73-12,709

ESSIEN, Enefiok Esienudo, 1938-
ECONOMICS OF PUBLIC RESOURCE ALLOCATION: A QUANTITATIVE ANALYSIS OF THE MICHIGAN RECREATION BOND PROGRAM.

Michigan State University, Ph.D., 1972
Economics, finance

University Microfilms, A XEROX Company, Ann Arbor, Michigan

ECONOMICS OF PUBLIC RESOURCE ALLOCATION: A QUANTITATIVE ANALYSIS OF THE MICHIGAN RECREATION BOND PROGRAM

By

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A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Resource Development

1972

ABSTRACT

ECONOMICS OF PUBLIC RESOURCE
ALLOCATION: A QUANTITATIVE ANALYSIS OF
THE MICHIGAN RECREATION BOND PROGRAM

By

Enefiok Esienudo Essien

This study was primarily concerned with measuring the extent to which the public resource allocation decisions of the Michigan Department of Natural Resources (DNR) were consistent with the intended objectives outlined by the Michigan Legislature. The DNR's decisions involved the determination of the eligibility of local projects for funding under the Michigan Recreation Bond Program. Although the decisions made by the DNR probably had some income redistribution and other implications, secondary consequences were not included in the study plan.

The DNR's project files were the main source of primary data. Only project applications whose eligibility criteria had been evaluated by the DNR were included in the population frame studied. In addition, the study was limited to those applications processed between July 1, 1969 and December 31, 1971.

A discriminant model was used to statistically classify project applications into "approved" and "rejected" groups. The statistically determined decisions were then tested against those made

by the DNR. The model was also used in estimating the relative weight of each evaluation criterion after which it was compared against the DNR assigned weights for possible discrepancy in priority ordering. A One-way Analysis of Variance was used in measuring the capacity of selected variables to cause variations in Project Scores.

More than 98 per cent of the projects approved by the DNR were found statistically to merit approval. However, the same level of precision did not hold for rejected projects. 29.87 per cent of the projects rejected by the DNR were found to have qualified for approval on the basis of the documented evaluation criteria used by the DNR. It was, therefore, concluded that the DNR was over-cautious in its allocation decisions - a condition which might have been necessitated by budget constraint.

The analysis of priority ordering disclosed that the DNR was more influenced by project efficiency than by community need.

Of the five categorical variables tested with the analysis of variance model, three were found to significantly (with $p < 0.0005$) explain variations in project score. Albeit, none of them had a coefficient of determination (R^2) high enough to adequately account for the variation in score values. The R^2 values ranged from a low of 0.058 to a high of 0.272.

The study was seen as a contribution to the search for better methods of decision making. Quantification of determinate decision rules was espoused as a means of providing administrators and analysts with the much needed time for non-programmed decision making.

To

Mr. & Mrs. E. U. Essien,

Iniobong, Ofonime, and

Idongesit Essien for many things.

ACKNOWLEDGMENTS

I wish to express my appreciation for the many useful comments and suggestions made by the following members of my graduate guidance committee: Dr. Raleigh Barlowe (Chairman), Professor of Resource Economics; Dr. Daniel E. Chappelle, Professor of Resource Economics; Dr. John H. Hoagland, Professor of Management; Dr. Gerald R. Miller, Professor of Communications; and Dr. Milton H. Steinmueller, Professor of Resource Economics.

The understanding, excellent counselling, and encouragement given by my major professor, Dr. Raleigh Barlowe, and by my acting advisor, Dr. Milton Steinmueller, deserve special mention and gratitude.

The brilliant lectures given by Dr. Daniel Chappelle in research methods and quantitative analyses have had a profound impact on the logic and style of the present study. I am grateful.

The cooperation given by the Michigan Department of Natural Resources and the technical assistance given by the Michigan State University computer programme consultants are both appreciated.

Finally, I wish to thank the members of my family, to whom this work is dedicated, for the many personal sacrifices they have made in the course of my becoming educated.

