Home range patterns of the strictly protected Caspian Whipsnakes (*Dolichophis caspius*, Gmelin, 1789):

A peri-urban population in Hungary.

BDEE, 2021

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Introduction

- Ecosystems continuously experience tremendous reduction of abundant **reptile** species.
- Significantly important role of reptiles in ecology.
- **Change in landscape:** human-induced transformations and fragmentation **- habitat loss** of reptile communities.

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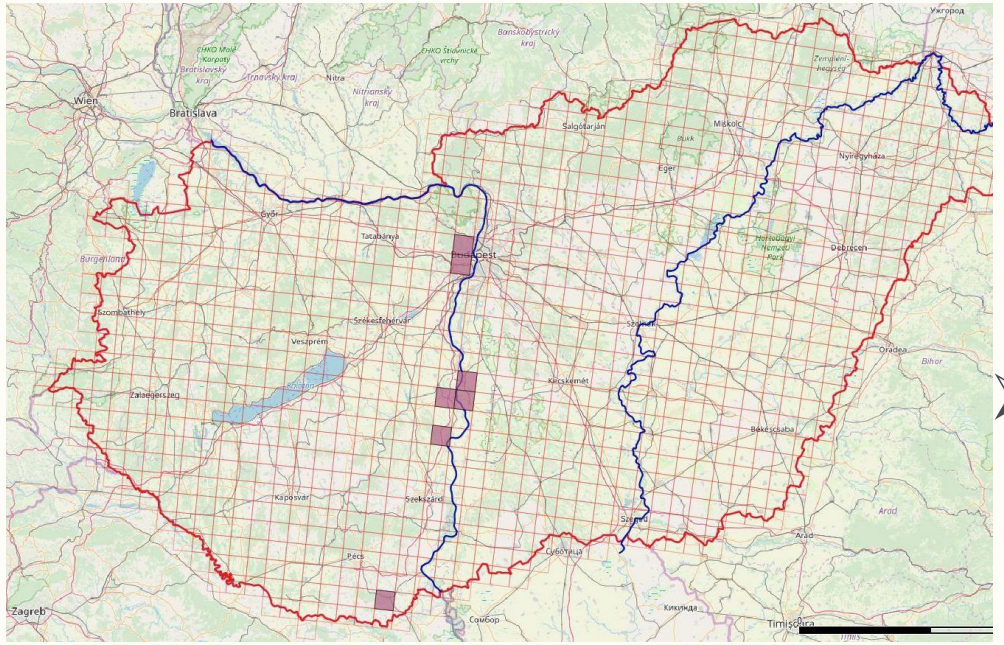


Photo: Thabang Teffo

Study background

- **Distribution**: Caspian whipsnake (*Dolichophis caspius*)
  - Balkan peninsula
  - Anatolian peninsula
- **Strictly protected** species in **Hungary**.
- **Main occurrence:**

  Szársomlyó (non-urban habitat)

  Buda-mountains (peri-urban landscape)

  - *e.g.* Vöröskővár (in Budapest)

Research questions

- What are the seasonal daily distances covered by the Caspian whipsnake in a peri-urban area?
- What is their seasonal home range size calculated by different estimation methods?

