# TECHNICAL REPORT

## ACTION A.3

## *Investigate attitude towards fish-eating birds in Bulgaria*

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***Conservation of the Dalmatian Pelican along the Black-Sea Mediterranean Flyway/Pelican Way of Life***

*LIFE18 NAT/NL/000716*

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## 1. Introduction

The Dalmatian Pelican (DP) *Pelecanus crispus* is a large, piscivorous waterbird, classified as 'Near Threatened' in the global IUCN Red List, with a decreasing population trend (BirdLife International 2018). In the European Red List Assessment of 2015, the species was downgraded from 'Vulnerable' to 'Least Concern'. The DP is listed in Annex I of the Birds Directive, Appendix II of the Bern and Bonn Conventions and in Annex II of AEWA.

Dalmatian pelicans nest colonially at sites with minimum disturbance, on islands in freshwater lakes and coastal lagoons, where they are protected from land predators and where adequate food resources are available (Nelson 1980). Due to their specific requirements and deterioration in their wetland habitats, the disappearance of DP colonies has been the rule during the last century (Catsadorakis 2019).

The global population of the DP is 22,000-27,000 individuals within three sub-populations (Mediterranean-Black Sea, West/SW Asia, East Asia). The breeding population of the DP is estimated at 7,342-8,984 pairs, with the Mediterranean-Black Sea flyway population holding c. 33- 41% of the global population of the species (Catsadorakis & Portolou 2018). Within the Mediterranean-Black Sea population, two meta-populations exist that have no, or very limited, exchange of genetic material, are demographically separate and need to be managed as separate units. These are the Western Greece-Albania-Montenegro population, which is small and in need of conservation action, and the population in wetlands of Central, Northern and Eastern Greece, Romania, Bulgaria, Ukraine and Turkey) (Catsadorakis et al. 2015). The DPs in both meta- populations are short-distance migrants that overwinter in wetlands lying close to their breeding sites, normally dispersing less than 900 km away, either in the same country or in neighbouring countries.

The species occurs mainly at inland, freshwater wetlands (lakes, inland estuaries, dam-lakes) but also at coastal lagoons, river deltas and estuaries (del Hoyo et al. 1992, Crivelli et al. 1997).

It nests on small islands in freshwater lakes or on semi-floating clumps of dense emergent macrophytes surrounded by water, within mosaics of open water areas and emergent aquatic vegetation such as reedbeds of *Phragmites* (Crivelli 1994; Peja et al. 1996; Crivelli et al. 1997) and open water, always in places surrounded by water or deep mud. A few breed in Mediterranean coastal lagoons (Peja et al. 1996). The species makes use of habitats surrounding its breeding sites, including nearby islands and wetlands for feeding (Nelson 2005).

On migration, large lakes form important stop-over sites (Nelson 2005) but can stop at a large variety of small to large wetlands, both natural and artificial. It typically winters on jheels and lagoons in India, and ice-free lakes and coastal wetlands in Europe (del Hoyo et al. 1992). A crucial habitat requirement for a site to be used at all by pelicans (stop-over site, breeding site, feeding site, etc.) is the existence of proper resting and roosting sites (Crivelli pers. comm.). These can be of two types: a) islands (earthen or made of vegetative material, such as rhizomes, semi-floating logs, etc.) surrounded by ample space of open water for

landing and take-off and b) low sand or mud bars or areas lying sufficiently far away from closest dense vegetation and having sufficient open space around them in order for the birds to be able to have unobstructed visual control to detect predators. During migration and if they meet adverse weather conditions that obstruct flight, they will necessarily land and roost in open uncultivated fields or land with low vegetation.

Nests are mostly in synchronised groups touching or almost touching each other and are situated amongst aquatic vegetation on semi-floating, but never free-floating, islands made of rhizomes, or earthen islands isolated sufficiently from the mainland to avoid mammalian predators (Crivelli 1994). They are occasionally built on open ground (Hatzilacou 1999, Nelson 2005). Nests usually consist of a pile of reeds (mostly Common Reed *Phragmites australis*) and sticks of other aquatic macrophytes (salt marsh plants mainly in lagoons) up to -but usually much lower and smaller than- 1m high and 0.5-1.0m in diameter (del Hoyo et al. 1992; Nelson 2005). The DP often tramples the vegetation under and between nests, and avoids building nests in areas of mud or where such activities would generate deep mud (Nelson 2005). In those cases where islands consist of reed-rhizome clumps, trampling activity, the removal of plant stems to be used as nesting material and droppings in combination to weathering, damage the islands and therefore limit the number of years for which an island can be used for breeding (Catsadorakis and Crivelli 2001). On average, small sites in Greece were found to be used for at least three years in succession (Catsadorakis & Crivelli 2001). Artificial nesting structures, either in the form of floating rafts or in the form of standing wooden platforms have been and are being widely used with varying success in many sites and countries since at least 50 years (Montenegro, Albania, Greece, Turkey, Romania, Bulgaria, Russia, Mongolia, etc).

Dalmatian Pelicans eat only fish and feed alone or in groups (Crivelli et al. 1991b). The composition of the diet depends almost entirely on the relative abundance of prey species, on their spatial and temporal distribution, and to a lesser extent on their behaviour. In lagoon systems the birds will catch mainly migratory fish such as eels *Anguilla anguilla*, mullets *Mugil* and sedentary fish such as gobies *Gobius* and sandsmelts *Atherina* (Crivelli 1987, Peja et al. in press, A. Crivelli, D. Hatzilacou and Ebert verbally). In inland fresh waters, preferred species are *Cyprinidae* such as roach *Rutilus*, bleak *Alburnus*, rudd *Scardinius*, carp *Cyprinus carpio* and others (Andone et al. 1969, Crivelli and Vizi 1981, Crivelli 1987, Romashova 1994). Fish taken range in length from 3 to 50 cm. Birds sometimes feed far away from the breeding colony.

## 2. The conflict with fish-eating birds in Bulgaria

Conflict between fisherman and fish-eating birds exists in many countries, leading to persecution and destruction of nesting sites. There were cases not long ago, when Pelican colonies were destroyed by fishermen. Risk of persecution is especially high in intensive fishponds and water reservoirs rented out for commercial fishing and angling. Some recent cases of shooting may even be attributed to negative attitudes to pelicans as fish-eating birds.

Although local public awareness in pelican conservation has increased significantly in recent years, potential conflict still exists in certain areas. Very often fishermen trying to force Great cormorants *Phalacrocorax carbo* out of the wetlands disturb pelican colonies which are used by cormorants as resting sites as do illegal hunting and movement of speedboats close to nesting islands. All such kinds of disturbance may disrupt the breeding effectiveness and may result in abandonment of whole colonies. This is especially true in the case of exposed and accessible colonies.

In Bulgaria part of fish farming is through using extensive production technologies. Most of the dams used for fish production are located in the lowlands of the country and are the natural habitats of herons, cormorants and pelicans. Thus these birds are considered to be pests in extensive aqua production. The areas of fish farms in Bulgaria are controlled by concession holders or owners which are responsible for conservation of protected birds. The attitude of fish producers towards fish-eating birds as well as compliance to the Law, depends on their personal attitude, knowledge and the sanctions imposed on them. (Peeva et al., 2017). The attitude towards the game and its use are stipulated in the Law for hunting and protection of the game (SG, 2000), and the prohibited devices, methods and means of capture and killing of waterfowl are defined in Appendix 5 of the Biodiversity Act (SG, 2002).

