



# COMMERCIAL WILD BERRY PICKING AS A SOURCE OF INCOME IN NORTHERN AND EASTERN FINLAND

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## ABSTRACT

*In recent times the potential of non-wood forest products (NWFP) in forest-based rural development has been paid an increasing amount of attention. In the case of developing countries, the economic importance of NWFPs in the subsistence of their rural economies has always been recognised as important, but little is known at the moment about the income generation role of NWFPs in the industrial countries in the boreal zone. The aim of the present study has been to examine the importance of commercial wild berry picking in household economies in four rural municipalities and one modest-sized city, all of them situated in the eastern and northern parts of Finland. It has been found that berry picking has provided additional income for between 8% and 31% of households on a scale ranging between FIM 1000 and 3280 FIM (USD 167-547) for the households involved. In general it can be said that berry picking proves to be of minor importance for individual household economies, since for the majority of cases picking provides no more than 3% of annual gross income, although in a few cases professional pickers were able to earn more than 10% of their annual income in this way. For this study the factors affecting commercial picking have been examined using both the Tobit model and also models concerned with the separately estimated propensity to participate in the activity (logit) and with the intensity of the picking activity (OLS). Our econometric analysis indicates that picking intensity is highest among underemployed households, a factor which emphasises the socio-economic function of the utilisation of NWFPs even in the boreal zone.*

*Keywords: Forest-based, household economy, non-wood forest products, rural development, socio-economic, welfare.*

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## INTRODUCTION

From a global perspective the role of NWFPs is most crucial in the developing countries, since when incomes rise there is often an accompanying decline in the economic importance of NWFPs themselves (Godoy *et al.*, 1995; Kant

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*et al.*, 1996). In developed countries, in contrast, utilisation of many NWFPs is no longer motivated by the demands of subsistence or the need to earn cash but has largely become a leisure-time activity or has simply disappeared as a result of its image as an inferior good (Kant *et al.*, 1996). Exceptions naturally exist and, for instance, in the case of transitional economies NWFPs still form a part of subsistence rather than a source of income (Piipponen & Karkinen, 1998).

With the increased demand for recreation and for products direct from nature, and with the growing emphasis on sustainable forestry, NWFPs have also begun to receive increased attention in the developed countries. To this end, reports from the United Nations Conference on Environment and Development (Report of the ..., 1992), the resolutions from the pan-European Ministerial Conference on the Protection of Forests in Europe (Ministerial Conference...1993), and the forestry strategy for the European Union (Communication from the ..., 1998) have also been taken into account in the general area of defining the principles for sustainable forestry.

For some NWFPs such as medicinal products, changing markets and consumer preferences have been marked by a substantial growth in consumption (Chamberlain *et al.*, 1998). More generally, the income- and employment-generating potential of NWFPs has also been recognised in the sphere of rural development (Saastamoinen, 1996; Hammett & Chamberlain, 1998; Chamberlain *et al.*, 1998; Luontoyrittämisen ..., 1998). In consequence, it has become apparent that the NWFPs also include products available from boreal forests which have the potential to reduce disparities in regional distribution, although their relative economic importance is by no means as extensive as in some of the developing countries. In the case of Finland, the picking of wild berries is clearly the most obvious and widespread use of NWFP.

Estimates of annual wild berry picking in Finland compiled for national accounts since 1860 suggest a history of wild berry utilisation which is probably typical of many other NWFPs over the same period. The quantities picked have increased along with population growth, resulting in peaks during troubled national periods, but in the 1950s

rising standards of living outweighed the effects of growth in the population, and the quantities picked began to decline (Kunnas, 1973). At the present day, however, the involvement rates for berry picking are still relatively high, involving between 65% and 90% of the population regionally (Kangas & Niemeläinen, 1996; Liikkanen *et al.*, 1993), but for the majority of people the purpose of picking is leisure rather than subsistence or cash income.

Despite this, the potential of economic wild berry utilisation in Finland remains substantial. Picking is an open-access activity, free for all citizens regardless of ownership rights, in contrast to many Central and Southern European countries. Added to this is the fact that, since the 1970s, any income received from berry picking has been free from taxation.