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CHAPTER I

THE PROBLEM

Introduction

On July 1, 1968, Governor George Romney signed House Bill Number 3978 into Public Act 257 of 1968. This act empowered the State of Michigan to issue general obligation bonds with which to fund a $100,000,000 public recreation programme. The effectuation of this authorization was made contingent on the approval by the majority of Michigan voters. To this end, the proposal was placed on the general election ballot on November 5, 1968, as follows:

> Shall the State of Michigan borrow the sum of $100,000,000 and issue general obligation bonds of the State, therefore pledging the full faith and credit of the State for payment of principal and interest thereon for public recreation facilities and programs consisting of land acquisition and the development of parks, forest and wildlife areas, fisheries and other facilities used or useful for public recreational purposes and for making of grants, loans and advances to political subdivisions and agencies of the State for recreational purposes, the methods of payment of said bonds to be from the general fund of the State?[1]

Not willing to leave the outcome of the referendum to chance, a massive promotional campaign was launched by the Michigan State Government in the autumn of 1968. Both mass and interpersonal media were used to persuade voters to support the recreation bond programme.

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[1]"Land and Water Conservation Fund", Michigan Department of Conservation, Newsletter No. 6, October, 1968.

Specifically, this included the formation of a citizen's committee by Governor Romney, the use of travelling displays and most importantly the publication and distribution of newsletters by the Department of Natural Resources. As Lanier (1969) points out:

> The DNR (Department of Natural Resources) devoted its September 12, 1968 issue of "Topics" to the travelling exhibit. It also published a "fact sheet", which answered specific questions. The Michigan Chamber of Commerce published at least four "Special Reports" by its Natural Resources committee (NR 3-68, NR 6-68, NR 7-68, and NR 9-68) on the bond issues.[2]

The central thrust of the campaign was to convince the electorate that by supporting the programme they would in effect be improving their recreation opportunities.

The results of the election "as certified by the Board of State Canvassers on November 25, 1968" showed that 53 per cent of the voters favoured the proposal. A breakdown of the voting pattern by county is shown in Appendix A. For some important recreation bonds approved by other states in 1968 when the Michigan referendum was passed see Table I. In addition, Table 2 shows some of the local recreation bonds approved in the same year.

Following the approval of the Michigan referendum, it was up to the legislature to specify in more definitive terms the intent of the recreation bond programme and the machinery by which it would be implemented. To do so, the seventy-fifth Michigan Legislature in its regular session on June 2, 1969, passed Senate Bill 759 which was signed by Governor William G. Milliken into law (Public Acts 108 of 1969) on July 24, 1969. In it the legislature set aside $30,000,000 to be used

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[2]L.L. Lanier, "$100 million Recreation Bond Issue for Michigan", An unpublished paper, East Lansing, October, 1969.

TABLE 1. -- Selected State-wide Recreation Bonds Approved by Voters in 1968.

State	Amount ($ million)*
Maine	4
Michigan	100
Ohio	50
Washington	40

* Figures are adjusted to show only the recreation portion of the bond issue.

Source: Bureau of Outdoor Recreation, Outdoor Recreation Action (Washington, D.C.: U.S. Department of the Interior, 1966-1969).

TABLE 2. -- Selected Local Recreation Bonds Approved by Voters in 1968.

State	Local Unit	Amount ($ million)*
California	Imperial Beach	.3
	San Diego	3.5
Maryland	Baltimore City	4.0
	Baltimore County	3.0
Minnesota	Brooklyn Park	1.5

*Figures are adjusted to show only the recreation portion of the bond issue.

Source: Bureau of Outdoor Recreation, Outdoor Recreation Action (Washington, D.C.: U.S. Department of the Interior, 1966- 1969)

for community recreation projects by local units.[3] The remaining $70,000,000 was to be used for state recreation projects as follows:[4]

a. Urban area oriented recreation projects, $25,000,000.

b. State park projects, $24,300,000.

c. Fisheries projects, $11,700,000.

d. Wildlife projects, $6,300,000.

e. Forest recreation projects, $2,700,000.

The issue of recreation bonds in Michigan aroused the attention of several interest groups. Although the different groups agreed in principle to the desirability of providing more and better recreation facilities in the state, each preferred a fund allocation arrangement which would most benefit its special interest. The fund distribution arrangements preferred by some of the major interest groups in Michigan are shown in Table 3. As a result of the divergent preferences, the ultimate allocation of funds by Act 108, as discussed above, was a political compromise. Accordingly, Governor Milliken remarked on reaching the compromise that "the outcome of the long debate (on a satisfactory bond allocation formula) is not a victory for any region, individual, or special interest. It is a victory for the people of Michigan and a response to their mandate."[5]

Other operational specifications provided by Act 108 included

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[3]Act 108, Public Acts 1969, Sec. 3(1)

[4]Ibid. Sec. 14(1)

[5]"Bond Issue Formula A Good Compromise", The State Journal, Lansing, Michigan, July 8, 1969, p. A-8

TABLE 3.--Recreation Fund Distribution Preference of Major Interest Groups in Michigan.

