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Setting-up a medium term plan for risk-assessment in aquatic and semiaquatic reptiles from the site "ROSCI0065" (Danube Delta) – Romania

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ABSTRACT. The present work provides information on the planning of a mid-term (one year long) study focused on gathering data on the impact of human activities on populations of three aquatic and semiaquatic reptile species (*Emys orbicularis*, *Natrix natrix* and *Natrix tessellata*) from Natura 2000 site ROSCI0065 (Danube Delta). After a check-out of reliable information sources (activity carried out in January – April 2013 period) on native species of reptiles from Romania (especially the works dealing with human-induced killings in reptile populations), several field investigations performed in May – August 2013 period along the continental limit of the site ROSCI0065. During the field trips three types of current threats to the target reptile species were identified, as follows: 1. Road-killings (in 10 sites: Ghiolul Cotului, Somova – Isaccea area, Ghiolul Pietrei area, Murighiol – Dunavatu de Jos area, Sarichioi area, Ghiolul Tauc lake area, Ceamurlia de Jos – Baia area, Cape Negru, Sinoe – Grindul Lupilor area and Grindul Chituc marine levee); 2. Deliberate killing of snakes (in 2 sites: ruins of Histria fortress and Cape Dolosman); 3). Infrastructures functioning as traps (4 sites: Vadu, Cape Negru, Sinoe area and Jurilovca area). Based on the results of the investigations there was set-up a mid-term, one year long, plan for periodical (weekly) survey, in March – October 2014 period, of 14 sites located along (or nearby) the limits of the Natura 2000 site ROSCI0065 (Danube Delta), in order to gather data on impact of human activities on populations of aquatic and semiaquatic reptile species.

Key words: risk assessment, *Emys orbicularis*, *Natrix natrix*, *Natrix tessellata*, ROSCI0065 (Danube Delta)

INTRODUCTION

The Site of Community Interest (SCI) coded with ROSCI0065 (named "Delta Dunării" / Danube Delta) was designated as part of the Natura 2000 European network of protected areas, first time in May 2007 (draft version) [14], than in December 2007 (accepted version of the proposals related to SCIs) [16]. The surface of ROSCI0065 is representing practically the continental part of the Danube Delta Biosphere Reserve (DDBR) to which there were added some areas located nearby the limit of DDBR (out of these, the biggest surface is the one that includes Bestepe Hills).

Among the Species of Community Interest whose conservation requires the designation of Special Areas of Conservation (SAC) ([11]; [13]; [15]) there is an aquatic reptile widely distributed in the freshwaters from the DDBR [5], respectively from the ROSCI0065: *Emys orbicularis*. Another aquatic reptile, *Natrix tessellata*, is also of special conservative interest (being nominated as Species of Community Interest in need of strict protection ([11]; [13]; [15]), being more frequent in the Razim-Sinoe lagoony area (the southern part of ROSCI0065). The semi-aquatic *Natrix natrix* (considered a protected species according to Act 13/1993 [12]) is widely distributed in the DDBR and ROSCI0065, being the most frequently met snake in this protected area.

Taking into account data from various publications on mortalities recorded several years ago in reptile populations from the DDBR (especially in the southern part of the protected area) ([3]; [4]; [6]; [7]) and more recent (from 2012) information (on mass-killings in reptiles) provided by employees of the Tulcea branch of the Romanian National Guard for Environment (Garda Nationala de Mediu - Comisariatul Judetean Tulcea), in the frame of the national project for monitoring of the Species of Community Interest [10] (for the official title of the project, see the "Acknowledgement" section of the present work) we have carried out several field-investigations to detect the sites where reptiles are at risk (due to human activities) in order to set-up a medium-term plan for assessing the severity of impact of human activities on the above mentioned species and, if possible, to gather quantitative data related to the phenomenon.

MATERIALS AND METHODS

In January – April 2013 period there were checked out the reliable information sources dealing with issues related to native species of reptiles from Romania, namely the works nominated in the bibliographical checklists published in 1992 [2], 1997 [1] and 2011 [8]. Also, there were gathered and analysed reports/opinions of various people (including representatives of environmental protection authorities) on cases when reptiles were killed, either accidentally or deliberately, by humans in the DDBR area or nearby its limits.

In May – August 2013 period there were investigated the sites (in most cases, various types of wetlands) along the limits of ROSCI0065, especially the ones located along the western (continental) limit of the Razim-Sinoe lagoony area. During the field-investigations there were recorded the following elements:

- which species are affected;
- number of corpses found;
- type of human activities or other factors that represent a threat to reptiles;
- dimensions (length, width) of the area where reptiles are threatened / at risk.

