

# Situation of *Armillaria* spp. and *Heterobasidion* spp. in Slovenia

A. BRGLEZ<sup>1,\*</sup> and N. OGRIS<sup>2</sup>

<sup>1,2</sup> Slovenian Forestry Institute, Department of forest protection, Večna pot 2, 1000 Ljubljana, Slovenia

## INTRODUCTION

Wood and its ingredients are subject to degradation and decomposition processes in nature. Species of the genus *Armillaria* and *Heterobasidion* are among the most common causes of stem and root rot in Slovenia. *Armillaria* spp. infects deciduous and coniferous trees, while *Heterobasidion* spp. mainly threatens spruce, pines, and fir. Especially spruce was greatly promoted and expanded beyond its natural habitat in the past. Due to inadequate site conditions, these stands are more exposed and susceptible to fungal infections and insect attacks.

Our aim was to assess the situation and prospects of *Armillaria* and *Heterobasidion* species in Slovenia.

## METHODS

To calculate and assess the situation and prospects of *Armillaria* spp. and *Heterobasidion* spp., we used a database about tree felling from 2013 to 2017. We calculated the proportions represented in total felling, total sanitary felling, total sanitary felling due to diseases, in wood stock, and in increments.

Within this paper, we do not distinguish between the individual species of both fungi, since data on the occurrence of *Armillaria* and *Heterobasidion* root rots are recorded only at the genus level (ZGS, 2016; ZGS, 2017).

## RESULTS

### *Armillaria* spp.

- From 2013 to 2017, 92,704 m<sup>3</sup> of coniferous and deciduous trees were cut down due to *Armillaria* spp.
  - Growing trend in sanitary felling due to the *Armillaria* root disease with a minimum in 2014.
  - Highest value in 2017, when 32,849 m<sup>3</sup> of timber (0.4% of the annual increment) was felled.

Figure 1: Portion of CONIFERS felling due to *Armillaria* spp. from 2013 to 2017 with regard to total felling, total sanitary felling and sanitary felling due to diseases.