Most studies concerning damage caused by fish-eating birds were focused on direct fish farms losses (MARION, 1990; OSIECK, 1991). Such studies have not been conducted in Bulgaria so far. A manuscript on the conflict towards with fish-eating birds in Bulgarias was published by Peeva et al. in 2017. To clarify whether in fact the owners and workers in fish farms obey the law with regard to fish-eating birds, an anonymous survey among 80 owners and workers in fish ponds from 115 registered fish farms in the region of Stara Zagora, Yambol and Sliven city was conducted between January and August 2014. The results are presented in Table 1:

**Table 1.** Results from the survey by Peeva et al., 2017.

| Questions | Positive answers | | Negative answers | |
|---|---|---|---|---|
| | n | % | n | % |
| 1. Have you seen cormorants in your fish farm? | 80 | 100 | - | - |
| 2. Have you seen herons in your fish farm? | 80 | 100 | - | - |
| 3. Have you seen pelicans in your fish farm? | 5 | 6.25 | 75 | 93.75 |
| 4. Do you think that cormorants cause damage to the fish? | 80 | 100 | - | - |
| 5. Do you think that herons cause damage to the fish? | 47 | 58.75 | 33 | 41.25 |
| 6. Do you think that pelicans cause damage to the fish? | 80 | 100 | - | - |
| 7. Do you consider that you should be compensated by the state because of damages caused by fish-eating birds in your fish farm? | 80 | 100 | - | - |
| 8. Do you think that cormorants should be exterminated? | 64 | 80 | 16 | 20 |
| 9. Do you think that herons should be exterminated? | 18 | 22.5 | 62 | 77.5 |
| 10. Do you think that pelicans should be exterminated? | 11 | 13.75 | 69 | 86.25 |

All respondents considered that cormorants and pelicans caused damage to the cultivated fish (Table 1 – question 2-4). More than half (58.7 5%) of the respondents also mentioned herons as pests and the remaining 41.25 % believed that these birds caused insignificant damage to the fish. The higher predation level by cormorants than by herons was recorded by GENARD et al. (1993). Further discussion made clear that this fact was also well-known to the fish producers. Pelicans were rarely found on the territory of the studied farms, the reason why they were not considered as pests. The number of Great Cormorants has increased as the species was protected from Council Directive 79/409/EEC of 2 April 1979 (EC, 1979), from the 1980s till now. This has exacerbated the conflict between fish producers and this bird species. Most of the respondents (80 %) considered that the cormorant population should be reduced, even by means of extermination. The attitude towards herons and pelicans was more tolerant. Only 22.5 % of respondents were willing to exterminate herons, and 13.75 % of them - pelicans. A large number of respondents were tolerant to the presence of herons and considered that these birds consumed mostly weed fish. The scarce presence of the pelicans in the study area as well as the current legislation, were the reason why the main part of fish farmers (86.25 %) did not exterminate them (Peeva et al., 2017).

Cormorants, pelicans, herons and others piscivorous birds concentrate their fishing efforts on fish farms and gather nearby rivers and lakes similarly to marine fish-eating birds using the abundance of food (BARLOW & BOCK, 1984; DRAULANS, 1987; CALLAGHAN et al., 1998; LEKUONA, 2002). Cormorants eat a large range of fish as they inhabit different type of habitats. Their average daily food intake is between 340 - 520 g fish (MARQUISS & CARSS, 1994). The damages from these birds were reported by TUCAKOV (2006) for Serbia, by LEKUONA (2002) for France, and other parts of Europe (IM & HAFNER, 1984; PERENNOU, 1987; MARION, 1990; OSIECK, 1991). Damages on fish should not be regarded as consumption only, but also as a worsening fish condition, injuries, transmitting parasites, anxiety etc. (CARRS, 1990; 1993). Cormorants attack fish in net cages and injure them fatally (RANSON & BEVERIDGE, 1983; CARRS, 1993). Regular attacks on fish stocks result in different extent of conditional stress which is associated to reduce production in farms (BERKA, 1989; ADAMEK, 1991). Fish-eating birds represent an important group of hosts of a wide range of parasite species using fish as intermediate hosts (SITKO et al., 2006). In Bulgaria all fish-eating bird species are protected by the Law.

## 3. Project sites in Bulgaria

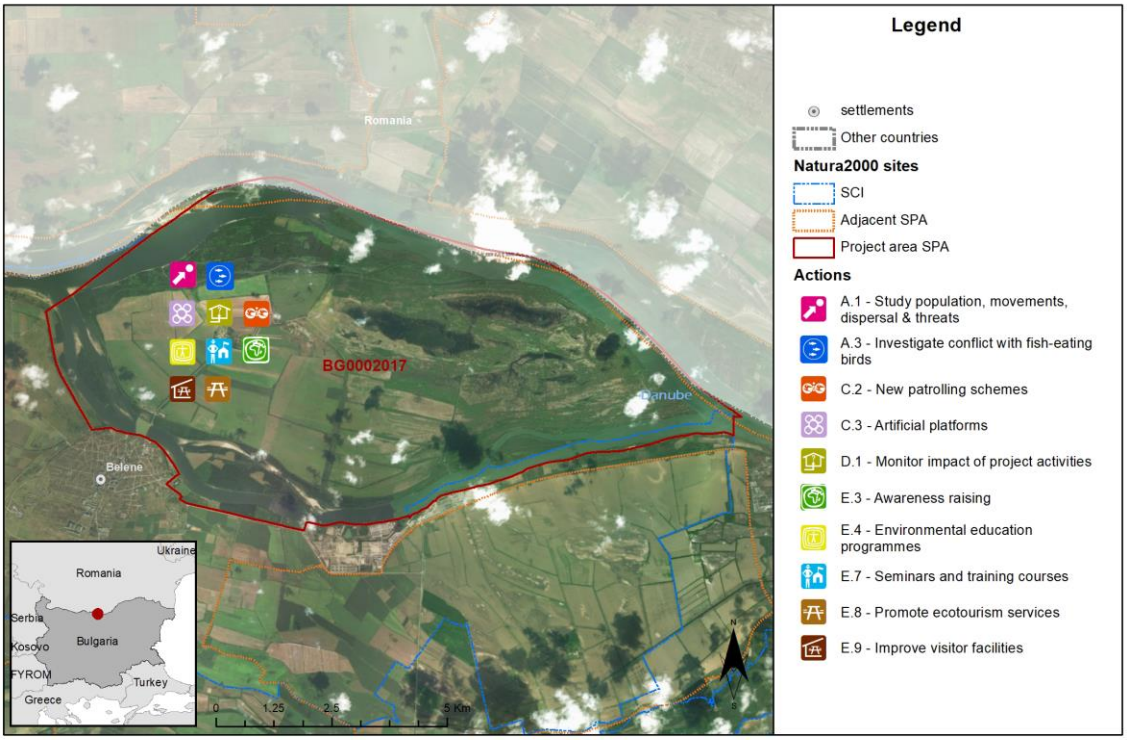
The action has taken place in six project areas in Bulgaria, where conflict is expected:

- **SPA Belene Islands Complex BG0002017**

The SPA includes the biggest Bulgarian Danube Island, Persina, with the three freshwater marshes on its territory, surrounded by old riverine willow forests, as well as the nearby islands Milka and Kitka, which are entirely covered by riverine forests. The islands are located between km 576 and 560 of the Danube River, north-east of the town of Belene and 18 km