Interest Group	Preferred Distribution (%)		Target
	State	Local	
Deprived Areas Recreation Team (DART)	20	80	Deprived Areas
Michigan Parks Association (MPA)	70	30	State Park & Conservation
Michigan United Conservation Clubs (MUCC)	70	30	State Park & Conservation
United Automobile Workers (UAW)	40	60	Urban Areas
Joint House & Senate Conservation Committee:[1]			
Detroit Public Hearings	20	80	Urban Areas
Traverse City & Escanaba Hearings	70	30	Rural Areas
Grand Rapids Hearings	70	30	Local Communities

[1]Figures represent majority opinion.

Sources: DART: John Westbrook, letter to Michigan State Legislature, 2/6/69.
MPA: E. Genevieve Gillette, Letter to Michigan State Legislators, 4/8/68.
MUCC: Wayne B. Sackett, Position Statement, House of Representatives, Lansing, Michigan.
UAW: Olga M. Madar, Press Release, 4/14/69.
Hearings: "Capitol Affairs", State Journal, Lansing, Michigan, 5/7/69, p. A-3; Thomas J. Anderson, Letter to Conservationists, 7/8/69, p. 2.

(i) the naming of the Michigan Department of Natural Resources[6] as the sole administrator of the Recreation Funds allocation and (ii) the stipulation of the considerations which would qualify a local project for funding.[7] Priority was to be given to localities with low income and high population densities. Additional considerations included deficiencies in recreation facilities in the area for which funds were requested; the "probable multiple use of the (proposed) facility"; capacity of the local unit for maintaining and operating the facility when completed; "accessibility to users including the handicapped, the elderly, the young, deprived and low income families; and interagency cooperation."[8]

On August 12, 1969, the Department of Natural resources circulated "guidelines for local participation" in the $30,000,000 portion of the recreation bond fund, thereby setting the stage for an eventual allocation of funds to qualified local units.

Problem Definition

Now that the local unit funds are almost completely allocated, it is becoming increasingly evident that local recreation needs have not been completely satisfied and that further recreation investment may be required in the future. However, to determine the next appropriate action calls for an assessment of both the effectiveness and efficiency of the current programme. To do so calls for evaluation of the extent

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[6]Prior to 1968 (Act 353 of 1968), the Department of Natural Resources was known as the Department of Conservation.

[7]Op. cit., Act 108 (1969), Sec. 7(1) and (2).

[8]Ibid., Act 108 (1969), Sec. 7(2).

to which the intended goals of the legislature, as transmitted by the Department of Natural Resources, compare with actual performance. It is only by such evaluation that the shortcomings, (if any), of the present programme can be corrected and its strong points emphasized in subsequent planning phases. Following a series of meetings between January 1 and December 31, 1971, the officials of the Department of Natural Resources unanimously agreed that some type of evaluation was very necessary and that "perhaps evaluation funding should be an integral part of every project or group of projects."[9]

The public decision making which will precede any further funding of public recreation in Michigan will no doubt benefit from an analysis of the allocation as well as other aspects of the current programme. Such an analysis is the primary objective of this study.

It is anticipated that the study will also provide a framework for use in assessing the prospective economic efficiency of the funded projects at some future date.

Objective

In general, the objective of this study is to contribute to the information available to public decision makers so as to facilitate their efforts to efficiently allocate scarce resources between recreation activities and other competing ends.

Specifically, the study is aimed at:

1. providing other researchers with basic information about the allocation and the efficiency of the Michigan recreation bond

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[9]Inter-office Communication, "Evaluation of Recreation Bond Program", Michigan Department of Natural Resources, August, 1971.

programme as a foundation for further research in this area;

2. enabling decision makers to determine the extent to which the intent of Public Act 108 of 1969 has been successfully implemented;
3. providing decision makers with a framework for determining at some future date whether on a purely economic basis the bond-subsidized[10] projects are feasible investments;
4. ascertaining community revealed preferences for various recreation facilities.

Scope of the Study

1. The study was confined to the $30,000,000 (community recreation) portion of the recreation bond programme.
2. Only applications submitted to, and processed by, the Michigan Department of Natural Resources between July 1, 1969 and December 31, 1971 were considered in the analysis of allocation effectiveness. Of the applications, only the "approved" and the "rejected" projects[11] having complete information were included in the population frame for the final analyses.

