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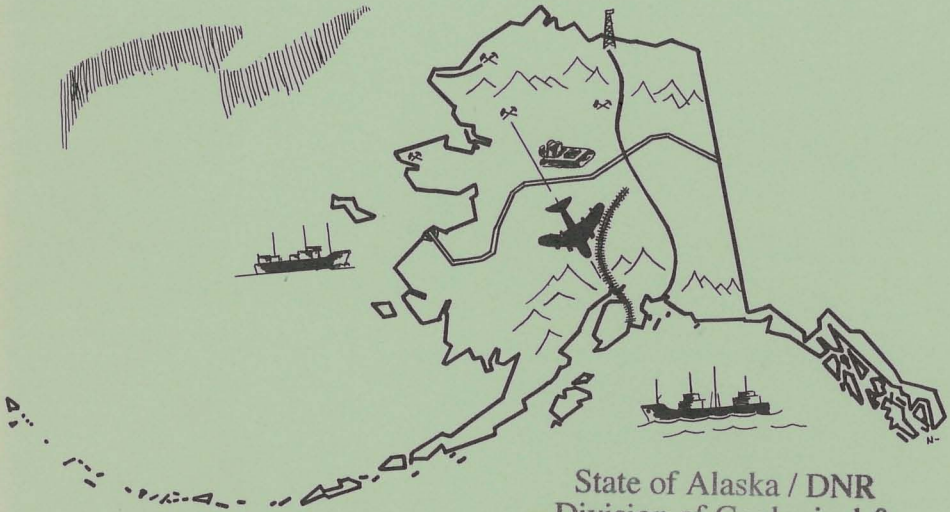


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I.R.L. Report No. 29A



PROCEDURE FOR ESTIMATING TOURISM BENEFITS



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MINERAL INDUSTRY RESEARCH LABORATORY

University of Alaska
Fairbanks, Alaska 99701

Richard J. Solie

September, 1973



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FOREWORD

Mineral Industry Research Laboratory Report No. 29, "Optimum Transportation Systems to Serve the Mineral Industry North of the Yukon Basin in Alaska", considers the transportation needs of the area north of the Yukon. The only industries that can be established there within the foreseeable future are minerals production, recreation, reindeer husbandry, and trapping. The present paper, M.I.R.L. Report No. 29A was originally written as an appendix to Report No. 29. After some consideration, it was decided that although it is too detailed an analysis of tourism to be included in M.I.R.L. Report No. 29, it also is too valuable a contribution to not be published at all. Therefore, it has been published in its present form as a separate report. It is recommended that M.I.R.L. Report No. 29 be consulted, especially Chapter 6.

PROCEDURE FOR ESTIMATING TOURISM BENEFITS

Richard J. Solie

Gates of the Arctic Visitor Projections and Mt. McKinley Experience

Several factors suggest the possibility of tying tourism estimates for proposed Gates of the Arctic National Park to present and past statistics for Mt. McKinley Park: 1) Gates of the Arctic is an area which many people feel equals or surpasses Mt. McKinley in terms of its scenic beauty and recreational opportunities. A study by the State's Division of National Resources describes it as "one of the richest potential areas (in terms of tourist appeal) to be found anywhere in Alaska." 2) Until recently, Mt. McKinley was accessible only by air, railroad, or by a lengthy and rough gravel road (154 miles of gravel on the Denali Highway from Paxson to the east boundary of the Park.) These same modes of transportation are considered in this study into the Gates of the Arctic area (although both the trip by gravel road and the train would be longer than those to McKinley); 3) In surveys by the Alaskan Travel Division, tourists have been asked to indicate their reasons for visiting Alaska. In the 1964 survey 21% of new visitors said "to see Mt. McKinley" while 16 percent of prior visitors and 18% of the new ones said "traveling north of the Arctic Circle." (U.S. Field Committee, 1971, p. 200.) Weighting these preference percentages by the proportion of new versus prior visitors indicates that an overall average of 24.2% of the tourists said they came to see Mt. McKinley while 17.6% wished to see the Arctic Circle region. (This is calculated by weighting the preference percentages by the percentage of the visitors classified as "new" (80%) and as "prior visitors" (20%). For McKinley, therefore, the weighted percentage is $(21\% \times 20\%) + (25\% \times 80\%) = 24.2\%$ while for the Arctic it is $(16\% \times 20\%) + (18\% \times 80\%) = 17.6\%$. (The percentages of new vs. prior visitors is from State of Alaska Travel Division.) The proposed Gates of the Arctic Park region, of course, lies north of the Arctic Circle and if developed in line with proposed plans, it would contain much of what people want to see in the Arctic plus providing the scenic beauty and recreational opportunities

described in Chapter 6. Thus the Arctic preference figure is utilized in the study as a measure of tourists willingness to visit the proposed Gates of the Arctic Park region.

