

UNIVERSITY OF SOPRON

Doctoral thesis

**A COMPLEX ANALYSIS OF THE GOOSE POPULATION OF  
„ LAKES BY TATA” RAMSAR SITE**

László Norbert MUSICZ

Sopron

2021

Doctoral School: Roth Gyula Doctoral School of Forestry and Wildlife Management Sciences

Leader: Prof. Dr. Sándor FARAGÓ, Doctor of the Hungarian Academy of Sciences

Program: Wildlife Management

Field of Science: Forestry and Wildlife Management Sciences

Project leader: Prof. Dr. Sándor FARAGÓ DSc.

## **Introduction, aims**

The aim of this dissertation is to summarise the results based on the author's research from the past 35 years (1984-2019) from the Old Lake, Tata, Hungary (to be referred to as Old Lake) which is one of the most significant goose wintering sites of Hungary, as well as to reveal the ecological correlations and critical factors in goose migration and wintering in this region of Tata. The author explained the relationships from a local, regional and national perspective (moreover internationally in some aspects) and aimed to determine the land use and nature protection which are essential to preserving the highly vulnerable Old Lake as a significant goose wintering site.

## **MATERIALS AND METHODS**

The base of the dissertation is a highly active field monitoring in the past 35 years. Results of nearly 2,000 monitoring days were evaluated, and the database of the Hungarian Waterfowl Monitoring (which works within the framework of the University of Sopron since 1984) were used as well. The author reviews the status of the European and Hungarian population, of 13 goose species occurring in Hungary, analyses the phenology based on 35 years of data, hunting statistics and ringing recoveries. For the latter, 2,081 data records of 54 Greater White-fronted Geese (*Anser albifrons*), 57 Greylag Geese (*Anser anser*) and 54 Tundra Bean Geese (*Anser serrirostris*) between 1961-2018 from Tata and Komárom-Esztergom County were analysed from the Bird Ringing Centre Database. Wildlife and game bird management aspects were discussed based on the annual reports of the National Game Management Database from 1997-2018, but data of the County Government Office and experienced hunting organisations were used as well.

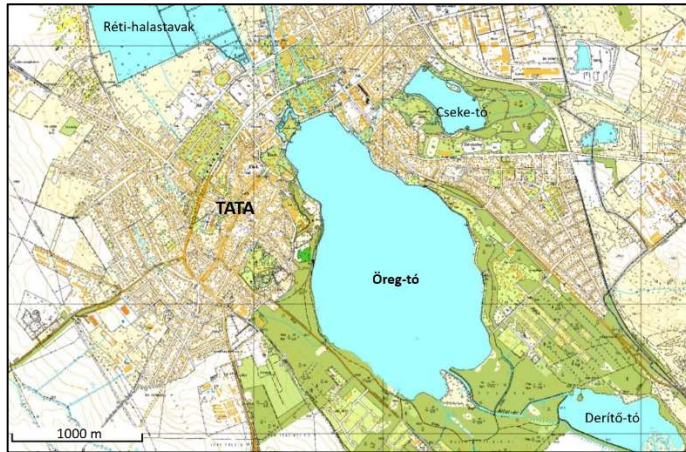
Effects of presence of several thousand wintering geese on water quality and nutrient turnover of the Old Lake were evaluated, partly through laboratory analysis of 65 self-collected faecal samples - in particular, total nitrogen (TN), total phosphorus (TP) and total organic carbon (TOC) – and partly through control calculations using specific load indices, known from other analyses.

## **Changes of environmental conditions of the Old Lake during the past decades**

The 220 hectares Old Lake has a special place among Hungarian and European Ramsar sites considering its environmental conditions, as it is one of the very few goose wintering sites of international importance, which is surrounded almost entirely by a human settlement. The presence of warm karst springs, emerging in the town for centuries (again in recent years) is another characteristic feature of this site. The dissertation describes the effects of habitat management forms and tourism on the Old Lake on goose migration.

Water management (lake operations) on the Old Lake is crucial for bird migration. The author highlights the optimal winter water management ideal for geese wintering on the Old Lake. During the past 35 years, there were significant changes in the protection status of the lake, as it was declared regionally protected in 1977, it became a Ramsar wetland in 1989, then it became a Natura 2000 Special Protection Area in 2004. Accordingly, the game management status of the lake was changed as well in several steps. After different restrictions over the years, waterfowl hunting was finally banned on the lake and its surroundings in 1993. Four major hunting areas in the region (Tata, Mocsá, Dunaszentmiklós, Kocs) shares almost 100% of geese

bag in Komárom-Esztergom County. Although organisational frameworks of fisheries management have changed several times during the past 35 years, autumn fish harvesting methods (by hand nets) stayed the same for centuries. Development of the urban density from the 18th century until the present was considered as a significant environmental factor.

