

Final Project Report (to be submitted by 15th September 2022)

Instructions:

- Document length: maximum 10 pages, excluding this cover page and the last page on project tags.
- We welcome the submission of Annexes (i.e. bachelor or master thesis, references, species lists, maps, drawings, pictures) to further HeidelbergCement's understanding and future use of your findings, however they will not be reviewed by the Jury, and we kindly ask for these to be sent separately to the National Coordinators.
- Please use the attached template for species data collected during the project and submit with the project report.
- Word/PDF Final Report files must be less than 10 MB.
- If you choose to submit your final report in your local language, you are required to also upload your final report in English if you wish to take part in the international competition.
- To be validated, your file must be uploaded to the [Quarry Life Award website](#) by **15th September 2022** (midnight, Central European Time). To do so, please log in, click on 'My account' / 'My Final report'.
- In case of questions, please liaise with your national coordinator.
- **You should not publish additional private information in your final report (e.g.: address, day of birth, email-address, phone number), just complete the categories we ask for below under "Contestant profile".**

The final reports should comprise the following elements:

For research stream projects:

- Abstract (0,5 page)
- Introduction :
 - For projects that are building upon a previous project, write a summary of actions that were already completed in the previous project.
 - Project objectives
- Methods: a detailed description of the methods used during the project is required.
- Results: the results of the project should be outlined and distinguished from the discussion.
- Discussion:
 - Results should be analysed and discussed with reference to region/country taking into account other publications.
 - Outline the added value of the project for science and for the quarry / company.
 - Recommendations and guidance for future project implementation and development on site is requested. Where possible, please mention the ideal timing and estimated costs of implementation.
- Final conclusions: a short summary of results and discussion.

1. Contestant profile

▪ Contestant name:	Aleks Sykała
▪ Contestant occupation:	student
▪ University / Organisation	University of Lodz (student)
▪ Number of people in your team:	3

2. Project overview

Title:	Recognition and minimalisation of factors negatively affecting birds of KSM Rakowice Reservoir
Contest: (Research/Community)	Research
Quarry name:	Kopalnia Surowców Mineralnych Rakowice

Abstract (max 0.5 page)

The project was carried out on the premises of KSM Rakowice, which is located in the vicinity of the Natura 2000 area - PLH020054 "Ostoja nad Bobrem". Special Protection Area "Dolina Bobru" is located nearby.

Our project was focused on the protection of the biodiversity of the reservoir located in the Rakowice quarry and its main goal was to identify the bird species occurring in this area and to protect the most valuable habitats of this area from human disturbance.

During field surveys, 26 species from Annex I of the Birds Directive were detected, including at least 2 species breeding in the quarry area- common tern and marsh harrier. Unfortunately, their breeding success turned out to be low as a result of changes in water level in the reservoir itself, as well as in the old oxbow lake located within the mine. To protect the breeding colony of the common tern breeding on the sandbanks in the future seasons, 5 floating platforms were made ready to deploy next year. That should guarantee breeding success despite the water level changes.

It is also important to restore the breeding colony of black-headed gulls on the island overgrown with willow thickets. To allow the birds to return there, the island was cleared of vegetation.

Final report (max 9 pages)

INTRODUCTION

The main goals of the project were:

- Recognition of the bird species occurring in the quarry - in order to improve the biodiversity of the area covered by the project, it was crucial to identify species for which the area is particularly important. It allows tackling the exact problem that these species face and taking appropriate protective measures in the future. It was necessary to conduct a full survey this season as the data concerning this area are poor - the last full survey was completed in 2006.
- Recognition of the main threats to the breeding birds - to take appropriate protective measures, it was first necessary to determine what has the greatest impact on reducing the breeding success of birds in the area of KSM Rakowice.
- An attempt to minimize the negative impact of human activities on birds and increase their breeding success - after identifying the greatest threats, attempts were made to minimize the impact of human disturbance. Activities to manage the island and banks on the reservoir were planned that can help Górażdże keep local bird populations in good health.

