

# Geocaching in protected areas – a survey of potential negative effects on the natural environment and implications for future management in the Donau-Auen National Park, Austria

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## Introduction

Geocaching originated in the year 2000 in the USA as a leisure activity, which requires the recreationists to find containers (so-called geocaches) based on their coordinates posted online. Since geocaches are often hidden off-trail in natural environments, protected areas are likely to be affected by this activity (Brost & Quinn 2011). Previous analysis has shown that the Donau-Auen National Park, which is partly located within the boundaries of Austria's capital city of Vienna and which is under a large amount of public use pressure (Arnberger & Hinterberger 2003; Tazcanowska et al. 2006), is most heavily affected by geocaching amongst all six Austrian national parks – both in terms of the number of caches hidden and in terms of the number of visits logged online (Hödl 2013).

## Method & results

Based on the findings mentioned above, staff members of the world's largest online platform dedicated to geocaching, [geocaching.com](http://geocaching.com), were contacted in cooperation with park officials and asked to provide a list of all caches hidden in the park and in possible future expansion areas. This information was used to find the caches and to evaluate them according to different characteristics, such as their distances from the nearest trails, their hiding places, their surroundings, the surface type at their locations and damages to soil and vegetation found at their hiding places. Field work, during which each cache was visited using a GPS unit (Garmin GPSMap 60CSx), was carried out on 18 weekdays, from August 14th to October 23rd 2015.

### *Location of geocaches*

Altogether, the hiding places of 208 caches and the coordinates of 86 so-called stages, which in some cases must be visited in order to find a cache's final location, were surveyed. The majority of them was placed in Vienna (71%: 153 caches, 55 stages), although the capital's share of the national park only makes up about one quarter of its total area. The remaining 29% (55 caches, 31 stages) were found in those park areas belonging to the federal state of Lower Austria.

According to zoning data provided by park officials, most of the visited coordinates were located within the park's so-called "nature zones" (47%), followed by "nature zones with management actions" (29%) and "outer zones" (9%), which is the least environmentally sensitive of all three zoning categories. The remaining 15% could not be assigned to a zoning category using ArcMap due to their location on desig-

nated expansion areas, their placing just outside the national park boundaries (in a buffer of max. 10m) or due to patchy zoning data.

### *Distances from trails*

The distances of the examined caches and stages from the nearest trails ranged from 0m to over 400m. The former was typically found with so-called “virtual stages”, which only require answering questions about the coordinates’ surrounding areas and where no actual containers or physical clues are hidden. In eight cases it was not possible to find the cache containers or their probable hiding places and therefore no distances from the nearest trails could be determined. Of the remaining 286 caches and stages about 40.2% were located within 0-5m from trails and another 23.4% within less than 10m.

### *Surrounding areas, hiding places and surface types*

The coordinates’ surroundings were mostly assigned to the categories “(floodplain) forest” (39%), “forest outskirts” (28%) and “developed area”, which is characterized by buildings or other artificial man-made structures (18%).

Amongst the hiding places, living trees and large shrubs were the most common ones (36%). Eight caches were even hidden in heights that can only be reached by climbing the respective trees using special equipment. Artificial structures such as information boards and signposts did also prove to be common hiding places (35%), followed by deadwood (28%) and hiding places between or under large stones (1%).

Most locations were assigned to the surface type “natural area” (71.4%), followed by “use area” (e.g. picnic areas or areas surrounding information boards) (22.1%) and “hardened surface” (6.5%).

### *Damages found at cache locations*

Damages were detected at 108 locations, with “damage to woody vegetation”, mostly caused by nails and wires used to attach geocaches to trees, and “bare dirt” being the most common types (40% each). However, since “bare dirt” did often occur in combination with the surface type “use area”, predominantly no natural areas were affected by this type of damage. Other damages such as “trampled vegetation” (11%) and “eroded soil” (9%) were less frequent.

## **Conclusions**

The results of this survey show that geocaching is a widespread leisure activity in the Donau-Auen National Park, mainly concentrated in areas within the city boundaries of Vienna. Although a large share of caches and stages is located along trails, some of them require walking off-trail for longer distances or even climbing up trees, which is both not in line with desired visitor behavior. Looking for these caches might disturb wildlife, damage sensitive vegetation and even bears the risk of spreading invasive species in previously unaffected parts of the national park. Up to now, caches found by park officials used to be removed without further notice, which did not prove to be efficient. It is likely that the cache owners simply believed them to have gone missing and therefore placed a new cache in the same location. In the future,

the respective cache owners should be contacted before their caches are removed. Therefore, awareness raising needs to be a significant part of any management strategy related to geocaching (Reams & West 2008). This is also underlined by Gantner et al. (2014), who found that, while geocachers do seem to be generally aware of wild-life disturbances, they do not consider geocaching itself to be a leisure activity that is potentially the cause of such disturbances.

Considering these points should help with developing a positive way of managing geocaching in the Donau-Auen National Park, allowing this leisure activity in a regulated fashion without impairing the natural environment.



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