Other sources of information tend to confirm the fact that the McKinley preference figures are a conservative measure of the numbers of non-residents who actually visit the Park. For example, the Alaska Travel Division sampling of tourists, when blown up to represent the total tourist population, indicates almost 43,000 non-resident recreational visitors to McKinley in 1971. (State of Alaska Travel Division, 1971, p. 4.) A Park Service survey in 1968 indicated that 64% of McKinley Park visitors were non-residents (National Park Service, 1968) and assuming this same ratio in 1970 and 1971, an estimated 29,440 of the 46,000 recreational visitors in 1970 and 35,677 of the 55,745 visitors in 1971 were non-residents. Application of the McKinley preference figure of 24.2% to the 1970 and 1971 total state tourist figures of 120,000 and 125,000 would yield estimates of non-resident visitors to McKinley of 20,040 and 30,250 for the two years respectively, a figure lower than either of the other estimates.

As mentioned above, both the gravel portion of the highway and the length of the rail trip required are greater into Gates of the Arctic than into McKinley. (The distance on gravel road into Gates of the Arctic would be approximately 100 miles farther than on the gravel Denali Highway into McKinley, while the rail trip from Fairbanks to Gates of the Arctic would be more than 200 miles farther than from Fairbanks to McKinley.) Unfortunately, there appears to be no reliable way to estimate the impact of this greater distance factor on destination oriented traffic into Gates of the Arctic. The somewhat arbitrary assumption is thus made that the greater distances would reduce potential recreational visits to Gates of the Arctic by 50%. A downward bias is introduced into Gates of the Arctic estimates by the fact that rail and highway traffic into McKinley were treated as though they were independent (i.e., as if the amount of rail traffic would be the same even if there was no highway and vice versa). In most of the transportation systems considered here, the Gates of the Arctic region would be served by either a railroad or a highway (but not by both), and thus traffic via

the single mode would undoubtedly be significantly greater than if both existed. An indication of the degree of interdependence between rail and highway traffic can be seen in the fact that rail traffic into McKinley during 1972 dropped to less than half what it had been in 1971, even though total recreational visits increased approximately 40%. The apparent reason was the large increase in highway traffic as a result of the completion of the new Fairbanks-Anchorage Highway. (National Park Service, Mt. McKinley Park, 1972.) Thus the estimates for Gates of the Arctic travel developed here are probably conservative.

Estimates of Destination Oriented Traffic to McKinley and Gates of the Arctic

Park Service records on mode of arrival in McKinley Park reveal that of the total of 46,000 recreational visitors in 1970, 16,422 (35.7%) arrived by highway, 24,012 (52.2%) by rail, and the remaining individuals by other means (air, hiking, climbers via Camp Denali, etc.). (National Park Service, Mt. McKinley Park, 1972.) Since no accurate breakdown of the "other" category was obtainable, only rail and highway traffic are included in subsequent estimates.

Alaska Highway Department figures show that in 1970, 40% of the non-commercial traffic on the Denali Highway at a check point near the east boundary of the Park were non-residents. (State of Alaska, Department of Highways, 1970, p. 29.) If 40% or 6,569 of the 16,422 visitors who arrived by highway were non-residents, then approximately 22.3% of the total non-resident visitors to the Park arrived by highway. This is determined by dividing the Park Service estimate of 64% non-residents of the 46,000 total visitors (29,440) into the 6,569. By similar calculations, 59.5% of the residents arrived by road (9,853 ÷ 16,560). Assuming that the rail arrivals were divided among residents and non-residents in the same ratio as the "other" arrivals, 63.1% of the non-residents but only 32.9% of residents arrived by rail.

It is assumed that the same preferences as to mode of transportation would exist for travel to the Gates of the Arctic Park as for McKinley. Assuming also that the 17.6% is a reasonable

measure of those who would desire to visit Gates of the Arctic by some mode of transportation, it is estimated that 3.9% of non-resident visitors to Alaska would travel by gravel road (17.6% x 22.3%) whereas 11.1% (17.6% x 63.1%) would travel by rail, if distances were comparable to those into McKinley. As stated above, these percentages are reduced by 50% to reflect the greater distance to Gates of the Arctic.

