THE FISH-BREEDING FARMS AS NESTING PLACES
FOR CHLIDONIAS HYBRIDUS (AVES, ORD.
CHARADRIIFORMES, FAM. STERNIDAE)

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ABSTRACT
Starting with 1948, the Prut River basin has suffered a lot of hydrotechnical and
hydrological works. As a result of these works many ponds with fish rearing destination
have appeared. These aquatic basins represent concentration areas of some important
populations of the bird species both in the passage period and in the reproduction one.

The avifauna of the inferior basin of River Prut was less studied until 1992. Starting with this year many studies were constantly made on the dynamics of the bird populations in the Romanian basin of River Prut (the studies also included Chlidonias hybridus species).

In this study we presents the size of the breeding populations of Chlidonias hybridus species in the fish-ponds of the inferior basin of River Prut and their evolution after 2002, the weather conditions that determine the nesting of this species in the fish-ponds, the influence of the fishery works on the Chlidonias hybridus colonies and the importance of the ponds as nesting places for this species.

The study period was in May-July, 2003-2005. The Chlidonias hybridus colonies were reviewed within the Cărja-Mața-Rădeanu ponds, Vlădești ponds and Brateș fishponds complex, all with a fish rearing destination in the Prut River inferior basin.

KEY-WORDS: Chlidonias hybridus, population size, breeding, fishpond.

INTRODUCTION
Starting with 1948, many territorial hydrotechnical and hydrological works took place in the Prut River basin. As a result of these works it appeared the Stâlca-Ștefănești barrage which was built to reduce the flood risk, creating the most extensive water surface from the Romanian basin of the Prut River. Another work that led to a radical transformation concerned the Prut inferior water meadow where in the past there was one of the biggest Romanian lakes - the Brateș lake, today reduced to almost a third part from the initial surface (Ujvari 1972).
All these hydrotechnical works were done for: decreasing flood risk, fitting out of ponds for fish rearing, obtaining of new agricultural surfaces and water source for irrigation. The fishpond nets became places of maximum attraction for the majority of bird species, replacing partially the previous natural habitats that suffered big quantitative and qualitative changes (Gache 2002).

Unfortunately, there are few studies on the fauna before these works and we can’t realize a comparative study. But we can pay attention to the industrialization influence, the intensive agriculture and the fishery works for the fauna.


Now in the Romanian basin of the Prut River the systematic list of the bird species includes 225 species divided in 50 families and 17 orders. The *Chlidonias* genus (Order Charadriiformes, Family Sternae) is represented by 3 species: *Chlidonias hybridus hybridus* Pallas, *Chlidonias niger niger* L. and *Chlidonias leucopterus* Temminck (Cramp 1995). All these 3 species of the genus are encountered in the passage periods and as breeding species there were pointed out only Whiskered Tern / *Chlidonias hybridus* and Black Tern / *Chlidonias niger*. The last one is nesting, especially, in the middle basin of the Prut River and accidentally in the inferior one.
Chlidonias hybridus hybridus is a polytypical species of mediterranean origin with an emphasized character for the palearctic area (Chiochia 1992). The global population is estimated at 200,000 pairs. Approximately a quarter of the global breeding range of Whiskered Tern lies within Europe (35,000-52,000 pairs (BirdLife International / European Bird Census Council 2000)), where the main breeding areas are in Romania and the forest steppe zone of Ukraine and Russia (Mees 1979, Glutz von Blodzheim and Bauer 1982, Cramp 1985, Ilyichev and Zabukin 1988). The species also breeds in the Iberian Peninsula, France, and Turkey and but also in a few sites which are more isolated in central Europe and Italy. Although the population has fluctuated considerably, declines were noted between 1970 and 1990 in countries holding up to half of the European population, due mainly to the destruction and deterioration of the wetland habitats which the species uses (Tucker & Heath, 1994).

Chlidonias hybridus is a species whose global population is not concentrated in Europe, but which have an Unfavorable Conservation Status in Europe (SPEC Category 3) (Tucker & Heath, 1994).

In Romania according to the references data (Munteanu 2002) the Whiskered Tern is spread especially in Romanian Plane and Danube Delta where there are stagnant waters and wetlands. Unlike the species status in other countries, in Romania Chlidonias hybridus is in territorial expansion. (Gorban 1991, Munteanu 2002, Tucker & Heath 1994).

- breeding;  o – probably breeding;

Our study had the following objectives:
- to estimate the breeding population size of the Chlidonias genus within the fish-breeding farms;
- to identify the weather conditions that influence the Chlidonias hybridus species nesting in the fishponds;
- the influence of the fishery works on the Chlidonias hybridus species.
MARIANA CAZACU: The fish breeding farms as nesting places for Chlidonias hybridus (Aves, Ord. Charadriiformes, Fam. Steridae)

- to estimate the importance of these basins for the species.