RESULTS AND DISCUSSION

In the frame of the national project for assessment of the current status of the populations of native amphibians and reptiles nominated as Species of Community Interest there were established 156 monitoring plots of 10x10km² scattered all-over Romania [10] (see Fig. 1). Two of the respective monitoring plots include some parts of the continental limit of the ROSCI0065 (this being – in most of the cases – also the limit of the DDBR) (Fig. 2). The field-studies carried out in the respective two monitoring plots can provide data only on the threats from the investigated plots and no on the current situation in the whole length of the continental limit of the ROSCI0065. Consequently, during the periodical field-trips there were investigated as many sites as possible along the continental limit of the ROSCI0065.

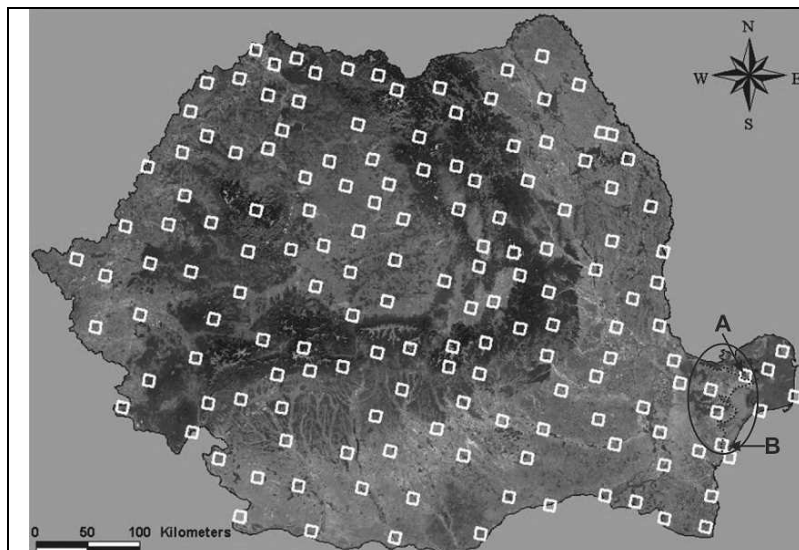


Fig. 1. Areas proposed for monitoring (in 2013 – 2015 period) of Romanian native amphibians and reptiles considered Species of Community Interest (modified after figure from page 42 of [10]).

Note. squares with white borders – areas (plots of 10x10km²) proposed for monitoring of Species of Community Interest; tip of arrow A points to the monitoring plot that includes Bestepe Hills and some part of the continental limit of the DDBR; tip of arrow B points to the monitoring plot that includes some part of the continental limit of the DDBR at Grindul Saele marine levee.



Fig. 2. Monitoring plots in and nearby the ROSCI0065 and the DDBR.

Note. squares with black borders – monitoring plots (of 10x10km²) that do not include parts of the continental limit of the ROSCI0065 and the DDBR; squares with white borders – monitoring plots (of 10x10km²) that include some part of the continental limit of the ROSCI0065 and the DDBR; tip of arrow A points to the monitoring plot which includes Bestepe Hills and some part of the continental limit of the DDBR; tip of arrow B points to the monitoring plot which includes some part of the continental limit of the DDBR at Grindul Saele marine levee.

During the field-investigations there were identified along the limits of site ROSCI0065 the following threats to aquatic and semiaquatic reptiles:

a). Road-killings

The most relevant case is that of the road-section from Ghiulul Cotului area (Fig. 3), between Sarichioi and Enisala localities (Tulcea county) (see 5 in Fig. 13). At this site road-killed specimens of *Emys orbicularis*, *Natrix natrix* and *N. tessellata* were regularly found [9] on a road-section with concrete embankment, having a total length of about 200 m, out of which along at about 100 m there is a metal fence (Fig. 2).