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Study Area

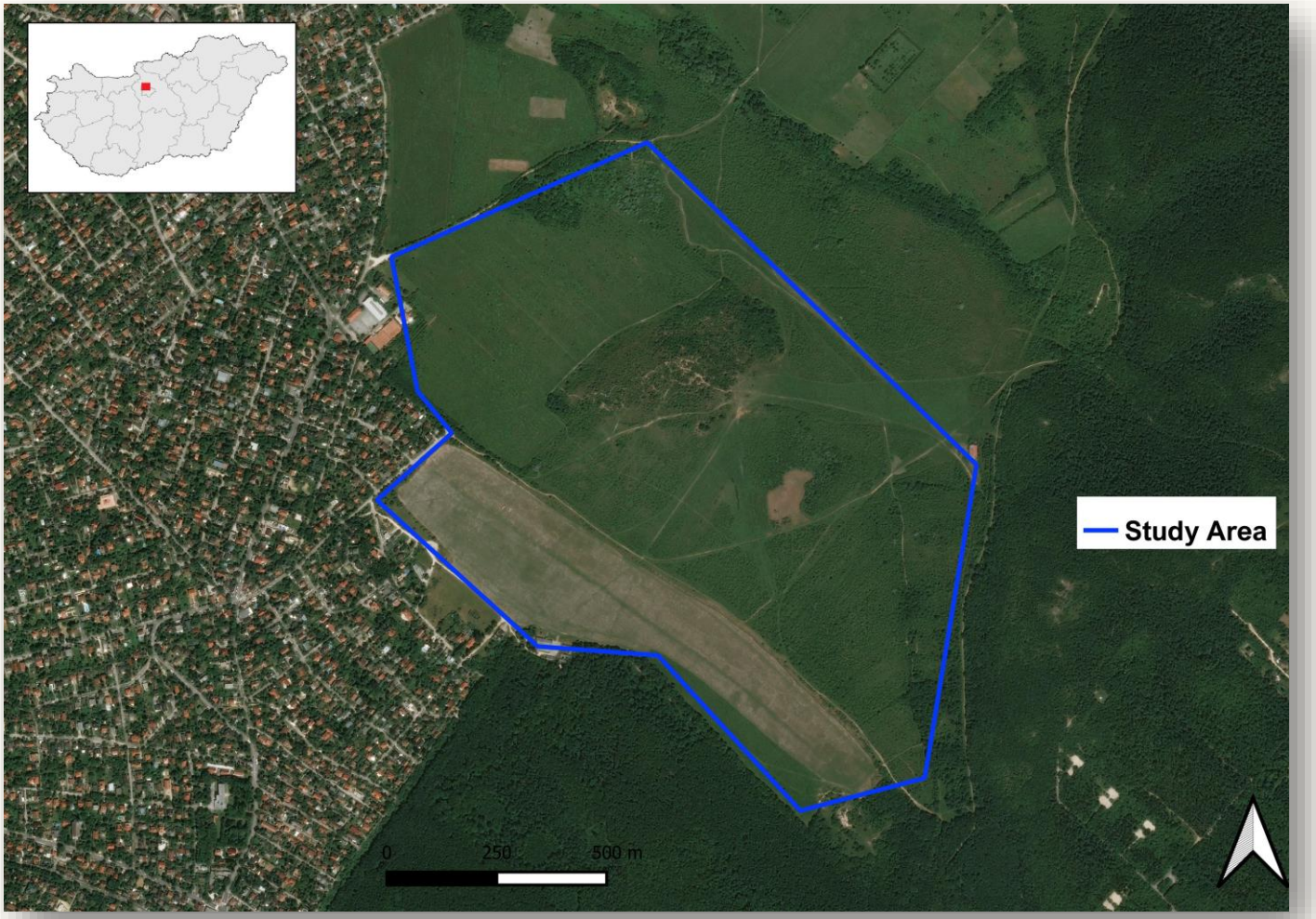


Figure 1: *Border line of the study area in Vöröskővár, Budapest*

- Vöröskővár - green island surrounded by **urban area** of Budapest.
- Area - 125 ha
- Partly included into Natura 2000 – Protected Area of Buda hills
- Different human disturbances
- Confined transition zone –

open and forested habitats which constitute different micro-habitat patches.

Methodology

Photos: Krisztian Katona

- Individuals were caught by hand.
- Body metrics are measured - **individual recognition.**
- **For radio telemetry -** implantable transmitter was used incorporated into the abdominal side of the animal by an anesthesia surgery process.