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[10]One of the conditions for State financing was that the local unit would pay at least 20 per cent of the total estimated cost of a project.

[11]Processed applications were placed under one of the following categories: Approved, Deferred, Withdrawn, Rejected, Transferred to Urban Project, Revised and Resibmitted, and Voided. This study is limited to projects in the "approved" and the "rejected" categories.

Assumptions

The following assumptions were made in this study:

1. It was assumed that bond financing was an efficient method of raising funds for the recreation programme. This assumption was made only for analytical convenience since fiscal considerations did not constitute a major thrust of the study.[12] Essentially, it was assumed that the financing decision was already accomplished.
2. It was also assumed that the priority considerations for funding as stipulated by the Michigan legislature were based on an accurate assessment of the wishes of the people of Michigan. Thus, given the intent of the legislature, the study attempted to ascertain the extent to which it was carried out as planned.
3. As a result of assumptions one and two preceding, the study did not attempt to analyze the equity and income redistribution implications of the recreation bond programme.
4. The contribution of a recreation facility to the economic base of a community[13] funded under the $30,000,000 portion of the recreation bond programme was assumed to be approximately zero. Since the community portion of the programme was designed to

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[12]For a further discussion of the merits and demerits of bond issue as a means of paying for recreation facilities see Marion Clawson and Jack L. Knetsch, Economics of Outdoor Recreation, (Baltimore: The John Hopkins Press, 1966), p.264.

[13]Charles M. Tiebout, The Community Economic Base Study, Supplementary Paper 16, Committee for Economic Development, 1962.

serve local neighbourhoods, the export component, (an indispensable item in economic base analysis) of a local recreation activity could be reasonably assumed to be approximately zero. That is, in

$$\Delta Y = \Delta E \left(\frac{1}{1 - \frac{N}{E}} \right)$$

where ΔY = changes in total income;

ΔE = changes in basic (export) income;

N = non-basic (local) income;

E = basic income;

if $\Delta E \simeq 0$, then $\Delta Y \simeq 0$.

Hypotheses

The general hypotheses investigated in this study was that the allocation of funds by the Michigan Department of Natural Resources did not significantly differ from the intent of Public Act 108 (1969), sec. 7 (1), (2). The operational hypotheses were that:

1. approved and rejected applications belonged to the same population;
2. a statistically determined decision to approve or reject applications for grants would not differ from that (decision) made by the Department of Natural Resources;
3. the scores assigned to each application did not vary according to region, county, project type, facility type, or judgement differentials of the reviewers.

The analytical methods for testing the above hypotheses will be discussed in Chapter IV. The discussion of results will be the subject matter of Chapter V.

CHAPTER II

COLLECTIVE RESOURCE ALLOCATION

Theoretical Framework

Like all conceptual constructs, economic models are designed to ba a representative abstraction of real world phenomena. The particular aspects of realism which have traditionally interested economists deal with the production and utilization of resource based goods and services.[1] Specifically, this deals with inquiries into the most efficient way of satisfying resource-satiable needs[2] of man in his existence as a member of household, firm, and society respectively.

Although it has always been realized that memberships in household, firm, and public sectors are not mutually exclusive, most

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[1]The term "resource-based goods and services" is used here in preference to "resources" in order to isolate and underscore the role of physical resources primarily as a medium of want satisfaction. For an elaboration of this approach see Henry L. Hunker (1964) and Kenneth Boulding (1966).

[2]A. H. Maslow in "A Theory of Human Motivation", Psychological Review, 50, (July 1943); and in Motivation and Personality (New York: Harper and Row Publishers, 1954) gives a hierachical ordering, in ascending order, as follows:

i. Basic psychological needs, (e.g. food),
ii. Safety from external danger,
iii. Love, affection and social activity,
iv. Esteem and self respect, and
v. Self realization and accomplishment.

In the present study, only those needs which can be satisfied by resource use are considered relevant. Love, for example, which is a need in the Maslow schema is outside the jurisdiction of the present work.

economic thought - especially its classical version - assumes a modular interaction among the sectors and as such is capable of analyzing membership in each of the sectors independently.