MATERIALS AND METHODS

Study period and work method

The study took place during the reproduction period of the species in May - July, 2003 - 2005.

We used the direct census of the nesting colonies (Blondel & Isenmann 1973). In the cases where it was impossible to visit the colony, the quantitative data were obtained using the census from the higher points that the colony area. The number of the pairs and of the nests was evaluated using the field glass or the binoculars (Publ. S.O.R. 2000).

Study area

The study took places within the fishponds from the Romanian Prut River's inferior basin.

The fishery Carja – Mata - Radeanu (Vaslui County) have a surface of the 1,517 ha water with a mean volume of 16.69 mil m$^3$ water (the water volume modifies yearly depending on the weather conditions and the piscicultural works) and almost 200 ha dikes and canals and it is an Important Birds Areas ["Important Birds Areas" Program is one of the most important Romanian Ornithological Society projects. In the I.B.A. list published by the R.O.S. in the 1995, is included a large wetland area situated on the border between the Galati and Vaslui Counties – Carja – Mata - Radeanu ponds (Ramsar Criteria 2)] (BirdLife International 2001, Gache & Muller 2002). These ponds belong to three fisheries Carja I, Carja II and Mata - Radeanu. The avifauna of the Carja - Mata-Radeanu ponds, includes 125 birds, 79 of them are nesting species; 99 species are used like I.B.A selection criteria (Gache & Muller).

The Vlădești - Oancea ponds (Galați County) have a surface of 572 ha.

The Brateș fishpond Complex (Galați County) has a surface of 295 ha with a volume of 4.22 mil m$^3$ water.

RESULTS

In the inferior area of the Prut River basin, only Chlidonias hybridus species nests constantly from all three species of the Chlidonias genus that
are present in Romania. This species forms colonies on the most of the fishponds where it finds proper conditions (Gache 2002, Gache & Müller 2002, Cazacu & Gache 2004).

Table 1. The colonies of *Chlidonias hybridus*’ dynamics in the Brates Complex between 2003 - 2005.

<table>
<thead>
<tr>
<th>Year Colony type</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monospecific colony</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Chlidonias hybridus</em></td>
<td>–</td>
<td>188</td>
<td>33</td>
</tr>
<tr>
<td>Polispecific colony</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Chlidonias hybridus</em></td>
<td>125</td>
<td>118</td>
<td>304</td>
</tr>
<tr>
<td><em>Chlidonias niger</em></td>
<td>–</td>
<td>12</td>
<td>23</td>
</tr>
<tr>
<td><em>Podiceps cristatus</em></td>
<td>15</td>
<td>6</td>
<td>22</td>
</tr>
<tr>
<td><em>Podiceps nigricollis</em></td>
<td>–</td>
<td>–</td>
<td>5 pairs</td>
</tr>
<tr>
<td><em>Fulica atra</em></td>
<td>–</td>
<td>–</td>
<td>1 pairs</td>
</tr>
</tbody>
</table>

In this section of the Prut River basin the species of *Chlidonias* genus build their nests using *Nymphaoides peltata*.

Until 2003, in the Brates Lake Complex, one colony of *Chlidonias hybridus* made out of 108 pairs was observed. In 1997, in the eastern border of this colony one pair of *Sterna albifrons* with two flying juveniles has nested (Gache 2002).
Fig. no. 1. The number of breeding pairs of Whiskered Tern between 1992-2002 (■, Gache 2002) and 2003 - 2005(■, personal observation) in Brates Lake Complex.

In the Vlădești fishponds, only one colony was reviewed, during the study, colony whose number modifies yearly depending on the weather conditions and the around fishery works.

Table 2. The colonies of Chlidonias hybridus’ dynamics in the Vlădești fish-ponds between 2003 - 2004.

<table>
<thead>
<tr>
<th>Year Colony type</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monospecific colony</td>
<td>Chlidonias hybridus</td>
<td>109 pairs</td>
<td>-</td>
</tr>
<tr>
<td>Polispecific colony</td>
<td>Chlidonias hybridus</td>
<td>-</td>
<td>161 pairs</td>
</tr>
<tr>
<td></td>
<td>Podiceps cristatus</td>
<td>-</td>
<td>6 pairs</td>
</tr>
<tr>
<td></td>
<td>Sterna hirundo</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Larus ridibundus</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
In 2005, the pond where Whiskered Tern nested before was emptied, so the colony moved on another pond with fish sapling.

