

ASSESSMENT OF ABUNDANCE AND DISTRIBUTION OF THE ROMAN SNAIL (*HELIX POMATIA* L.) IN POLAND. II. PODLASKIE VOIVODESHIP

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ABSTRACT: The results of research on abundance, distribution and structure of the Roman snail (*Helix pomatia* L.) populations, conducted in 2011 in Podlaskie voivodeship, are presented. All the communes were thoroughly checked in the spring and summer. In 374 sample sites 4,109 individuals of *H. pomatia* were recorded. The average density for the voivodeship was approximately 0.6 individual per 1 are (= 6 thousand individuals/1 km²). The biomass of adult individuals was estimated at 900 tons. Most of the surveyed local populations were stable or dynamic, characterised by a high proportion of juveniles.

KEY WORDS: *Helix pomatia*, population resources, species protection, exploitation quota, exploitation limits

INTRODUCTION

Helix pomatia L. the largest snail in Poland, has been commercially exploited in this country since 1951 (STEPCZAK 1976). Due to its commercial exploitation and the existence of limits of collection issued without a previous verification there is a need for research on the occurrence, distribution and population size of *H. pomatia*. In the last 20 years a detailed Roman snail inventory was conducted in Kujawsko-Pomorskie voivodeship only (BŁOSZYK et al. 2010). The extensive research on abundance and distribution of the Roman snail in Poland was continued in Podlaskie voivodeship by the staff and students of the Faculty of Biology, Adam Mickiewicz University in Poznań (STEPCZAK 1976, REPORT 2009, 2010, 2011).

During the research we applied an original method developed by us to locate individuals in the study sites using GPS and computer programmes, which helped to determine the spatial distribution and abundance of the local populations. Owing to the research, commercial quota for *H. pomatia* harvesting given by the Regional Nature Conservator acquired a real point of reference. Moreover, our observations may provide a starting point for regular monitoring of the species. The obtained results provide some information on its biology and ecology (e.g. age structure, size and biomass of individuals in local populations) and possibilities of its commercial harvesting.

MATERIAL AND METHODS

The studies included all the communes in Podlaskie voivodeship (Fig. 1). Field work was conducted

from May to July 2011. At least three sites of potential occurrence of the Roman snail were selected in each