Objective functions are specified for each sector such that the dominant interest of the household is to maximize resource-satiable needs (or utility) while the firm maximizes profits and society maximizes public welfare. With the assumption of a perfectly competitive structure within which intra- and inter-sector transactions are conducted, the behaviours of the respective sectors are usually perceived as being mutually reinforcing. Accordingly, maximized production and consumption functions could be viewed as adding up to a maximized welfare of society. In other words, given the above assumptions, an optimal collective resource allocation could be seen as a linear and additive function of optimum allocation in the household and firm sectors. And since both sectors are presumed to behave rationally,[3] each is by definition always striving for the optimum.[4] The implication of this theory for public decision making is significant. Principally, it rules out the need for explicit government action to influence the course of public welfare. To the extent that government action is at all necessary, it is expected to be limited to maintaining the smooth functioning of the market system.

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[3]For a specification of the assumptions necessary for rational economic behaviour, see C. E. Ferguson, Microeconomic Theory (Illinois: Richard D. Irwin, 1966), pp. 13-14.

[4]Underlying, and to some extent preceding the above premise, is the presupposition, as J. F. A. Taylor (1966) points out, that the struggle for the satisfaction of human needs is predicated on some benevolent covenant - a mutual trust and respect of each transactor's dignity. The perception of such benevolence helps in defining away the incongruity between individual and social goals.

The system would then foster maximum efficiency in production and consumption, and by so doing, would automatically (but incidentally) promote maximum public welfare.

The efforts of Alfred Marshall (1916), John Maynard Keynes (1926), and Joan Robinson (1933) to draw attention to possible frictions in the market mechanism introduced a chain of ad hoc studies directed at various aspects of public welfare. It was Baumol's (1952) work, however, which pioneered the conscious and explicit attempts at relating economic welfare of society to public decision making.

But even though the economic profession was slow at breaking away from the traditions of market mechanism à la Adam Smith (1869), the rest of the world had come to accept the growing role of government, especially after World War II,[5] in influencing the pattern and magnitude of resource allocation. This awareness, in essence a delimitation of the scope of market effectiveness, requires a definition of the relationship between the respective interests[6] in society and in government. It involves a determination of when resources would be collectively allocated, the decision rules to be used in such collective transactions, and how decisions and manifest interests would be implemented through public mechanism.

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[5]For a historical narration of the increasing role of government in economic decision making in the United States, see Forest G. Hill, "The Government and Institutional Adjustment: The American Experience" in Carey C. Thompson, Institutional Adjustment: A Challenge to a Changing Economy (Austin: University of Texas Press, 1967), pp. 85-109.

[6]It should be noted that public interest is a variable whose scope and definition is a function of time, place and circumstance.

In a market structure where methodological individualism[7] is the accepted ideal order, rational individuals must be singularly stimulated by a threat of loss or an opportunity for gain in order for them to voluntarily choose to allocate resources collectively. These stimuli include the inconveniences arising from market imperfections, the need for alternative quality and the need for a redistribution of power proxies, as well as non-excludability of potential beneficiaries. Regardless of the character and source of the stimulation, the acceptance of collective choice involves the subjugation of individual to group preference where the two are at variance. To minimize the potential conflict of individual and group interests, efforts have been made by many analysts to devise specific rules which must govern the process of collective choice. Group consensus has been suggested as the most satisfactory rule for guarding against such conflict. Buchanan and Tullock (1962), in particular, prefer the consensus rule over other alternatives. Accordingly, they remark:

> The individualist theory of the constitution we have been able to develop assigns a central role to a single decision-making rule - that of general consensus or unanimity. The other possible rules for (collective) choice making are introduced as variants of the unanimity rule. These variants will be rationally chosen, not because they will produce "better" collective decisions, but rather because on balance, the sheer weight of the cost involved in reaching decisions unanimously, dictates some departure from the "ideal" rule.[8]

The consensus rule requires every group member to agree with a group position before action could be taken. Thus each member is vested with

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[7]In contrast to methodological collectivism, this is an arrangement wherein individuals are the significant units of analysis.

[8]J. M. Buchanan and G. Tullock, The Calculus of Consent, (Ann Arbor: University of Michigan Press, 1962), p. 96.

the capacity to stop action by withholding consent.