According to statistics gathered over the past two decades, the cash income which pickers have made out of commercial wild berries has ranged between USD 5 and 27 million (Malin 1998), measured in 1997 monetary values. Such statistics are, however, not all-inclusive since the wild berry trade is diverse in nature, and a closer examination of the statistics would indicate the actual income-smoothing nature of wild berry picking. Most of the income generated has in fact been distributed to the sparsely populated eastern and northern regions of the country, which suffer from high unemployment, rural-urban migration and a slim economic base.

Apart from the aggregate figures little is known about commercial berry picking as a source of livelihood at local and household levels. The purpose of this study is to look at the income effects of commercial picking in five municipalities situated in eastern and northern regions of Finland. One of the points that will be examined in some detail, in addition to the relative importance of berry picking in the economies of the households concerned, is the way in which the income generated by picking is actually distributed, since on a global scale the role of NWFPS in reducing income inequalities is considered to be significant (Kant *et al.*, 1996). Our hypotheses concerning income-smoothing and the employment characteristics of berry picking are also tested here by means of econometric models.

TABLE 1. BASIC DATA FOR THE MUNICIPALITIES STUDIED (STATISTICAL YEARBOOK ..., 1998; STATISTICS OF INCOME ..., 1999).

	Ilo- mantsi	Suomus- salmi	Roi Town	Roi Rural	Inari	Finland
Population (persons)	7633	11692	35718	21923	7719	5147349
Population Density inhabitant/km <sup>2</sup> )	2.8	2.2	378.8	2.9	0.5	16.9
Total Net Migration persons/year)	-41	-205	10	-45	-76	3710
verage Income FIM/person/year)	69496	68458	89084	82787	76442	92845
Unemployment Rate (%)	25.8	30.7	24.4	21.9	28.6	16.4

## MATERIAL AND METHODS

The core research areas consist of four rural municipalities (Ilomantsi, Suomussalmi, the Rovaniemi rural municipality, and Inari) located in eastern and northern Finland, and one northern city (Rovaniemi), which is surrounded by large areas of forest. One of the features which all the municipalities have in common is unemployment rates which are visibly above the Finnish national average (Table 1).

A random sample was made on the basis of the Finnish Population Register of 318 households in Ilomantsi, 322 in Suomussalmi, 310 in Rovaniemi city, 247 in Rovaniemi rural municipality, and 309 in Inari. The data for the samples was collected as part of a national survey (Saastamoinen *et al.*, 2000) by mailed questionnaires sent out in the last quarter of 1997. The response rates for the five communities were 61%, 63%, 59%, 64% and 57%, respectively.

Even though the response rates were relatively high, a comparison of successive waves of response indicated the likelihood of a non-response bias. Previous surveys have shown that people who are interested in the topic and are involved in the activities studied respond more frequently or earlier than those less interested (Goyder, 1987; Dillman, 1991; Martin, 1994). In the case of the present study, a declining trend was observed when the quantities collected and the extent of involvement in berry picking were compared for the waves of response. In order to reduce the potential non-response bias a random sample of 116 non-

respondents was taken and generalised to all of the non-respondents (Kanuk & Berenson, 1975). This random sample was interviewed by phone in the spring of 1998. Since we wished the participation threshold in the non-respondent survey to be as low as possible, only the aggregate figures for the quantities amounts collected were requested. The aggregate figures were divided up amongst the various berry species according to the distribution calculated from the mail survey data.

The income effects were calculated by multiplying the quantities collected by the regional prices for each species (Malin, 1998). In addition to examining the basic income figures, we also investigated the economic importance of berry picking by means of direct questions. Households were asked to assess both the picking income as a proportion of their annual gross income and also the degree of professionalism of their berry picking. In the latter case, a time scale classification was offered, which ranged from occasional picking to professional picking, where the picking constituted the main source of employment for the picker during the crop season.

Because differences exist both in the prices and also in the regional abundance of the various species, the gross income received from berries sold is used in the description of the picking intensity,  $y_{ij}^*$ , rather than the actual quantities gathered for sale. A Tobit model (Maddala, 1983) was estimated, bearing in mind that the Tobit model uses the information available for  $y_{ij}^*$  above zero. Hence,

$$\begin{aligned} y_{ij} &= y_{ij}^* = \beta' x_{ij} + u_{ij} && \text{if the right-hand side is positive} \\ y_{ij} &= 0 && \text{otherwise} \end{aligned} \tag{1}$$

where  $y_{ij}$  is the income received in FIM 1000s of household  $i$  ( $i = 1, \dots, 831$ ) in the various municipalities  $j$  ( $j = 1, \dots, 5$ ),  $x_{ij}$  is a vector of the independent variables,  $\beta$  is the vector of the unknown parameters, and  $u_{ij}$  are the normally distributed residuals.