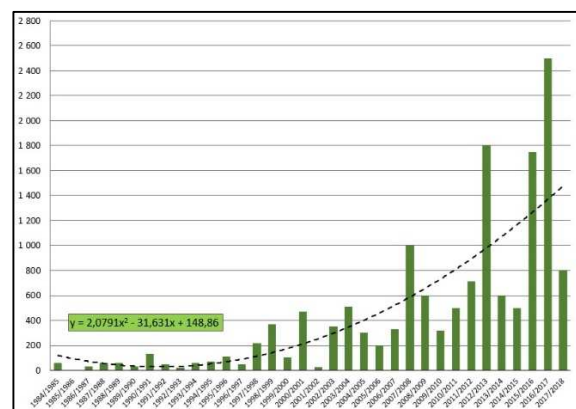


**Figure 1: Location of the Old Lake of Tata**

## RESULTS AND DISCUSSION

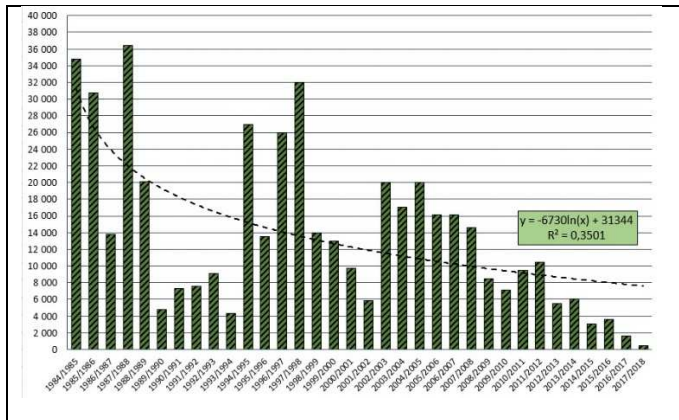
### Analysis of migration ecology of geese gathering on the Old Lake between 1984-2019

The dissertation describes the status of the actual European population and the Hungarian occurrences of all (13) goose species and gives a detailed insight into the observations on the Old Lake and around Tata. Analysis of migration phenology changes in the past 35 years, hunting statistics of three dominant (all huntable) goose species, as well as other aspects of migration, known from ringing data, is presented.



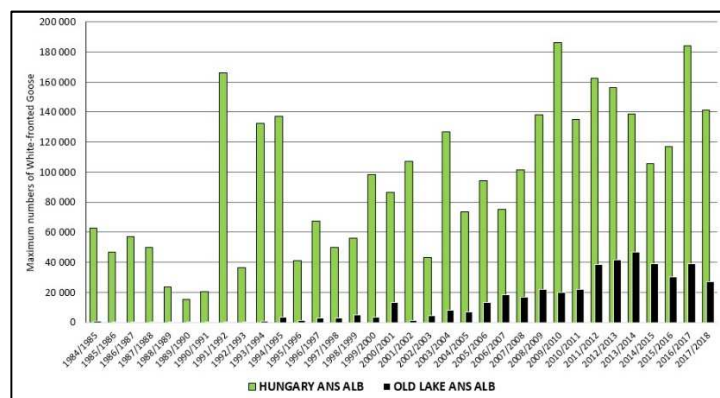
**Figure 2: Maximum wintering number of Greylag Geese (*Anser anser*) on the Old Lake of Tata between 1984–2019**

Significant phenological changes were experienced in the goose migration dynamics and wintering in Tata in the past 35 years, and further changes are to be expected in the future. Climatic changes in most cases can explain the cause of these phenological changes (e.g. later autumn arrival, earlier spring leave, almost a month shorter wintering period), but in Tata, migration and wintering conditions of geese are characteristically influenced by anthropogenic effects as well. The autumn migration peak increasingly moves towards December, although the migration pattern varied highly during the past decades. A subchapter reveals the correlations of significant population changes in just a few days on the lake.



**Figure 3: Maximum wintering number of Tundra Bean Geese (*Anser serrirostris*) on the Old Lake of Tata between 1984–2019**

**Figure 4: Maximum wintering number of Greater White-fronted Geese (*Anser albifrons*) in Hungary and on the Old Lake of Tata between 1984–2019**



The dissertation highlights the effects of weather conditions (mainly extremes), climate change and predators, as natural ecological factors influencing goose migration, were highlighted, and based on several background data, possible effects of earthquakes have also been mentioned. Besides these, special attention was put on the analysis of anthropogenic effects on the lake, knowing its unique location. Among the anthropogenic effects influencing goose migration, hunting aspects, and the more and more pronounced disturbing effect of New Year’s Eve fireworks were analysed, but water management, lake operation works, different light and noise effects, disturbances caused by small planes and drones, aspects of fisheries management and other direct human effects have also been discussed through examples and case studies. Attention was paid on human-induced landscape transformations on goose feeding areas in the past decades (new wind farms, industrial parks, roads, gravel pits). The role of these factors on migration dynamics and local rearrangement of geese have also been discussed.

