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HABITAT USE OF WHISKERED TERN *(CHLIDONIAS HYBRIDA)* IN THE DANUBE DELTA AT BREEDING

The article addresses usage of different habitats by the whiskered tern at breeding in the lakes Kartal, Kugurlui and adjacent areas. We revealed that distribution of whiskered tern in this area depends on distribution of vegetation communities, colonies of other *Laridae* species and water depth at colony sites. The most critical vegetation community, providing breeding of whiskered tern in the lakes Kartal and Kugurlui was community of water lily (*Nymphea alba*) at places with water depth from 1,5 to 2 m. Significance of other vegetation communities is not so important. The species apparently uses them in accordance with principals of ideal free type of habitat selection.

Key words: habitat, community, colony, substrate

The whiskered tern is a common breeder in Ukrainian wetlands. The core of its European population inhabits Eastern Europe and Spain [9]. Since 1930 a slight decrease of the European population is recorded, mainly due to loss and degradation of wetlands, the crucial habitat for the species [9]. Meanwhile, breeding populations of whiskered tern in Romania, Ukraine and some other countries are slightly increasing [9]. In the middle 70's whiskered tern has expanded its breeding area to Ukraine [4] and its population here is estimated about 5000—7000 pairs.

There're three main breeding centers of whiskered tern in Ukraine: the Danube delta, Western Ukraine and Crimea-Sivash area [4]. The Danube delta supports the most consistent breeding group of whiskered tern within Ukraine.

So far little attention was paid to breeding biology of whiskered tern in Ukraine. It wasn't that many studies were dedicated to this species after substantial studies by Бородулина Т. Л. [1, 2] and Мельников Ю. И. [5] on breeding biology of the species in USSR, including Ukraine, primarily for difficult access to breeding sites of whiskered tern.

The group of whiskered tern inhabiting the Danube delta within Ukraine is confined to the lakes Kartal and Kugurlui. These wetlands are listed as national Ramsar sites reserved by statute of the President of Ukraine for further inclusion into the Danube Biosphere Reserve. Now this area attracts a lot of attention of state institutions, non governmental organisations and scientific bodies. Projects for management and wise use of these lakes and their resources are being elaborated at the moment. Therefore studies of whiskered tern in these lakes to conserve its habitats and preserve importance of these lakes in Ukrainian part of the Danube delta for the species seem to be important for us.

To do this it's necessary to identify the most important habitats, which support breeding whiskered terns in the lakes Kartal and Kugurlui.

The goal of this study was to identify crucial habitats for the marsh tern in the Da-

nube lakes Kartal and Kugurlui and factors affecting distribution of the species in march habitats in the area.

In the literature we find usually only the main habitat types whiskered tern uses for breeding [1, 2].

Detailed studies on habitat use of whiskered tern at breeding were carried out in Hungary [10]. However, the Danube delta was never a place for such studies. Therefore we decided to address this issue within our studies of march tern biology in South Ukraine considering changes in hydrological regime of the lakes, which are to come shortly as a result of projects being implemented in the area.

Methods and study area

Habitat use of whiskered tern at breeding were carried out in the lakes Kartal, Kugurlui and adjacent areas in Ukrainian part of the Danube delta during two field seasons, from May to August in 1998—99. We addressed some external factors, which are likely to affect distribution and colony size of whiskered tern in the lakes. These factors are substrate type, water depth and colony composition. The possible effect of the factors was tested by monofactor dispersion analysis. Colony size was estimated directly by a number of nests in a colony.