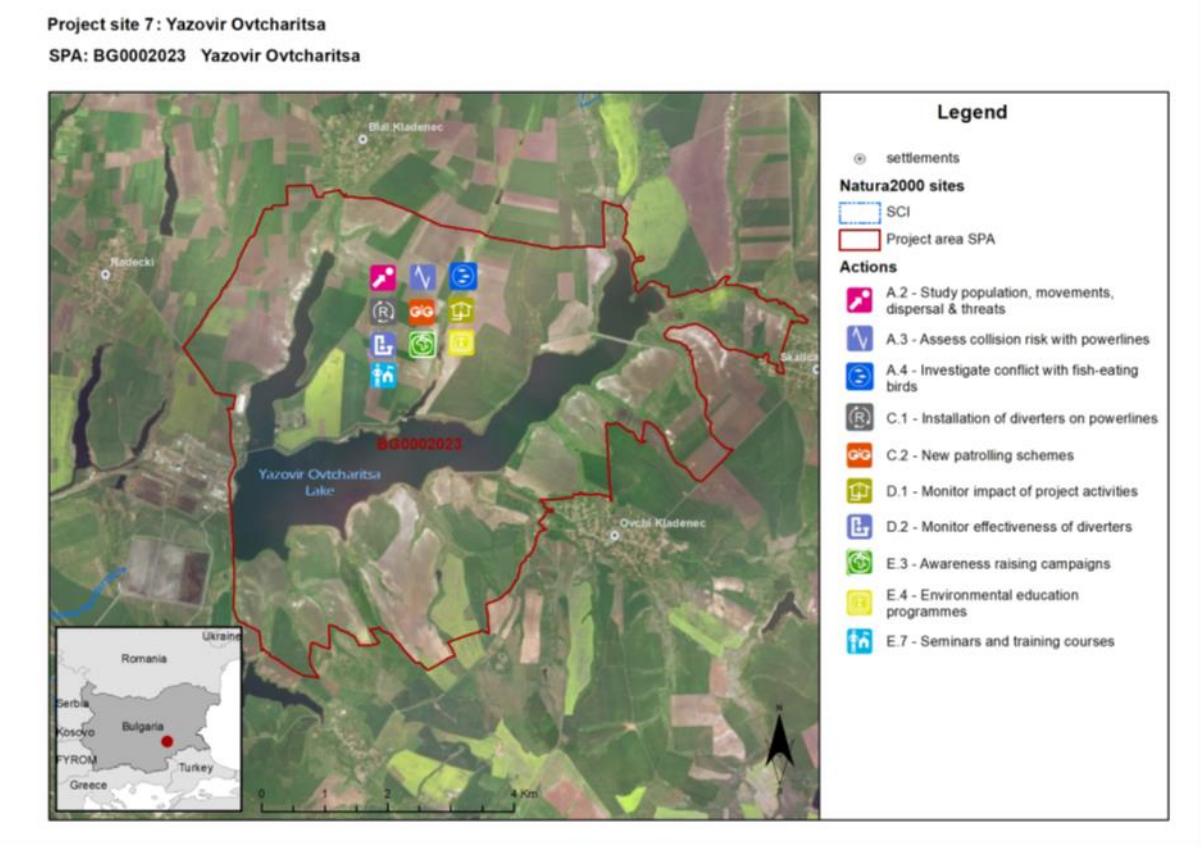
west of the town of Svishtov. As a result of targeted conservation measures in last 12 years, the value of the wetlands has started to recover, so that in 2016 Dalmatian Pelican started breeding there. Belene Island Complex is primarily important as a breeding site for colonial waterbirds.

**Project site 5: Belene Islands Complex**
**SPA: BG0002017 Kompleks Belenski ostrovi**



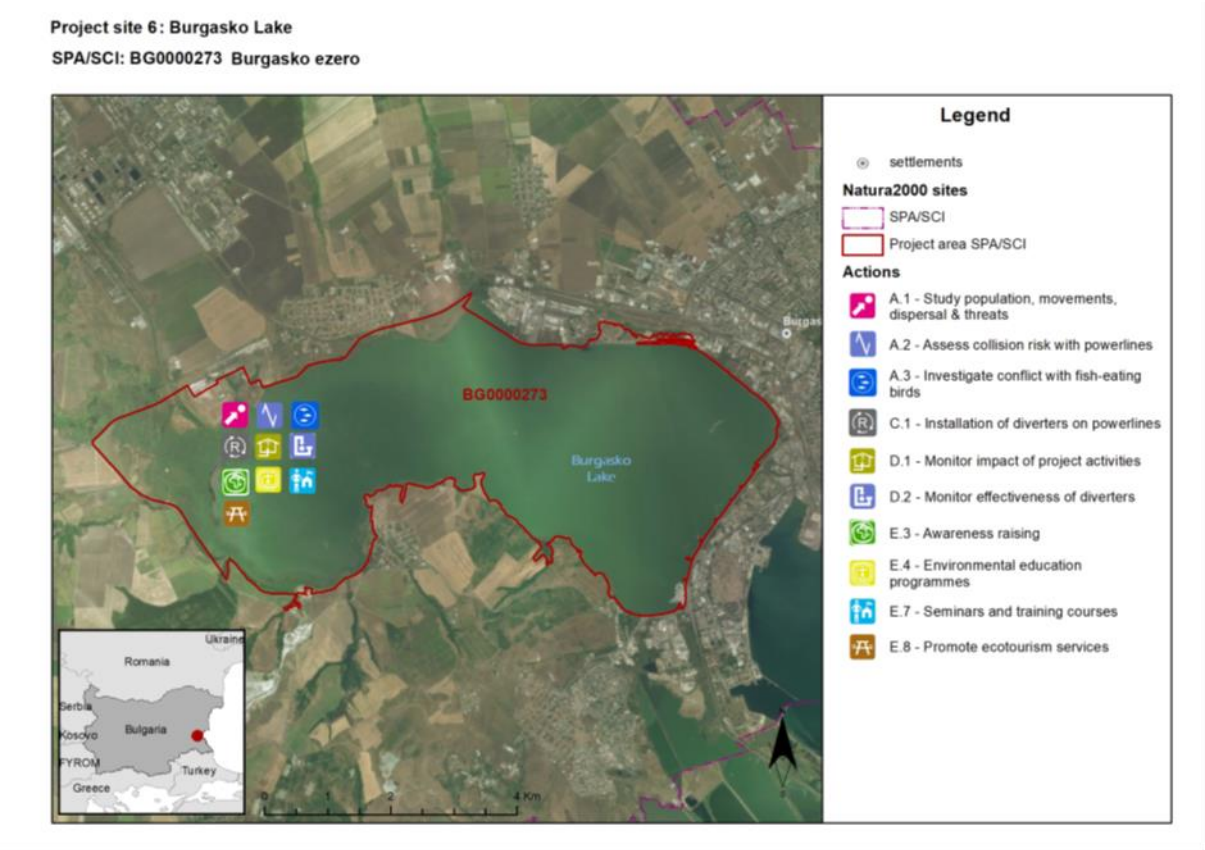

- **SPA Yazovir Ovtcharitsa BG0002023**

The site is reservoir of the Ovtcharitsa River, east of the town of Radnevo that does not freeze in winter. It is surrounded by low hills of arable land. Immediately next to the dam wall Heating Plant 2 is located. The area is also includes the nearby small pools with standing water, the sedimentation pools of the heating plant and the valleys of several smaller rivers. Ovtcharitsa Reservoir is one of most important places in the world for the wintering Dalmatian Pelican. The peak of the wintering pelicans count for the site is 406 individuals. A large proportion of the Dalmatian Pelicans are young and immature individuals.