### **Migration dynamics connection between the Old Lake and other goose wintering areas of the wider region**

Goose migration at the Old Lake was analysed with wetlands of closer and wider proximity. Relations of goose migration at wetlands within a 30 km radius to the Old Lake as stable or occasional goose roosting sites established in the past few years (even decades) were analysed in detail, (Ferencmajori Fishponds, Asszony Lake, Grébics Lakes, some parts of the Danube). Special attention was paid to probable or proved migration connections to wetlands in Slovakia. Migration connections to the wetlands, involved in the Hungarian Waterfowl Monitoring, are analysed by comparing population survey data from the past ten years: (Lake Fertő, Danube sections Gönyű-Szob and Gemenc, Eastern-Balaton, Kis-Balaton, Lake Velencei-/Dinnyési-Fertő, Soponyai Reservoir, Rétszilas Fishponds and the alkaline lakes of Kiskunság).

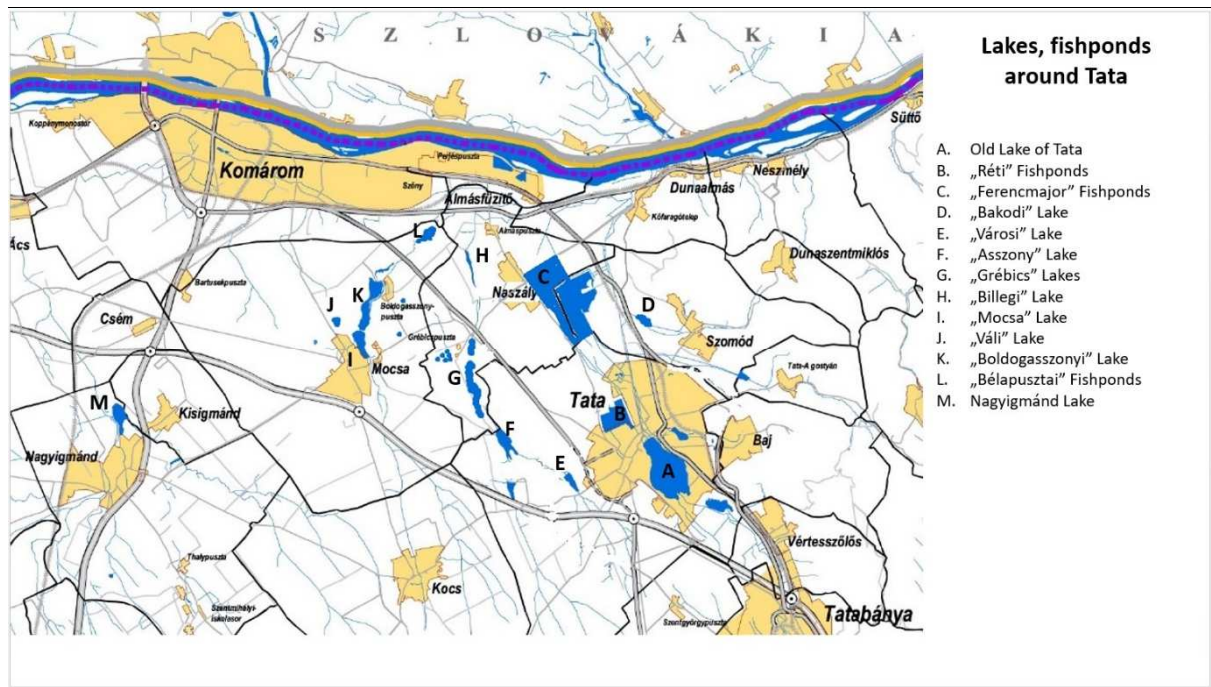
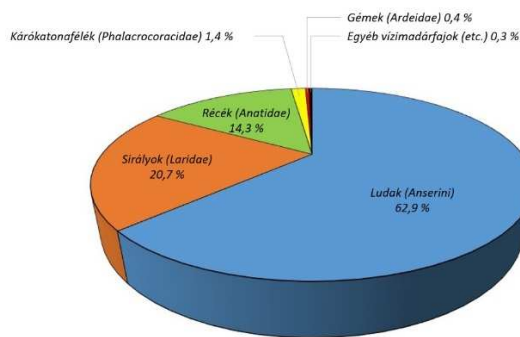


Figure 5: Lakes and fishponds in the Tata area have a special position in terms of wild goose migration

### Status of goose species in waterfowl communities of the Old Lake

The effects of goose species, arriving at the Old Lake and staying there for almost half a year, on the waterfowl community (106 species in 35 years).



The total annual number of 13 goose species occurring at the Old Lake reached 6.6 million goose-days in the past 5 years, which represents almost two-thirds of the total waterfowl turnover (10.5 million bird-days).

Figure 6: Proportions of the main water-bird groups in the Old Lake Tata between 2014 and 2018

The Greater White-fronted Goose became super-dominant on the Old Lake during the past decade with almost 93% all geese Tundra Bean Goose (5%) and Greylag Goose (2%) had significant total numbers, while the presence of other goose species is hardly detectable in the total waterfowl turnover of the lake.