The estimate of potential numbers of visitors is determined by multiplying these percentages by the estimated total tourist traffic into Alaska for the years through 1998 (see Table 1.) This projection of tourist visits to the State is based on estimates made by Cresap, McCormick, and Paget (p. X-4) in their 1968 tourism study and it projects beyond the period covered by their study at the same 10% per year rate of increase assumed by them.

Estimates of resident visitors to Gates of the Arctic are also based on the McKinley Park figures cited earlier, but in this case they are tied to Alaskan population figures. Dividing the resident 1970 visitors to McKinley by the 1970 state population figure (16,560 ÷ 302,647) yields a figure of 5.5% who visited McKinley Park sometime during the year. Using the previously calculated percentages by mode of arrival, 3.3% of the population arrived by highway while 1.8% arrived by rail. If it is assumed that residents' ratio of Arctic to McKinley Park preferences is the same as for non-residents ($\frac{17.6\%}{24.2\%} = 72.7\%$) then 1.2% of the total population would visit Gates of the Arctic Park in a given year by highway (3.3% x 72.7% x 50%) while 0.65% would arrive by rail. These percentages are multiplied times state population projections (Table 2) to yield an estimate of potential resident visitors by mode of transportation to Gates of the Arctic in the years 1975-1998. (The state population projections used are based on an as yet unpublished study by Dr. Peter Lin of the Institute of Agricultural Sciences, University of Alaska. They incorporate his assumption of pipeline construction beginning in 1973. Since Dr. Lin's estimates only covered the years of 1975, 1980 and 1985, figures were calculated for intervening years by assuming the same compound rate of growth as Dr. Lin assumed from beginning to end of the period. Beyond 1985, a rate of growth comparable to that which Dr. Lin used for the period 1980-85 was used.)

For both resident and non-resident visitor figures, it is assumed that it would take at least 5 years from 1975 for a new Gates of the Arctic Park to reach its full potential. Thus, actual visits are assumed to be only 20% of potential in 1975, 40% in 1976, etc., until they reach 100% of potential in 1979.

Dollar estimates of resident and non-resident expenditures are based on the following assumptions: 1) The average visitor to the Park will spend one day and one night in the Park, one day enroute, and one day returning on new road or rail systems included in this study. This compares with McKinley Park data showing that the average visitor spends one night and parts of two days in the Park. (National Park Service, 1968.) 2) Non-residents will spend an average of \$23.00 per day or \$69.00 during the 3-day period for a variety of goods and services. This is calculated by dividing an estimated \$300 per tourist spend in Alaska (Cresap, et. al., 1968, p. 11-8, and U.S. Federal Field Committee, 1971, p. 7) by the average estimated stay in 1971 of 13 days (State of Alaska, Travel Division, 1971, p. 6.) 3) Residents' expenditures are assumed to approximate those of non-residents, but a deduction needs to be made to account for the expenditures which the resident would otherwise spend for food, gas, etc., if he were at home, but which are replaced by the daily vacation expenses. This amount is calculated to be \$3.00 per day per person and is calculated as follows: The per person expenditure on food at home is calculated to be approximately \$2.00. This is based on average annual food expenditures in Fairbanks during 1971 for a middle income family of 4 persons of \$3,002.00. Dividing the amount by 4 persons yields \$755.50 per person which when divided by 365 days = \$2.07 per day. (See: Tussing and Thomas, 1971.) An additional \$1.00 per day per person is assumed to cover other expenses which would be discontinued or reduced while the individual was on vacation. The net amount of resident vacation expenses is thus reduced to \$20 per day or \$60 per trip to Gates of the Arctic. The dollar totals based on multiplying these average individual trip expenditures by the estimated number of each type of visitor are also shown in Tables 1 and 2.

Where a transportation system contains routes to both units of the proposed Gates of the Arctic Park, visitor days are

assumed to be 50% higher than when a route to only one point exists. The increase is based on an expectation of both longer stays by Park visitors and an increased volume of visitors because of the added attractions.

Estimate of Non-Destination Oriented Traffic

Non-destination traffic is assumed to exist in the study only where a highway system is interconnected with existing highway networks. This, of course, overlooks the possibility of automobiles being hauled by rail to a highway segment not connected with existing roads or of rental cars being available under similar circumstances. It is felt, however, that the degree of under-estimation as a result of this assumption is not serious.