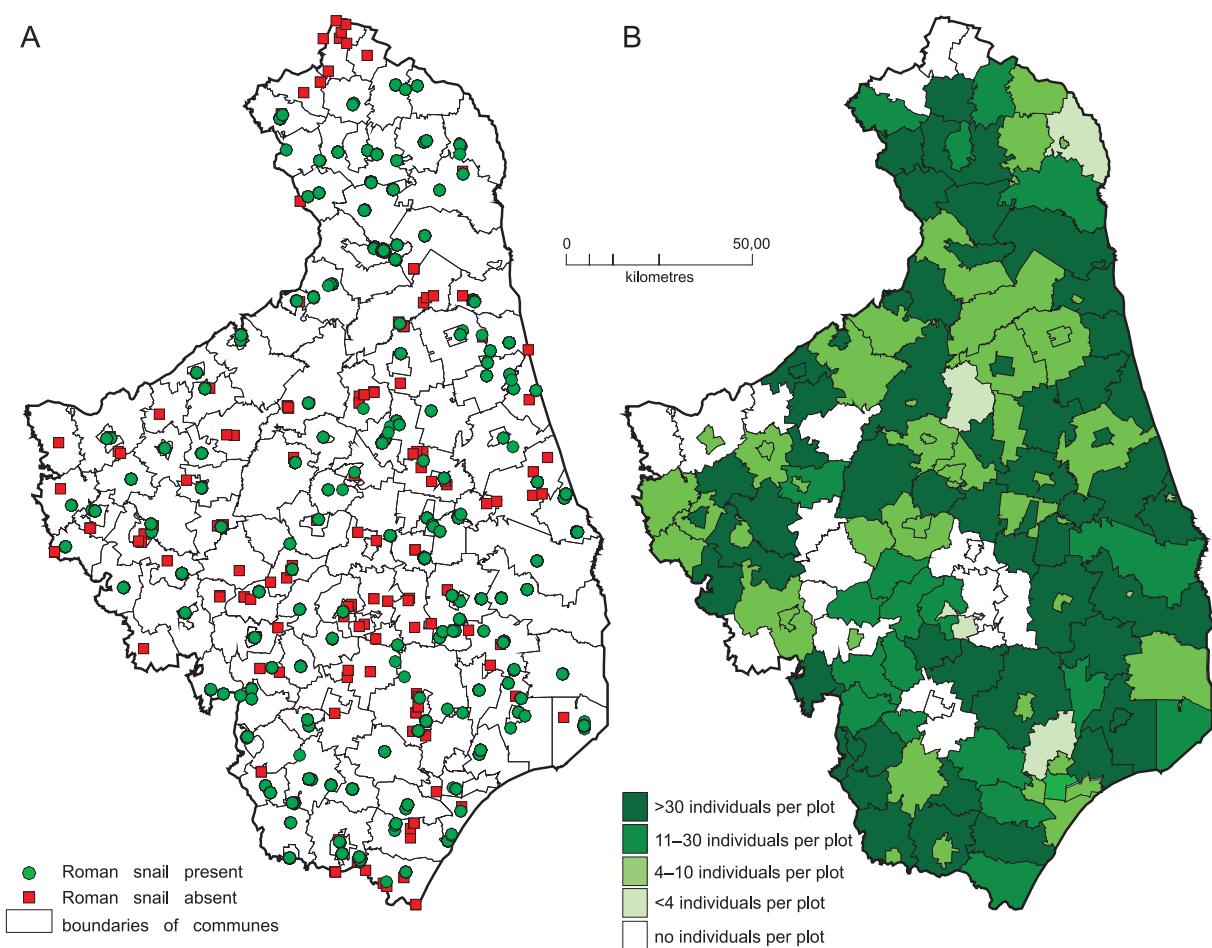


Fig. 1. Study area: A – study sites in Podlaskie voivodeship (2011); B – differences in abundance of *H. pomatia* in all communes in Podlaskie voivodeship

commune, based on satellite maps, and then verified in the field. Additionally, other potential sites were checked during field work. The mean number of locations inspected per commune (118 communes) was 3.17, however the number of locations varied among the communes. The habitat in some of the communes was more homogeneous than in the others, where it was necessary to check more sites. The differences in the number of examined sites resulted also from the size of the communes. Besides, when we were not sure to find stable, large populations or suspected that a commune held no *H. pomatia*, we checked more sites. For example, in the commune Wiżajny, 8 plots were checked where the snail could potentially occur, but no populations were recorded. However, in the com-

munes where it was easy to find a large population, we usually checked only one or two sites (Białystok, Rajgród, Szczuczyn, Poświętne).

In each surveyed local population all individuals were counted and located using GPS (Garmin GPSMAP 62st). Moreover, each snail was weighed (to the nearest 0.01 g) using electronic scales and measured using electronic calipers (to the nearest 0.01 mm). The shell diameter was determined using a plastic template with circular holes of varying diameters: 10.1–12.0 mm, 12.1–14.0 mm, 14.1–16.0 mm, 16.1–18.0 mm, 18.1–20.0 mm, 20.1–22.0 mm, 22.1–25.0 mm, 25.1–28.0 mm, 28.1–30.0 mm, 30.1–32.0 mm, 32.1–36.0 mm, >36.0 mm. Cartograms were based on the MapInfo programme.

RESULTS

SPATIAL STRUCTURE AND DISTRIBUTION OF THE ROMAN SNAIL IN PODLASKIE VOIVODESHIP

Out of 374 plots verified in the field, 65 yielded 30 and more individuals of the Roman snail. In 68 plots 1

to 10 individuals were observed; 57 plots yielded between 11 and 30 snails. No *H. pomatia* was found in 184 of the examined plots (Fig. 1A).