### Effect of wintering goose groups on the nutrient turnover of the Old Lake

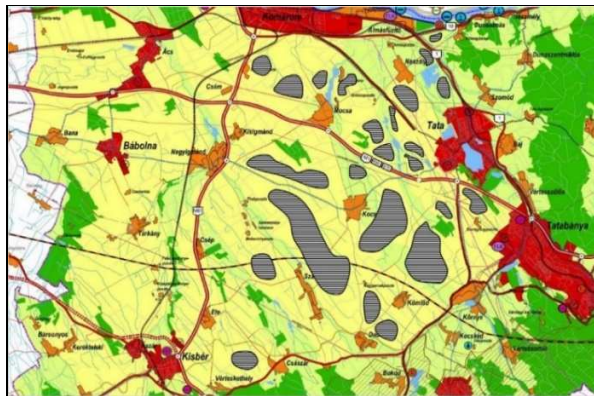
The author did not only analyse the effects of environmental conditions on geese but the effect of several ten-thousands of geese on the Old Lake as well. A higher number of geese contributes to the nutrient balance of the lake at an increasing rate, considering the investments on water quality in the previous years.



Based on an intense goose monitoring and laboratory analysis, it was revealed, that the phosphorus load from goose excrement (346 kg/year) represents about 6.02% of the total phosphorus load (5,752 kg/year) getting into the lake from other sources (through Által-ér), considering the maximum goose numbers of the past 35 years (2.2 million goose-days in winter of 2013/2014). The highest measured nitrogen load by geese (2,719 kg/year), is 2.02% of the total nitrogen turnover (134,470 kg/year). Similar examinations in the 1990's calculated a rate below 1% of both components.

### **Examination of agricultural conflicts caused by goose groups**

The majority of geese wintering in the region of Tata is within 20 km of the city. These sites were discussed in detail. A 45 hectares agricultural land neighbouring lake IV. of Ferencmajor Fishponds near Naszály in 2017, was selected by the author. 4,000-4,800 goose individuals were observed on the growing winter wheat field between 16-20.02.2017. (96% *Anser albifrons*, 4% *Anser serrirostris* and *A. anser*). There were patches of groundwater on the southern side of the study area, used by the geese for drinking during the day. Geese used mostly these water spots and the neighbouring areas, where the excrement density was 8-12 pieces/m<sup>2</sup> on 25th February, but it reached 14-16 pieces/m<sup>2</sup> at some spots as well. The drier middle parts of the field were less preferred by geese, where the excrement density here was 3-10 pieces/m<sup>2</sup> (average: 7.2 pieces/m<sup>2</sup>). A site visit carried out two days before harvest (on 11.06.2017.) The area of spring inland water patches remained bare, but the crop recovered totally from the intense trampling and pecking by geese by the end of winter in winter end, based on the personal observation (on 11.06.2017.).



**Figure 7: Location of the most important wild goose feeding grounds in the Tata area**

These examinations proved the general conclusion that crops recover in spring following the departure of geese, the pecking makes the crop denser, and the nutrient input from goose excrement has positive effects on the crop. Therefore in total, until the summer harvest, there is usually no significant economic loss caused by goose feeding.

To reduce damages caused by the significant number of geese wintering in the region, and to compensate farmers, as well as for the protection of geese, the dissertation recommends to adopt the High Nature Value Sites (HNV) Program, mainly in the administrative area of Tata, Dad, Kisigmánd, Kocs, Komárom, Kömlőd, Környe, Naszály, Mocsá, Szákszend, Szomód, at significant goose feeding areas.

Regarding agricultural conflicts, the highly pathogenic avian influenza epidemics were also mentioned in the dissertation, which can even cause hunting restrictions in severe cases. Though there were smaller avian influenza outbreaks in Europe and Hungary in the past decade, no waterfowl hunting restrictions were necessary. The outbreak of 2016/2017 significantly

affected Hungary as well (more swan and goose deaths occurred on the Old Lake and in the region of Tata this winter), but the official veterinarian ordered hunting restrictions only in Nagykeszi, Slovakia, a neighbouring region to Komárom-Esztergom county, in January 2017.

### Recommendations for the preservation of goose populations

It is highlighted that local habitat protection measures can significantly contribute to preserving the status of a wetland of bird migration importance, which is under the umbrella of an international convention. The Old Lake, with its highly sensitive status, exposed to several anthropogenic effects, was successfully preserved as an internationally important migrating and wintering site, (meeting the criteria of the Ramsar Convention) by nature protection measures and management practices introduced in the past few years. The dissertation takes into account the efficiency of nature protection measures introduced so far, and also gives recommendations for possible further actions on hunting, use of fireworks, water management, light effects of urban and traffic origin, airspace disturbance, fisheries, direct human disturbances, water and winter sports.



