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Visitor management and wildlife trapping in the Danube floodplain Wachau

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CITATION

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Abstract The “LIFE+ Wilderness Wachau” project focused on the establishment of a nature reserve of Danube floodplain at Rossatz (Wachau, Austria). Project restoration measures led to create a third inflow area by lowering the riverbank to mean water level, to close walking paths and to terminate land lease agreements in the area of island Pritzenau. In our study, we used wildlife camera trapping to monitor both, the number of visitors and of wildlife on the island before and after completion of the restoration measures of revitalization. Our survey shows that with the establishment of the nature reserve the number of visitors was lowered to a half only than before at the protected island area. In addition to this lowered visitor pressure, leisure activities by people moved to the edge of the island. Further, a new attractive “hotspot” for local recreation has emerged on the new Schopperstatt side branch, located nearby but away from the nature reserve island. This visitor management has had a significant impact on wildlife activity. After floodplain restoration measures had been implemented, wildlife activity was almost 4 times higher in the nature reserve than before. Not only more captures of animal individuals (pre-revitalization monitoring: 222; post-revitalization monitoring: 833 per year) but also more mammalian species could be observed. The three most common, camera captured mammals over the whole observation period (pre-monitoring: Oct. 2018 – Oct.2019, post-monitoring: May 2021 – April 2022) were deer, fox and badger. Tracking the inverse related wildlife activities and visitor pressure on the one side, and the relocation of recreational hotspot use apart the nature conservation island on the other, is discussed to supplement information about successful river restoration management in protected Danube floodplain Wachau.

Keywords: floodplain restoration, ecotourism, recreational landscape use, Danube Austria

1 Introduction

Before the Danube was regulated in the 19th century, its course was divided into numerous side branches

and islands (Jungwirth et al., 2005). Flat gravel banks were found on one side and riparian banks shaped

by erosion on the other. By regulating the Danube, the side branches were cut off, the banks were fixed and the watercourse monotonized. Since 2003, measures to reconnect side branches and restore river banks have been implemented in the Wachau with the help of the EU funded LIFE program. The latest project realized here is “LIFE+ Wilderness Wachau”, located opposite small town Dürnstein, at the other bank side of the Danube River (Scheiblechner, 2022; Layman_Report, 2023).

The core of the project was the optimization and expansion of the side branch system near Rührsdorf-Rossatz on the right-hand side of the Danube. A new side branch was created with a length of more than 1.6 km. This resulted in a side branch system of more than 5 km in total. A flood basin in the Pritzenau was created by lowering Danube riverbank to mean water level. This is meanwhile the third connection to the Danube, which brings fresh water into the system. Both, natural flat and steep banks are developed, which includes wave protected fish fauna habitat areas. The alluvial forest was ecologically improved by removing neophytes and planting autochthonous tree species as, e.g., *Populus nigra*.

Additional measures for amphibians (> 50 spawning waters), white-tailed eagles (nest

protection zone, 6 artificial nests), black poplar (planting of >5000 specimen) and old trees (contractual protection of >300 old trees) were implemented throughout the Wachau. 15.5 ha of alluvial forest were created and 39 ha were cleared of neophytes. With the islands of Pritzenau and Schönbühl, a total of more than 60 hectares of nature reserves with undisturbed alluvial wilderness were created.

The present floodplain revitalisation study reports results from wildlife camera trapping supporting revitalization management measures at the nature reserve island Pritzenau (41.5 ha) near Rührsdorf-Rossatz. Tracking wild life activities by camera trapping became a reliable method to assess habitat quality for wildlife in recent decades, in particular in nature protected area (e.g., Stöllinger, 2003; Burton et al., 2015; ENETWILD-consortium, 2023). Wildlife cameras installed at island Pritzenau were not only used for wildlife camera trapping, but also for visitor monitoring assessing public use pressure relevant for floodplain management and nature conservation. The main aim thus was to survey visitor activities in the new protected island area and to identify potential effects on the wildlife activities in the new nature reserve.

