The density of dry soil material is 1.31 g/cm⁻³, and the fraction of material giving rise to the elevated turbidity levels at the dredging locations and spoils dump site is 13.99%.

11. The results of comprehensive field survey showed no evidence of significant impact o dredging operations on the hydrobiological parameters.
12. As of May 2005, the general state of macrozoobenthos in the project area (except the dredging site in the sandbar section of the Bystre Branch and the marine spoils dump site) can be described as satisfactory.
13. New information has been derived with respect to the state of migratory and indigenous fish species, including the data characterizing the state of spawning fish (collected during the fishing ban period). The preliminary data indicate that the spawning process for the majority of commercial fish species was successful, enhanced by higher water levels in the Danube River.
14. The collected data on the sizes and weights of the Danube herring show close correspondence with the historical averages.
15. High spring-flood flow affected some riverside areas within the Danube Biosphere Reserve, not only resulting in the degradation of riparian vegetation, but causing the landslipping in 3 locations.
16. According to the recommendation by the Danube Biosphere Reserve management, the prohibited area for small-size vessels was established along the spit, marked with 2 special buoys. Moreover, in 2005 the reserve management set a strict limitation on inspection visits to the spit for various commissions in order to minimize the potential for disturbance during the nesting period. These measures have proved very helpful in terms of minimizing the disturbance caused by navigation activity in the area of the Ptichia Spit, which is particularly important for the nesting bird colonies.
17. For the first time in the history of the Danube Biosphere Reserve, the great black-headed gull colony of 23 pairs was found to have set nests on the Ptichia Spit approximately 800 m further from the navigation channel. This colony has become part of larger colony of Caspian gulls (*Larus cachinnans*). It should be noted that the presence of great black-headed gulls showing signs of nesting behaviour has been recorded since 2003, though their nesting activity started two years later. This slow process of nesting habitat selection is normal for this bird specie, with young birds tending to stay near their future nesting ground for 1-2 nesting seasons before they mature and start their nesting activity.
18. The preliminary data indicate that the population of key colonial species (sandwich tern (*Sterna sandvicensis*) and common tern (*Sterna hirundo*) currently nesting on the Ptichia Spit would be similar to the 2004 nesting population. Likewise, the populations of other accompanying nesting species are likely to remain stable.