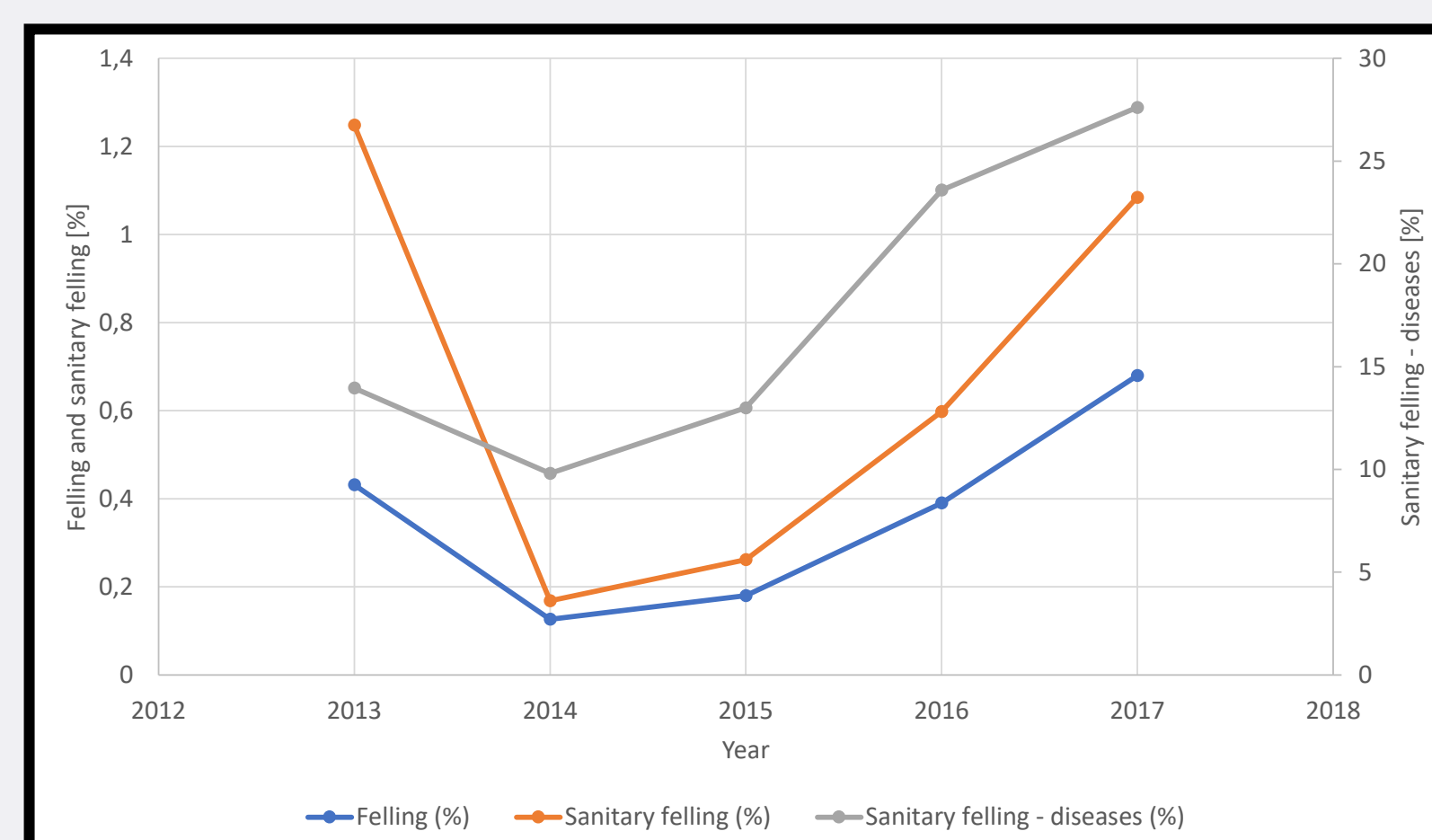


Figure 2: Portion of DECIDUOUS felling due to *Armillaria* spp. from 2013 to 2017 with regard to total felling, sanitary felling and sanitary felling due to diseases.