2 Material and methods

2.1 FIELD SURVEY

The landscape of the revitalized project area is shown in Figure 1 A-C. In the area of the nature reserve three wildlife cameras (Cuddeback C1-Color) were installed before and after the implementation of project measures for each period of one year (pre-revitalization monitoring: 06/10/2018 – 19/10/2019, post-revitalization monitoring: 01/05/2021 to 30/04/2022). During the post-monitoring, in addition

to these cameras on island Pritzenau, a fourth camera was installed at the newly created side branch Schopperstatt. The three island camera sites were located at the Danube riverbank (footpath), at a game crossing and at a game feeding station. The fourth camera was installed only during post-monitoring on the Schopperstatt side branch. The location of the cameras is shown in the map of Figure 2.

For reasons of data protection (information privacy) the cameras were clearly marked with information signs, which also provided a phone number for any queries.

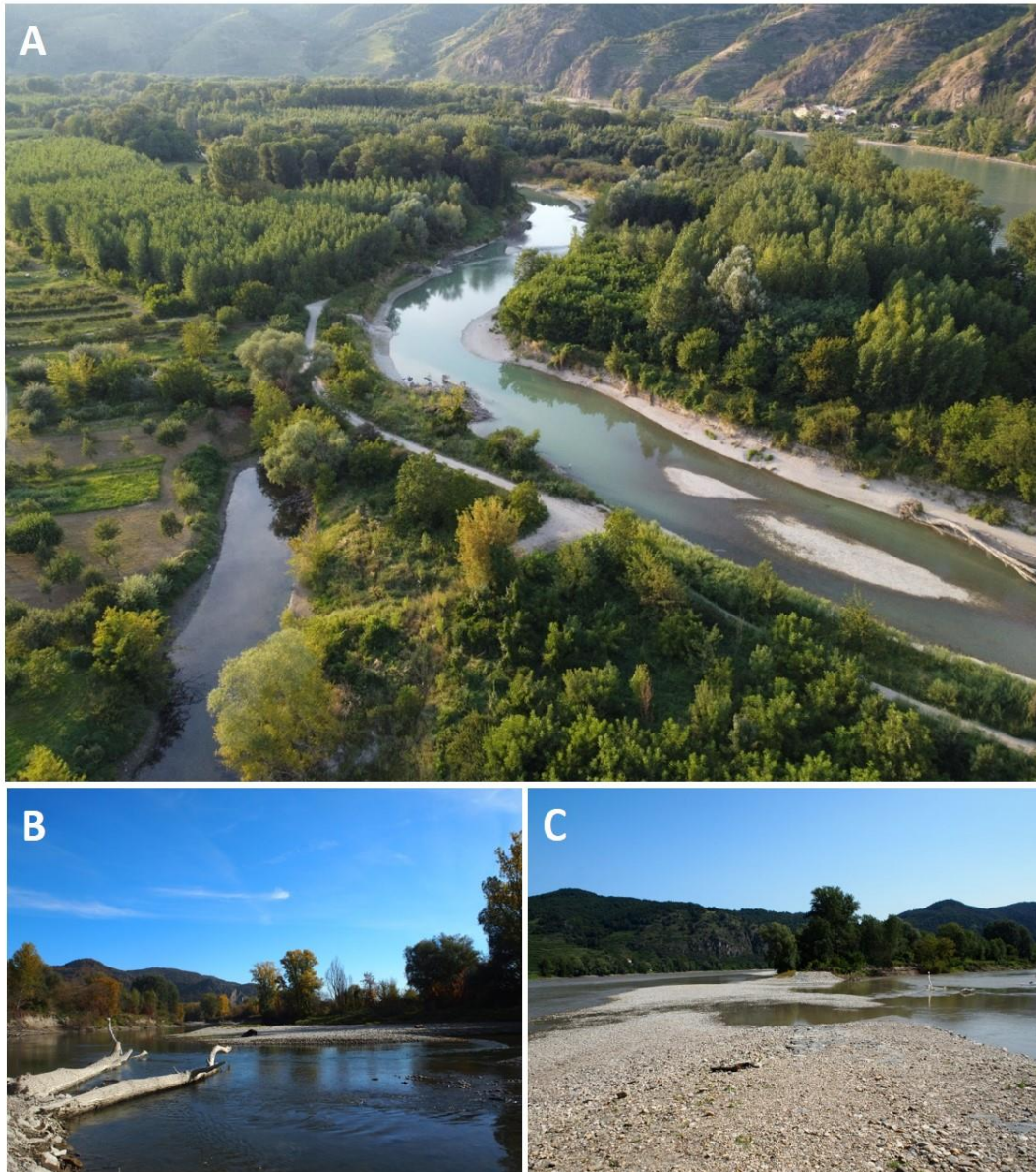


Figure 1: LIFE+ Wilderness Wachau side branch Schopperstatt. Overview (A) and view on the new inflow area of the flood basin close to Pritzenau (B) and on the lowered riverbank during mean water situation (C): photo credits: A - Johann Nesweda, B and C - Ursula Scheiblechner.

2.2 DATA ANALYSIS

After the field surveys, the photos were counted, anonymized and those photos showing people or pets were deleted. Due to technical problems

(battery running flat, vegetation in front of camera etc.), recording was not all time possible. The few gaps in data monitoring were taken into account