This roosting site could ensure optimal resting conditions for geese for a more extended period as well. Besides, social and publicity aspects connected to goose migration were also described in the thesis.

**Figure 8: One possible form of artificial reef system to be developed on Old Lake (A – bird resting reefs; B – riverbed filled but covered with shallow water)**

Furthermore, goose protection recommendations, concerning the ongoing and forthcoming habitat reconstructions on the Old Lake, were also proposed. The establishment of an artificial reef system was recommended to be made during the planned major dredging works on the lake.

### NEW SCIENTIFIC RESULTS, THESES

- I. The author has revealed, which environmental factors have a major influence on the migration of geese on the Old Lake.** Besides natural ecological factors (e.g. predators, weather extremities, climate change, earthquakes) the especially great variety of anthropogenic effects was categorised as well (e.g. hunting, New Year's Eve fireworks, water management, lake operation, different light and noise effects, small airplanes and drones in the airspace of the lake, fisheries management, other direct human disturbances, landscape changes).
  
- II. It was revealed, that definite phenological changes took place in the dynamics and migration characteristics of wintering geese in the past 35 years, and these should be expected in the future as well.** It was pointed out, that due to the later autumn arrival and earlier spring departure of wintering geese, the length of the wintering pe-



riod became almost a month shorter, while and the autumn migration peaks were shifting more and more from November to December, but there are probably shorter (3-5 years) and a longer (20-22 years) cycles in their dates.

- III. **The dissertation has revealed the actual European, and Hungarian population status of the 13 goose species observed in Hungary and has analysed the role of the Old Lake in their migration.** Tundra Bean Goose (*Anser serrirostris*) which was super-dominant earlier, has passed this role to Greater White-fronted Goose (*Anser albifrons*). The population of the subdominant Greylag Goose (*Anser anser*) strengthened, both in nesting and wintering. New information could be collected about the migration activity of the three species, through several ringed individuals and GPS trackers. Other goose species increasingly be seen in Tata, which could notably be the result of a stronger observation activity.
- IV. **The author proved the theory that the Old Lake is not the only wintering site for the goose population of Tata any more, as it plays this role together with other wetlands of the region.** From the 2,000s, an increasing number of geese migrate to Ferencmajor Fishponds, Asszony Lake, Boldogasszony Lake, Grébic Lakes and sections of the Danube river near Dunaalmás and Nyergesújfalu. The Old Lake constitutes the wintering region of Tata with these increasingly stable wintering sites for geese.
- V. **The author has examined the migratory connectivity and dynamics of more distant (within a 150 km radius) Hungarian and Slovakian goose wintering places and their connection to the Old Lake regarding migration dynamics.** Based on the analysis of the population dynamics within the framework of the Hungarian Goose Monitoring, and ringing recoveries, a clear migratory connection of varying intensity can be detected, mostly with western Slovakian (Morva valley) gathering sites, as well as the Lake Fertő, Lake Velencei/Dinnyési-Fertő, Soponyai Reservoir, Rétszilas Fishponds and the alkaline lakes in Kiskunság.
- VI. **The dissertation has revealed, that geese play a dominant role in the total annual waterfowl communities of the Old Lake.** The total annual number of the 13 goose species once appeared on the Old Lake was 6.6 million goose days for the period of the last five years, which represents almost two-thirds of the total waterfowl turnover (10.5 million bird-days) of the lake. The majority of this (almost 93%) was the Greater White-fronted Goose which became super-dominant on the Old Lake during the past decade. Besides this, Tundra Bean Goose (5%) and Greylag Goose (2%) had significant numbers, while the presence of other goose species is hardly detectable in the total waterfowl turnover of the lake.
- VII. **The author demonstrated, by calculations and laboratory analysis, how wintering goose populations contribute to the eutrophication of the Old Lake by their phosphorus and nitrogen load.** Considering the maximum goose numbers until the present (2013/2014), the phosphorus load from goose excrement (346 kg/year) represents about 6.02% of the total phosphorus load (5,752 kg/year) washed into the lake from other sources (through Által-ér). Considering the highest load of geese (2,719 kg/year), they responsible for about 2.02% of the total nitrogen turnover (134,470 kg/year).

- VIII. The dissertation revealed the feeding areas of geese wintering in the region of Tata and also proved on a selected study area that even several thousands of geese cause no significant damages in crops.** Repeated on-site research No significant damages in growing winter wheat field (on an almost 70 hectares agricultural land marked out study area near the Ferenmajor Fishponds), could be detected other than the temporary effects of trampling and pecking caused by 4,000-8,500 feeding geese for five days in February. Crops on even the most intensely exposed sites have recovered by the harvest. To compensate damages in some instances (on agricultural fields used by a significantly high number of geese for weeks or during wet weather) and to minimise conflicts, it is recommended to introduce the High Nature Value Sites (HNV) program for farmers in the region, especially at the primary goose feeding areas.
- IX. The author proved that local habitat protection measures could significantly contribute to maintaining the status of a wetland habitat, which is under the ‘protection’ of an international convention, as an important bird migration site.** To meet the criteria of the Ramsar Convention and to maintain the status of the Old Lake, which is exposed to many anthropogenic effects, several nature protection measures (hunting prohibition, ban of New Year’s Eve fireworks, optimisation of water management, elimination of airspace disturbance, reducing disturbing effects of fisheries, water sports and other utilisation types of the lake) were implemented.