Thus far, there has not been multivariate analysis of commercial wild berry picking and so information about the factors affecting both the propensity to participate and the intensity of picking has been limited. It is not known, for example, whether the independent variables used have a contradictory effect on the discrete and the continuous

choices, an unpredictable factor which is implicit in the use of the Tobit model, where the effects of this kind are forced into a parallel relationship (see Equation 1). In consequence, a logit model was also used to construct the propensity to participate in commercial picking and a regression model was also used to construct the intensity of picking (observations above zero). A household was defined as being involved in commercial picking if its members reported having sold berries, no matter how large or small the quantity. As the observation unit was based on the individual household as a whole, information about who exactly within the household had picked the berries was not utilised.

The independent variables and their expected signs were are listed in Table 2.

On previous occasions the age structure of commercial pickers has come under discussion and it has often been claimed that it is skewed towards the older age groups. However, since people in the active working age group were likely to be the most active pickers, while the propensity of the youngest and most elderly age groups to participate was possibly lower as a result of either reluctance or relative physical infirmity, the relationship between age and intensity of commercial picking was assumed to be non-linear for this study.

TABLE 2. LIST OF INDEPENDENT VARIABLES AND THEIR EXPECTED SIGNS.

Symbol	Definition	Expected Sign
$x_1$	At least one unemployed person in the household	(+)
$x_2$	White-collar occupation	(-)
$x_3$	Age < 31 respondent under 31 years of age reference group	
$x_4$	Age 31–40 respondent 31 years or over but under 41	(+)
$x_5$	Age 41–50 respondent 41 years or over but under 51	(+)
$x_6$	Age 51–60 respondent 51 years or over but under 61	(+)
$x_7$	Age > 60 respondent over 60 years	(?)
$x_8$	Respondent living in Suomussalmi reference group	
$x_9$	Respondent living in Ilomantsi	(-)
$x_{10}$	Respondent living in the city of Rovaniemi	(-)
$x_{11}$	Respondent living in the Rovaniemi rural municipality	(-)
$x_{12}$	Respondent living in Inari	(-)

Owing to the hypothesised income-smoothing and employment-generating nature of commercial wild berry picking, it was predicted that households with involuntary unemployment would be likely to earn more income from commercial picking, since for them the opportunity cost of time is probably lower and the marginal utility of picking higher than for employed persons. The same was also expected to hold true for low-income households. Since, however, the actual use of household income was problematic as a result of missing observations and inconsistencies, occupation was used as a proxy for income, and regional dummies were included in order to check whether the activity of commercial picking is significantly highest in Suomussalmi, as the statistics suggest (Malin, 1998).

## RESULTS

### *Picking Income and Income Distribution*

The involvement rate in commercial berry picking ranged from 8% of all households in the city of Rovaniemi to 31 % in Suomussalmi (Table 3), and the income derived from picking ranged between FIM 397 000 in Ilomantsi to FIM 4.8 million in Suomussalmi. In the case of the city of Rovaniemi and the Rovaniemi rural municipality, the income generated amounted at FIM 2.5 and 1.9 million respectively. In proportion to the respective populations, the generated income was highest in Suomussalmi, at FIM

TABLE 3. ESTIMATED INCOME EFFECTS (FIM 1000) OF COMMERCIAL WILD BERRY COLLECTION.