Methodology

Photo: Thabang Teffo

Photo: Balint Halpern

- localisation points on weekly (1 or 2 occasions per week) field visits using radio-telemetry.
- home range sizes of 5 individuals from 2016 to 2019
- 2 males and 3 females
- 4 different methods for HR estimation:
  - **Minimum Convex Polygon** (MCP),
  - **Adaptive** and **Fixed** Kernel Density Estimation (90 and 60%),
  - Local **Convex Hull** (LoCoH-R).
- Daily movements for vegetation and hibernation period

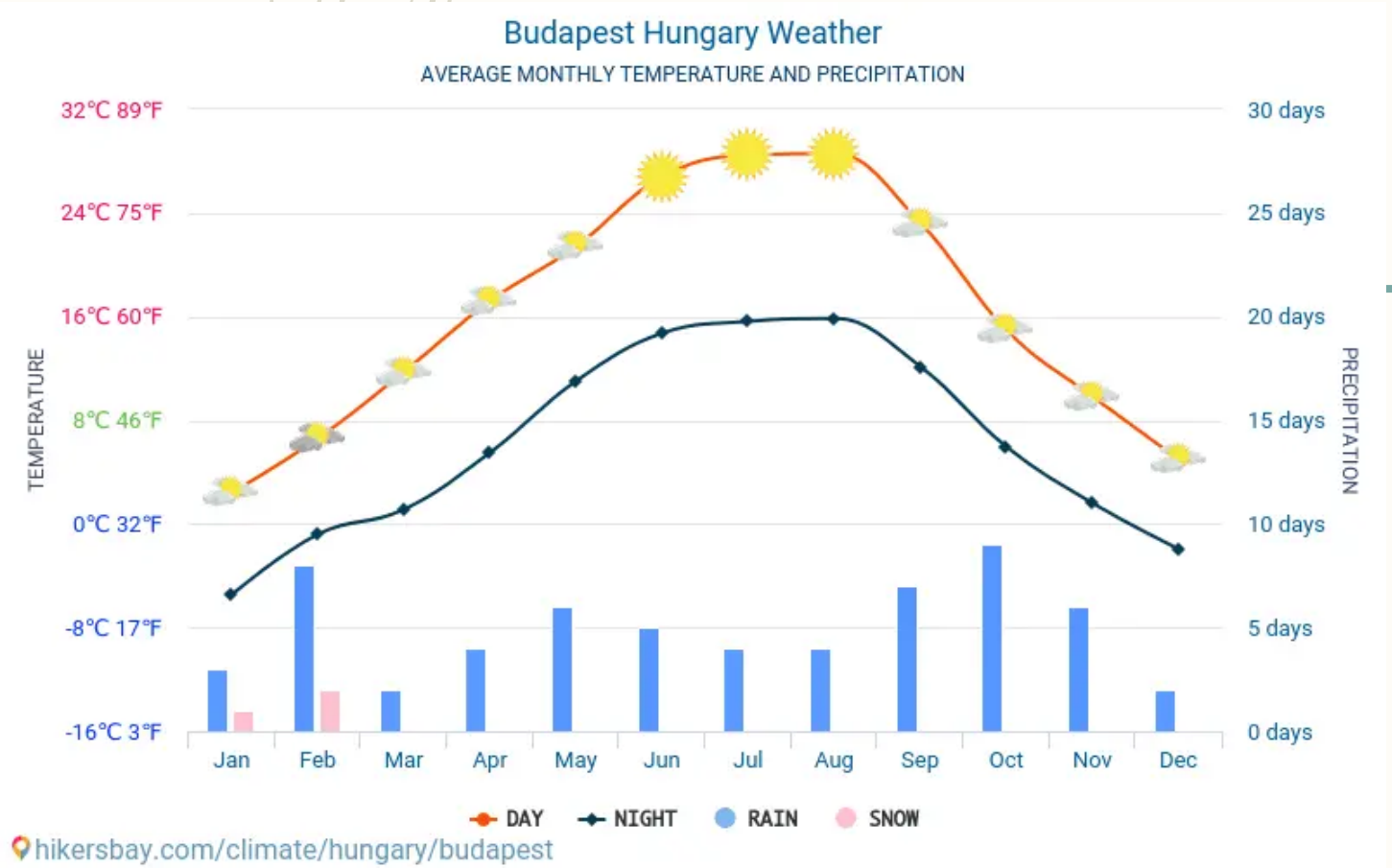


Figure 2: An annual variation of of temperature and precipitation in Budapest, Hungary, based on data between 2015 and 2021.