The lake Kartal and Kugurlui are situated on the left bank of the Danube river and belong to the western group of the Danube lakes. In terms of their origin, these are former river estuaries, which used to discharge in to the Black Sea and later were isolated from the sea as the Danube delta grew. The lakes are fresh water wetlands, with the typical array of marsh habitats. In the middle 60's they were dammed and extensive use of their catchment for agriculture has started. Hydrological regime was altered and the lakes were virtually rendered into water reservoir with little water level fluctuation both within a year and between the years. Water level in the lakes is maintained by a system of artificial canals equipped with sluices. Present water management doesn't consider environmental needs for preservation of valuable flora and fauna of the lakes. As it was mentioned above the lakes are of great international importance and have Ramsar status as shelters for rare and disappearing species like Dalmatian pelican (*Pelecanus crispus*) and pygmy cormorant (*Phalacrocorax pygmeus*). The lakes themselves were heavily used for fish production and stocked with non-aborigine fishes.

Results

Colony distribution of whiskered tern in both Kartal and Kugurlui lakes depends on the substrate (vegetation communities) ($P = 99\%$). Most of the colonies in 1998 and 1998 were located on open water patches overgrown with water lily (*Nymphea alba*) (table 1).

Significance of the rest of vegetation substrates for whiskered tern in the area was merely equal. In 1999 whiskered tern didn't use communities of fennel pondweed In 1999 we observed complete degradation of fennel pondweed communities in of the Kartal lake, however, at the beginning of the breeding season whiskered terns still had large patches of the this species at their disposal. Unlike colony distribution, substrate has no affect on colony size of whiskered tern in the area.

Table 1

Usage of different vegetation communities by whiskered tern for nesting in the lakes Kartal and Kugurlui

Number of colonies in	Substrate			
	water lily	fennel pondweed	water rush	water soldier
1998	17	2	1	2
1999	11	0	2	1

Another factor affecting colony distribution was water depth at the colony sites ($P = 95\%$). Most of the colonies were allocated at sites with water depth from 1,5 to 2 m. We consider that water depth directly affects colony distribution of whiskered tern in the lakes, but not through distribution of water lily communities. Water lily covers large areas in the lakes on shallow water, where water depth is less then 1m, although we didn't register any case of using these places by whiskered terns for nesting.

Colony distribution of whiskered tern also depended on distribution of colonies of other bird species ($P = 99\%$). Whiskered tern forms mixed colonies with black headed gull (*Larus ridibundus*), yellow legged gull (*Larus cahinans*), Slavonic grebe (*Podiceps nigricollis*) and coot (*Fulica atra*) in the Kartal and Kugurlui lakes. Two species of gulls create particularly large colonies in these lakes.

Of 22 colonies of whiskered tern we found in 1998, 12 were mixed with Slavonic grebe and coot (the satellite species in colonies of gulls and terns). Black headed gull and yellow legged gull start breeding much earlier then whiskered tern in the Danube lakes. Mass nesting of whiskered tern occurs at the beginning or by the end of hatching of the gulls (end of May – beginning of June). Accordingly, whiskered tern is by no means a satellite species in colonies of these two gulls. Whereas, coot and Slavonic grebe prefer to nest in colonies of gulls and terns using defense of gulls and terns as a protection for their own nests. Thus, we paid much attention to gulls as it's they who found the colonies, whilst whiskered tern is a satellite species in their colonies, although it occasionally may outnumber them.

As for the colony size of whiskered tern in the Kartal and Kugurlui lakes, we found that none of the factors we tested has any affect on it.

Discussion of the results

In the lakes Kartal and Kugurlui of Ukrainian part of the Danube delta, whiskered tern nests in communities of floating and submerged aquatic vegetation. The most important of them are communities of water lily, which are also the main substrate for breeding whiskered terns in deltas of other large rivers like Volga [2, 3]. Communities of Yellow water lily, the other species resembling species are not used by whiskered tern for breeding. In my opinion it may be accounted for by the fact that yellow water lily has less leaf density then water lily.

Such vegetation communities are appropriate for mezothrofic wetlands. Hence, floodplain mezothrofic wetlands with well-developed vascular floating and submerged aquatic vegetation amongst mosaic reed-beds play the most important role for breeding of whiskered tern in the Danube delta.

In these wetlands, whiskered tern prefers litoral zone with water depth from 1 to 2 m.

