

Capture and recapture of Grass snakes near Amsterdam

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Abstract. Within the Grass snake (*Natrix natrix*) metapopulation near Amsterdam several sub-populations were investigated using mark-recapture methods in order to examine the effects of conservation measures and habitat destruction/degradation. Of the three sub-populations included in this study, two have increased in numbers and one showed a decline. This study shows how Grass snakes can profit from conservation measures and are affected by habitat-degradation within a short timespan.

Introduction

Along the shores of lake IJmeer, the south-western corner of Lake IJsselmeer, the Grass snake, *Natrix natrix*, borders Amsterdam. Snakes live here in several locations connected by dikes and the lake itself, resulting in a network of patches, i.e. in a metapopulation structure.

Living in the vicinity of Amsterdam, snakes have to cope with a highly dynamic, ever changing landscape. Typical Dutch landscape characteristics as dikes, ditches and allotments play a vital role in sustaining the grass snake populations in this (sub)urban area providing the snakes with hibernacula, foraging sites and egg deposit sites: the three main habitat requirements of the Grass snake (Madsen, 1984; Völkl, 1991).

In the late 90's the city of Amsterdam began constructing new artificial islands in Lake IJmeer to solve the housing-shortage, thereby disconnecting the northern- and southern branches of the metapopulation from each other (fig.1).

During the spring and summer of 2005 capture-recapture studies were carried out in several patches, as was done in previous years. Results show how the Grass snake reacts to conservation measures and habitat destruction/degradation.

Methods

During favourable weather conditions Grass snakes were caught from the end of March until June along linear structures (dikes, ditches), the best places for catching Grass snakes near Amsterdam as previous studies have shown (Zuiderwijk et al., 1999). As Grass snakes are individually distinct by their belly pattern (Zuiderwijk

and Wolterman, 1995), individuals were marked by photographing or drawing the pattern of the first twenty ventralia.

Permits to catch and handle captured Grass snakes, listed as *Vulnerable* in the Dutch Red List (Hom et al., 1996), were provided by RAVON (Reptile, Amphibian and Fish Research Netherlands). (Sub)population size estimates were calculated using Bailey's modification of the Lincoln-Petersen method (Begon, 1979).

Results

In total 41 individual Grass snakes from the subpopulations A, B and G were caught and thus marked during surveys. Recaptures of adult snakes were scarce. Snakes with a snout-vent-length (SVL) < 40 cm were regarded as sub adults and excluded from the Lincoln-Peterson estimates (Table 1.).

Due to the small sample size and the limited number of recaptures Standard Errors are large and give no additional information: estimates should be regarded as approximations rather than calculated population sizes.

Discussion

Before construction of the new islands in Lake IJmeer in 1998, the southern branch of the metapopulation consisted of several larger populations (E, F and G) whereas the populations of the northern branch (A and B) were regarded as small (Zuiderwijk et al., 1999). Besides the new islands themselves there were other infrastructural interventions in Grass snake habitats. The islands need a new approach to the motorway, sport accommodations, a park and other requirements new residential areas need nowadays. A gunpowder factory, situated in an old forested marsh just behind the dike of population G, an important foraging site for snakes, was closed in 2004 due to the political consequences of the Enschede Fireworks disaster of 2000. Dismantling of this important part of the habitat of population

Table 1. Lincoln-Petersen estimates of the examined subpopulations.

| Subpopulation | 1998 | 2005 |
|---------------------|--|--|
| | Zuiderwijk <i>et al.</i> , 1999 Lincoln-Petersen estimate | <i>this study</i> Lincoln-Petersen estimate |
| A (northern branch) | 12 | 80 |
| B (northern branch) | 8 | 18 |
| G (southern branch) | 54 | 15 |

G almost immediately led to fewer sightings and smaller population size estimates.

The small populations of the northern branch were of special concern after the splitting of the metapopulation, as small populations can not survive on the long term (Soulé, 1980). Conservation measures such as the construction of breeding heaps, creation of dams leading to shallow water and a change in mowing regime carried out by several organisations in the last 4 years start to pay of as shown by the estimates of 2005.

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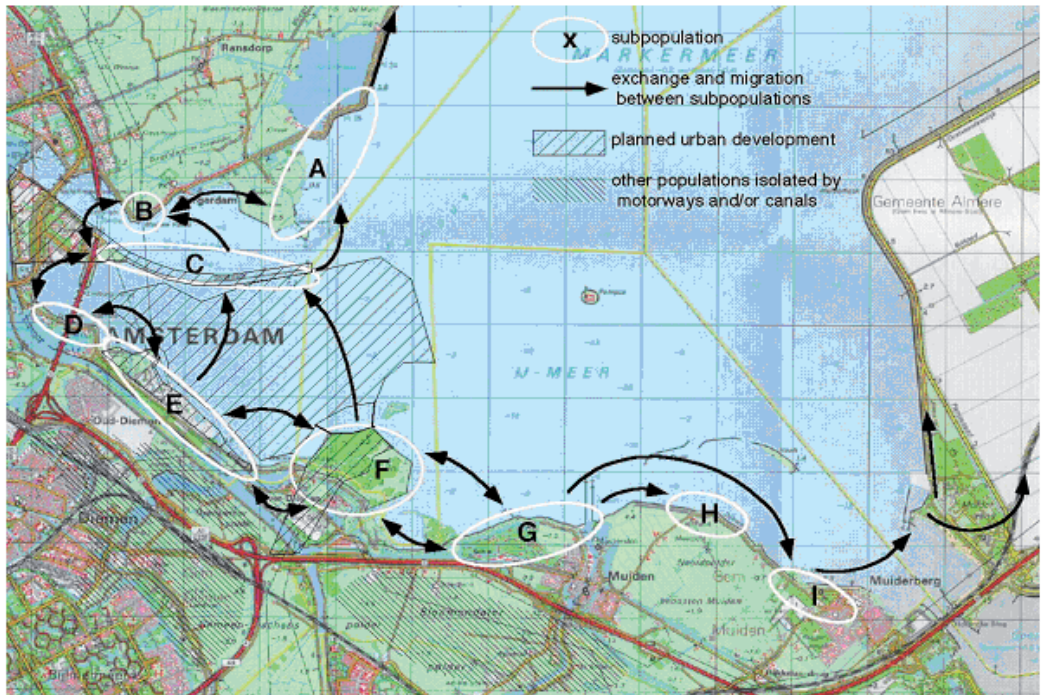


Figure 1. The structure of the metapopulation with subpopulations A-I and the city-development plans.