Vegetation period

- May – September months

Brumation period

- December - April

Results

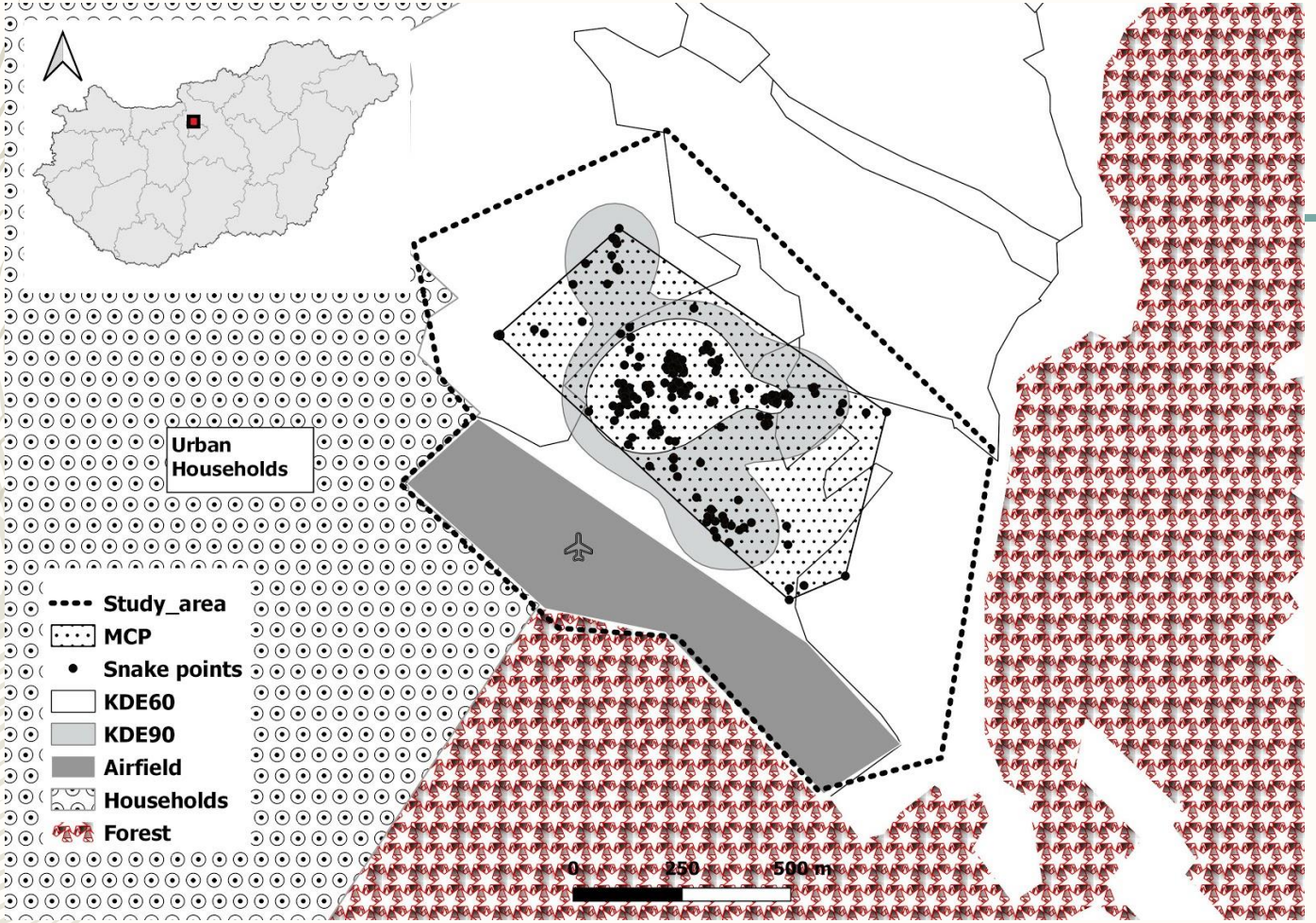


Figure 2: *Overall distribution of all points (n=313) of five snakes in the study area.*