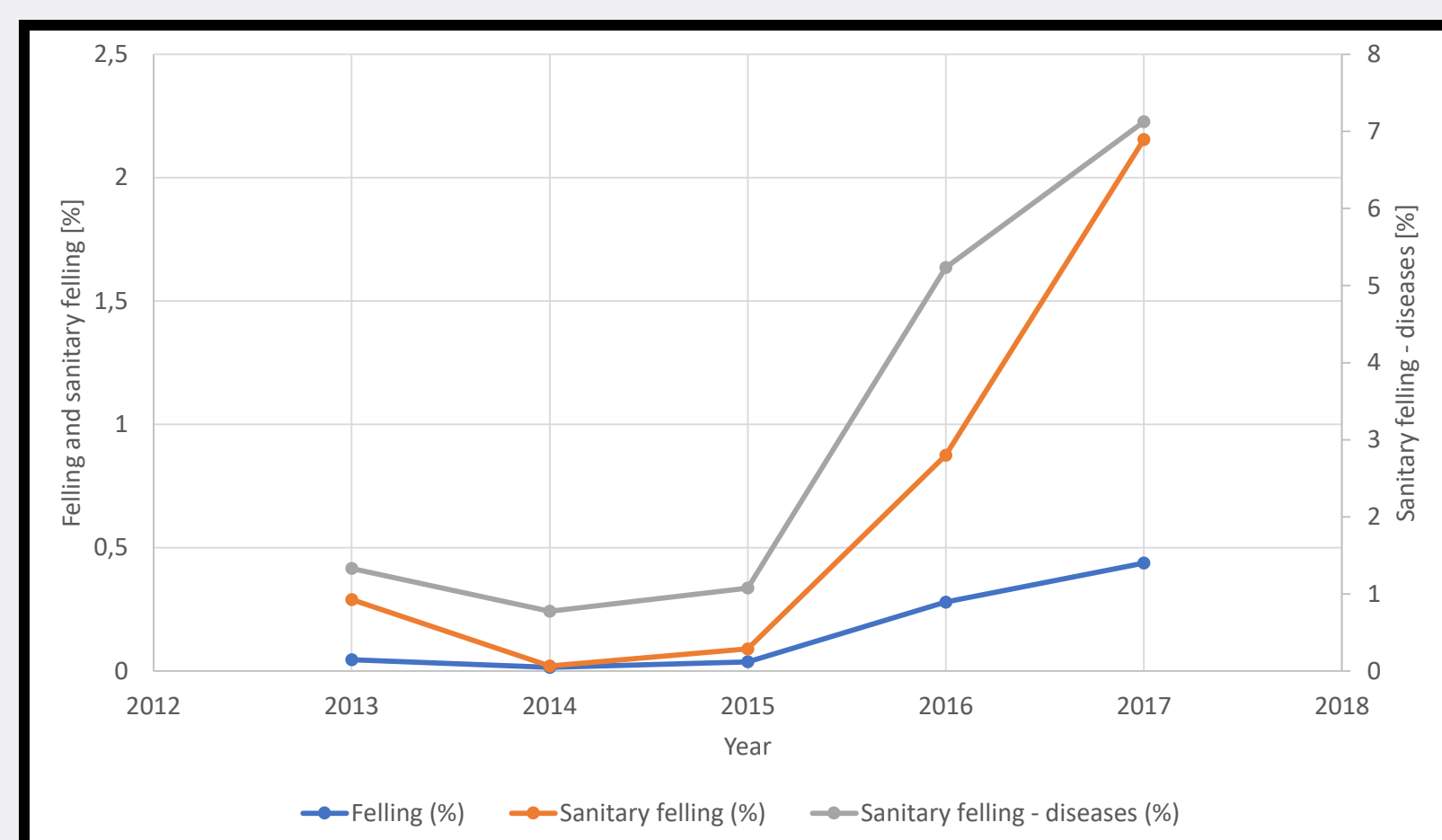
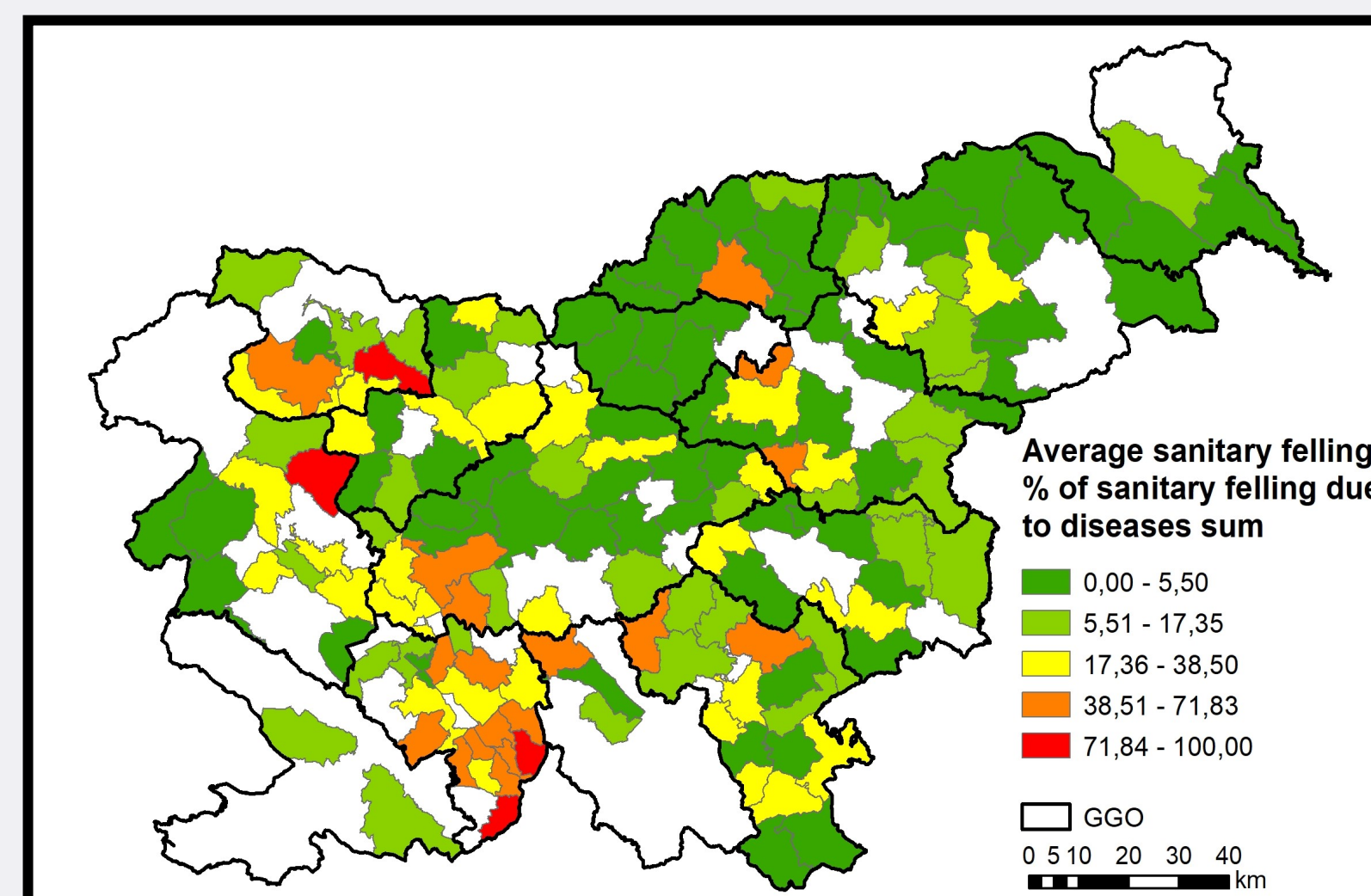