All the communes in Podlaskie voivodeship were thoroughly checked. The Roman snail was quite evenly distributed across the whole region. No snails

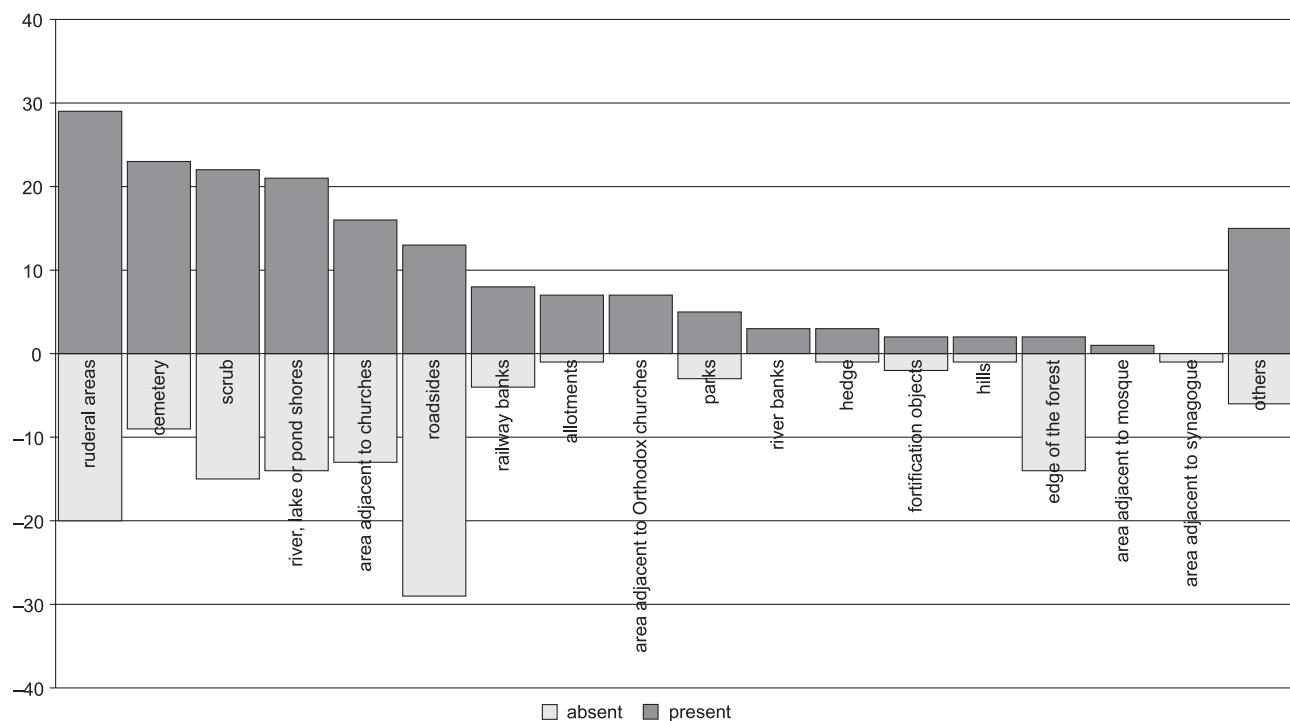


Fig. 2. Classification of surveyed habitats, with number of studied sites

were found only in 17 communes (Fig. 1B) on the northern and north-western edges and in the central part of the voivodeship. Nearly half of the communes held populations which could be used for commercial purposes.

HABITAT PREFERENCES AND GENERAL CHARACTERISTICS OF THE ROMAN SNAIL POPULATIONS IN PODLASKIE VOIVODESHIP

The study sites, where the observations were carried out, can be divided into 18 distinct types, based on different environmental factors and the specificity of habitat conditions (Fig. 2). The ruderal sites were the most common (49). The observed frequency of *H. pomatia* in this type of habitat exceeded 59%. The second type of habitat, which was frequently occupied by the species, were roadsides (43). The frequency of the Roman snail in these sites was 30%. In shrub-covered areas (37) the snail's frequency was 59%. Moreover, the margins of rivers, ponds and lakes were studied (35), and the frequency of *H. pomatia* was 60%. The frequency was also high in the vicinity of churches (55%) and cemeteries (72%). Other types of habitats were fewer (less than 10%).

