Minnesota

DEPARTMENT OF
NATURAL RESOURCES

METHODOLOGY FOR THE CALCULATION OF OUTDOOR RECREATION Participation and Interregional Flow

SCORP

Research and Policy Section
Bureau of Comprehensive Planning & Progamming

METHODOLOGY FOR THE CALCULATION OF OUTDOOR RECREATION PARTICIPATION AND INTER-REGIONAL RECREATION PARTICIPATION FLOWS

Compiled for
The Minnesota Department of Natural Resources,
Bureau of Comprehensive Planning and Programming
St. Paul, Minnesota

by
Gail E. Duering

Institute of Outdoor Recreation and Tourism
Utah State University
Logan, Utah

December, 1978

Report Number 2315

This project was carried out with funds provided by the Legislative Commission on Minnesota Resources

TABLE OF CONTENTS

LIST OF TABLES

INTRODUCTION

There were over 23,000 actual, not expanded, recreation occasions reported by Minnesota residents who participated in the Department of Natural Resources sponsored study during the winter season (November through March), 1977-1978. These 23,000+ occasions were generated by a sample of over 30,000 Minnesota residents during that same period.

The Estimation of Total Occasions

In order to estimate the number of recreation occasions by all residents, it was necessary to "expand" the sample occasions. Table 1 presents a comparison of the number of sample occasions and the expanded number of occasions (state totals) for the various activities in the sample.

In expanding these data, the recreation occasions were paired by the thirteen Minnesota Development Regions of residence and Development Region of destination. Recreation occasions by children less than six years of age were not included. See Table 2 for a list of counties comprising each development region.

For a more complete discussion of sample size validity, see Minnesota Recreation Information Management System Report Number 14.

A formula representing the process of expansion is:

$$O_i = \frac{A_i}{N_i} \times P_i \times 17$$

where:

O_i = number of expanded occasions originating in region i during sample period

A_i = number of sample occasions by residents of region i

N_i = number of people in sample who are residents of region i over six years of age

P_i = number of people in Minnesota population (1978 estimate) who are residents of region i over six years of age

17 = number of weeks in sample period

The Minnesota population figures were extrapolated from the Office of the State Demographer population estimates for 1975 and 1980. Table 3 shows both the sample and population figures for each region.

For reporting purposes, after the number of occasions were expanded to the population, they were grouped by destination where the recreation activities occurred. The possible destinations included the 13 Minnesota Development Regions and such out-of-state locations as Wisconsin, Iowa, Manitoba, Ontario, other U.S. locations, other Canadian and other foreign locations.

For some occasions, it was impossible to locate the area where the recreation occasion occurred. The cases containing missing information were distributed proportionally among those cases with no missing information. For example, assume that 60 percent of the recreation occasions with no missing information occurred on federally managed land and 40 percent occurred on land in the private sector and there are 10 occasions with missing data. The 10 occasions would be split into two groups, one containing 6 and the other 4 occasions each. These occasions would then be added to the number of occasions with no missing information and new percents calculated.

Confidence Intervals for Origin Destination Pairs

Seventy-five percent confidence intervals were calculated for each origin destination pair where occasions occurred. The 75 percent level was chosen during consultation with SCORP planning personnel. The formula used was:

$$C_{ij} = 19.55\sqrt{N_i^2 \cdot \frac{S^2}{n_i}}$$

where:

$$S^2 = \frac{\sum_{k=1}^{n_i} Y_k^2 - \frac{\left(\sum_{k=1}^{n_i} Y_k\right)^2}{n_i}}{n_i - 1}$$

where:

19.55 = 17 * 1.15
- 17 - number of weeks in sample
- 1.15 = number of standard deviations above and below the mean containing 75 percent of the observations under a normal curve

N_i = number of people in Minnesota population (1978 estimate) who are residents of region i who are six years of age

n_i = number of people in sample who are residents of region i over six years of age

Y_k = number of occasions per resident k of region i over six years of age

C_{ij} = confidence interval for occasions by residents of region i that occur in region j

The expanded occasions by people six years of age and older represent the estimated number of occasions that occurred in a region during the 1977-1978 winter season.

Report Number 2316 entitled Inter-Regional Winter Recreation Activity Occasion Flows contains data concerning the flow of recreation occasions from region of origin to region of destination. Flows have been produced

for all activities investigated during the 17-week period by the winter telephone survey. Calculated confidence intervals appear in Minnesota Recreation Management System Report Series, Report Number 2315.