3 Results and discussion

3.1 NUMBER OF MAMMAL SPECIES

Only few mammal species could be identified at the camera locations both in the pre- and in the post-

revitalization monitoring (Figure 3 A-F). In the pre-monitoring (2018/2019) four species were detectable: deer, fox, pine marten and badger. In the post-monitoring (2021/2022), at least six mammal species were identified: deer, fox, pine marten, badger, wild boar and a squirrel. The deer was camera captured most frequently in both the pre- and post-revitalization monitoring, whereby the number of sightings increased significantly from 199 during the one-year



Figure 3: Wildlife camera captures: deer bock with antlers in forest (A), deer fawn (B), wild boar (C), fox with prey in his mouth (D), pine marten (E), badger (F).

pre-revitalization monitoring to 571 animals during one year of post-revitalization monitoring. Also, fox (pre: 15/ post: 173), badger (pre: 2/ post: 79) and wild boar (pre: 0/ post: 14) could be recorded significantly more often during post-monitoring (Figure 4).

This camera capture increase might refer to two changed conditions: due to visitor calming on the new protection area at island Pritzenau protection and as

no hunting on animal population between autumn 2019 and autumn 2021 due to construction works in the area was possible.

Typical aquatic mammal species such as beavers or otters were not found, although their tracks were clearly visible in the project area. The size and the position of the camera detection zones were probably not suitable to capture these species (see also [ENETWILD-consortium, 2023](#)).