Out of 4,046 individuals of *H. pomatia* recorded in Podlaskie voivodeship, 1,734 were adult and 2,312 juvenile (Fig. 3). Therefore, the population seems to be stable. The average adult shell height was 40.43 mm, while the mean weight was 23.55 g. Thus, one kilogram equaled approximately 42 individuals; thus 4,200,000 individuals of *H. pomatia* can be harvested to fill the limit of 100 tons.

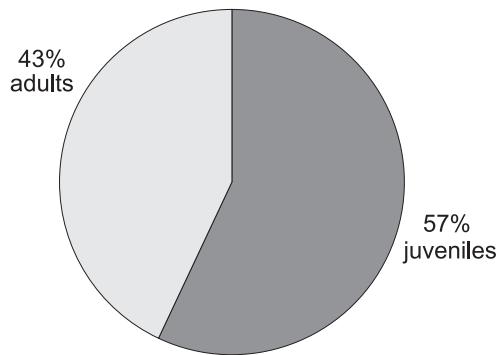


Fig. 3. Proportion of adults and juveniles in collected samples

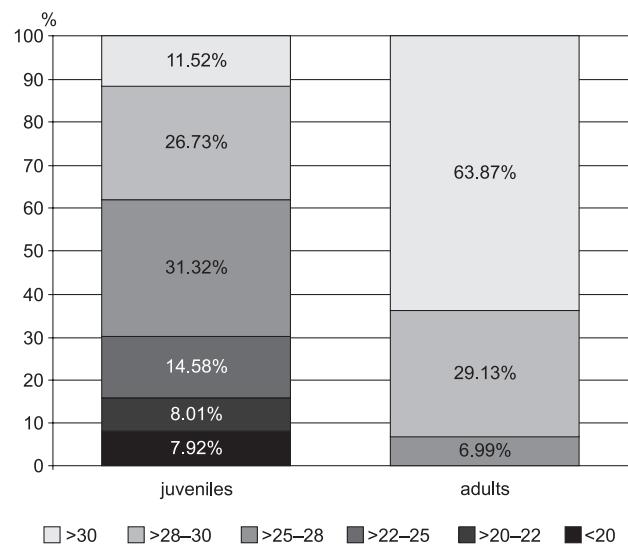


Fig. 4. Proportion of shell diameter among adults and juveniles

More than 1/3 of the snails (36.1%) in the voivodeship did not exceed 30 mm of shell diameter (Fig. 4). These individuals were disqualified for commercial purposes. On the other hand, approxi-

mately 12% of juveniles exceeded 30 mm of shell diameter. The situation might protect the Roman snail populations from excessive harvesting.

DISCUSSION

The inventories of the Roman snail in Kujawsko-Pomorskie (BŁOSZYK et al. 2010) and Podlaskie (this paper) voivodeships are the only ex-

tensive, whole-province inventories in Poland, based on field observations. The previous country-wide information on the distribution and abundance of