An alternative rule for collective choice is that usually attributed to Pareto (1897) in which collective decision is considered desirable only if at least one group member is benefited and no member is deprived as a consequence of such decision. The principal criticism of this approach is in the power vested in any member whose position may be worsened by a group decision. Other alternatives include the majority rule,[9] and the compensation principle[10]. The attempt to establish a constant symmetry between individual and collective preferences is a futile endeavour. This view is very well documented by Amartya K. Sen (1970), who, after an analytic and critical appraisal of alternative rules for collective choice, concludes that "there is no 'ideal' system of collective choice that works well in every society and for every configuration of individual preferences".[11]

Operational Framework

So far, we have implicitly assumed in this chapter that the role of government is that of a passive mechanism whereby public interests (however defined) are effectuated. In such a perception of the public sector, the government has no significant input into the actual process of decision making. It merely translates expressed public interests into desired action much in the same way as the market services the

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[9]D. Black, The Theory of Committees and Elections, (Cambridge: Cambridge University Press, 1958)

[10]J. R. Hicks, "The Rehabilitation of Consumers' Surplus, Review of Economic Studies, Vol. XIX, 1942.

[11]A. K. Sen, Collective Choice and Social Welfare, (San Francisco: Holden-Day Inc., 1970), p. 200.

needs of buyers and sellers without directly subscribing to the outcome.[12] An alternative and more operational theory assumes that government has a more deliberative role in public decision making including the capacity to initiate action intended to serve the interest of a specified public.

The Michigan experience is illustrative of this view. From the discussion in chapter one, it is evident that the Michigan state government has played an active role not only in generating public interest in favour of the recreation bond programme, but also in defining the objectives that would guide its subsequent administration. A measurement of the extent to which the resultant allocation of funds reflected the expressed intent of the legislature is one of the major thrusts of this study. For now, it suffices to note that in the analyses to follow, government will be treates as an active participant in collective resource allocation.[13]

The Publicness of "Public Goods"

The complexity surrounding the role of government in public decision making is not restricted to the dichotomous theories of government as a neutral or participating instrument of collective

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[12]Variants of this model are articulated by Anthony Downs, An Economic Theory of Democracy (New York: Harper and Row, 1957); and Arthur Maass, "Systems Design and the Political Process: A General Statement" in Design of Water Resource Systems, (Cambridge, Mass.: Harvard University Press, 1962), pp. 565-604.

[13]For a discussion of some of the deliberating processes which underlie decision making by the public sector see Duncan Black (1958), op. cit.

choice. It is also necessary to know the exact nature of government's participation in such choice. Does it merely provide guidelines and legislations governing the behaviour of private actors? Does it indirectly influence policy through fiscal adjustments, subsidies, moral suasion or some combination of the above?[14] The exact pattern of involvement depends on the situation. In the case under study, the spending power of Michigan state government was the chosen instrument of influencing the supply of recreation services.

Regardless of the pattern of influence, any collective good the supply of which is directly undertaken or subsidized by the government will here be referred to as a public good.[15] To be "public" a good must be "a collective good". Peter O. Steiner (1969), who has presented a very persuasive argument in favour of the above definition comments on collective goods as follows:

> Collective goods arise whenever some segment of the public collectively wants and is prepared to pay for a different bundle of goods and services than the unhampered market would produce. A collective good thus requires (i) an appreciable difference in either quality or quantity between it and the alternative the private market would produce, and (ii) a viable demand for the difference.[16]

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[14]These alternative policies are only illustrative. For a more detailed discussion of legitimate powers that government can use to influence resource allocation see Raleigh Barlowe, Land Resource Economics, (New Jersey: Prentice-Hall Inc., 1972), Chapter 17. For specific reference to recreation see Marion Clawson and Jack L. Knetsch, op. cit., Chapter 14.

[15]For a similar but more open-ended definition of public good see William C. Birdsall, "A Study of the Demand for Public Goods" in Richard Musgrave, Essays in Fiscal Federalism, (Washington D. C.: The Brookings Institution, 1965), pp. 235-292.

[16]Peter O. Steiner, "The Public Sector and the Public Interest" in The Analysis and Evaluation of Public Expenditure: The PPB System, Vol. 1, (Washington D.C.: U.S. Government Printing Office, 1969), p. 17.