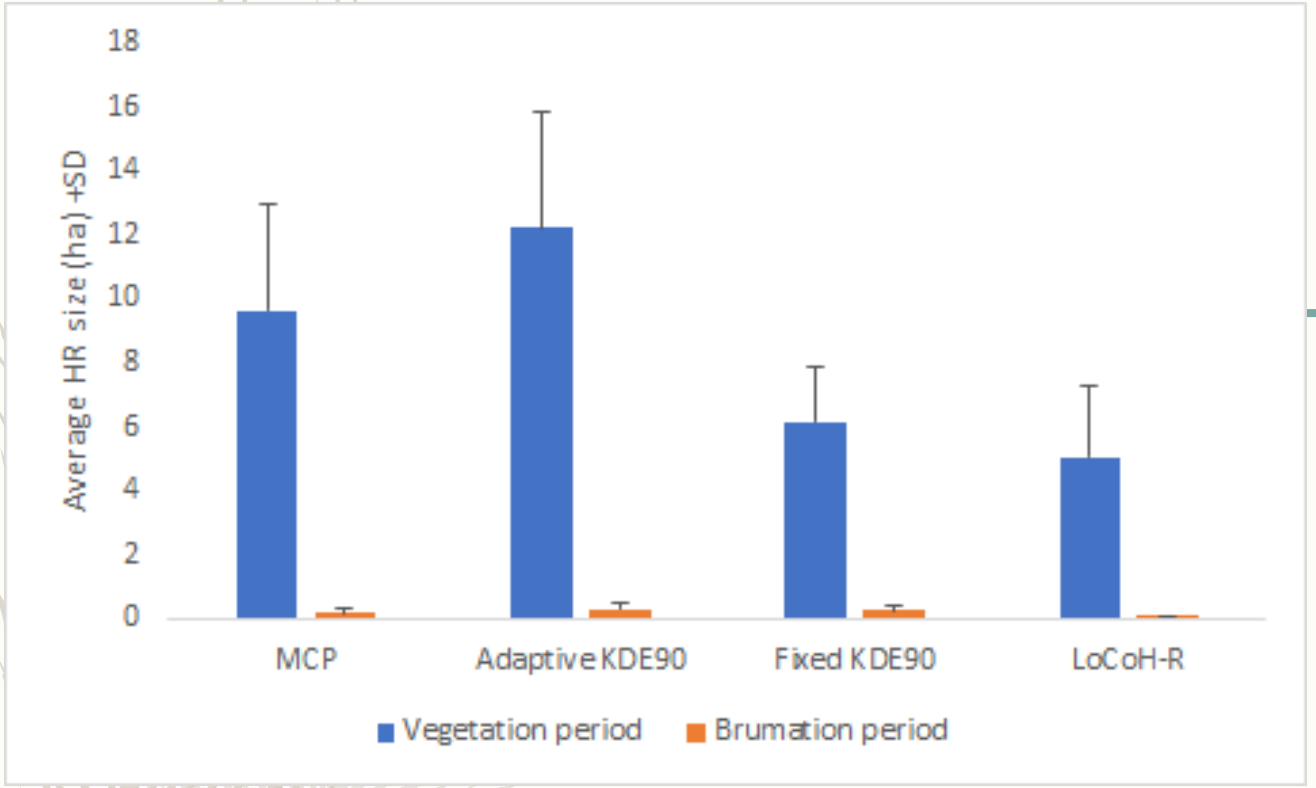


***Figure 3** : Daily distance (mean+SD) of individual snakes during brumation and vegetation periods*

There was a significant difference in the daily distance of snakes during brumation and vegetation period.
(*Paired t-test: t =5; p=0.005*)

- longer average daily distances during VPs
- Very short average daily distances during BPs