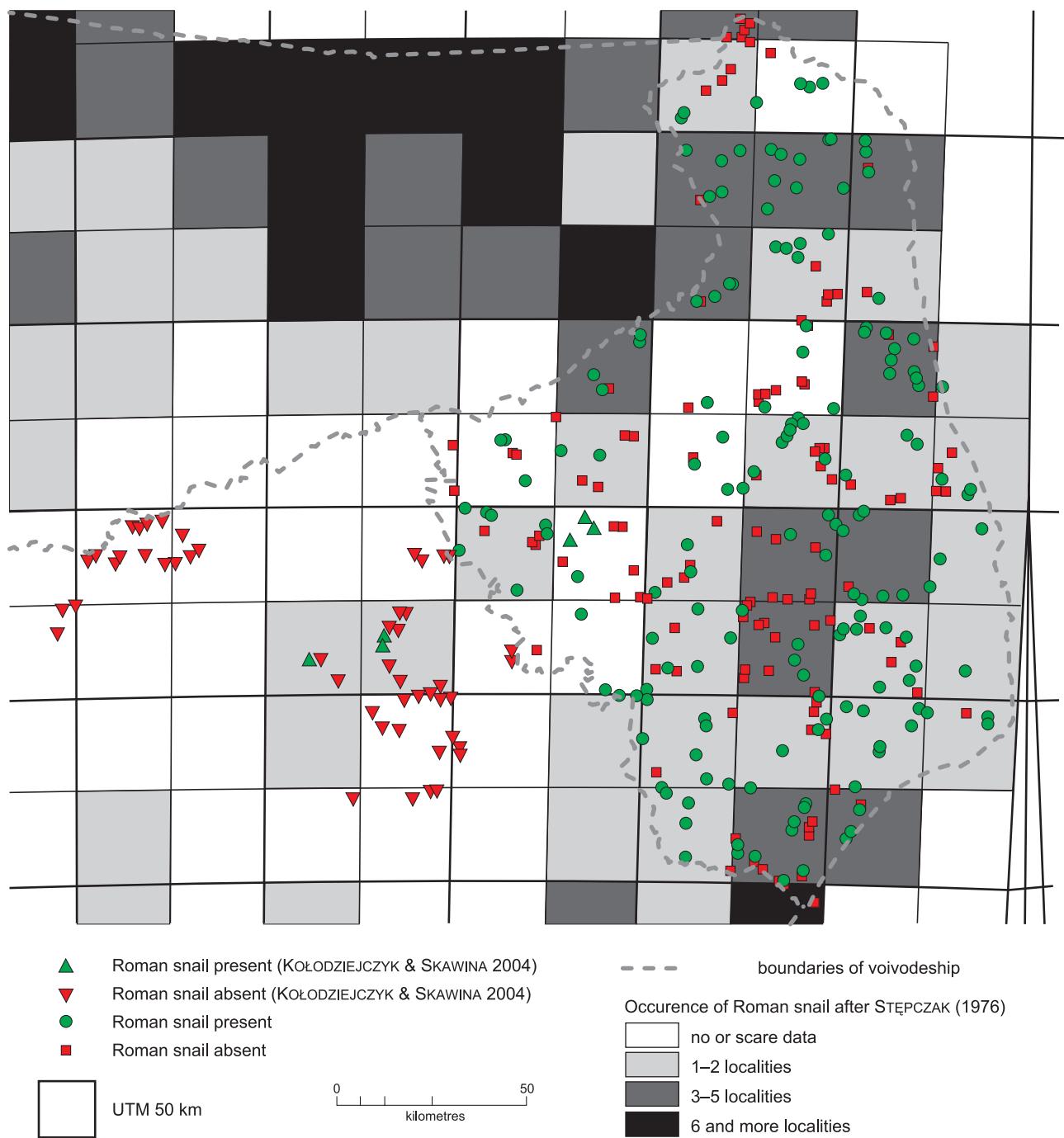


Fig. 5. Distribution of Roman snail localities in Podlaskie and NE. part of Mazovia voivodeships



the species was based primarily on the paper of STEPCZAK (1976) obtained using questionnaire.

On the other hand, observations carried out by KOŁODZIEJCZYK & SKAWINA (2009), using similar methods, covered only a small part of north-eastern Mazovia voivodeship. Figure 5 shows the comparison of their results with those obtained by our team in Podlaskie voivodeship. The proportion of places with no Roman snail in Mazovia is surprisingly high. In the three sites recorded by KOŁODZIEJCZYK & SKAWINA (2009) the snails occurred in small local populations of varied abundance, biomass, weight, and size of individuals.

Compared to our results, the estimates of STEPCZAK (1976) from the area of the present Podlaskie voivodeship are mostly underestimated. In the majority of UTM squares (25×25 km) used by the author to visualize the spatial frequency of the Roman snail localities we found higher numbers. This may result both from the changes during the interval between the two periods of study (almost 40 years) and from the method of data collecting. The results obtained by KOŁODZIEJCZYK & SKAWINA (2009) were more similar to those of STEPCZAK (1976).