Similar type of threat was identified in the following sites located along limits of site ROSCI0065:

- Mineri - Isaccea area (Tulcea county) (see 1 in Fig. 13): along a very long section of this concrete road (starting with Mineri locality and ending with Capaclia area, close to Isaccea town) there were found many roadkilled specimens of *Natrix tessellata* and *N. natrix*, respectively (more sporadically) *Emys orbicularis* specimens: Most part of the investigated road has no concrete embankment and there are no metal fences (of any kind) along the road;
- Ghiulul Pietrei area (Tulcea county) (see 2 in Fig. 13): on the concrete road, in at about 6 km long sector between Mahmudia and Murighiol localities, having concrete embankment (on most part of the studied section) and being without any fence there were regularly recorded roadkilled *Natrix natrix* specimens (in most of the cases), *Natrix tessellata* specimens (in most of the cases at the ends of the road-section) and *Emys orbicularis* specimens (usually, at nearby Murighiol);
- Murighiol – Dunavățu de Jos area (Tulcea county) (see 3 in Fig. 13): on the concrete road, along at about 8 km long sector between Murighiol locality and the eastern end of Dunavatu de Jos village, having concrete embankment on some parts of the studied section and being without any fence there were regularly recorded roadkilled *Natrix natrix* and *N. tessellata* specimens;

- Sarichioi area (Tulcea county) (see 4 in **Fig. 13**): on the concrete road, along at about 2 km long sector eastward of Sarichioi locality, having concrete embankment and being without any fence there were sporadically recorded roadkilled *Natrix natrix* and *N. tessellata* specimens;
- Ghiolul Tauc (Balta Topraichioiulu) lake area (Tulcea county) (see 6 in **Fig. 13**): on the concrete road, along at about 500 m long sector from the bridge over the channel between Ghiolul Tauc and Babadag lake, having concrete embankment and metal fence there were regularly recorded roadkilled *Natrix natrix* and *N. tessellata* specimens, respectively (sporadically) *Emys orbicularis* specimens;
- road between Ceamurlia de Jos and Baia localities (Tulcea county) (see 9 in **Fig. 13**): on the concrete road, along at about 2.5 - 3 km long sector without concrete embankment or any fence there were regularly recorded roadkilled *Natrix natrix* specimens;
- Cape Negru (Tulcea county) (see 10 in **Fig. 13**): on the dirt-road, along at about 1.5 -2 km long sector parallel with the shore of the reed-marsh bordering Ceamurlia lake (without embankment or any fence) there were sporadically recorded roadkilled *Natrix tessellata* specimens;
- Sinoe – Grindul Lupilor area (Constanta county) (see 11 in **Fig. 13**): on the dirt-road, along at about 1.5 -2 km long sector from Grindul Lupilor marine levee (without concrete embankment or any fence) there were sporadically recorded roadkilled *Natrix tessellata* specimens;
- Grindul Chituc marine levee (Constanta county) (see 14 in **Fig. 13**): on the concrete road, along at about 3 km long sector (starting from the eastern end of Vadu village), with rocky embankment, but without any fence, there were regularly recorded roadkilled *Natrix natrix* specimens, respectively (sporadically) *Emys orbicularis* specimens.

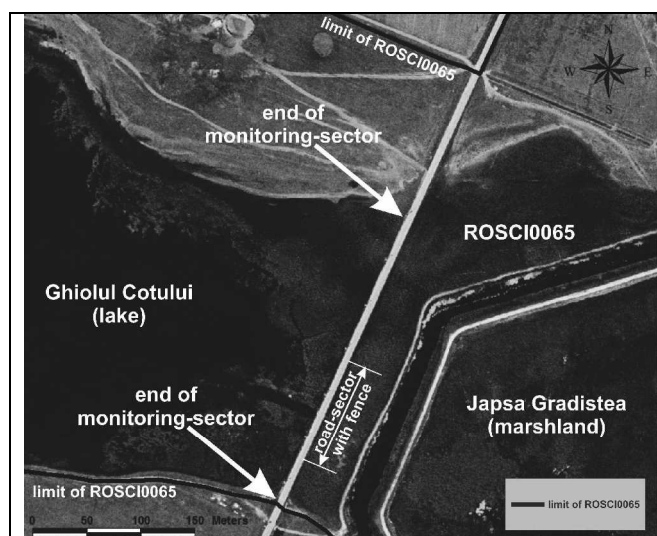


Fig. 3. Road-sector (between Sarichioi and Enisala) with roadkillings.



Fig. 4. Metal fence and concrete embankment along the road-sector (between Sarichioi and Enisala) with roadkillings.



Fig. 5. Road-killed *Emys orbicularis* juvenile on the road-sector between Sarichioi and Enisala.



Fig. 6. *Natrix tessellata* specimen deliberately killed by visitors of Histria fortress (shore of Sinoe lake).

b. Deliberate killings of snakes

The most relevant case is the one from the ruins of Histria fortress (Constanta county) (see 12 in **Fig. 13**) [9], located at the western shore of Sinoe lake (**Fig. 7**). These ruins are one of the most visited archaeological sites from south-eastern Romania. The stony shore (**Fig. 8**) represents a proper habitat for *Natrix tessellata*, to rest and swallow the fish for which they are foraging in Sinoe lake. Even if the respective site is part of site ROSCI0065 and is included into a strictly protected area (core area) of the DDBR, there are several cases when visitors are deliberately killing the snakes (*N. tessellata* - **Fig. 6** – and *N. natrix*).