- **SPA Burgasko Lake BG0000273**

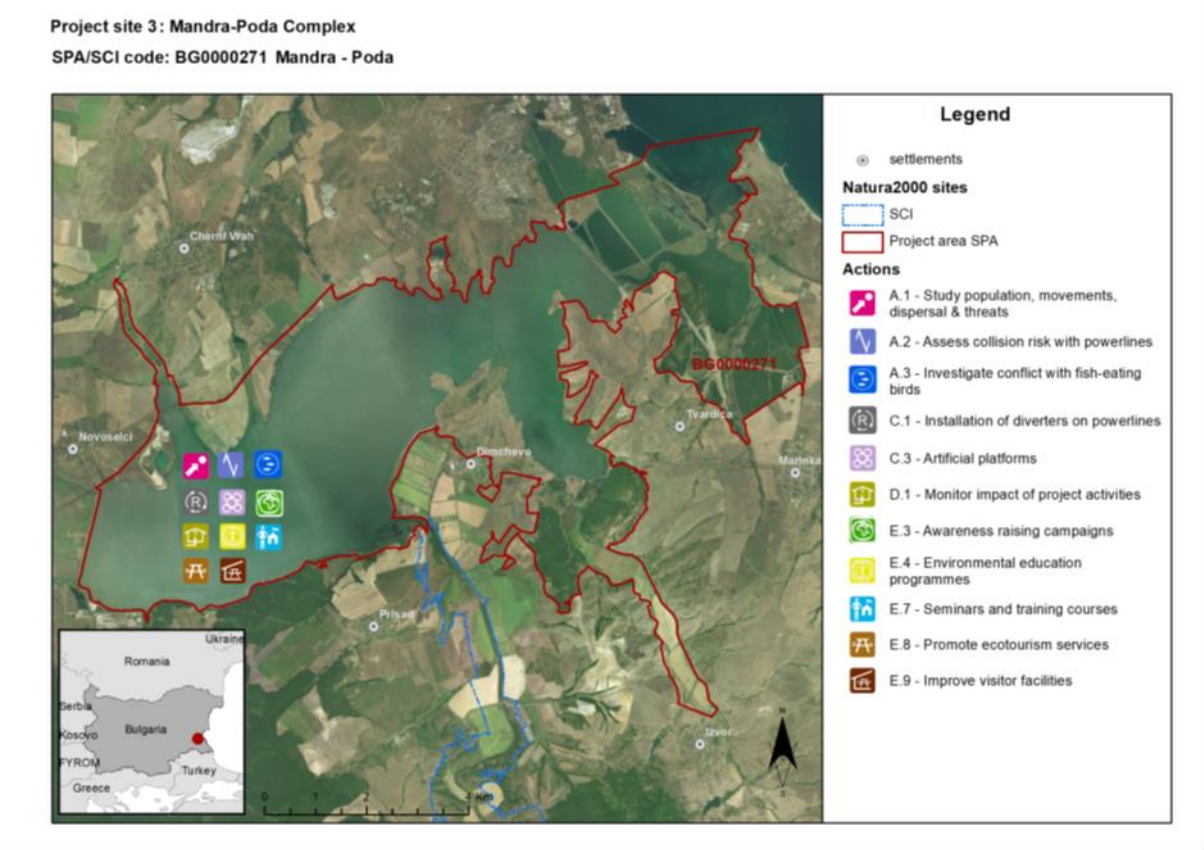
Burgasko Lake is a shallow brackish coastal lake – an open firth with a loose connection to the sea, fringed with hygrophytes. It is located to the west of the city of Burgas. Its entire eastern part and parts of its northern and south-western parts are contiguous with the industrial and residential areas of the city. Burgasko Lake is one of the most important staging sites for the Dalmatian Pelican in this part of Europe. All the population from the Danube Delta stages here during migration. The species occurs at the lake all year round and uses the lake mainly for feeding. In its eastern and western parts, pelicans roost as well, sometimes in flocks up to 130 individuals.




- **SPA Mandra-Poda Complex BG0000271**

The Mandra–Poda Complex includes Mandra Lake with its adjacent wetlands. Mandra Lake is located at the Black Sea coast and is the southernmost of the Burgas lakes. Its north-eastern section is continuous with the city of Burgas. This former brackish lake has been converted into a freshwater reservoir. A lagoon, covering the areas of Podaand Uzungeren, has been preserved between the dam of the reservoir and the Black Sea, connected with the shallow marine area of Foros bay. The former oxidising pools of the petrol refinery between the dam and the E87 road (in the Komlushka Lowland) and the cascade-likelocated fishponds in the north-western part of the lake, south of the village of Cherni Vruh, are also part of the complex. Until 1940 Mandra Lake hosted the last mixed breeding colony of the Dalmatian Pelican and White Pelican in Bulgaria. Its disappearance is due to the drainage of the marshlands at the western part of the lake, which has destroyed the huge reedbeds there. Since then the lake and adjacent smaller wetlands have been used by pelicans all year round (sometimes demonstrating breeding behaviour), but no nesting was proved. Being situated at just one-day flight for the pelicans from the Danube Delta, the Mandra, Burgasko and Atanasovsko Lakes are the key stopover area on the migration flyway of these two species. Together with Burgasko Lake, the Mandra Lake is their main feeding place during their annual presence here. The easternmost parts of Mandra–Poda complex (Komlushka Lowland and Poda) are also important roosting sites for the Dalmatian Pelican. During severe winters, when the rest of the Burgas Wetlands get frozen, the Poda Protected Site and Foros Bay are

the only area with open water around Burgas, where Dalmatian Pelicans (and all other wintering waterfowl, including White-headed Duck, Common Pochard, and other globally threatened birds) find shelter and food.

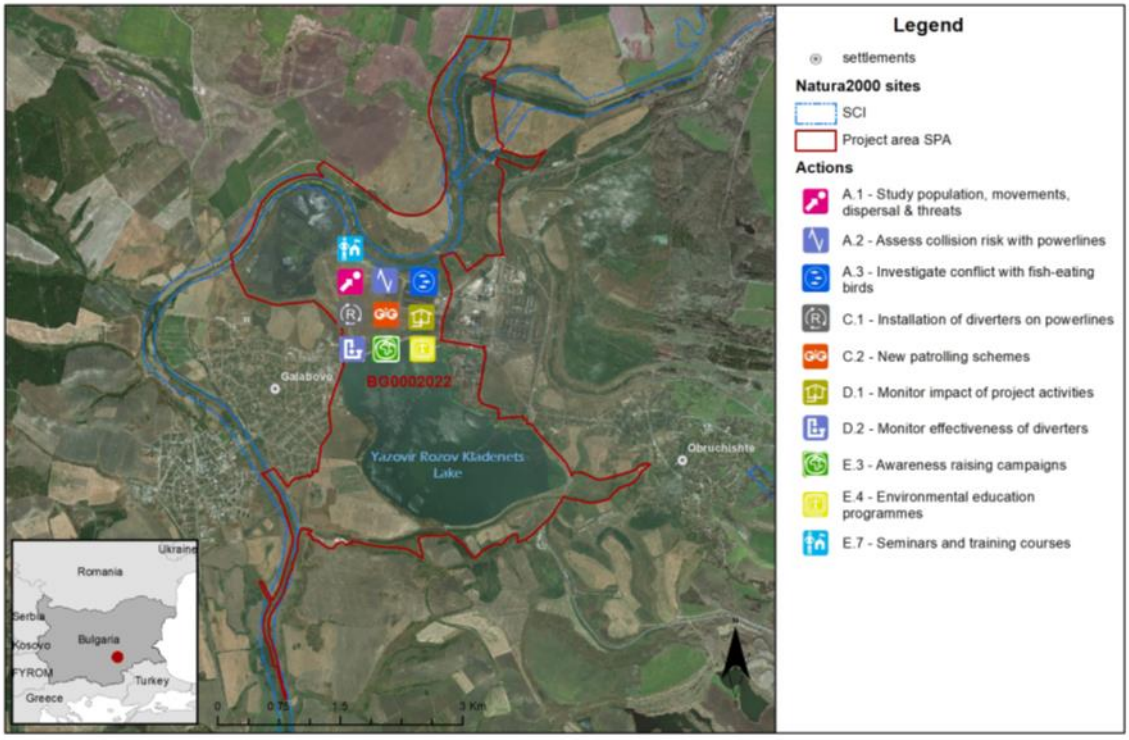



- **SPA Rozov Kladenets BG0002022**

A water reservoir, located between the villages of Galabovo and Obruchishte in the Sokolitsa river valley, at the spot where it joins Sazliika River. It is surrounded by low hills (100-130 m high) and by settlements with huge industrial center on the east and west. There is a smaller water reservoir to the north of the reservoir wall, at about 1 km from it. Because of the existing natural connection, the area also includes a part of the shallow valley of the Sazliika River. The reservoir water is used to cool down the nearby heating plant and because of this they keep a comparatively constant temperature in winter, usually higher than the ambient. Rozov Kladenets reservoir is one of most important places in Bulgaria for the wintering Dalmatian Pelican. The peak of the wintering pelicans count for the site is 212 individuals. A large proportion of the Dalmatian Pelicans are young and immature individuals.