The project was focused on wetland birds. These are the species whose population has dropped dramatically in recent years. Habitats that they occupy are particularly fragile to progressive climate change and direct human actions - industrialisation, disturbance and progressive development - wet meadows and reedbeds are artificially drained or dry up as a result of more frequent droughts. Water reservoirs on which bird shelter, breed and feed are under the influence of eutrophication and so on become poor in food. Simplification of hydromorphology of reservoirs and rivers causes floodplain meadows, oxbow lakes or sand/gravel banks to be almost unheard of. Sadly, the prospects for an improvement in their situation are low. This is the reason why the protection of the breeding grounds and the last refuges of wetland birds should be considered a priority when planning any works affecting their habitats.

METHODS

Data for the project were collected during field surveys with the use of optical equipment (spotting scope, binoculars), which took place at least twice a month. To assess, the presence of migrating birds accurately heard birds flying over the reservoir were also recorded. In addition, to make the list of species occurring in the area as accurate as possible, the archival data collected in the years 2016-2021 submitted to local (Silesian Avifauna Database) and national (ornitho.pl) databases were used. Events that took place in the quarry during and in between the surveys also were recorded to monitor how could they affect the birds breeding in the reservoir.

In order to increase the breeding success of birds in the quarry, we've taken actions focused on the island where there used to be a breeding colony of gulls, and a gravel bank on which common terns and ringed plovers attempted to breed. Work on the overgrown island was divided into two parts - the residual dry herbaceous vegetation and tree seedlings were manually removed during the first clearing in March, while the willow thickets were cut in August. During the removal of vegetation, only willows with a trunk circumference of less than 80 cm were removed. Removal of these trees does not require the consent of the Regional Directorate for Environmental Protection (RDOŚ). To minimize the negative impact on passerine birds nesting in this type of habitat, an ornithologist was consulted and his recommendations were followed. As a result of the activities, about ___ m² of land was cleared. The project plan also included fencing the island to protect the colony from tourists entering it, although the budget was too small and the idea was abandoned. To compensate for this, four signs were made to install on the island and a big gravel bank to keep people out of the area during the breeding season.

Five floating platforms were built and prepared to be launched next season in early spring.

In order to prevent the sinking of eggs and chicks of terns, little ringed plovers and great crested grebes which are prone to flooding, four small 60 x 60 cm floating rafts were built from plastic mesh and upcycled PET bottles. They were covered with dry grass and willow sticks. One large platform, measuring 100 x 200 cm, was made using a metal sheet, wooden frame and plastic mesh. The platform is fenced to protect the brood against predatory mammals and prevent chicks from leaving it prematurely. Its surface was covered with a substrate suitable for the species - gravel and sand, which allows the birds to scrape nests. It is floating on two platform floats - 75 litres in volume each. Chick shelters were built from wood - 50 x 20 cm timbers were attached to form triangular boxes. They should serve as shelters against predators and unfavourable weather conditions. To promote the idea of upcycling, some of the materials used for the construction were collected from private persons for whom individual elements were an unnecessary waste. Some were collected from an illegal dump near the mine, which was then reported to the relevant authorities.

RESULTS

During the field surveys, a total of 176 bird species were detected in the mine. Twenty six of them are priority species for the European Union Community listed in Annex I of the Birds Directive, which is the basis for the designation of Special Protection Areas (SPAs) under the Natura 2000 network. These species are: whooper swan (*Cygnus cygnus*), ruff (*Calidris pugnax*), dunlin (*Calidris alpina*), wood sandpiper (*Tringa glareola*), black-headed gull (*Ichthyaetus melanocephalus*), little gull (*Hydrocoloeus minutus*), common tern (*Sterna hirundo*), caspian tern (*Hydroprogne caspia*), black tern (*Chlidonias niger*), little tern (*Sternula albifrons*), black-throated diver (*Gavia arctica*), white stork (*Ciconia ciconia*), white egret (*Ardea alba*), night heron