![Bar chart showing number of pairs from 1992 to 2005]

Fig. no. 1. The number of breeding pairs of Whiskered Tern between 1992 - 2002 (■, Gache 2002) and 2003 - 2005(■, personal observation) in the Vladesti fish-ponds.

The environmental condition variation and the fishery practice within the Cârja – Maţa - Rădeanu ponds, during study period, offer us an interesting image of the Whiskered Tern’ dynamics in reproduction period and prove us the amazing adaptability of this species.

Table 3. The colonies of *Chlidonias hybridus*’ dynamics in the Carja I fishery’s perimeter between 2003 - 2004.

<table>
<thead>
<tr>
<th>Year Colony type</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monospecific colony</td>
<td><em>Chlidonias hybridus</em></td>
<td>72 pairs</td>
<td>106 pairs</td>
</tr>
<tr>
<td>Polispecific colony</td>
<td><em>Chlidonias hybridus</em></td>
<td>-</td>
<td>3 pairs</td>
</tr>
<tr>
<td></td>
<td>Podiceps cristatus</td>
<td>-</td>
<td>12 pairs</td>
</tr>
<tr>
<td></td>
<td>Podiceps nigricollis</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Larus ridibundus</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Fulica atra</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
Between 1996 - 2002, in the Carja I fishery’s perimeter were reviewed two colonies of *Chlidonias hybridus* forming by 122 pairs (Gache 2002, Gache & Müller 2002).

The number of breeding pairs of Whiskered Tern between 1992 - 2002 (9, Gache 2002) and 2003 - 2005(9, personal observation) in the Carja I fishery’s perimeter.

In the Mata-Radcanu fishery, in 2004, we reviewed for the first time, one colony of *Chlidonias hybridus* forming by 72 pairs although its presence in this area was confirmed by the staff of the fish farm since 2000.

Table 4. The colonies of *Chlidonias hybridus*’ dynamics in the Mata - Radeanu fishery’s perimeter between 2003 - 2004.

<table>
<thead>
<tr>
<th>Year Colony type</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monospecific colony</td>
<td></td>
<td>72 pairs</td>
<td>104 pairs</td>
</tr>
<tr>
<td><em>Chlidonias hybridus</em></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In this area, the Whiskered Tern builds its nest using leaves of *Nymphaea alba*. In this colony we have observed the gradual building of the nests.
Table 5. The colony of the *Chlidonias hybridus* at 13.06.2005 in the Mata – Radeanu fishery.

<table>
<thead>
<tr>
<th>No.</th>
<th>Nest type</th>
<th>No. of nests</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Empty 1)</td>
<td>21</td>
</tr>
<tr>
<td>2.</td>
<td>1 egg</td>
<td>14</td>
</tr>
<tr>
<td>3.</td>
<td>2 eggs</td>
<td>22</td>
</tr>
<tr>
<td>4.</td>
<td>3 eggs 2)</td>
<td>39</td>
</tr>
<tr>
<td>5.</td>
<td>4 eggs</td>
<td>5</td>
</tr>
<tr>
<td>6.</td>
<td>5 eggs</td>
<td>1</td>
</tr>
<tr>
<td>7.</td>
<td>3 - 5 day chicks</td>
<td>2</td>
</tr>
</tbody>
</table>

1) The pairs of empty nests had 27 chicks of age between 10 - 14 days and 14 flying juveniles.


In the Carja II fishery’s perimeter, in 2005, there were present two new colonies of *Chlidonias hybridus* one with 105 pairs and the second with 220 pairs. Due to the difficulty access to the colonies our observations were done from a point higher than the colonies. On 19 July, there were found chicks in colonies that had ages between 10 and 22 days. Also, there were observed flying juveniles.

![Graph showing the dynamics of the Chlidonias hybridus breeding effect in the Prut River's inferior basin, during the study period.](image)

Fig. 1. The dynamics of the *Chlidonias hybridus*’ breeding effect in the Prut River’s inferior basin, during the study period.
DISCUSSIONS


In the inferior basin of Prut River there are natural permanent pools (Cotul Chiuleti, Brănești pool, Vășcău and Cotul Vălăni) and temporary pools that appear as a result of the rains and snow melting during spring.

Until now, we have observed two colonies of Whiskered Tern on the Brănești and Vășcău pools.

During the study we have observed that on these pools, during the spring, there are present numerous individuals of *Chlidonias hybridus* which present specific behaviour of nesting period: matting parade, choosing the nesting place, nest construction. As a result of the temporary pool’s drying and permanent pool’s decreasing, the birds abandon these surfaces, going to the existent fisheries in the studied area or to other northern wetlands.