Similar type of threat was identified in the following sites located near to the limit (but inside) of site ROSCI0065:

- Cape Dolosman (Tulcea county) (see 7 in **Fig. 13**): along the stony shore of the Razim lake there were frequently found corpses of *Natrix tessellata* killed by visitors of this area which is part of site ROSCI0065 and strictly protected area (core area) of the DDBR.

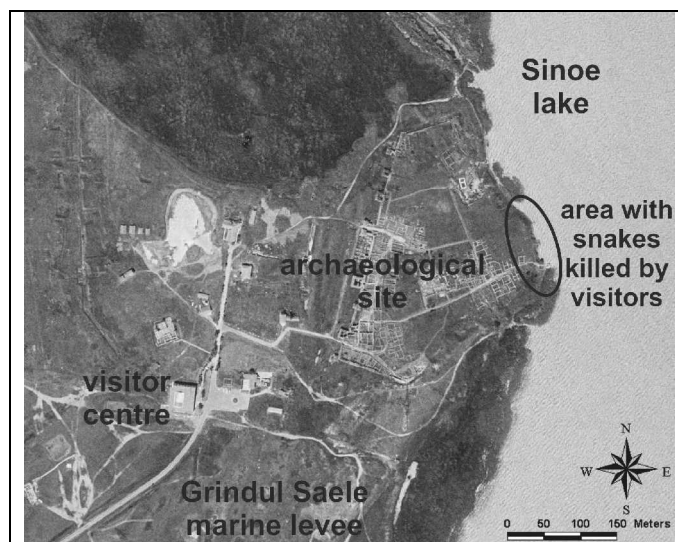


Fig. 7. Location of the area where deliberate killings of *Natrix tessellata* and *N. natrix* specimens were regularly recorded.



Fig. 8. Shore of Sinoe lake where deliberate killings of *Natrix tessellata* and *N. natrix* specimens were regularly recorded.

c). Various infrastructures functioning as traps

The most relevant case is the one of the artificial hole (resulted from dismantling the scale used for weighing heavy trucks) with high, vertical walls (**Fig. 10**), located at one of the entrances of the former industrial plant (build at about three decades ago for processing the sands that are rich in rare metals - as zirconium) (**Fig. 9**) from nearby Vadu village (Constanta county) (see 13 in **Fig. 13**) [9]. In this abandoned industrial infrastructure (of about 12 m length and 2.5 m width) there were regularly found dead specimens of *Emys orbicularis* (**Fig. 11**), respectively (more sporadically) dead *Natrix natrix* specimens. In the concrete pit there were frequently found live *Natrix natrix* specimens (**Fig. 12**) and we suppose that the snakes (especially the adults) are probably capable to leave the respective trap at the ends having staircase-like shape (meanwhile *Emys orbicularis* are not able to escape in this way from the trap).

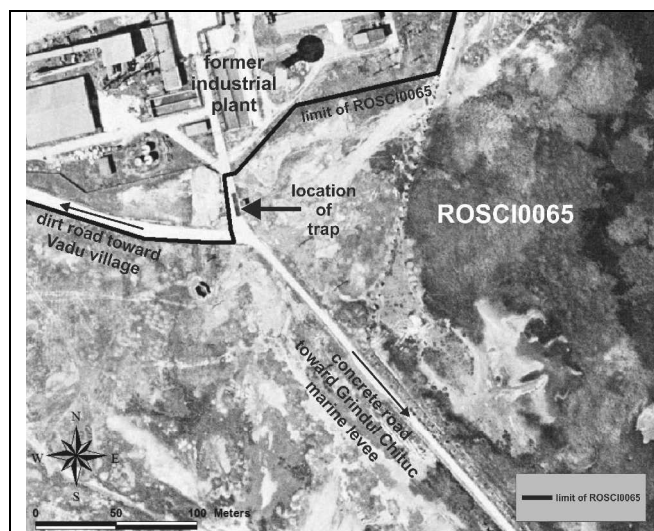


Fig. 9. Location of the abandoned industrial infrastructure functioning as trap (nearby Vadu village)



Fig. 10. The abandoned industrial infrastructure functioning as trap (nearby Vadu village)



Fig. 11. Corpses of *Emys orbicularis* in the corner of the concrete pit resulted from dismantling the scale used for weighing heavy trucks.