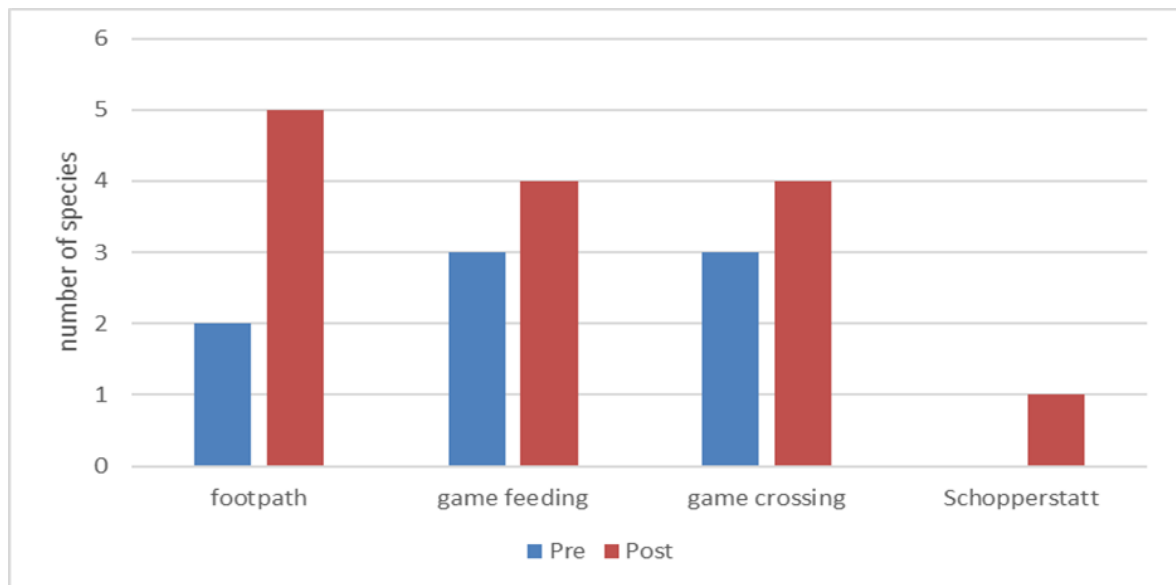


Figure 4: Mammal sightings of six species during pre-revitalization monitoring (blue) / post-revitalization monitoring (red).

3.2 FREQUENCY OF ANIMAL CAPTURE PER CAMERA

The frequency of animal captures at all 3 camera locations Pritzenau significantly increased during post-revitalization monitoring if compared with the pre-revitalization monitoring. While a total of only 222 animal sightings was documented in the pre-monitoring, an increase of about four times to 833 sightings in post-monitoring was found.

If looking at the frequency of animal captures per camera location during pre-revitalization and post-revitalization monitoring, the camera at the game feeding station always shows the largest frequency. The camera location at the game crossing is ranked in

second place and the footpath at the Danube riverbank in last place (Figure 5).

The capture increase of mammals at all camera locations from pre-revitalization monitoring to post-revitalization monitoring is clearly shown. At the game feeding station, the number of sightings increased 2.5 times (from 160 to 418) and at the game crossing by 6 times (from 45 to 271). An increase by factor 8 was detected at the footpath of Danube riverbank (from 17 to 144).

The camera on the Schopperstatt side branch, installed in post-monitoring only, revealed the lowest number of mammal visits at all (Figure 5).

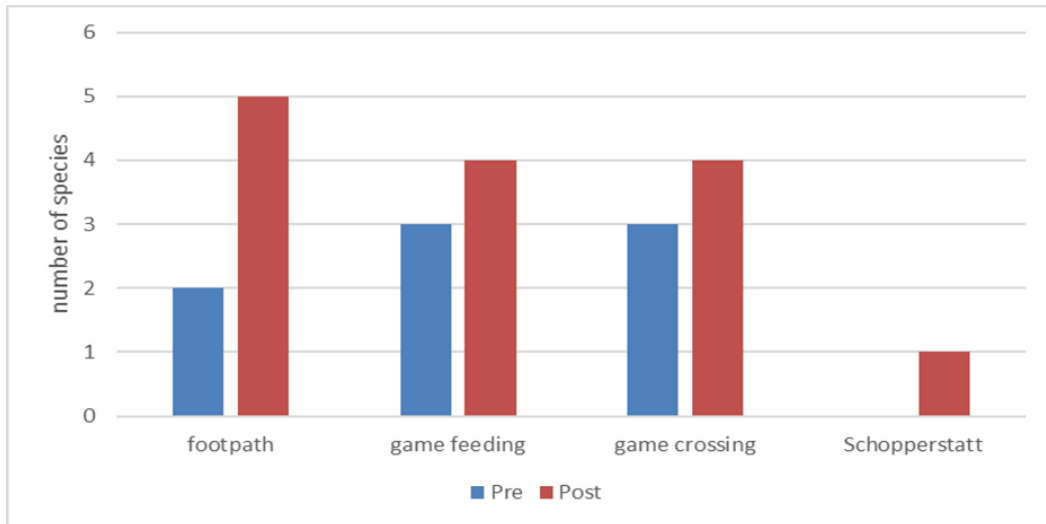


Figure 5: Number of mammal capturing per camera station pre-revitalization (blue) / post-revitalization monitoring (red).

3.3 WILDLIFE ACTIVITY VERSUS HUMAN USE

The frequency of wildlife capture at the installed cameras is almost exactly the opposite of those documented for human use. This result is evident for both, the pre-revitalization monitoring and the post-revitalization monitoring period.