Project site 8 : Yazovir Rozov Kladenets

SPA: BG0002022 Yazovir Rozov Kladenets

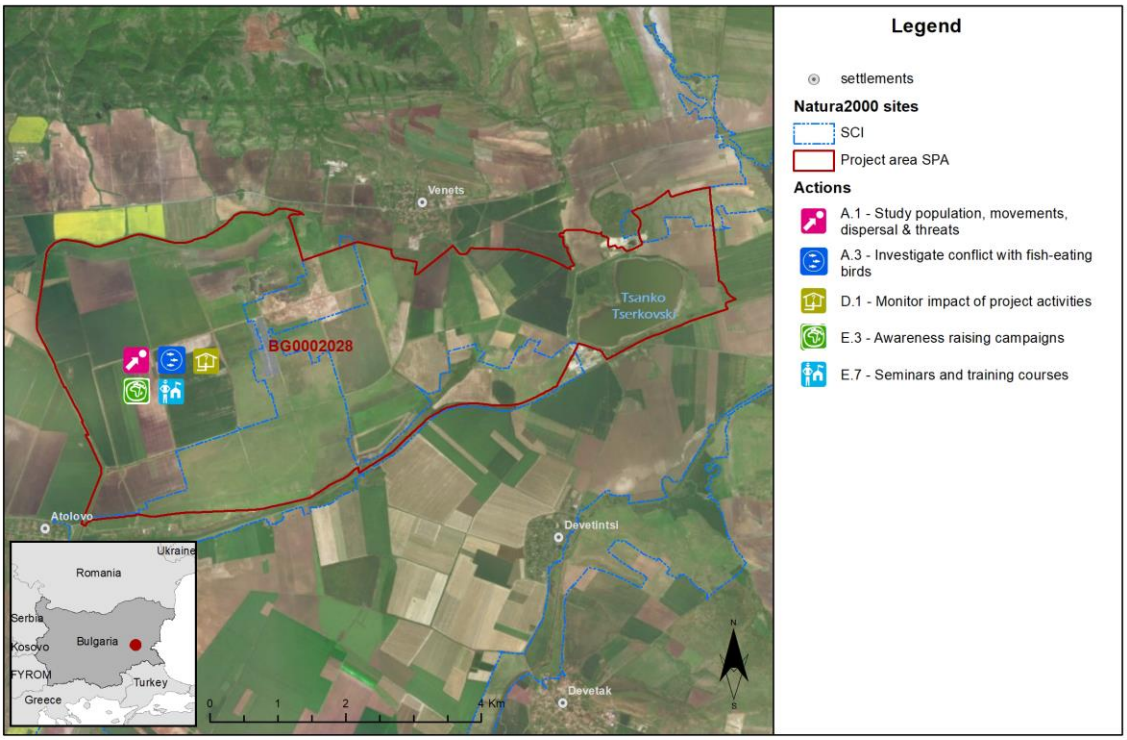



- **SPA Straldzha complex BG0002028**

The Straldzha complex includes Tserkovski reservoir with an area of about 180 ha and the nearby wet meadows and marshy areas, remnants of the eastern part of the former Straldzha marsh (the biggest marsh in the country's interior in the past). It is located 12 km south of the Burgas-Sofia main road, in its section south of the village of Venets. Straldzha marsh was the biggest inland wetland in Bulgaria until the mid-1920s, when gradual drainage of the area started to take place. At that time species such as Dalmatian (*Pelecanus crispus*) and Great White (*Pelecanus onocrotalus*) Pelicans, as well as Crane (*Grus grus*) bred there in considerable numbers. By the 1940s the wetland was completely drained, but in wet years considerable parts of it became flooded and overgrown with reeds. The Straldzha Complex is one of most important places in the country for the migrating and wintering Dalmatian Pelicans most of which are young and immature individuals.

Project site 11 : Kompleks Straldzha

SPA: BG0002028 Kompleks Straldzha




## 4. Aim and objective

This action is aimed to investigate the attitude of key stakeholders including fishermen and owners of fisheries and reservoirs towards fish-eating birds, to collect information on losses or perception of losses and identify potential sites with risk of persecution.

## 5. Methodology

The action has taken place in six project areas in Bulgaria where conflict is expected: Belene Islands Complex, Burgas Lake, Ovcharitsa reservoir, Mandra-Poda, Rozov Kladenetz reservoir and Straldzha complex. Fish ponds, reservoirs and wetlands used by pelicans outside of the project sites were visited as well.

To clarify the features of the conflict between stakeholders and fish-eating birds a special questionnaire was composed in March 2020 by BSPB Project Coordinator (Annex 1). The survey was conducted in the period July 2020 – January 2022. The questionnaire was used to collect the information within face-to-face interviews with the target groups. Data collection was carried out by the Bulgarian Society for the Protection of Birds (BSPB) project staff. Information for presence of fish-eating birds and pelicans, perceptions of the stakeholders about losses caused by the birds and their attitude to them has gathered through questionnaires completed during open interviews with the following groups:

- National agencies and NGOs: Executive Agency of Fisheries and Aquaculture, Forestry Agencies, Port Authorities, Protected Areas Management Authorities, Police, Professional organisations of fishermen, hunting and angling organisations;
- Representative of stakeholders: professional and recreational fishermen, owners and users of fishponds, aquacultures and fisheries, fishpond staff, anglers, etc.

The main point is that the interview of most of the stakeholders was not evident so that honest answers are received as much as possible. The interview was carried out in the form of an open conversation. The researcher was completed the questionnaire after the conversation is over. The open interviews of stakeholders should be conducted with great care in order to collect as precise data as possible. In this context the interviews will be structured in two stages, with questions being as indirect as possible:

A) Generic questions regarding their job, habits, and problems (attitude questions), with the objective of familiarization and building up trust;

B) Specific questions regarding presence of fish-eating birds, species, numbers, damages caused by them and mitigation measures including illegal shooting.

## 6. Results

In July 2020 – January 2022 the BSPB project staff carried out **65 meetings and interviews** with stakeholders (anglers, hunters, fishponds owners) in the regions of the project sites. **65 questionnaires** related to investigating the attitude towards fish-eating birds have been filled (Table 2).