Figure 3: Average sanitary felling due to *Armillaria* spp. in Slovenia from 2013 to 2017, expressed as % of sanitary felling due to diseases in forest management units (considering all tree species).



### *Heterobasidion* spp.

- From 2013 to 2017, 211,144 m<sup>3</sup> of conifers was felled due to *Heterobasidion* spp.
  - From 2014 onwards, around 40,000 m<sup>3</sup> of timber has been felled every year.
  - Curve shapes are more or less the same between considered tree species.
  - Most of the sanitary felling is located in the northern part of Slovenia.

Figure 4: Portions of sanitary felling of SPRUCE due to *Heterobasidion* spp. from 2013 to 2017 in comparison to total felling, total sanitary felling, sanitary felling due to diseases and increment.

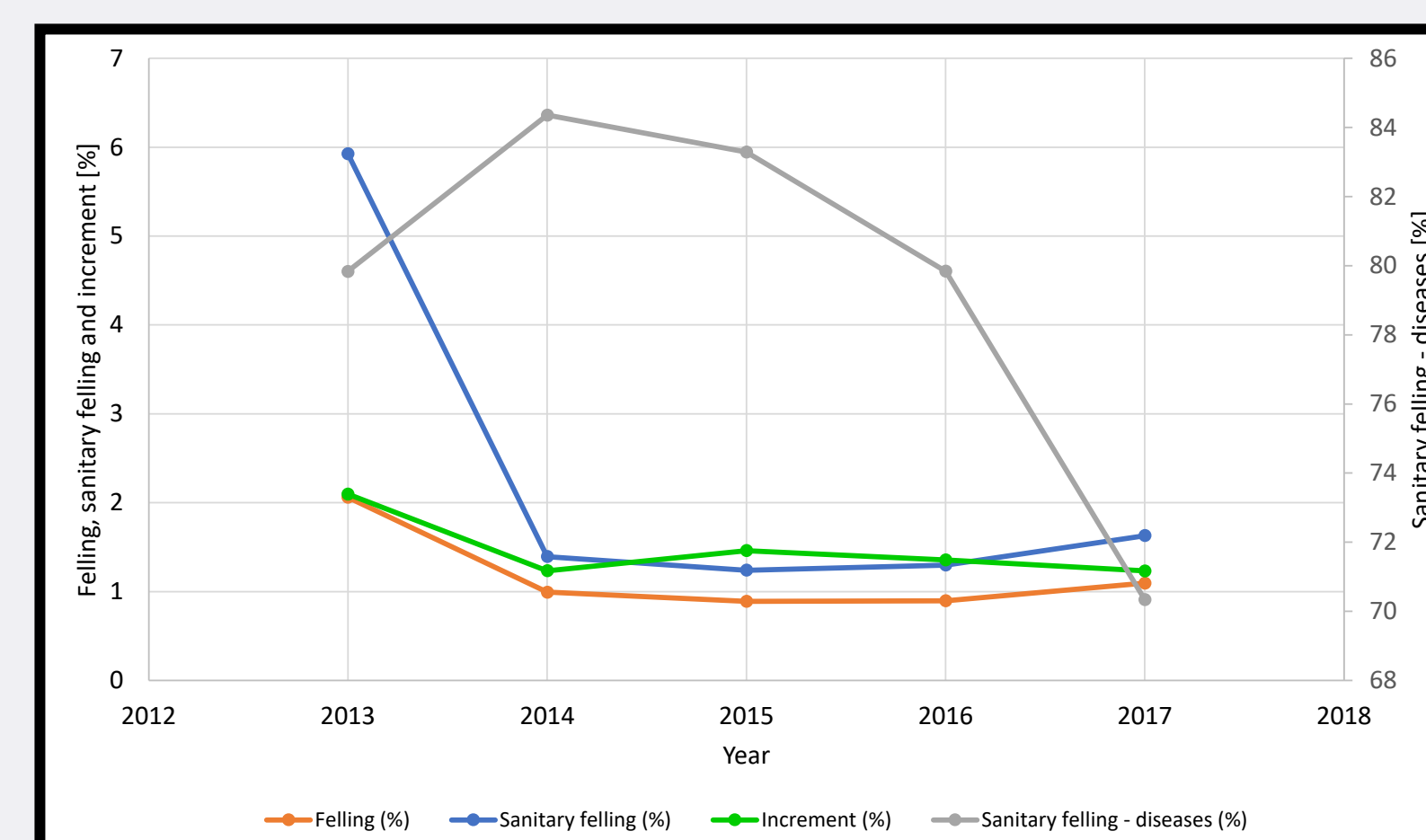


Figure 5: Portions of sanitary felling of FIR due to *Heterobasidion* spp. from 2013 to 2017 in comparison to total felling, total sanitary felling, sanitary felling due to diseases and increment.