In contrast to the destination oriented estimates which are tied to the McKinley-Arctic preferences, non-destination oriented estimates are based on highway traffic to the nearest point on the existing highway system during 1970. Thus, traffic up the TAPS road and into Kobuk or up to Knifeflader is tied to highway counts of traffic to Livengood while that for the road to the Kandik Basin is based on traffic to Circle. A function was constructed for estimating the effect of increasing distances on gravel road from data on non-destination oriented traffic on the Denali Highway (total Denali traffic minus McKinley Park Highway arrivals) in 1970. These data suggested that for each 20 miles of additional distance, 20% of the remaining traffic dropped off. The function can be stated as:

$$y = (.8)^{\frac{x}{20}} \quad \text{where: } y = \text{Fraction of traffic at start of route still continuing on the highway at a point } x \text{ miles from the beginning.}$$

x = Distance in miles from the beginning of the route.

Thus, 40 miles along on a gravel road, only 64% of the starting traffic would still remain, and this would fall to approximately 33% by the end of 100 miles.

For road segments connecting with the Elliot Highway (Livengood), Bureau of Land Management estimates are used

which indicate that 75% of the traffic on the Elliot is recreational. Using Highway Department estimates of an annual average of 40 vehicles per day into Livengood in 1970, recreational traffic is estimated at 30 vehicles with 15 going in each direction.

Assuming further that the average vehicle contains 2.6 persons (the average per vehicle passenger count estimated by the Alaska Travel Division), the annual recreational passenger traffic to Livengood was approximately 14,000 persons in 1970. Using the previously stated functional relationship, it is estimated that only 20.2% of these individuals would proceed as far as Prospect Creek (144 miles from Livengood) and at that point half would proceed further on the TAPS road (and thus not be counted in the study) while the other half would turn on the gravel road to Bettles, if it existed. At Bettles, it is also assumed that the remaining traffic would split in half if both the roads to Kobuk and Knifeflame existed. Traffic into the Kandik Basin is based on the number of vehicles reaching Circle City with the assumption made that one-half of them would be willing to cross the Yukon and proceed further on a gravel haul road.

Visitor counts on each road segment are estimated at 20 mile intervals and the estimated number of vehicles passing that point is multiplied by twice the mileage in the segment (to reflect both outgoing and return mileage). The Bureau of Land Management estimates that the recreational traffic on the Elliot Highway is split between non-residents and residents in a ratio of 55% to 45%, respectively, and by multiplying these figures times the number of total visitor miles for each segment, an estimate of resident and non-resident miles is obtained. The same ratio of resident to non-resident traffic and recreational/non-recreational is assumed for the Steese Highway to Circle as for the Elliot. It is assumed that 200 miles per day of travel on a gravel road is the equivalent of one visitor day, and by dividing 200 into the number of visitor miles per segment, an estimate of the visitor days per segment is obtained.

Dollar expenditures for non-destination oriented visitors are estimated at the same daily rate as for destination oriented (\$20 per day for residents and \$23 per day for non-residents). The estimates of annual expenditures by segment (based on 1970

level traffic) are shown in Table 3 along with estimates of the number of resident and non-resident visitors. The estimates in this table for segments beyond Bettles are based on an assumption that only one road goes beyond that point (i.e., either the road to Kobuk or the road to Knifeblade, but not both). As indicated above, if both routes beyond Bettles should exist in the transportation system, visitor days and expenditures on each route would be reduced by 50%.

Projections of traffic for future years are made assuming the same rate of increase in resident traffic and expenditures as in projections of State population and for non-residents as in projections of the total number of tourists visiting Alaska per year.

Table 1

Estimated Non-Resident Recreational Visitors to Alaska and to Gates of Arctic, 1975-1998