**Table 2: Overall presentation of questionnaires, SPAs and villages**

| Country | Partner | No of questionnaires | No of SPAs | Not SPA areas | No of villages |
|---|---|---|---|---|---|
| Bulgaria | BSPB | 65 | 6 | 17 | 31 |

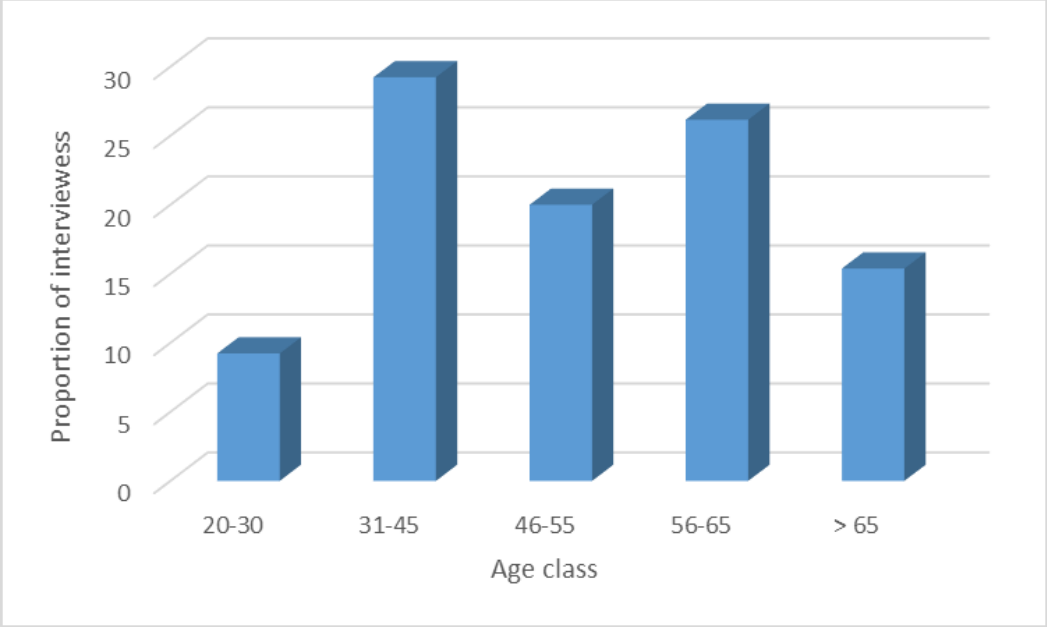
The eight main categories of stakeholders were: owners of reservoirs, owners of fishponds, anglers, hunters, staff of reservoirs and fishponds (security, supporting staff), Experts in National agencies and Authorities, Professional organisations of fishermen and NGO's experts (Table 3). Four combinations among them were also recorded: angler/hunter; expert in National agencies and Authorities/angler; expert in National agencies and Authorities/hunter and owner of reservoir/angler/hunter. More than 50% work as as public servants (policemen, firemen, foresters and military personnel), or as private employers, restaurant owners, merchants, loggers, accountants, auto electricians, agriculturists, plumbers, engineers, hotel owners and doctors.

**Table 3: Classification of target groups**

| Target group | Bulgaria |
|---|---|
| Owners of reservoirs | 9 |
| Owners of fishponds | 8 |
| Anglers | 25 |
| Hunters | 4 |
| Staff of reservoirs and fishponds | 5 |
| Experts in National agencies and Authorities | 6 |
| Professional organisations of fishermen | 6 |
| NGO experts | 2 |
| **TOTAL** | **65** |

In Bulgaria the majority of interviewees were between 31-65 years old, with 29.2 % of participants aged between 31-45 years (Figure 1). This represents the productive age of the target groups and the data therefore appear to be representative of the general population.

**Figure 1: Proportion (in %) of interviewed stakeholders in each age class (n = 65)**




For the question *"Were there damages in your produce the last ten years? Grade them according to their volume (1 - Small, 2 - Medium, 3 - Large, 4 - Very large)"* the highest percentage (53.9 %) of interviewed stakeholders have declared that fish-eating birds cause the greatest damage to their production. In second place were declared illegal activities (23.1 %) and in third place with 15.4 % were declared bad weather conditions (Figure 2).

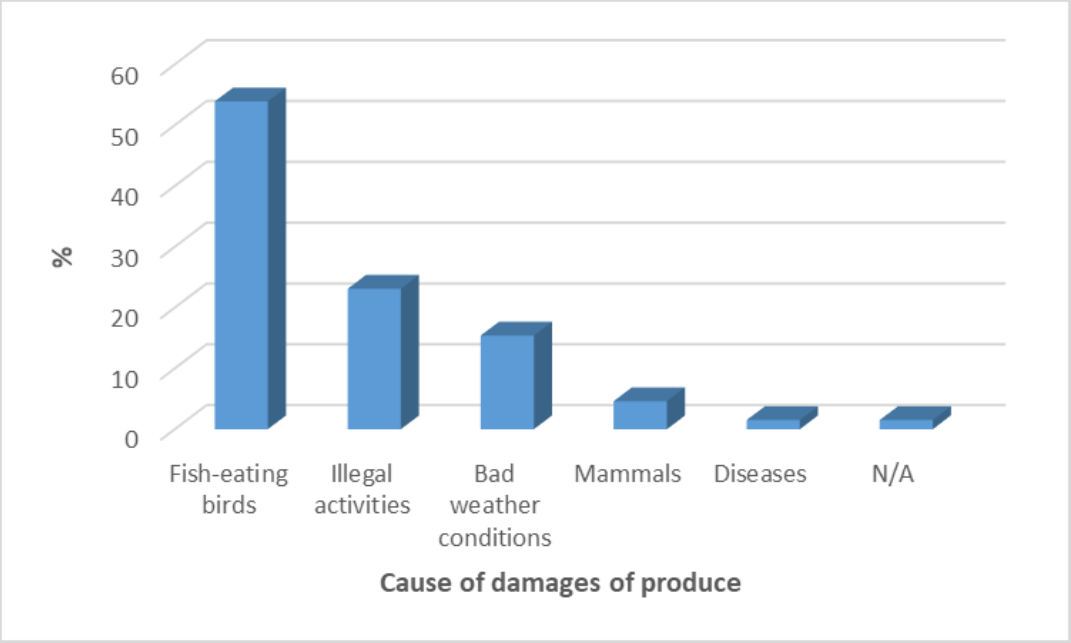



**Figure 2: Proportion (in %) of cause of damages of produce (n = 65)**

For the question *"In the case of damages due to fish production, like fish-eating birds or mammals, what measures did you adapt?"* the highest percentage (50.8 %) of interviewed stakeholders did not answer. In second place was the use of pyrotechnics (15.4 %) and in third place with 10.8 % was declared the scarring of birds (Figure 3).

