

181 Estimating visit volume at the county level: An application of a variant form of the Lincoln Index method

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It is important to have an accurate estimate of visit volume to a destination. While this may be easily done for a place with controlled gates and/or with ticket sales, it is a major challenge for a destination (e.g., a county) without gate counts. This study uses a variant form of the Lincoln Index method to estimate visit volume for Garrett County, Maryland based on data collected from two survey periods: 2008-2009 and 2019-2020.

Methods

Data collection

A questionnaire was developed by drawing on findings from the literature with inputs from the Garrett County Chamber of Commerce. The questionnaire was administered to visitors that were randomly approached at 21 locations/events (Figure 1) during 2008-2009. A replica survey was conducted using the same version of the questionnaire during 2019-2020 at 20 locations, most of which are the same as the survey period 2008-2009.

Estimation of visit volume

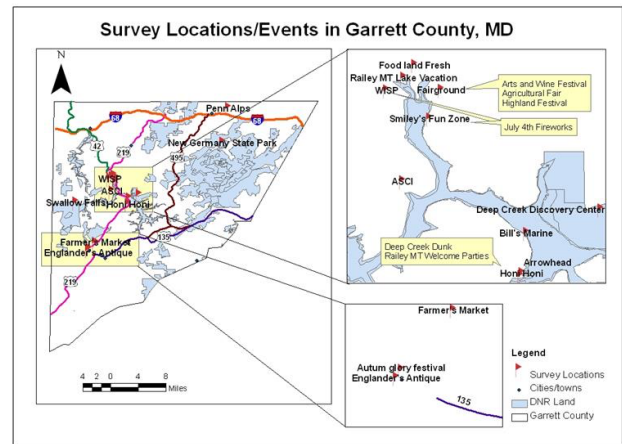
The Lincoln Index is a method that is originally developed to estimate the size of closed population of an animal species. The method was later applied to estimate attendance of open access events (Brothers & Brantley, 1993). Basically, the Lincoln Index method has its root in the simple random sampling method with an assumption that the proportion of marked animals in the sample is equal to the proportion of the marked animals in the whole population. Applying this method to the context of tourism, it is assumed that for a given visitor type, the proportion of a visitor type in the surveyed sample is the same as the proportion of the same visitor type in the population (Deng et al., 2017):

$$\frac{S_i}{S_t} = \frac{P_i}{P_t} \tag{1}$$

$$P_t = \frac{S_t * P_i}{S_i} \tag{2}$$

Where S_i : number of visitors surveyed for visitor type i ; S_t : total number of visitors surveyed; P_i : total number of visitors documented for visitor type i during the survey period; P_t : total visitor number during the survey period. Since S_i and S_t can be obtained through survey, the total visitation can then be estimated if the actual visitation for visitor type P_i is documented.

Visitor types were identified by accommodation. During the survey, respondents were asked to report the lodging they stayed or will stay during their visits to the county. Respondents were also asked to report their frequency of visits to the county in the previous 12 months.



Results

The total number of nonlocal visitors approached during 2008-2009 was 4,931 (vs. 4,378 for the period 2019-2020). Of this number, 2,692 (vs. 2,693 for the period 2019-2020) were willing to fill out the questionnaire, resulting in a response rate of 54.6% (vs. 61.4% for the period 2019-2020).

The average frequency of visits in the previous 12 months was 6.8 for the period 2008-2009 vs. 6.0 for the period 2019-2020. Garrett County has documented the total number of overnight visitors who have stayed in cabins during the survey period. This number was 19,009 person-trips for the period 2008-2009 and 29,503 for the period 2019-2020, respectively. Based on the

surveys, cabin guests visited the county 2.53 times on average in the previous year for the first survey period and 2.09 times for second survey period, resulting in the number of cabin guests being 7,514 (that is, 19,009/2.53) for the period 2008-2009 and 14,117 (that is, 29503/2.09) for the period 2019-2020, respectively.

Both surveys asked visitors to report their frequency of visits in the previous year and use it as a proxy for the frequency of visits for the current period. This is not without problem as visitation is largely subject to many unexpected external factors (i.e., disease, weather, price, etc.) which would result in visitation volume being different from year to year. To correct this, as with the survey during the period 2008-2009, only frequency of visits reported in the recent season was used for the estimation because it reflects the frequency of visits for the survey period more realistically than other seasons during which reported frequency of visits goes beyond the survey year. The frequency of visits of most recent season was 4.85% for 2008-2009 and 7.17% for 2019-2020, respectively. Based the above formulas, the total number of visitors was estimated at 154,928 persons (i.e., 7,514/0.0485) for the first

the second survey, which can then be used to estimate the number of visitors of other visitor types by multiplying the number of 154,928 or 196,880 by the percent of a visitor type. Finally, person-trips for a given visitor type can be derived by multiplying the number of visitors of the visitor type by the frequency of visits of that visitor type. The total person trips by this approach was 1,117,744 for the period 2008-2009 and 1,398,150 for the second period (Table 1).

Conclusion

Interestingly, the total person-trips of 1,398,150 estimated for the year 2019 are quite comparable with the total number of 1,427,887 documented by Maryland Department of Natural Resources (DNR) for the state park visitation in the same year. Although a direct comparison does not make too much sense as the DNR visitation reflects multiple counts of the same person at different locations, and thus it overcounted the actual person-trips. However, it does not count people who visited other parts of the county, although some people who visit one or several units of the park system may also visit other sites of the county for shopping, eating during or other purposes during the same trip. Nonetheless, the DNR data can provide a reference point by which the current estimation can be judged/gauged. It should be noted that the estimation of 1,117,744 for the survey period 2008-2009 is also quite comparable with the DNR documentation of 1,200,522 for the year 2007. In addition, if the frequency of visits for the whole year was applied, the total estimated person-trips would be 1,192,619 for the year 2018, which is also quite comparable with the total visitation of 1,178,009 documented by DNR. Thus, the method used in this project is reliable and valid (as DNR data are valid).

Table 1. Estimation of person-trips

Visitor type	Percent (% of persons surveyed)	Persons	Frequency of visits	Person-trips	Percent (% of person-trips)
Day trippers	24.56	37969	10.91	414245	37.06
	22.09	43491	10.58	460133	32.9
Hotel/motel	12.85	19866	1.94	38540	3.45
	11.46	22562	2.84	64077	4.6
Bed & Breakfast	2.52	3896	0.71	2766	0.25
	1.65	3249	1.86	6042	0.4
Stay with friends/family	13.16	20345	4.31	87687	7.84
	12.88	25358	3.36	85203	6.1
Short-term RV/Campground	3.29	5086	2.67	13580	1.21
	2.91	5729	5.0	28646	2.0
Cabins	4.86	7513	2.53	19009	1.70
	7.17	14116	2.09	29503	2.1
Vacation rental home	19.47	30100	1.59	47859	4.28
	25.35	49909	3.63	181170	13.0
Second home owner	18.32	28322	16.81	476099	42.59
	14.76	29,059	18.36	533,532	38.2
Others	0.96	1484	12.1	17958	1.61
	1.73	3406	2.89	9843	0.7
Total	100.00	154,583	100.00	1,117,744	100.00
	100.00	196,800	100.00	1,398,150	100.00

Note, values in bold refer to the survey period 2019-2020.

survey and 196,880 persons (i.e., 14,117/0.0717) for

References

Brothers & Brantley, 1993. Deng et al.2017.DOI: <https://doi.org/10.3727/108354217X14828625279933>.