(*Nycticorax nycticorax*), white-tailed eagle (*Haliaeetus albicilla*), osprey (*Pandion haliaeetus*), black kite (*Milvus migrans*), red kite (*Milvus milvus*), marsh harrier (*Circus aeruginosus*), eagle owl (*Bubo bubo*), kingfisher (*Alcedo atthis*), peregrine (*Falco peregrinus*), bluethroat (*Luscinia svecica*), woodlark (*Lullula arborea*), red-backed shrike (*Lanius collurio*), tawny pipit (*Anthus campestris*). At least two of them (common tern and marsh harrier) attempted to breed in the reservoir area, while for all of them the quarry was an important feeding site during both the breeding season and migration.

Of the species identified in the quarry almost half of them, 84 species, are birds associated with the aquatic environment and wetlands. A total of 23 species of wildfowl, 3 species of rails, 3 species of grebes, 11 species of waders, 8 species of gulls, 6 species of terns, 3 species of herons, 1 species of diver, 1 species of cormorants, 4 species of raptors, 1 species of kingfisher and 8 species of passerines all associated to the aquatic environment. Every fourth identified water-marsh bird species had a breeding status in the quarry or its very close vicinity. Several other species could potentially breed in the area, and the activities undertaken during the project were to increase this chance.

As a result of removing thickets in the central part of one of the islands, a habitat was obtained that can become a breeding place for black-headed and Caspian gulls, as well as much rarer breeding species, such as the common, yellow-legged and Mediterranean gull. The chances of recreating a gull colony are considerable, as in previous seasons, before the excessive growth of vegetation (*Calamagrostis epigejos* and willows, *Salix spp.*) gulls eagerly chose this place to nest. After the first clearing of that island, during which only dry herbaceous vegetation, seedlings and perennials were removed, several pairs of black-headed gulls regularly appeared on the island and mated there. Unfortunately, they did not settle this season. Breeding behaviour indicates that it is likely to change in the following seasons due to the removal of thick bushes during the second cleaning.

The large platform built as part of the project is a place where terns and little-ringed plovers can safely nest. So far, they've occupied the gravel bank; unfortunately, that bank was regularly flooded, which meant that every year eggs were flooded and chicks drowned. The maximum observed breeding success was 1 fledgling per 11 incubating pairs.

In addition, specially constructed chick shelters will allow the chicks to hide from unfavourable weather conditions (heavy rain or heatwaves), as well as from predations (corvids, gulls), thus reducing the pressure of predation on the colony. Such an improvement should significantly increase the breeding success of birds nesting on the platform.

Potentially, this type of platform may also be occupied by common sandpipers - regular visitors to the quarry, and little terns.

Small platforms, 60x60xm, covered with vegetation give a chance to increase the breeding success of great crested grebes, which also suffered from rising water levels, regularly losing their broods. Additionally, thanks to the proximity of the flooded sandbanks, in the event of a rise in the water level, they give chicks that already hatched on the bank a chance to survive. Chicks of terns and plovers can swim short distances, so they will be able to swim to and rest on the floating platforms. Potentially, the platforms may also attract the black terns appearing on the reservoir during migration, which are an endangered species in Poland.

DISCUSSION

As the disappearance of natural water habitats progresses, substitute habitats, such as the artificially created reservoir in Rakowice Wielkie, have an increasingly important role in maintaining the population of wetland birds. KSM Rakowice quarry, thanks to the water reservoir within its boundaries, is a breeding ground for water birds and is also a rest and feeding site for migrating birds who treat the reservoir as a place to rest and get food. However, due to the frequent, rapid fluctuations in water levels, specific to this type of reservoir, they often become an ecological trap - birds, encouraged by a potentially attractive breeding habitat, attempt so nest on exposed banks. They cannot predict, however, that within a few weeks their nests are likely to be flooded as a result of rapid discharges of water through the dam above the reservoir.