Pre-revitalization monitoring: The camera at game feeding station showed relatively low human

usage (39) but the highest number of animal sightings (160, Figure 6). The camera at game crossing was in the middle with 46 mammal sightings per observation year, while here the lowest human activities were seen (12). In contrast, the camera directly at the footpath of Danube riverbank showed the most intensive use by humans (1,133), while the fewest mammalian activities per year were recorded with 17 detections.

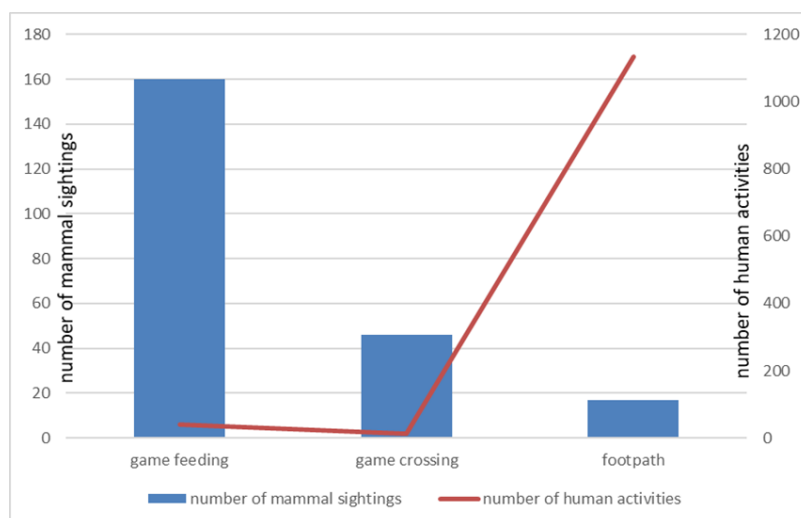


Figure 6: Number of mammals (blue bars) versus human activities (red line), pre-revitalization monitoring.

Post-revitalization monitoring: In the post-revitalization monitoring, the findings from the pre-monitoring are impressively confirmed (Figure 7). The camera at the game feeding station shows the most frequent animal sightings (418) with a small number of human activities (43). The camera at the game crossing also recorded many animal sightings (271) with the lowest

overall number of human activities (3). The camera on the footpath of Danube riverbank showed a moderate number of animal sightings (144) with relatively high number of human activity (500). The most intensive human use (5,584) was on the Schopperstatt side branch with the lowest number of animal sightings (53).

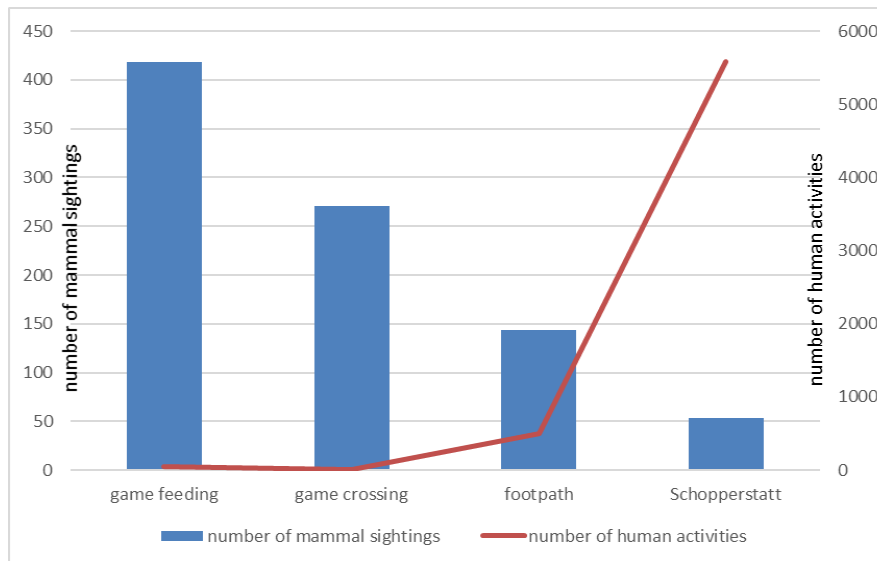


Figure 7: As in Figure 6 but for post-revitalization monitoring.