	Ilo- mantsi	Suomus- salmi	Roi town	Roi rural	Inari
<i>Vaccinium vitis-idaea</i>	186.2	1904.6	434.5	449.4	24.0
<i>Vaccinium myrtillus</i>	82.2	1802.7	265.5	129.2	4.9
<i>Rubus chamaemorus</i>	118.7	963.3	1837.5	1348.3	397.9
Others	10.3	105.9	0	3.0	1.5
Total	397.4	4776.5	2537.5	1929.9	428.3
Mean per household	0.12	1.03	0.16	0.24	0.14
Involvement rate, %	12	31	8	13	11
Mean for households involved	1.01	3.28	1.96	1.89	1.31

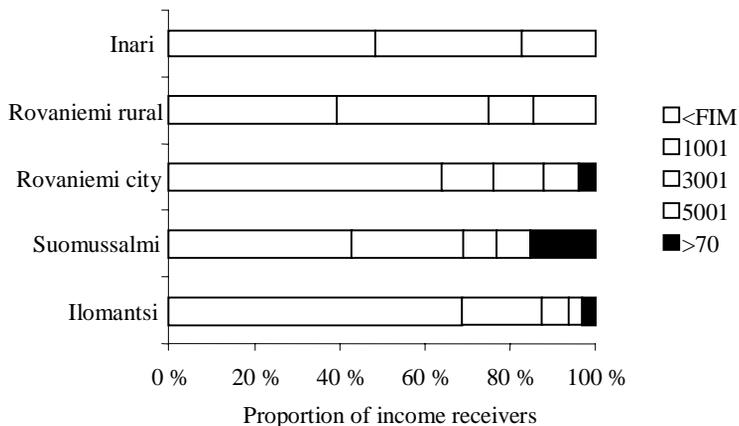


FIGURE 1. HOUSEHOLD INCOME RECEIVED FROM WILD BERRY PICKING IN THE FIVE STUDY AREAS.

1030 per household, and lowest in Ilomantsi, where it amounted to FIM 120 per household.

The average income calculated for the households involved in commercial picking ranged between FIM 1000 in Ilomantsi and Inari to FIM 3280 in Suomussalmi (Table 3). However, for the large majority of households income received fell to below FIM 1000 (Figure 1).

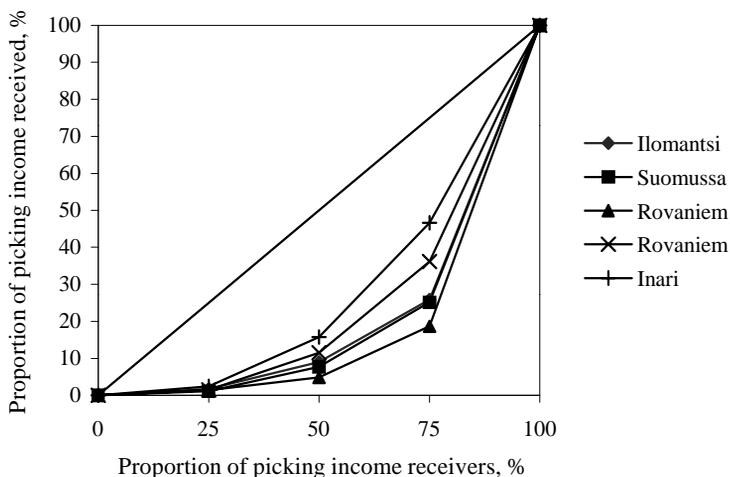


FIGURE 2. CUMULATIVE DISTRIBUTION OF INCOME RECEIVED FROM BERRY PICKING.

Although a high proportion of pickers earned small amounts of money from berry picking, their share of the total household income received from berry picking was low in each municipality (Figure 2). In terms of these "Lorenz-like" curves the income receivers are arranged along the x-axis in ascending order and their share of the total picking income can be seen on the y-axis. The curves indicate a highly uneven distribution of picking income. The highest quartile of income receivers receives between 53% (Inari) and as much as 81% (city of Rovaniemi) of the total picking income generated in their respective areas.

### *Relative Economic Importance of Berry Picking in Household Economies*

Households were asked to assess the importance for them of berry picking according to their commitment to commercial picking (Table 4) and the role of picking as a source of household income (Table 5). These questions concerned not only the particular year of 1997 but also the perceived average longer-term importance of berry picking. With the exception of Suomussalmi, the majority of households reported selling berries only occasionally. Professional pickers were found only in Suomussalmi, while in the other municipalities picking was regarded to be at most a moderate source of livelihood. For comparison, the results for the highest 25% of income receivers showed that for most of them commercial picking was an annual activity but still only a minor source of extra income.