As for relationship with other species, whiskered tern tends to nest separately from other gulls and terns, although its colonies provide protection for other opportunistic species like coot and Slavonic grebe. In this case whiskered tern is a colony founder. Whiskered tern may nest in colonies of other gulls and terns, like black headed gull and common tern, apparently if deficient of good places for breeding. Mixed colonies of whiskered tern with black headed gull and yellow legged gull in 1998 were allocated in vegetation communities other then those of water lily. In 1999 when a number of breeding whiskered terns in the lakes had dropped, we recorded much less mixed colonies of whiskered tern in the lakes, and most of the colonies of whiskered tern were in communities of water lily.

Such pattern of habitat selection is called "ideal free" and appropriate for most of the gulls, terns and other seabirds [6]. In ideal free type of habitat selection, a species first colonizes the most optimal habitat. Competition for this habitat grows as a number of birds in it increase, and therefore attractiveness of this habitat decreases. At some point birds may start colonizing another less optimal type of habitat, which attractiveness is the same as that of optimal habitat with high density of a species [8].

In our case communities of water lily is the optimal habitat type. Less optimal are communities of fennel pondweed (*Potamogeton pectinatus*), Yellow water lily water rush and colonies of other bird species in optimal habitat.

We didn't find any factor affecting colony size of whiskered tern in the Kartal and Kugurlui lakes. According to the literature, the colony size may depend on area of habitats suitable for breeding and foraging, availability of food at necessary amount in a wetland and adjacent areas [8].

As for the first factor, it's hardly relevant in this case as we observed large areas covered by communities of water lily and occupied only by small colonies of whiskered tern (20—30 pairs).

The most likely factor affecting colony size of whiskered tern in the Kartal and Kugurlui lakes is availability of necessary food amount in the lakes and adjacent areas. Whiskered tern feeds on variety of prey species, primarily insects [1, 2, 7] in both terrestrial and aquatic habitats. It's extremely difficult to assess the value of foraging habitats and dynamics of changes within these habitats in the lakes for whiskered tern. With available equipment and finances we can hardly undertake this research now.

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БІОТОПІЧНЕ ПОШИРЕННЯ БІЛОЩОКОГО КРЯЧКА В ПЕРІОД РОЗМНОЖЕННЯ В ДЕЛЬТІ ДУНАЮ

Резюме

Розглянуто використання різних біотопів білощоким крячком для розмноження на озерах Картал, Кугурлуй та прилеглих територіях. З'ясовано, що поширення колоній білощокого крячка на даній території пов'язано з розподілом рослинних асоціацій, колоній інших мартинових птахів та глибини води. Найважливішими рослинними асоціаціями, що забезпечують гніздування виду на озерах Картал і Кугурлуй є асоціації латаття білого, в місцях з глибиною води від 1,5 до 2 метрів. Роль інших рослинних асоціацій менш важлива, вони використовуються видом відповідно з моделлю "ідеального вільного типу вибору місць існування".

Ключові слова: місце існування, колонія, асоціація, субстрат.

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БИОТОПИЧЕСКОЕ РАСПРЕДЕЛЕНИЕ БЕЛОЩЕКОЙ КРАЧКИ В ПЕРИОД РАЗМНОЖЕНИЯ В ДЕЛЬТЕ ДУНАЯ

Резюме

Рассматривается использование различных биотопов белощекой крачкой для размножения на озерах Картал и Кугурлуй. В результате проведенных работ выяснено, что распределение колоний белощекой крачки на данной территории связанно с распределением растительных ассоциаций, б колоний других чайковых птиц и глубины воды. Наиболее важными растительными ассоциациями, обеспечивающими гнездование вида на озерах Картал и Кугурлуй являются ассоциации кувшинки белой, в местах с глубиной воды от 1,5 до 2 метров. Роль других растительных ассоциаций менее важна, они используются видов в соответствии с моделью "идеально свободного типа выбора мест обитания".

Ключевые слова: место обитания, колония, ассоциация, субстрат.