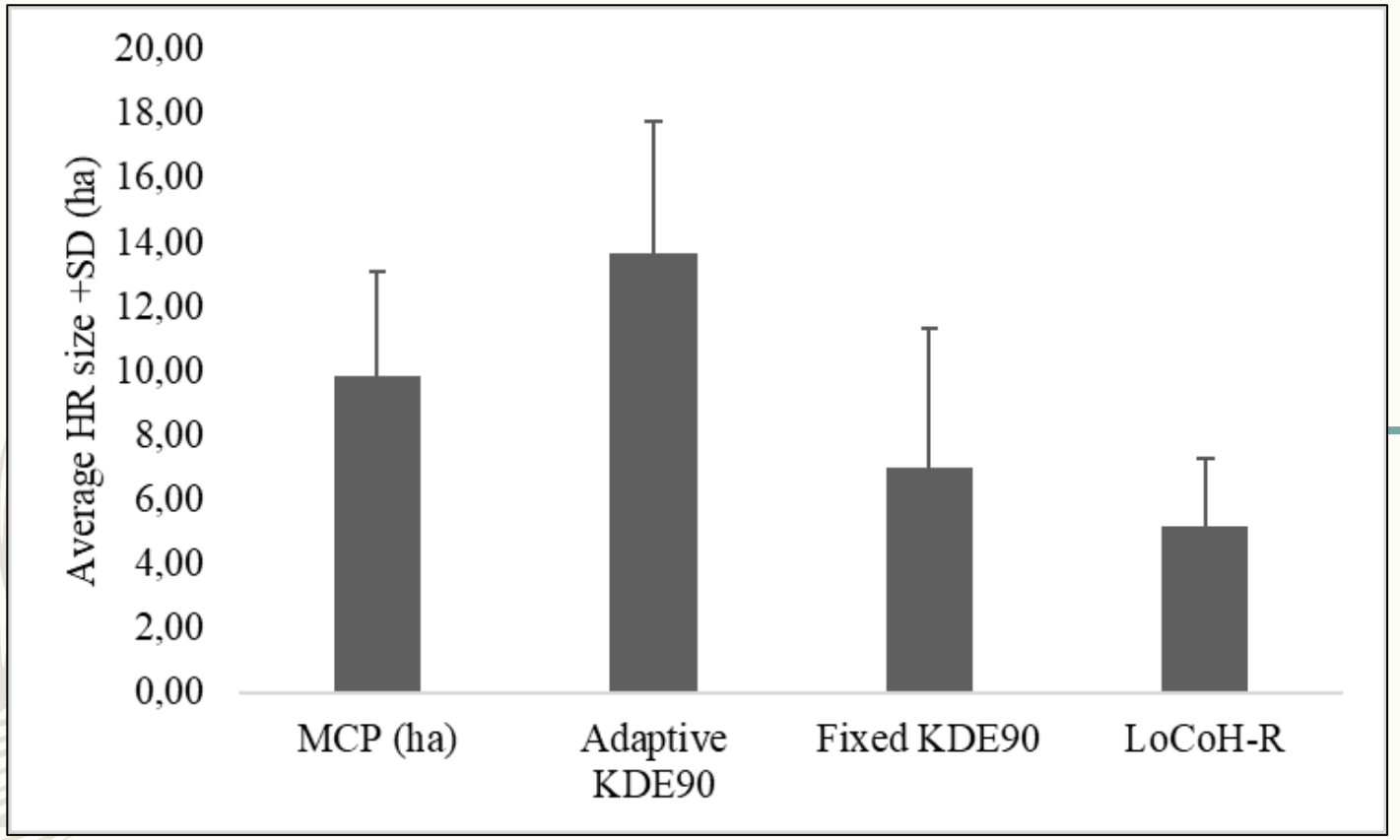