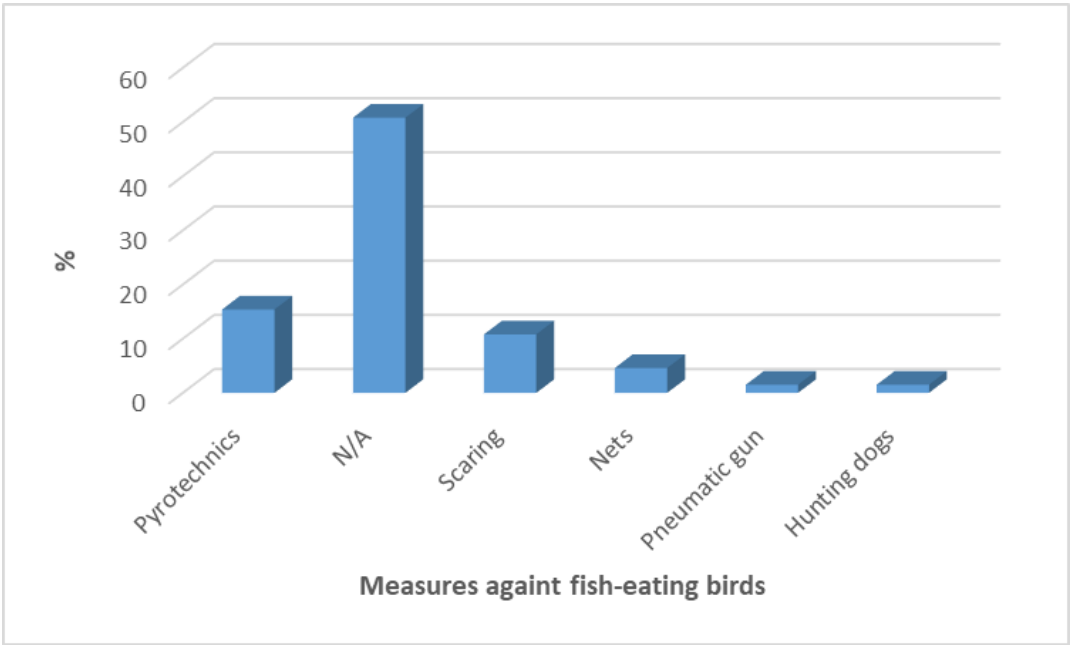



**Figure 3: Proportion (in %) of measures against fish-eating birds (n = 65)**

Regarding the question "*Are you aware of Aqua-Ecological measures? What do you think about them?*" most of interviewees (69.2 %) are not familiar with these measures and schemes.

For the question “Who do you believe has the reasons to persecute fish eating birds?” the highest percentage (38.7 %) of interviewed stakeholders have declared that fishermen persecute fish-eating birds the most. In second place were declared owners of fisheries or reservoirs (30.1 %) and in third place with 20.8 % were the people who have not answered this question (Figure 4).

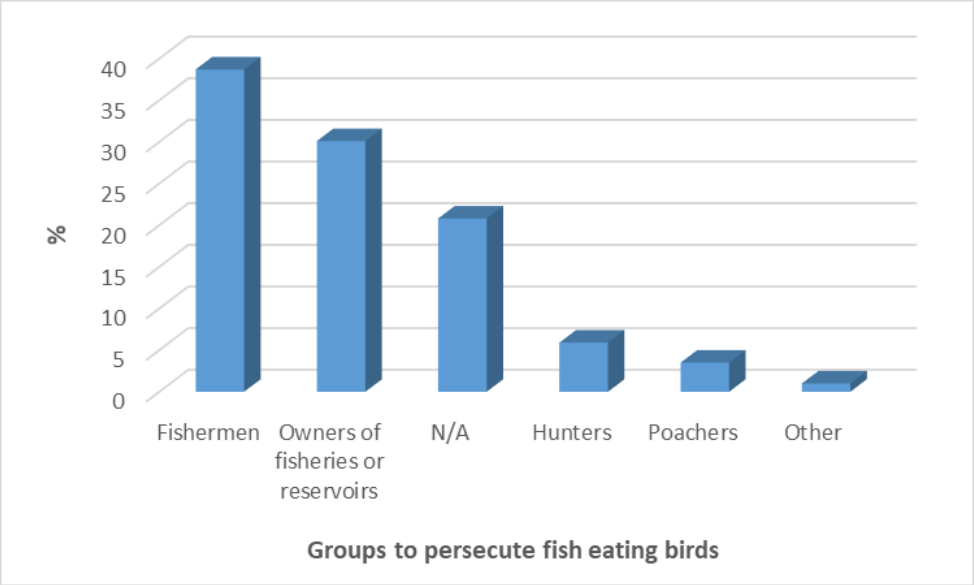



**Figure 4: Proportion (in %) of groups to persecute fish-eating birds (n = 65)**

Regarding the question “*Which birds are targeted – cormorants, herons, pelicans, ducks, White-tailed Eagle, etc.?*” the highest percentage (53.4 %) of interviewed stakeholders have declared the cormorants. In second place were the people who have not answered (22.9 %) and in third place were declared the herons (10.7 %). The interviewees also mentioned two species of mammals – otters (5.1 %) and dolphins (2.3 %) (Figure 5).

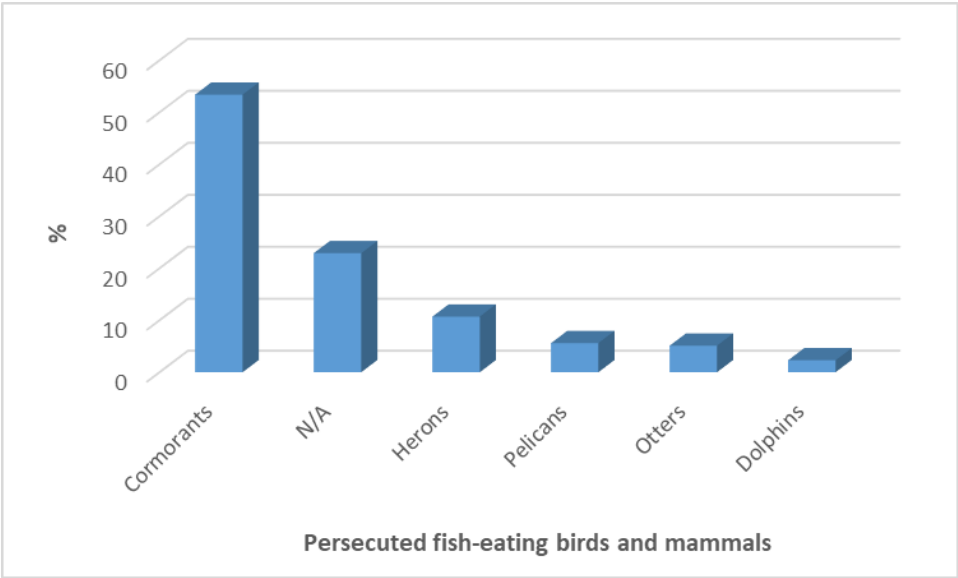



**Figure 5: Proportion (in %) of persecuted fish-eating birds and mammals (n = 65)**

Regarding the question "*Do you believe there are measures taken to prevent this conflict that are effective?*" the highest percentage (63.6 %) of interviewed stakeholders cannot decide. 25.9 % of the interviewees think that the measures used to prevent the conflict against fish-eating birds are not effective and 10.5 % of interviewed people believe that measures are effective (Figure 6).

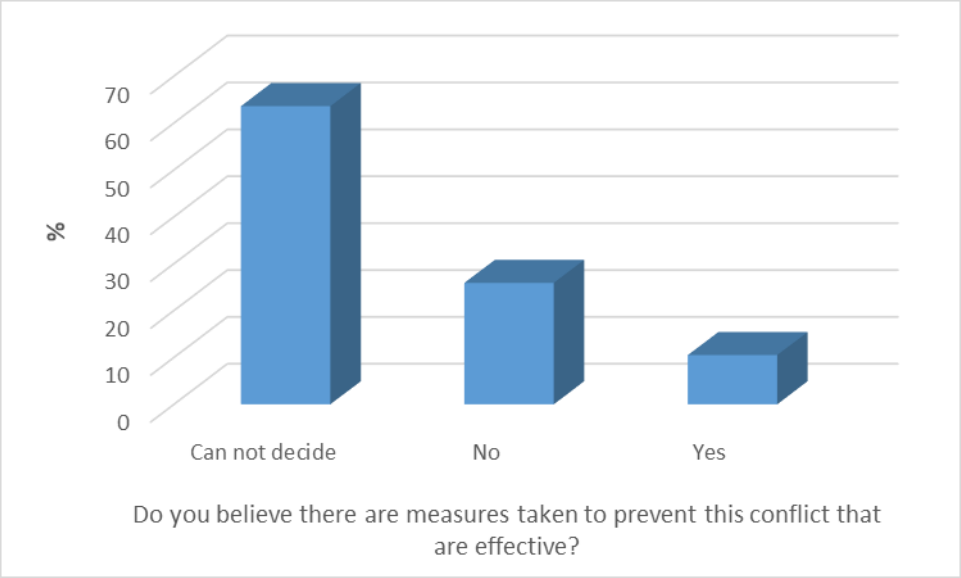



**Figure 6: Proportion (in %) "Do you believe there are measures to prevent this conflict that are effective?" (n = 65)**

Regarding the question "*Do you like pelicans?*" the highest percentage (70.3 %) of interviewed stakeholders have answered "Yes". 26.6 % of the interviewees have answered "I don't know" and 3.1 % of people have answered "No" (Figure 7).