Such situations result from the extreme human transformation of entire riparian environments. Straightening, cleaning, partitioning and embankment of rivers, cause a frequent rise in water levels during rain events. The result is a flood risk, which generates the need to create large dam reservoirs. For them to be able to accumulate additional rainwater, significant amounts of excess water are drained into the rivers below each time before the expected heavy rainfall. Unfortunately, the discharges are made a few days in advance of the expected rains and could be more stretched over time, they are made too quickly. This leads to the flooding of a difficult-to-estimate number of nests, as the problem does not only concern the primary dam reservoir or the gravel pit covered by the project. The nests of swans, ducks, grebes and coots in the riverbed and the reservoir, nests of passerine birds nesting lower in willow thickets and reeds, broods of plovers, gulls and terns occupying banks on the reservoirs - all are at risk of flooding.

The described problem takes place in many places in Poland. A good example is the Mietkowski Reservoir located nearby the mine, where a colony of gulls protected by Natura 2000 is threatened by flooding every year. The most famous nest flooding took place in 2018 when a massive discharge of water from Włocławek Reservoir flooded all the wetland birds' nests all the way down to the Vistula mouth. Every year, environmental organizations call for taking greater care, when planning such activities, but this is usually ineffective. Our team intervened in the matter of the situation in Rakowice, both at the Polish Waters and the Regional Environmental

Directorate in Wrocław. Unfortunately, the reports have had no effect - the changes in water levels are still happening just as violently as before.

For this reason, the only solution that could realistically increase the breeding success of the most valuable birds occupying the area of Rakowice quarry is to make the chances of breeding success independent of water level fluctuations. This can be done by installing special floating platforms.

Nesting platforms for wetland birds are a worldwide proven method of active species protection. According to B. Manikowska-Ślepowrońska et al. (2022) in the area of Lake Drużno, the local population of the common tern showed a sharp decline from the years 1999-2021 (-92%). Therefore it was decided to recreate the common tern population by making floating platforms to encounter them to breed on the lake once again. Birds accepted artificial breeding platforms in the first year of their installation. The number of breeding pairs in artificial nests in the years 2017-2021 accounted for 53-100% of the breeding population in the study area, which means that this method of protection is very effective. Artificial rafts can be a good conservation measure for common terns in places with limited access to breeding habitats but optimal foraging areas. The area in Rakowice Wielkie covered by our project is a place with a decent feeding base; if it were not for the problems with regular flooding of the colony, these birds could have achieved great breeding success in the Rakowice quarry. Dunlop et al. (1991) describe the great success of breeding platforms within the next year of their assembly - 115 pairs settled on 4 platforms with a total area of 100 square meters. This density can be increased by providing chick shelters on the platforms by up to 16% (Dietrich and Nachtigall, 2021). The chick shelters will serve as protection from weather and predation for both hatchlings and fledglings.

It is particularly important to protect colonial birds because apart from improving the condition of the local population of the terns themselves, colonial species help to increase the breeding success of other species nesting near the sandbanks they occupy. Birds living in the colony constantly monitor the surroundings for predators, and once they notice danger, they alert other birds in the area. They are much more effective in detecting and alerting about danger than solitary breeding species. In addition, they often attack potential threats - during the project, it has been observed many times that common terns nesting on the gravel pit collectively attacked much larger birds such as ravens, crows, grey herons and ospreys, as soon as they've been spotted. Black-headed gulls are also very effective in these activities, and they often nest along terns. According to the research of Pöysä et al. (2019), in which the long-term trends in the number of breeding birds in the reservoirs were analyzed, there is a clear positive correlation between the size of the black-headed gull colony and the breeding success of birds nesting nearby. Therefore, we hope that the actions consisting in cleaning the centre of the island of vegetation will bring the expected effect and will not only allow the gulls to return to their former nesting place, but also improve the breeding success of other birds.

RECOMMENDATIONS FOR FUTURE SEASONS

In order to enable the establishment of a gull colony on the island and avoid its disappearance over the years, regular, preferably annual, mowing of the central part of the island should be carried out. This will allow you to remove both dry grass and perennials, as well as young trees. Thanks to the regularity of these activities, it will not require the laborious removal of grown trees, but only mowing the area with a brush cutter. Ideally, mowing should take place outside the breeding season, i.e. in March or October.