## LIST OF PUBLICATIONS

### *Announcements connected to the topic of the dissertation*

#### *Announcements in journals*

- MUSICZ L. (1985): Vonuló vízimadarak számlálása az Öreg-tavon. In: CSABA A. (szerk.): *A tatai Herman Ottó Kör munkái* 7: 147-151.
- MUSICZ L. (1986): Részlegesen albínó vetési lúd (*Anser fabalis*). *Madártani Tájékoztató* 1986. április-szeptember: 70.
- MUSICZ L. (1988): A Ferencmajori-halastavak madárvilága. *LIMES – Komárom Megyei Tudományos Szemle* 1: 69-90.
- MUSICZ L. (1990a): Rendellenes színezetű vadludak (*Anser sp.*) sorozatos megfigyelése. *Madártani Tájékoztató* 1990. július-december: 61-62.
- MUSICZ L. (1990b): Vadlúdmozgalmak vizsgálata a tatai Öreg-tavon az 1984-1989 közötti időszakban. Wild goose movements on the Tata Öreg Lake 1984-1989. *Aquila* 96-97: 19-35.
- MUSICZ L. (1992): A tatai Öreg-tó vadlúdforgalmának antropogén hatásvizsgálata. *LIMES – Komárom-Esztergom Megyei Tudományos Szemle* 1992/2: 29-40.
- MUSICZ L. (1995): A tatai Öreg-tavon telelő vetési ludak (*Anser fabalis*) nagyarányú állománycsökkenése. *Szélkiáltó* 10: 10-11.
- MUSICZ L. (1997a): A tavak, víztározók ökológiai-természetvédelmi szerepe a Tatai-medence madárvilágában. *LIMES – Komárom-Esztergom megyei Tudományos Szemle* 1997(1): 95-116.
- MUSICZ L. (1997b): A vadlúdtelelés ökológiai-természetvédelmi vonatkozásai a tatai Öreg-tavon. *Partimadár* 1997 (6): 42-63.
- FENYVESI L. & MUSICZ L. (1997): Büttykös ásólúd (*Tadorna tadorna*) megfigyelések 1997-ből. Observations on shelduck (*Tadorna tadorna*) from 1997. *Aquila* 103-104: 120-122.
- MUSICZ L. & SZABÓ B. (2000): A tatai Öreg-tavon telelő vadludak eutrofizációs szerepének vizsgálata 1986-1997. időközében. *Magyar Vízivad Közlemények (Hungarian Waterfowl Publications)* 6: 179-206.
- RIEZING N., MUSICZ L. & KOVÁCS GY. (2013): Szélerőműparkok madártani vizsgálata, különös tekintettel a fészkelő fajokra. Ornithological survey of wind turbine parks with a special emphasis to breeding species. *Aquila* 120. p. 7-14.
- BÁTKY G., MUSICZ L., CSONKA P. (2014): Anser-fajok vonulásdinamikája a Kelet-Kisalföld térségében 2001-2012 között. Migration dynamics of Anser species in the eastern part of the Small Hungarian Plain from 2001 to 2012. *Szélkiáltó* 16: 66-67.
- MUSICZ L. (2014): Vadlúd monitoring a Tatai-tavakon. Monitoring of wild geese on the Lakes of Tata. *Szélkiáltó* 16: 17-19.
- MUSICZ L., BÁTKY G. & CSONKA P. (2016): Vadlúdfajok arányainak változása Tatán 2000-2015 között. *Szélkiáltó* 17: 14-21.
- MUSICZ L. (2016): A tatai Öreg-tavon telelő vadlúdcsapatok vonulási mintázatának változása 1984-2016 között. *Magyar Vízivad Közlemények* 28: 67-80.
- FARAGÓ S., MUSICZ L. & HAJAS P. P. (2017): Vetési lúd (*Anser fabalis*) fajkezelési terv Magyarországon (Management plan for Bean goose (*Anser fabalis*) in Hungary). *Magyar Vízivad Közlemények (Hungarian Waterfowl Publications)* 30: 117-153.

**MUSICZ L.** (2018): A tűzijátékok zavaró hatása a tatai Öreg-tavon telelő vadludakra. The impact of fireworks on wild geese wintering on Öreg-tó, Tata. *Aquila* **125**. p. 7-10.

### Other publications on nature conservation

**MUSICZ L.** (1993): *A területfejlesztések természetvédelmi vonatkozásai a Tatai-medencében.* Diplomadolgozat, ELTE Humánökológus Szak, 46 p.