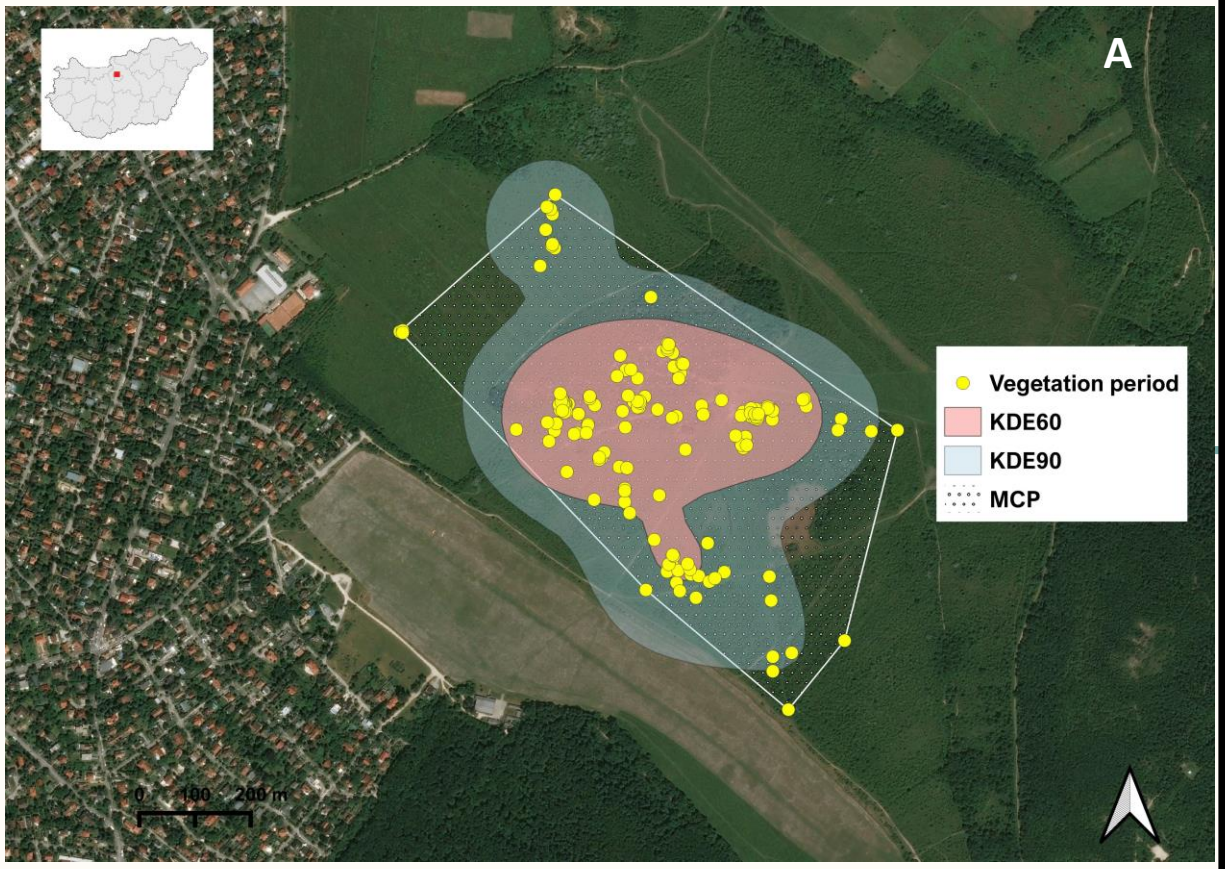