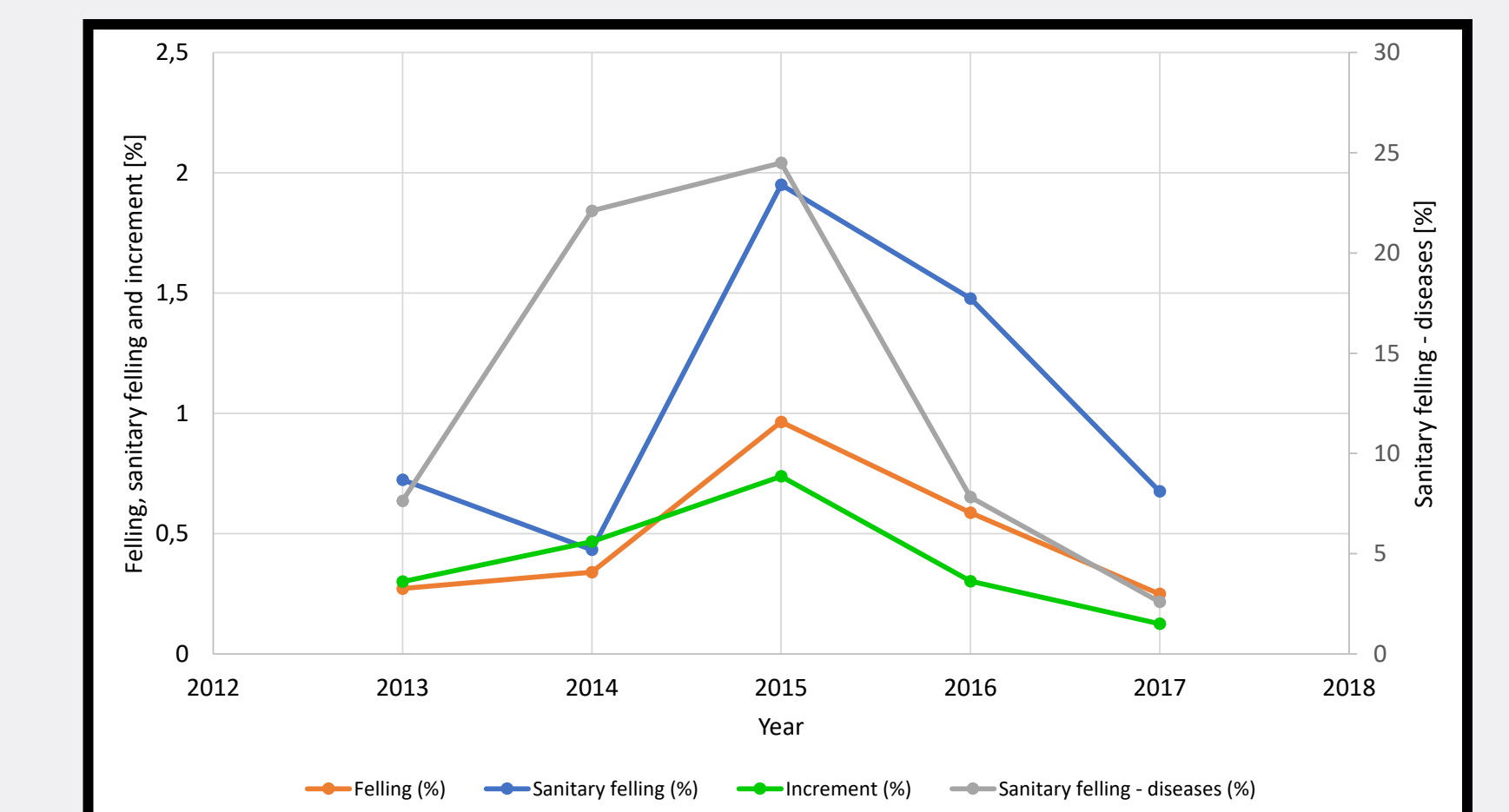


Figure 6: Average sanitary felling due to *Heterobasidion* spp. in Slovenia from 2013 to 2017, expressed as % of wood stock in forest management units (considering only conifers).