**CSONKA P. & MUSICZ L.** (2001): A Ramsari Egyezmény – Nemzetközi egyezmény a vizes élőhelyekről. In (szerk): *Komárom-Esztergom Megyei Vadászati Almanach 2001.* pp. 1-10.

**CSONKA P. & MUSICZ L.** (2002): A Ferencmajori-halastavakról. *Madártávlat* **9** (4): 4-5.

**MUSICZ L.** (2002): Feladatok és lehetőségek a tatai források újjáéledése kapcsán. *Tatai Helytörténeti Egyesület évkönyve*, 66-75.

**MUSICZ L.** (szerk. 2003): Tata természeti és építészeti értékei. *Tata Város Önkormányzata* **32** p.

**BÖHM A. & MUSICZ L.** (2003): Lake Öreg: where nature and life coexist. *World Conservation Bulletin* 2003 (1): 27.

**MUSICZ L.** (2006): Tata madártani jelentőségének áttekintése. In: **FATUSKA J.** (szerk.) *Környezetváltozás, termelés, fogyasztás: Adatok a történeti ökológia kérdésköréhez. Annales Tataienses* **5**: 141–149.

**MUSICZ L.** (2012a): Vadludak, vízimadarak Tatán. *Tatai Patrióta* **3**: 40-54.

**MUSICZ, L.** (szerk. 2012b): *Tata Város 2005-2010. évi környezetvédelmi programjának felülvizsgálata és a 2011-2016. évekre szóló környezetvédelmi programja.* Euronatur Bt., 82 p.

**MUSICZ L.** (szerk. 2013): *Út a tatai Öreg-tó és az Által-ér vízgyűjtő teljeskörű rehabilitációjához.* Által-ér Szövetség, 24 p.

**KERESZTESI, J. – MUSICZ L.** (szerk. 2016): Természeti értékek és fenntartható fejlesztés a Gerecse Natúrparkban. Magyar Zoltán Népfőiskolai Társaság, pp. 36.

**CSORDÁS E., MILINTE J. & MUSICZ L.** (2018): „Csendes égbolt” összefogás a Vadludak Városában. Civil kezdeményezés Tatán a szilveszteri tűzijátékok természetvédelmi célú korlátozására. *Madártávlat* **25**:3. p. 36-39.

**MATUS G., ASZALÓS R., DOROTOVIČ CS., HANYICSKA M., HÜVÖS-RÉCSI A., MUSICZ L., MIGLÉCZ T., PAPP M., SCHMOTZER A., TÖRÖK P., VALKÓ O., VOJTKÓ A., HARTMANN J., TAKÁCS A. & BALOGH R.** (2019): Kiegészítések a magyar flóra ismeretéhez. Supplements to the knowledge of the Hungarian flora. *Botanikai Közlemények* **106**(1): 71–112.

### Book, Book chapters

**MUSICZ L.** (2021): A tájban élő ember – a Neszmélyi Borút ökoturisztikai értékei. Neszmélyi Borút Egyesület, Baráth Nyomda, Tata. Pp. 88. ISBN 978-615-81815-0-1

**MUSICZ L. & CSONKA P.** (2007): Tatai tavak (A tatai Öreg-tó, a Ferencmajori- és a Réti-halastavak). In: **TARDY J.** (szerk.): *A magyarországi vadvizek világa.* Alexandra könyvkiadó. Pécs: 62–77.

**MUSICZ L.** (1996): Komárom-Esztergom megye helyi jelentőségű védett természeti értékei. In: TARDY J. (szerk): *Magyarországi települések védett természeti értékei*. Mezőgazda Kiadó, Budapest. 309-333 p.

### **Forthcoming publications:**

**MUSICZ L. & FARAGÓ S.** (in press): The significance of local anthropogenic effects on the movements of wintering geese on the Lakes by Tata Ramsar site (in Wetland City Tata). A lokális antropogén hatások jelentősége a Tatai-tavak Ramsari területen (Tata Ramsari városban) telelő vadludak dinamikájában. *Ornis Hungarica*.

**PELLINGER, A., MUSICZ, L., TATAI, S., LABER, J., BÁTKY, G. & BODOR, Á.** (In press.): Átvonuló és telelő vadludak eloszlásának változásai a Dunántúl északi részén. [Changes in the distribution of migrating and wintering wild geese in the northern part of Transdanubia]. – Rence - A Fertő-Hanság Nemzeti Park Igazgatóság tanulmánykötetei [Monograph series of Fertő-Hanság National Park Directorate] (5)

### **Conference lectures**

**MUSICZ L.** (2019): Vadludak a városban – Tata, a Ramsari Város. MTA Erdészeti Tudományos Bizottság Vadgazdálkodási Albizottság ülése, Tata, 2019.12.10.

**MUSICZ L.** (2019): Tata a vizes élőhelyek hazai és nemzetközi jelentőségű képviselője. Debreceni Hidrobiológus Fórum. Debrecen, 2019.12.05.