3.4 RECREATIONAL USE

The island Pritzenau is a popular recreation area, used for leisure activities in many ways (details see below, 3.4.3). On the one side, the total number of human visitors per year, recorded by the three camera locations in the Pritzenau, was reduced from 1,184 during pre-revitalization monitoring to 546 during post revitalization monitoring (Figure 8). On the other side, with the creation of a new "hotspot" for local recreation, i.e., the Schopperstatt side branch including a new footpath, the number of visitors has been increased (5,584 uses/year). This result shows, that visitors could be guided to areas outside the protection zone of nature reserve Pritzenau. Since construction of the Schopperstatt side branch as part of the project LIFE+ Wilderness Wachau, the focus of leisure activities thus has been successfully shifted from the nature reserve Pritzenau to the new side branch.

Pre-revitalization monitoring: During pre-monitoring - before implementation of the construction measures of LIFE+ Wilderness Wachau and thus before the lowering of the riverbank section to mean water level (flood basin) - most people were recorded on the footpath at Daube riverbank (1,133 uses in the survey year, whereby one month from mid-March to mid-April not included due to dead battery, Figure 9). Only 39 people were camera captured at game feeding station. By far the least number of people were detected at the game crossing (12 people throughout the year). For the pre-monitoring it could thus be clearly documented that almost the entire recreational visits were along the footpath on Daube riverbank, while the network of paths within the island Pritzenau was rarely used.

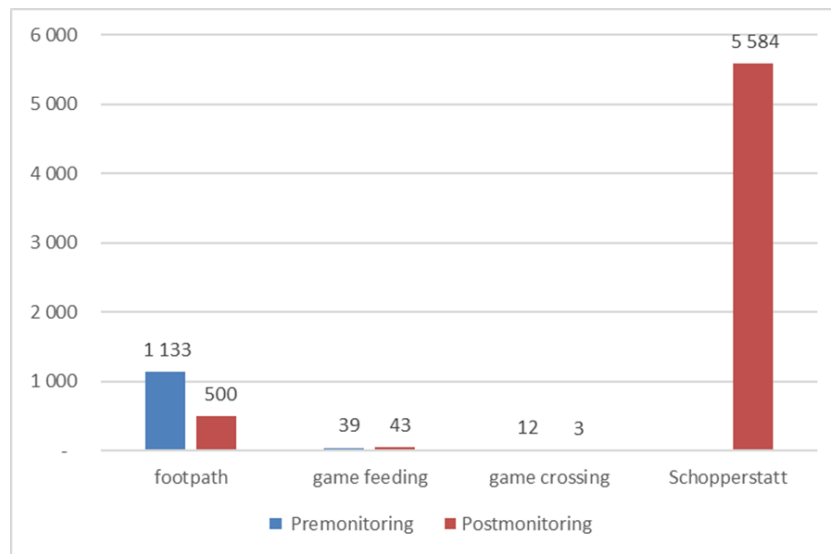


Figure 8: Number of uses per camera location in pre-revitalization (blue) and post- revitalization monitoring (red).

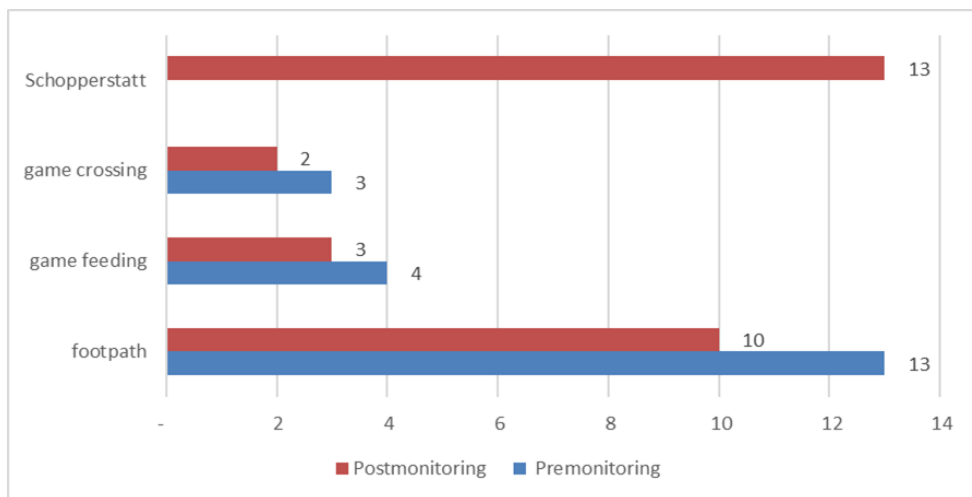


Figure 9: Number of usage types per camera location in pre-revitalization (blue) and post--revitalization monitoring (red).