The populations of *H. pomatia* in Podlaskie voivodeship should be regarded as relatively abundant and stable. The biomass of adult individuals was

estimated at 900 tons. This indicates that the current limit of commercial harvesting of *H. pomatia* in the voivodeship (100 tons, i.e. about 4,500,000 individuals) is reasonable, but in our opinion it could be raised to 120 tons. In Podlaskie voivodeship and in the whole northern part of Poland the Roman snail is an alien species. Thus, there is no need to over-protect its populations through imposing low harvesting limits. The size structure of the populations (significant proportion of individuals with shell diameter of less than 30 mm) seems to be sufficient protection from excessive harvesting. Nevertheless, regular monitoring is needed (at least once every three years), especially in the communes where *H. pomatia* is intensively collected.

ACKNOWLEDGEMENTS

We are grateful to all persons who helped with the field work, especially to Dr. JÓZEF MUSIAŁ, Mr. MICHAŁ CZYŻ, Ms. RENATA KALINOWSKA, Ms. AGNIESZKA MIKOŁAJCZYK, Mr. BARTOSZ LABIJAK, Mr. TOMASZ RACZYŃSKI, Mr. FILIP SKWIERCZYŃSKI. The inventory was commissioned by the Regional Administration of Environment Protection in Białystok, whose staff helped us in all respects.

REFERENCES

- BŁOSZYK J., MACHNIKOWSKI M., NAPIERAŁA A., GOŁDYN B., RYBSKA E., STEPCZAK K., SZYBIAK K., KONWERSKI S., LESZCZYŃSKA-DEJA K., DYLEWSKA M., KALINOWSKI T., JANKOWIAK A. 2010. Assessment of abundance and distribution of Roman snail (*Helix pomatia* Linnaeus, 1758) in Kujawsko-Pomorskie voivodeship. *Folia Malacol.* 18: 113–121. doi: 10.2478/v10125-010-0014-z
- KOŁODZIEJCZYK A., SKAWINA A. 2009. The Roman snail (*Helix pomatia* Linnaeus, 1858) in northern Mazovia. *Folia Malacol.* 17: 63–68. doi: 10.2478/v10125-009-0010-3
- STEPCZAK K. 1976. Distribution, abundance and protection of the Roman snail (*Helix pomatia*) in Poland. Wyd. Nauk. UAM, Poznań, Ser. zool. 3: 1–68.
- REPORT 2009: BŁOSZYK J., DYLEWSKA M., GOŁDYN B., KALINOWSKI T., KONWERSKI S., KUPCZYK M., MROČZYK P., MUSIAŁ J., NAPIERAŁA A., RYBSKA E., STEPCZAK K. Ocena liczebności i rozmieszczenia ślimaka winniczka na terenach dotychczasowego pozyskiwania z obszaru województwa kujawsko-pomorskiego. Typescript: 89 pp. PDF file: www.helix.amu.edu.pl.
- REPORT 2010: BŁOSZYK J., RYBSKA E., BAJACZYK R., CZYŻ M., DYLEWSKA M., GOŁDYN B., JANKOWIAK A., KACZMAREK L., KALINOWSKI T., KONWERSKI S., MUSIAŁ J., NAPIERAŁA A., SELL-PIACZYŃSKA K. D., SZYBIAK K. Ocena liczebności i rozmieszczenia ślimaka winniczka na terenach dotychczasowego pozyskiwania z obszaru województwa kujawsko-pomorskiego. Typescript: 110 pp. PDF file: www.helix.amu.edu.pl.
- REPORT 2011: BŁOSZYK J., KALINOWSKI T., GOŁDYN B., NAPIERAŁA A., RYBSKA E., KONWERSKI S., BAJACZYK R., JANKOWIAK A., CZYŻ M., DYLEWSKA M., MUSIAŁ J., NOWAK M., KALINOWSKA R., SZYBIAK K., MIKOŁAJCZYK A., LABIJAK B., RACZYŃSKI T., SKWIERCZYŃSKI F. Ocena liczebności i rozmieszczenie populacji ślimaka winniczka (*Helix pomatia* L.) na terenie województwa podlaskiego. Typescript: 98 pp. PDF file: www.helix.amu.edu.pl.

Received: March 8th,

Revised: September 9th 2012

Accepted: October 1st, 2012