**MUSICZ L.** (2019): Tata – Wetland City. Inaugural Roundtable of Wetland City Mayors. Suncheon City, Republic of Korea. 23-25 October 2019.

**MUSICZ L.** (2018): The significance of local anthropogenic effects on the movements of wintering geese in the Pannonian region (A lokális antropogén hatások jelentősége a telelő vadludak Pannon-régió belüli mozgalmában). *The 18<sup>th</sup> Conference of Goose Specialist Group* – Klaipėda, 2018.03.37-30.

**MUSICZ L., BÁTKY G., CSONKA P. & SZABÓ M.** (2017): A kis lilik (*Anser erythropus*) hazai előfordulása – aktualitások az Észak-Dunántúl térségében. A kis lilik (*Anser erythropus*) védelmi munkacsoport ülése/Lesser White-fronted Goose National Working Group Workshop – Hortobágy-Máta, 2017. február 22.

**MUSICZ L.** (2017): Vizes élőhelyek, élőhelyrekonstrukciók az Által-ér völgyében. “Vizes Élőhelyek Világnapja” országos központi ünnepség, Földművelésügyi Minisztérium, Tata, 2017.02.02.

**PELLINGER A., MUSICZ L. & TATAI S.** (2016): Átvonuló és telelő vadludak eloszlásának változásai a Dunántúl északi részén. V. Fehértavi Darvadozás – Szatymaz, 2016. november 10-11.

**MUSICZ L.** (2016): A tatai Öreg-tavon telelő vadlúdállomány és a vadászati hasznosítás összefüggései 2000-2015 között. III. Vadlúd, Daru, Hattyú Workshop – Hortobágy, 2016. október 21.

**MUSICZ L.** (2015): A tatai táj megőrzése modern eszközökkel. „Tájgondnokkal a tájak fejlesztéséért” Konferencia, Budapesti Corvinus Egyetem – 2015. december 10.

**MUSICZ L., BÁTKY G. & CSONKA P.** (2015): Vadlúdfajok arányainak változása Tatán 2000-2015 között. II. Vadlúd, Daru és Hattyú Workshop – Sarród, 2015.02.21.



CSONKA P. & MUSICZ L. (2011): Vadlúd monitoring a Tatai tavakon. I. Vadlúd, daru, hattyú workshop - Mekszikópuszta, 2011. április 9.

MUSICZ L. (1994): Tata város feladatai az Öreg-tó és környezetének helyreállításában. In: Takács Zs. (szerk.): Az Által-ér vízgyűjtő területének környezetvédelmi problémái. *MTESZ-Szimpózium*. Tatabánya, 1994. november 17.

### Other lectures

MUSICZ L. (2020): Források és vadludak – Amiről Tatát világszerte (el)ismerik. Eötvös József Gimnázium, Tata, 2020.01.31.

MUSICZ L. (2019): A Tatai medence karsztvizeinek természeti értékei. Rotary Club, Tatabánya, 2019.05.23.

MUSICZ L. (2018): Tűzijáték kontra természetvédelem, avagy meddig maradhat az Öreg-tó Európa egyik legfontosabb vadlúd pihenőhelye? Tatai Vadlúd Sokadalom, Tata, 2018.11.24.

MUSICZ L. (2018): A tatai Öreg-tó üzemeltetésének vizes élőhelyvédelmi vonatkozásai. Magyar Hidrológiai Társaság, Győr, 2018.03.22.

MUSICZ L. (2017): A vízgazdálkodás természetvédelmi aspektusai. Magyar Hidrológiai Társaság, Tatabánya, 2017.10.25.

MUSICZ L. (2017): Tájvédelem és tájgazdálkodás a Gerecse Natúrparkban és az Által-ér völgyében. "10 éves az Európai Tájjegyzményt kihirdető törvény". Alapvető Jogok Biztosának hivatala, Budapest, 2017.10.03.

MUSICZ L. (2016): Természetvédelmi projektek Tatán, a Ramsari Egyezmény szellemében. Debreceni Egyetem, Hidrobiológus Szak, 2016.04.08.

MUSICZ L. (2014): A Tatai Vadlúd Sokadalom 14 éve. „40 éve a természet szolgálatában” Magyar Madártani és Természetvédelmi Egyesület, Tata, 2014.09.20.

MUSICZ L. (2014): Élőhelyrehabilitációs célkitűzések az Által-ér völgyében. „A Tatai medence tiszta vizeiért” Konferencia, Tata, 2014.03.21.

CSONKA P. & MUSICZ L. (2014): Helyi jelentőségű természetvédelmi területek Komárom-Esztergom megyében. Pro Vértes Közalapítvány, Tatabánya, 2014.01.16.

MUSICZ L. (2012): Vadludak és vízimadarak Tatán. Nyugat-Magyarországi Egyetem, 2012.05.09.