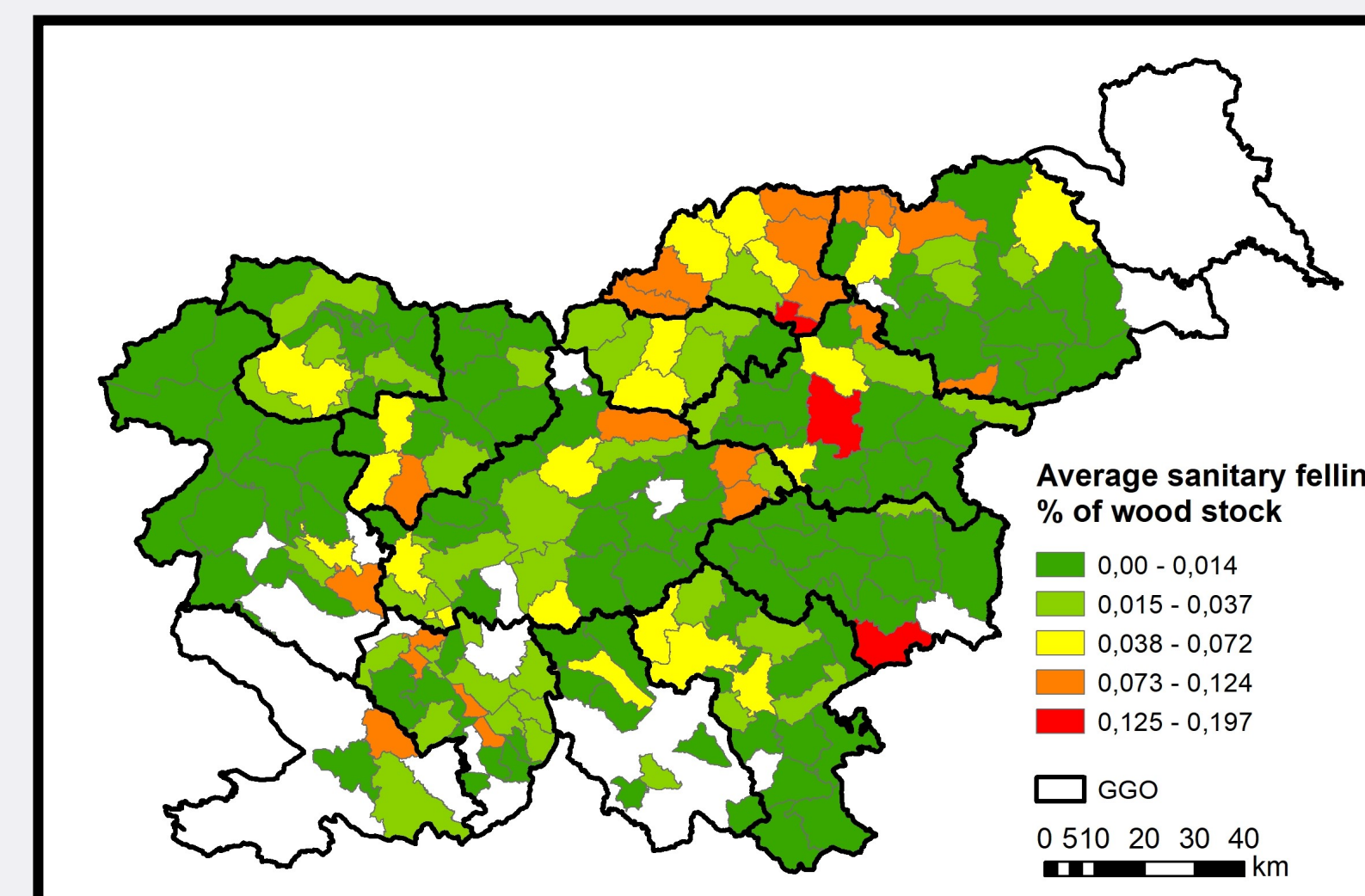