Frequency of recreational use - post-revitalization monitoring: In post-monitoring the human activity could be reduced at almost all camera locations in the protection zone of nature reserve Pritzenau. The use inside the nature reserve nearly remained either the same (game feeding station pre: 39/ post: 43 uses) or was further minimized (game crossing pre: 12/ post: 3 uses). Also, the use of the footpath at Daube riverbank could be significantly reduced through the measures of the LIFE+ project (footpath pre: 1,133/ post: 500 uses). While here the focus of recreational

use was recorded before project implementation, the recreational use intensity was halved afterwards.

Since the Pritzenau nature reserve can be passed only at water levels below mean water (MW), the area has been significantly calmed down. Before the lowering of the riverbank, the Pritzenau area was accessible almost all year round (365 days/year). During the post-revitalization monitoring period (05/01/2021 - 04/30/2022) the accessibility could be reduced to 2/3 of the year (229 days), by lowering the footpath at the Danube riverbank to MW.

Table 1: Post-revitalization monitoring: human activities in phases above and below mean water (MW) at the footpath on Danube riverbank Pritzenau.

Water level > MW	Number of days	Number of people
11.05.21 – 06.09.21	119	38
30.12.21 – 08.01.22	10	0
18.02.22 – 20.02.22	3	2
08.04.22 – 11.04.22	4	21
Total	136	61
Average (Person/d)		0,45

Water level < MW	Number of days	Number of people
Total	229	439
Average (Person/d)		1,9

The intensity of using at the footpath at Danube riverbank was counted separately for the phases above and below MW levels (Table 1). It can be seen that during wet-up phases with water level above MW only 0.45 people per day used the footpath, while during dried up phases below MW the area became popular for visits with 1.9 people per day on

average.

Furthermore, the focus of recreational use is now outside the nature reserve Pritzenau on the new Schopperstatt side branch. Here 5,584 human activities could be detected in the post-revitalization monitoring period, which is by far the most intensive leisure time use of all camera locations.

4 Conclusions

Between autumn 2019 and 2021 the main construction works of the LIFE+ project wilderness Wachau had been implemented. The existing side branch system near Rührsdorf-Rossatz was optimized by bank flattening and bank structuring, while a new side branch Schopperstatt was created with a length of more than 1.6 km. Beside the hydrological re-connection of the floodplain with the Danube River, the project aimed at calming human visitor traffic at protected area of the new nature reserve island Pritzenau. The visitor documentation captured by wildlife camera aimed at verifying a successful visitor management towards the new “hotspot” of recreational side branch Schopperstatt.

This visitor management also has had a significant impact on wildlife activity. After the revitalization measures had been implemented, wildlife activity was almost four times higher in the nature reserve than before. This increase refers not only to a significant higher number of captures of individual animals (pre-revitalization monitoring: 222; post-revitalization monitoring: 833) but also to an increase of captured species number from four to six. The six mammal species identified by capture-recapture approach of wildlife cameras were deer, fox, pine marten, badger, wild boar and a squirrel. Both wildlife camera observation, i.e., tracking recreational activities by visitors on the one side, and of wildlife on the other, supplement information serving successful project management implementation, i.e., satisfying recreational use and nature protection in one region. Our results could clearly show, that wildlife activities are obviously negatively correlated with the visitor pressure. As during both, the pre-revitalization and the post-revitalization monitoring period, a higher visitor pressure was linked to a lowered wildlife activity and vice versa, our study recommends for the confirmation of management measures to capture with wildlife cameras not only wildlife but - in compliance with data protection regulations – also public use activities in nature protection areas.

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