Fig. 12. *Natrix natrix* climbing the staircase-shaped structure from the corner of the concrete pit resulted from dismantling the scale used for weighing heavy trucks.

Similar type of threat was identified in the following sites located along the limit of site ROSCI0065:

- Cape Negru (Tulcea county) (see 10 in **Fig. 13**): wells (for drinking water for livestock), without walls above the ground level, nearby the shore of the reed-marsh bordering Ceamurlia lake;
- Sinoe area (Constanta county) (see 11 in **Fig. 13**): wells (for drinking water for livestock), without walls above the ground level, nearby the shore of the reed-marsh bordering the western gulf of Sinoe lake;
- Jurilovca area (Tulcea county) (see 8 in **Fig. 13**): basins with vertical, concrete walls of various pumping stations (water being used for irrigation of farmlands) nearby the shore of Razim lake and Golovita lake. We suppose that there are several similar kind of traps along the shores of the lakes of the Razim-Sinoe lagoony area.

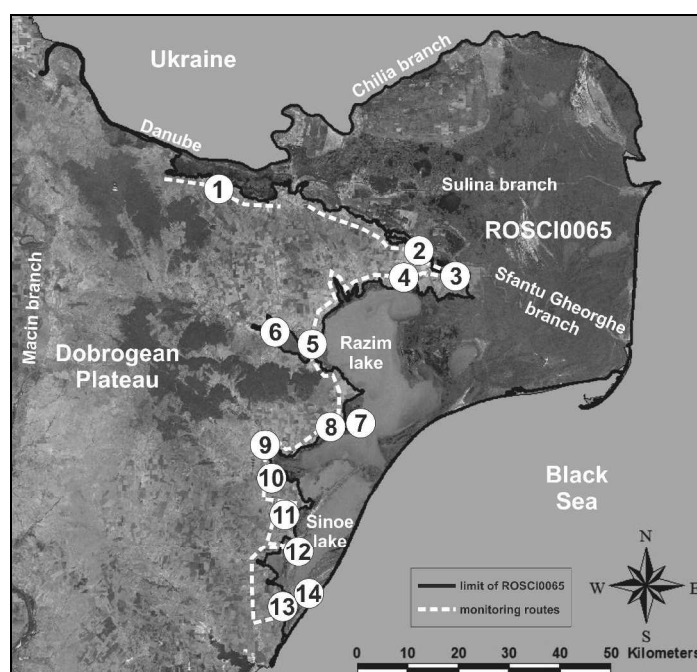


Fig. 13. Sites located along and nearby the continental limits of the ROSCI0065 (Danube Delta) proposed for mid-term monitoring.
Note. 1 – Mineri – Isaccea area; 2 – Ghiolul Pietrei area (road between Mahmudia and Murighiol); 3 – road between Murighiol and Dunavatu de Jos; 4 – Sarinasuf; 5 – Ghiolul Cotului area (road between Sarichioi and Enisala); 6 – road crossing the channel between Ghiolul Tauc lake and Babadag Lake; 7 – Cape Dolosman; 8 – Jurilovca; 9 – road between Ceamurlia de Jos and Baia; 10 – Cape Negru; 11 – Sinoe area; 12 – ruins of Histria fortress; 13 – Vadu; 14 – Grindul Chituc marine levee.

Based on the results of the investigations carried out in 2013 we set-up a mid-term (one year long) plan to check out the above mentioned 14 sites (**Fig. 13**). The field-studies are planned to be carried out weekly in March – October 2014 period, in order to

gather data on the number of specimens belonging to aquatic and semiaquatic reptile species and also on the seasonal dynamics of the impact on reptile populations of the human activities (or of the human-induced factors).

CONCLUSIONS

Based on the results of preliminary field studies, carried out in May – August 2013 period, there was set-up a plan to perform in March – October 2014 period a weekly survey (check-out) of 14 sites located along (or nearby) the limits of the Natura 2000 site ROSCI0065 (Danube Delta) in order to gather concrete data related to the impact on reptile populations of the human activities (or of the human-induced factors).

ACKNOWLEDGEMENTS. The investigations and analyses were performed in the frame of the contract No. 2326/IBB/2012 (corresponding to the contract No 457/INCDDD/2012), developed by the Danube Delta National Institute for Research and Development - Tulcea, in partnership with the Romanian Herpetological Society - Cluj Napoca, with financial support from the Institute of Biology - Bucharest (co-ordinator of the project co-financed by the European Regional Development Fund).

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