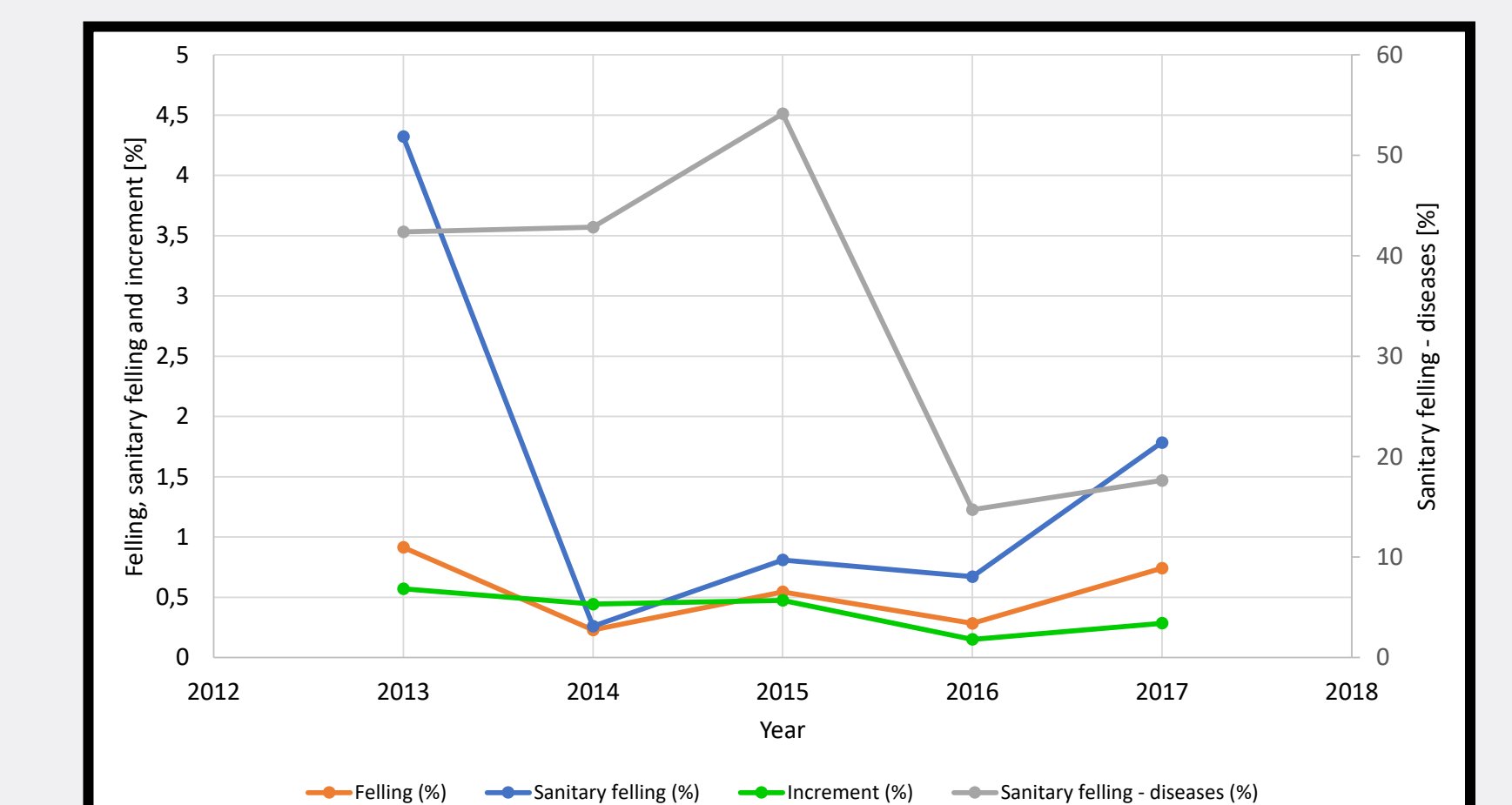