Year	A	B	C	D	E
	Est. Tourists to Alaska ¹	Est. Hwy. Visitors to Gates of Arctic (= A · .0555) ²	Est. Rail Visitors to Gates of Arctic (= A · .0555) ²	Est. Hwy Expenditures (= B · \$69) ³	Est. Rail Expenditures (= C · \$69) ³
1977	224,877	882	2,496	60,860	172,230
1978	247,365	1,939	5,492	133,790	378,950
1979	272,101	3,200	9,061	220,800	625,210
1980	299,312	4,694	13,290	323,890	917,010
1981	329,243	6,453	18,273	445,260	1,260,840
1982	362,167	7,099	20,100	489,830	1,386,900
1983	398,384	7,809	22,110	538,820	1,525,590
1984	438,223	8,589	24,321	592,640	1,678,150
1985	482,044	9,448	26,753	651,910	1,845,950
1986	530,249	10,393	29,429	717,110	2,030,600
1987	583,274	11,432	32,372	788,810	2,233,670
1988	641,602	12,576	35,609	867,740	2,457,020
1989	705,762	13,833	39,170	954,470	2,702,730
1990	776,338	15,216	43,087	1,049,910	2,973,000
1991	853,972	16,738	47,395	1,154,920	3,270,250
1992	939,369	18,412	52,135	1,270,430	3,597,320
1993	1,033,306	20,253	57,348	1,397,460	3,957,010
1994	1,136,636	22,278	63,083	1,537,180	4,352,730
1995	1,250,300	24,506	69,392	1,690,910	4,788,050
1996	1,375,330	26,957	76,331	1,860,040	5,266,840
1997	1,512,863	29,652	83,964	2,045,990	5,793,520
1998	1,664,149	32,618	92,360	2,250,640	6,372,840

Table 2

Estimated Resident Recreational Visitors to Gates of the Arctic, 1975-1998

Year	A	B	C	D	E
	Est. Alaska Population ¹	Est. Hwy. Visitors (= A · 0.012) ²	Est. Rail Visitors (= A · 0.0065) ²	Est. Hwy. Expenditures (= B · \$60) ³	Est. Rail Expenditures (= C · \$60)
1977	349,267	838	454	50,280	27,240
1978	354,157	1,700	921	102,000	55,260
1979	359,115	2,585	1,400	155,100	84,000
1980	364,918	3,503	1,898	210,180	113,880
1981	378,420	4,541	2,460	272,460	147,600
1982	392,422	4,709	2,551	282,540	153,060
1983	406,941	4,883	2,645	292,980	158,700
1984	421,998	5,064	2,743	303,840	164,580
1985	437,581	5,251	2,844	315,060	170,640
1986	453,803	5,446	2,950	326,760	177,000
1987	470,594	5,647	3,061	338,820	183,660
1988	488,006	5,856	3,172	351,360	190,320
1989	506,062	6,073	3,289	364,380	197,340
1990	524,786	6,297	3,411	377,820	204,660
1991	544,206	6,530	3,537	391,800	212,220
1992	564,339	6,772	3,668	406,320	220,080
1993	585,220	7,023	3,804	421,380	228,240
1994	606,873	7,282	3,945	436,920	236,700
1995	629,327	7,552	4,091	453,120	245,460
1996	652,613	7,831	4,242	469,860	254,520
1997	676,759	8,121	4,399	487,260	263,940
1998	701,799	8,422	4,562	505,320	273,720

Notes for Table 1.

1. Estimates of tourist visits to Alaska based on 10% annual growth factor. See discussion on p. 4.
2. Estimates for years 1977, 1978, 1979, and 1980 are 20%, 40%, 60% and 80% respectively of potential volume (i.e., of indicated % x tourist population). The percentages by which highway and rail estimates are projected are discussed on p. 3-4.
3. Non-resident recreational visitor expenditures based on assumption of an average one day stay in Park and one day spent each way going and coming on new road system. Daily expenditures estimated at \$23.00. See p. 5.

Notes for Table 2.

1. See p. 4 for explanation and source for population projections.
2. See p. 4 for discussion of multiple by which highways and rail visitor estimates are projected. For the first 4 years, estimates are 20%, 40%, 60% and 80% respectively of the potential determined by multiplying the % times population.
3. Resident highway and rail expenditures are based on an assumption of \$20 per day average expenditure with 1 day spent in the Park and 1 day spent traveling each way to and from the Park on the new road system.

Table 3
 Estimated Non-Destination Oriented Visitor Days
 and Expenditures by Route Segment (based on 1970 Traffic)¹

Road Segment	Segment Mileage	Estimated Resident	Visitor Miles Non-Res.	Estimated Resident	Visitor Days Non-Res.	Est. Total Expenditures
10	30	29,615	36,195	148	181	\$ 7,123
11	157	60,210	73,590	301	368	14,484
12	13	1,854	2,266	9	11	433
15	45	4,284	5,236	21	26	1,018
16	226	67,815	82,885	339	414	16,302
20	96	695	850	3	4	152
21	184	5,832	7,128	29	36	1,408
24	147	397,170	485,430	1,986	2,427	55,821

Source: See p. 6-8.

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