Inter-regional flows were developed by taking the total number of outdoor recreation occurrances for each region, based on the region of origin, and distributing them to the region of destination based on the number of total occurrances within each destination region. Thirty-one sets of origin-destination tables were produced, one for each of the activities covered by the study. Each table includes all 13 Minnesota Development Regions, plus other states and regions of the U.S. The most important item to remember when utilizing the data is that origin is the region of residence of the participant and destination is the region of participation.

Table 1. Statewide sample occasions and corresponding expanded totals for all winter activities.

ACTIVITY	NUMBER OF SAMPLE OCCASIONS	EXPANDED NUMBER OF OCCASIONS
Camping	75	164,039
Cross Country Skiing		
Free Skiing	611	2,136,536
Trail Skiing	510	1,984,901
Combined Skiing	89	305,387
All Cross Country Skiing	1,637	4,435,715
Dog Sledding	24	52,577
Downhill Skiing	1,229	3,648,220
Hunting		
Upland Birds	58	83,206
Big Game	49	87,276
Waterfowl	3	8,143
Miscellaneous	828	1,324,983
All Hunting	938	1,503,609
Ice Boating	10	14,905
Ice Fishing	2,886	5,156,011
Ice Skating		
All Ice Skating	4,856	12,718,597
Figure	355	995,496
Hockey	1,171	4,158,345
Free	2,547	7,562,535
Open Water Fishing	12	36,267
Orienteering	25	68,221
Sledding	4,298	9,399,203
Snowshoeing		
Trail	39	121,668
Free	122	330,150
Combination	16	61,412
All Snowshoeing	318	543,846

Table 1. cont.

ACTIVITY	NUMBER OF SAMPLE OCCASIONS	EXPANDED NUMBER OF OCCASIONS
Snow Tubing	321	741,845
Snowmobiling		
Trail	1,264	2,716,610
Free	3,185	6,107,117
Combined	1,179	2,409,097
All Snowmobiling	6,822	11,253,703
Trapping	431	604,410

Table 2. Destination regions.

Region 1	Region 6(E)*
Kittson	Kandiyohi
Marshall	McLeod
Norman	Meeker
Pennington	Renville
Polk	
Red Lake	Region 7 (6W)*
Roseau	Bigstone
	Chippewa
Region 2	Lac Qui Parle
Beltrami	Swift
Clearwater	Yellow Medicine
Hubbard	
Lake of the Woods	Region 8 (7E)*
Mahnomen	Chisago
	Isanti
Region 3	Kanabec
Aitkin	Mille Lacs
Carlton	Pine
Cook	
Itasca	Region 9 (7W)*
Koochiching	Benton
Lake	Sherburne
St. Cours	Stearns
	Wright
Region 4	
Becker	Region 10 (8)*
Clay	Cottonwood
Douglas	Jackson
Grant	Lincoln
Ottertail	Lyon
Pope	Murray
Stevens	Nobles
Traverse	Pipestone
Wilkin	Redwood
	Rock
Region 5	
Cass	Region 11 (9)*
Crow Wing	Blue Earth
Morrison	Brown
Todd	Faribault
Wadena	Le Seur
	Martin
	Nicollet
	Sibley
	Waseca
	Watonwan

Table 2. cont.

Region 12 (10) *	Region 14
Dodge	Wisconsin
Fillmore	Iowa
Freeborn	South Dakota
Goodhue	North Dakota
Houston	Manitoba, Canada
Olmsted	Ontario, Canada
Rice	Other U.S.
Steele	Other Canadian
Wabasha	Other Foreign
Winona	
Mower	
Region 13 (11) *	
Anoka	
Carver	
Dakota	
Hennepin	
Ramsey	
Scott	
Washington	

* Numbers and letters in parentheses refer to Minnesota Development Regions.

Table 3. Sample and 1978 projected population (over six years of age) figures for each Minnesota Development Region.

REGION	SAMPLE SIZE	POPULATION
1	1,921	104,953
2	1,957	54,751
3	1,942	303,445
4	1,899	177,661
5	1,947	111,992
6E	1,768	94,265
6W	1,725	56,265
7E	1,851	82,859
7W	1,838	180,142
8	1,797	129,791
9	1,793	205,592
10	1,751	369,005
11	6,432	1,792,781
State Total	28,621	3,663,602