For most of the households involved in commercial picking the picking income constituted less than 3% of the annual gross income of the whole household (Table 5). This also held true for the highest fractile of income receivers. In Suomussalmi, the proportion of households earning more than 10% of their annual gross income was 8%, while in the city of Rovaniemi none of the households involved in commercial picking reported earning more than 3% of their annual gross income by this means.

### *Econometric Analysis of Factors Affecting Commercial Wild Berry Picking*

In the case of the Tobit model the coefficients for unemployment and socio-economic status, which can be used as a proxy for income, were consistent with our expecta-

TABLE 4. THE DISTRIBUTION OF HOUSEHOLDS ACCORDING TO THE CATEGORIES OF COMMERCIAL PICKING ACTIVITY.

	Proportion, %					Total
	I	II	III	IV	V	
Ilomantsi	69	29	2	0	0	100
Suomussalmi	47	35	14	1	3	100
Rovaniemi city	85	15	0	0	0	100
Rovaniemi rural	66	32	2	0	0	100
Inari	66	30	4	0	0	100
Highest 25 %	7	61	25	2	5	100

*I = Sell occasionally; II = sell relatively often in different years and during the same year, minor importance as a source of extra income; III = moderate source of livelihood, amounts sold are relatively large aiming at extra income; IV = at least one almost professional picker in the household, who use much time for picking and sell large amounts; V = at least one professional picker in the household for whom picking is the main employment during the crop season.*

tions (Table 6). Households with at least one involuntarily unemployed person received more income from commercial berry picking than households in full employment. Households whose head was in a white-collar occupation earned less income from commercial picking than the others, but only at a 20% level of significance.

Respondents below the age of 31 earned least from berry picking, although the difference was statistically significant only for the 41–50 age group. In the case of regional differences, households in Suomussalmi (the reference group) earned more income from berry picking than the comparable groups in all of the other municipalities.

TABLE 5. BERRY PICKING INCOME AS A PROPORTION OF A HOUSEHOLD'S ANNUAL INCOME BEFORE TAXES IN AN AVERAGE CROP YEAR.

	Proportion, %					Total
	<1 %	1–3 %	4–6 %	7–10 %	>10 %	
Ilomantsi	44	47	5	2	2	100
Suomussalmi	39	34	13	6	8	100
Rovaniemi city	61	39	0	0	0	100
Rovaniemi rural	57	36	3	2	2	100
Inari	48	42	2	6	2	100
Highest 25 %	7	54	18	8	13	100

TABLE 6. REGRESSION RESULTS.

The table presents the estimated coefficients (maximum likelihood estimates) and t-values of the Tobit model for income received (FIM1000/household) derived from wild berry picking and the logistic regression model (Wald statistics in parentheses) for selling probability and the linear regression model for income received (observations above zero, FIM1000/household).

Independent variable	Coefficients		
	Tobit (t-value)	Logit (Wald)	OLS (t-value)
Constant	-2.55** (-2.83)	-0.51 (2.72)	1.36 (1.43)
Unemployment in the household	2.28*** (4.24)	0.66*** (11.96)	1.43* (2.42)
Socio-economic status	-0.88 (-1.29)	-0.12 (0.26)	-1.34 (-1.69)
Age			
age < 31 Reference group			
age 31-40	0.64 (0.70)	0.01 (0.00)	1.49 (1.44)
age 41-50	2.06* (2.37)	0.43 (1.93)	2.29* (2.42)
age 51-60	1.40 (1.50)	0.10 (0.09)	2.68* (2.57)
age > 60	0.93 (1.01)	0.10 (0.09)	1.52 (1.49)
Municipality			
Suomussalmi Reference group			
Ilomantsi	-4.59*** (-6.22)	-1.41*** (30.58)	-2.49** (-3.00)
Rovaniemi city	-4.71*** (-6.23)	-1.60*** (36.26)	-1.46 (-1.71)
Rovaniemi rural	-3.74*** (-4.97)	-1.24*** (22.12)	-1.30 (-1.53)
Inari	-4.58*** (-6.08)	-1.47*** (31.41)	-1.84* (-2.20)
$\sigma$	5.08*** (18.10)		
Observations	831	831	196
Log likelihood	-819.14	-411.93	

\*\*\* = significant at 0.1 % level, \*\* = significant at 1% level, \* = significant at 5 % level

The factors affecting commercial wild berry picking derived by the Tobit model were largely consistent with those offered by separately estimated “propensity to participate“

and "picking intensity" models. However, the age variable had a greater impact on the level of sales proceeds than on the probability of involvement in commercial picking. The regional dummies also had a greater impact on the probability of involvement than on the rate of income. All the regional dummies were significant in the logistic regression model, while in the linear regression model statistically significant differences were found only when Ilomantsi and Inari were compared with Suomussalmi.