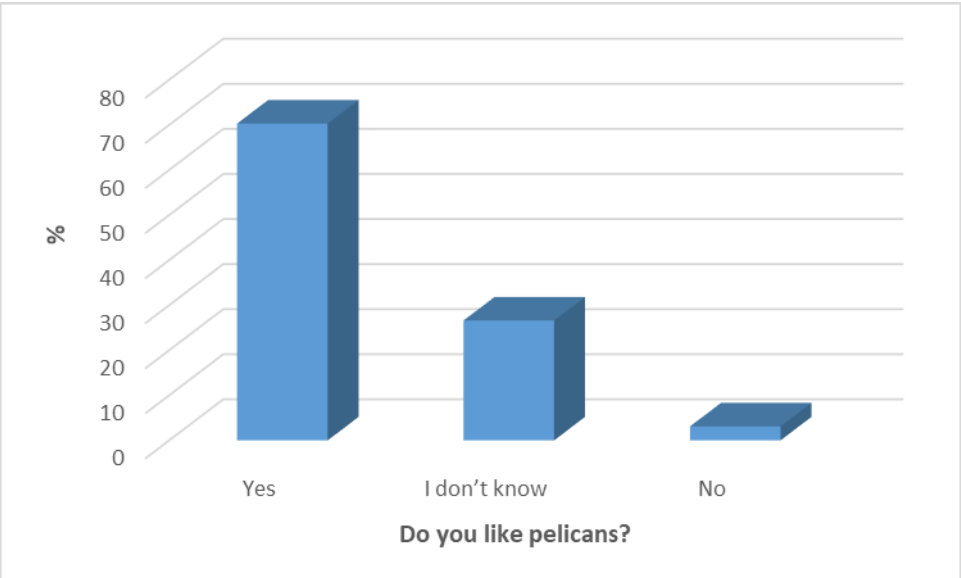



**Figure 7: Proportion (in %) "Do you like pelicans?" (n = 65)**

## 7. Discussion and conclusion

The conflict with fish-eating birds in Bulgaria is relatively strong in places such as private fishponds and dams. Most of the owners of fishponds and reservoirs considered that they should be compensated for the damage caused by the fish-eating birds from the government. In Bulgaria, there was a practice of paying compensations for the damage caused by fish-eating birds to fish farms, which was terminated. As a result, fish producers took intensive measures, including persistent persecution and extermination of the piscivorous birds, which also adversely affected Pygmy cormorants (Plachiyski et al., 2014). The most negative is the attitude towards cormorants. The attitude towards herons and pelicans was more tolerant.

Economic losses from eaten and damaged fish and the lack of compensation for fish producers from the government generate a negative attitude towards fish-eating birds in study area, motivating owners of fisheries and reservoirs to exterminate piscivorous birds, opposing to National legislation. Fisherman and fish farmers are indicated as being the main social groups responsible for persecution of fish-eating birds in Bulgaria. The use of pyrotechnics, covering with nets and the use of pneumatic cannons are the most common measures used against fish-eating birds in study area. It can be expected that the use of these measures will also have a negative impact on Dalmatian pelicans concentrating in the study area.

A multifaceted approach is needed to solve the problem with the conflict towards fish-eating birds in Bulgaria including measures such as: more research on the magnitude and effects of this conflict; Promote communication and cooperation among various experts, NGOs and authorities; Campaigns to increase awareness related to conflict towards fish-eating birds among target groups (fisherman, owners of fisheries and reservoirs, hunters) and relevant authorities; Improvement of the national policy aims to control better and more effectively the use of legal and illegal measures to resolve the conflict towards fish-eating birds; Doing campaigns for local stakeholders to increase awareness about the Aqua-Ecological measures.

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## APPENDIX 1 - Questionnaire

### 1. Questionnaire

**Interviewee's personal information**

Date of interview: ..... SPA code: ……
Name and age: .....
Occupation: .....
Agency/Organization: .....
Village/Municipality: .....
Other: ……

**Questions:**

1. How many years do you reside in the area? Have you been working for many years in this line of work? How many years have you been fishing/hunting in the area?

……
……

2. Are you satisfied with your job and income? Is there enough fish?

……
……

3. How many fishponds/fisheries/reservoirs do you have under your care?

……
……

4. Is there sufficient resources in the area for your work/fishponds/reservoirs/hunting areas?

……
……

5. Is there any infrastructure to take care for your work/animals/fishponds/reservoirs? If yes, is it in good condition?

……
……

6. Do you believe your children or young people in general will continue this work? Why?

……
……

7. Have you observed any changes in the presence of wild birds or mammals during the last ten years? If yes, which species and which could be the reasons for these changes?

……
……

8. Were there damages in your produce the last ten years? Grade them according to their volume (1 - Small, 2 - Medium, 3 - Large, 4 - Very large).

……
……

Diseases …….....  Illegal activities……  Fish-eating Birds……
Bad weather conditions…… Mammals……..  Other……..

9. In the case of damages due to fish production, like fish-eating birds or mammals, what measures did you adapt?

……
……

10. Do you feel satisfied from the support you have from the Executive Agency of Fisheries and Aquaculture/National agency of agricultural compensation regarding their response to your situation and the compensation given? For each one grade: 1 - Not at all, 2 - A little, 3 - Not quite, 4 - Completely satisfied
    Response.....  Compensation .....
    ……
    ……

11. Are you aware of Aqua-Ecological measures? What do you think about them?

……
……

12. What are the changes needed in the system of state compensations?

……
……

13. What do you think about the birds? Do they cause any damages?

……
……

14. Do you know cases of persecution of birds like herons, cormorants and pelicans?

……
……

15. Who do you believe has the reasons to persecute fish eating birds? Grade each group: 1 - Very important, 2 - Important, 3 - Medium, 4 - Insignificant.

Fishermen……. Hunters……. Poachers…….

Owners of fisheries or reservoirs……. Other…….

……

……

16. Which birds are targeted – cormorants, herons, pelicans, ducks, White-tailed Eagle, etc.?

……

……

17. Which are the main types of damages caused by these fish-eating birds? Describe them and give an estimation of their size in the last decade (1 - Small, 2 - Medium, 3 - Large, 4 - Very large).

……

……

18. Could you locate and name the areas where of persecution, or incidents with fish-eating birds take place most often?

……

……

19. Do you know the types of activities (shooting, destroying nests, chasing away, covering fishpond) related to the fish—eating birds used in your area? Describe them and grade them according to the extent of their use: 1 - Small, 2 - Medium, 3 - Large, 4 - Very large.

……

……

20. What suggestions do you have to minimize the level of conflict between human and fish-eating birds in the region?

……

……

21. Do you believe there are measures taken to prevent this conflict? If yes, which ones?

……

……

22. Have you ever seen Pelicans in the region? When, where, how many?

……

……

23. Do you like pelicans? What do you think about the Pelicans?

……
……

24. Have you ever find a dead Pelican? If yes, do you have any idea about the reason of its death?

……
……

At the end of the interview, try to understand whether the interviewees are in favor or against the use of illegal activities to prevent the fish-eating bird's conflict as a formal control method and note it.

## APPENDIX 2 – Pictures


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