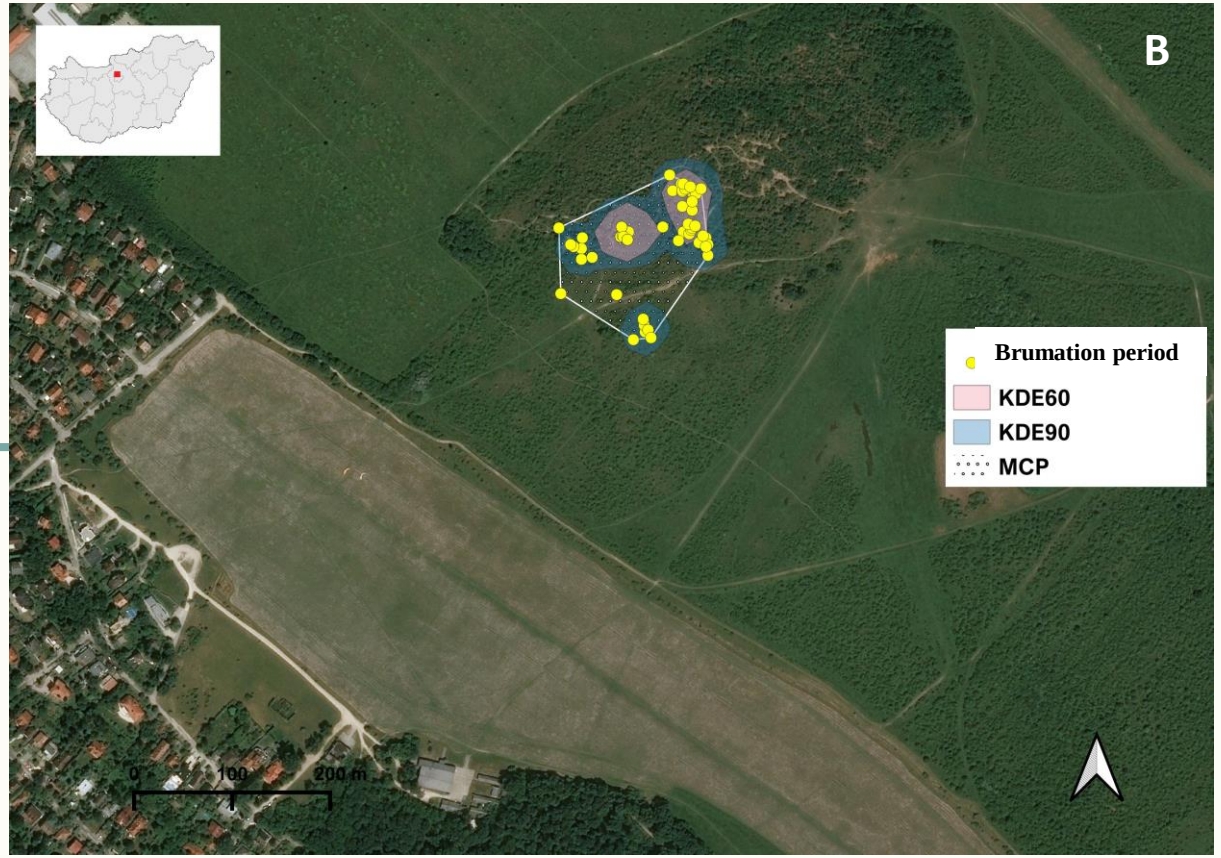
***Figure 4**: Total individual home ranges sizes of 5 snakes in the study area, over a period of four years (2016-2019).*

Repeated measures ANOVA:

There is a significant difference among the means of the methods used: ($F(3,4)=5.34$, $p=0.014$).

Tukey-Kramer test: There was a significant difference between Adaptive KDE90 and LoCoH ($p<0.05$) and no significant difference was found between the other methods ($p>0.05$).





Vegetation period

- Long active periods – **large hunting ground**
- Snakes use most parts of the area during VPs (14 ha on average)
- Avoid entirely open areas (example: airfield) – Human activities (direct observation)

Brumation period

- Clustering behaviour – Same burrows (close proximity) – few wintering places
- The dense bushes and rocky area are preferred during BPs

Conclusion for future biology

- Methods of HR estimation vary greatly.
- Caspian whipsnakes in our study appear to have much smaller home ranges (from 6 to 14 ha) in relation to the available habitat size
- **Small protected sites** can support few individuals (not enough to protect only the core area of hibernation)
- The snakes use the most parts of the green urban island.
- Caspian Whipsnakes in Vörösk**ő**vár prefer all available patch types dense bushes and partially open areas but mostly rocky areas during Brumation Periods.
- Increased anthropogenic activities in the hilly area may result in permanent extirpation of the species.
- Shrub encroachment, adequate management of the habitat is an important issue.

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Thank you for your attention

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