Going from our study done in the reproduction period (2003 - 2005) it is obviously that the fish-ponds offer proper conditions for the nesting of the Whiskered Tern through:

- a feeding place richer than in the natural aquatic ecosystem, excelling, especially through the abundance of a feeding resource in excess – fish.
- the presence of the nesting places near a rich feeding-place.
- the silence assurance through a high degree of inaccessibility due the border area status of the Prut River basin and of the precaution measures against the fishes – poaching took by the staff of the fisheries.

According to our observations, *Chlidonias hybridus* adapts very easily at the changes that take place within the fisheries as a result of the fishery works. All the conditions enumerated above determine the nesting of this species almost on any or majority of pools that have aquatic vegetation such as *Nymphaea alba, Nymphoides peltata, Trapa natans, Sagittaria sagittifolia, Myriophyllum spicatum, Myriophyllum despicatum*, 122
Potamogeton sp., etc. In the exceptional cases, this species nests even on the clumps of the reed. (Phragmites communis) case met at Cârja I, in 2004 (Cazacu & Gache 2004).

An interesting example presents the pond EC no 1' (breeding pond) within the Cârja I fishery. Each spring, this pond has water as a result of the abundant rains from this period and of melted snow. But, this pond is emptied yearly, during the spring. In 2005, as a result of the last year’s weather condition modification (the rains were abundant even at the beginning of the summer and the freshets took place on the course of the Prut River). For these seasons the pond had water all the year, facilitating the development of a rich vegetation of the Nymphaea alba, Nymphoides peltata, Potamogeton sp. Phragmites communis, Thypa angustifolia etc. Therefore, on this pond Chlidonias hybridus formed a rich colony (188 pairs) with other species, such as: Larus ridibundus, Podiceps cristatus, Podiceps nigricollis and Fulica atra. (table 3, figure 3).

Some fishery works, as the basins emptiness for fishing, can have negative effects on Whiskered Terns and not only. The basin emptiness in a certain period of time (usually, once in three years) determines their abandon by the breeding population of Chlidonias hybridus. This is the case of the colony within the Vlădești ponds in 2005 that leaved the VI pond (fish sapling from the summer I), where it was present for many years, but occupied the Vili pond (fish from the summer III).

Another interesting case is presented by the colony from the EC 0+ F0+ no. 1/2 pond (sapling breeding and fish recovery after reproduction pond) (Cârja I). Chlidonias hybridus formed a colony on this basin for many years, starting with the end of May. The colony has been observed starting with 1996 (Gache, 2002). The pond is emptied during the winter and refilled with water at the end of April – the beginning of May, because is living the fish sapling obtained by artificial forced reproduction. In 2004, this pond was refilled with water just in the end of May as a result of the intensive weather changes with some abundant rains, low temperatures for this period of the year, big thermic difference between night and day. Thus, Chlidonias hybridus couldn’t form the colony on this basin because the vegetation of the Nymphoides peltata using by bird for nest was low developed. As a consequence, the colony was present on another pond on the clumps of the reed.
Also, the present economic situation marks some essential aspects of the aquatic surfaces. The big price of the electrical energy necessary to pump the water into the basins led to the abandon of some ponds within the fisheries' perimeter (Cârja I, Cârja II, Mața - Rădeanu). Therefore, some of these ponds were invaded by the reed that created nesting places for many species (Ardeidae, Acrocephalus, etc.) but not for the Whiskered Terns. But, some ponds with big surfaces were partially occupied by the reed and, due the abundant rains from the last three years, these ponds contained water (1-1, 5 m depth) with a rich developed floating vegetation. This is the case of a pond within the Cârja II fishery. These are proper conditions for the Chlidonias hybridus colonics and, on this aquatic basin, it was reviewed in 2005 a colony of Whiskered Tern formed by 220 pairs.

So, the abundant rains seem to favour the numerical expansion of the Chlidonias hybridus species by creating new feeding and nesting places. Thus, we can also explains the big numerical difference of the individuals from year to year in the colonies within the Brateș fishery and the appearance of a new colony within the Cârja II pond.

The abundant rains favour a big development of the aquatic vegetation which contributes to a good development of the aquatic and terrestrial insects and their larvae, so giving rich feeding places for Chlidonias hybridus.

Also, the positive trend of breeding population is favoured by the fact that some ponds are not used for the fishery production in some years.

Although, according to our observations, the Chlidonias hybridus species is in a numerical expansion in the Prut River's inferior basin, we believe that the fish-ponds need a better management to create a lasting equilibrium because this species prefers for the nesting the same areas every year (Gorban 1991) although it adapts easily to certain changes.

In conclusion, because of the decrease of the aquatic biotopes, the fish-ponds represent the only areas from the Prut River's inferior basin with a special importance as nesting places, but also as resting and feeding places for Chlidonias hybridus species, as well as for other water birds.

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