To extend the life of the floating platforms they should be removed from to protect them from damage caused in winter. That should happen after the breeding season (September, October). The platforms should be stored in a dry, closed shed, or as a last resort, they can be secured outside during the winter, e.g. on a cleared island. Platforms should be removed in September / October and launched by the end of March. Before the breeding season, along with the platforms, boards informing about the prohibition of entry should be placed on the islands and the bank.

Additionally, we recommend to install more floating platforms, especially big platforms with gravel substrates. This will enable the development of common tern colonies, as well as increase the chance of a new species breeding on the reservoir. It is recommended that the platforms are equipped with shelters (e.g. wooden canopies made of two boards, 50x20 cm in size) limiting the predator pressure from corvids.

The costs of such an undertaking will depend mainly on the size of the platforms, the method and materials used for construction. To keep track of the effectiveness of the actions taken, it will be possible to establish cooperation between the quarry and licensed bird ringer in order to mark the birds hatched in the reservoir every year. That would give a chance to gain information about the survival and return of the birds hatched and breeding there.

To add an educational aspect to the activities undertaken, it would be advisable to place an educational board on the shore about the birds found on the island and the platforms. The board, apart from the purely educational value, could additionally draw attention to strollers and anglers how important it is from the point of view of conservation not to disturb the birds by deliberately approaching or destroying the nests, and how big a risk to their safety is posed by unleashed dogs. Placing the board during the project was planned, but it turned out to be impossible due to financial constraints.

Bibliography:

1. Coccon F., Borella S., Simeoni N., Malavasi S., 2018, Floating rafts as breeding habitats for the Common tern, *Sterna hirundo*. Colonization patterns, abundance and reproductive success in Venice Lagoon. *Rivista Italiana Di Ornitologia*, 88(1), 23–32
2. Dietrich Stoyan & Winfried Nachtigall, 2021, The effect of artificial chick shelters on nest placement by Common Terns *Sterna hirundo*, *Bird Study*, 68:3, 345-350
3. Dunlop C. L., Blokpoel H., Jarvie, S., 1991, Nesting Rafts As A Management Tool for a Declining Common Tern (*Sterna hirundo*) Colony. *Colonial Waterbirds*, 14(2), 116–120

4. Manikowska-Ślepowańska B., Ślepowański K., Jakubas D., 2022, The use of artificial floating nest platforms as conservation measure for the common tern *Sterna hirundo*: a case study in the RAMSAR site Druzno Lake in Northern Poland, *The European Zoological Journal*, 89:1, 229-240
5. Pöysä H., Lammi E., Pöysä S., Väänänen V.-M., 2019, Collapse of a protector species drives secondary endangerment in waterbird communities, *Biological Conservation*, 230, 75-81

To be kept and filled in at the end of your report

Project tags (select all appropriate):

This will be use to classify your project in the project archive (that is also available online)

Project focus:

- Beyond quarry borders
- Biodiversity management
- Cooperation programmes
- Connecting with local communities
- Education and Raising awareness
- Invasive species
- Landscape management
- Pollination
- Rehabilitation & habitat research
- Scientific research
- Soil management
- Species research
- Student class project
- Urban ecology
- Water management

Flora:

- Trees & shrubs
- Ferns
- Flowering plants
- Fungi
- Mosses and liverworts

Fauna:

- Amphibians
- Birds
- Insects
- Fish
- Mammals
- Reptiles
- Other invertebrates
- Other insects
- Other species

Habitat:

- Artificial / cultivated land
- Cave
- Coastal
- Grassland
- Human settlement
- Open areas of rocky grounds
- Recreational areas
- Sandy and rocky habitat
- Scree
- Shrub & groves
- Soil
- Wander biotopes
- Water bodies (flowing, standing)
- Wetland
- Woodland

Stakeholders:

- Authorities
- Local community
- NGOs
- Schools
- Universities



HEIDELBERGCEMENT