Figure 7: Portions of sanitary felling of SCOTS PINE due to *Heterobasidion* spp. from 2013 to 2017 in comparison to total felling, total sanitary felling, sanitary felling due to diseases and increment.



## DISCUSSION AND CONCLUSIONS

- The sanitary felling of coniferous and deciduous trees has been rising since 2014.
- We assume that the amount of sanitary felling due to *Armillaria* spp. will continue to increase, but it will not account for large shares in wood stock or increment.
- We assume that the volume of timber harvested due to *Heterobasidion* spp. will gradually decrease over the years due to the lower wood stocks of spruce, which has recently been hit by numerous natural disasters and infestation of bark beetles.
- The loss of timber due to both root rot can be reduced by ensuring adequate site conditions of stands and avoiding water stress. We must be aware that a tree that grows in itself optimal conditions is also healthy and stable, and it meets many of the functions of the forest.
- Rising temperatures and climate changes will affect populations of rot fungi. Researchers assume that rot fungi will most likely be able to adapt well to the changes, and therefore we expect an upward trend in their occurrence.

### REFERENCES

Maček, J., 2008. Gozdna fitopatologija. Zavod za gozdove Slovenije: Zveza gozdarskih društev, Gozdarska založba, Ljubljana.  
ZGS, 2016. Gozdni fond. Podatkovna zbirka. Zavod za gozdove Slovenije.  
ZGS, 2017. Timber. Podatkovna zbirka o poseku gozdnega drevja. Zavod za gozdove Slovenije.

\* Corresponding author: ana.brglez@gozdis.si

### ACKNOWLEDGEMENT

This paper was conducted in the framework of the Young Researchers Programme, which is co-financed by the Slovenian Research Agency (research core funding No. P4-0107). The authors acknowledge the Public Forestry Service, which is financed by the Ministry of Agriculture, Forestry and Food. We also thank the Slovenian Forestry Service for the data that enabled the study.