## DISCUSSION AND CONCLUSIONS

Our research has yielded new and more detailed information on the role of wild berries as a source of additional income and on the factors affecting that role. The share of commercial wild berry picking in the total livelihood of the households under survey was not high, a finding which is consistent with previous studies. As overall living standards rise, the economic importance of NWFPs declines both at household and at national level (Godoy *et al.*, 1995; Kant *et al.*, 1996).

Measured by means of any of the indicators used in this study, Suomussalmi was found to be benefiting to the greatest extent from wild berry picking. In that particular area, a total of FIM 4.8 million was earned from wild berry picking by 31% of all households. However, since these income figures are based on the results of a single year, we should not draw too far-reaching regional comparisons or conclusions, since differences in annual crop yields can be considerable. Furthermore, it is hard to determine the extent to which differences are due to regional economic conditions or to cultural differences. Regional conditions can be seen especially in the greater region of Kainuu, within which Suomussalmi is situated, where the utilisation of berries has long and strong traditions. Cultural aspects, on the other hand, may have to be taken into consideration in the case of the city of Rovaniemi, where the involvement rate in commercial berry picking was relatively high (8%). This may not hold true in the case of cities of the same size in southern parts of the country, where a berry picking culture is not as developed as in Rovaniemi. It should also be noted that, in addition to local traditions, large NWFP resources surrounding the

city of Rovaniemi also increase the potential of NWFP utilisation.

The average income earned from berry picking for the households involved ranged from FIM 1000 per household in Ilomantsi and Inari to FIM 3280 in Suomussalmi. Closer investigation indicated, however, that assessment of the economic importance of wild berry picking based only on aggregate and average figures can be misleading because the income distribution was highly uneven. For 39-69% of households the income earned remained below FIM 1000, while the quartile earning the highest incomes captured 53-81 % of the total income generated. The actual income distribution appears to be desirable, since our econometric analysis indicated that picking intensity was highest amongst households whose members were at an active working age but suffering from involuntary unemployment.

The proportion of occasional pickers was large. Occasional participation may be a result of the minor importance of picking in the total composition of the annual livelihood of a household. This factor, in turn, may result from large annual variations in crops, disparities between productivity and price, or the role of picking as a pastime. In any case, it can be noted that for a few households resident in Suomussalmi picking constituted their main employment during the crop season.

Our study results also seem to suggest that commercial wild berry picking makes up only a small fraction of annual livelihoods, in most cases no more than 3% of the total. Despite this, for a small group of households berry picking is significant and forms an important part of annual livelihood. The fact of tax exemption also increases the economic part played by berry picking income in relation to annual income, but it remains to be seen how much the costs of picking in fact reduce the relative importance of berry picking as a partial source of income.

It can be concluded that wild berries, like non-wood forest products in general, play their part in employment generating and income smoothing. However, since Finland is a country with a high standard of living, the importance of wild berry picking in household economies is not generally high. As a matter of fact, supporting the household

livelihood largely on the basis of wild berries is highly unstable, since annual fluctuations in a biological crop and also in market conditions can be considerable. Evidently, the significance of NWFPs lies in small-scale regional development where it can provide seasonal extra income and employment opportunities. In addition the value added aspect of berries could be advanced on a regional level by encouraging local processing industries. Hence, suggestions that attention should be paid to the regional economic importance of non-wood forest products in the general context of developing methods for subsidising remote rural areas (Luonnontuotealan nykytilan ..., 2000) may be considered highly desirable. For the sake of the whole of the wild berry industry it seems justifiable to subsidise storage facilities according to the suggestions of recent working groups (Luontoyrittämisen toimintaohjelma, 1998; Luon-nontuotealan nykytilan ..., 2000), since the problems caused by the large variations in annual yields are well known.

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