Steiner's definition spares economists the burden of having to define public goods in terms of their technical properties.[17] No longer is it necessary for a good to be only private or public by nature. Few goods have such clear-cut characteristics. Most goods are combinations of "public" and "private" attributes and the determination of the source of supply is usually based on which attribute is dominant in a good. With that in mind, a formulation can be made as follows:

$$DD_X = dd_{x_1} + dd_{x_2},$$

where

DD_X = demand for good X = $(x_1 + x_2)$

dd_{x_1} = demand for the private attribute (x_1) of good X

dd_{x_2} = demand for the public attribute (x_2) of good X

Viewed from the production or supply standpoint, the definition also implies that:

$$MC_X = mc_{x_1} + mc_{x_2}$$

where

MC_X = marginal cost of producing good X = $(x_1 + x_2)$

mc_{x_1} = marginal cost of producing the private attribute (x_1) of good X

mc_{x_2} = marginal cost of producing the public attribute (x_2) of good X.

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[17]For illustrations of the more restrictive definitions of public goods see Albert Breton, "A Theory of the Demand for Public Goods", Canadian Journal of Economics and Political Science, November, 1966, pp. 455-467; and Robert H. Strotz, "Two propositions Related to Public Goods", Review of Economics and Statistics, November, 1958, pp. 329-331.

If it is assumed that DD_X represents the aggregate marginal social benefit associated with the consumption of composite good X, and MC_X is the corresponding aggregate marginal cost associated with the production of the same composite good, then given a competitive market structure, the equi-marginal principle can be used to specify a decision rule which maximizes public welfare where:

$$MC_X = DD_X$$

$$\text{or } mc_{x1} + mc_{x2} = dd_{x1} + dd_{x2}.^{18}$$

This approach to the nature of public goods makes it unnecessary for the theory of public goods to be discussed in terms of an incomplete and misleading listing of goods and services which "rightfully" belong to the public domain. But, probably of greater advantage is the fact that it allows quantifiable public goods to be evaluated in terms of their benefits and the associated costs - at least on a conceptual level.

The Publicness of Recreation Services

The growing involvement of all levels of government in recreation activity raises a question about the qualifications of recreation service as a public good. In keeping with the definition of a public good given previously, it is not sufficient that the supply of recreation services is publicly influenced. To qualify as a public good it is also necessary that there is an appreciable difference in either quantity or quality between the public good and the alternative

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[18]In its present form, this analysis assumes fixed proportions in the production of public and private attributes of good X. This assumption is made only for convenience and is not necessary for the validity of the argument.

which the private market is producing. The difference may be due to location, price, clientele etc. Furthermore, it is necessary that there should be a demand for that difference.

The quality of a recreation service is an attribute, subjectively perceived by each recreation consumer, which defined his relationship with a particular recreation service. It varies with individual experiences, tastes and culture among other determinants. Consequently, a comparison of the quality of public and private recreation services is plagued with measurement difficulties. To the contrary, it is relatively easy to measure "quantity" of recreation services received by the public in terms of the participation rate of different socio-economic (or other) grouping. A test of dissimilarity between private and public "quantity of recreation" could then be conducted with reference to the specific grouping. Implied in most rationalizations for public supply of recreation services is the assumption that there is a discernible difference (especially in terms of accessibility) between private and public goods - particularly in the short run.[19]

In the present study, the existence of a "public good" attribute in recreation goods and services will be taken as given. Our analytical focus will, therefore, be on the effectiveness of the existing arrangements.

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[19]For an illustration of such a rationalization see Katz, Myron, Potential for the Recreation and Tourist Industry in the Pacific Northwest, U.S. Department of the Interior, Bonneville Power Administration, 1969. p. 14.

CHAPTER III

RESEARCH PROCEDURE AND STATISTICAL DESIGN

Population Frame and Data Source

This study involved the analysis of the fund allocation process used by the Department of Natural Resources (DNR), in the recreation bond programme. It was primarily concerned with the problem of determining the extent to which the intended goals of the legislature, as transmitted by the DNR, compared with actual performance.

All applications for the bond funding which were either approved or rejected were potential members of the finite population, (608), for analysis. Actual inclusion in the population frame depended on whether the application contained the needed data in a usable form. Specifically, to qualify for inclusion in the study, an application had to be rated by the DNR in terms of each of its evaluation criteria.

Only applications submitted to, and processed by the DNR between July 1, 1969 and December 31, 1971 were analyzed. By the latter date, a large amount of the community portion of the bond funds had already been committed in varying degrees. The temporal limitation was also due to the fact that at the time data were collected for this study the DNR did not have an up-to-date record of post-December, 1971, transactions in its project files. Project records maintained by the DNR were the sole primary data source for this study.

Sample Design

Although the use of entire populations entail greater data handling, it is superior to sampling because of its ability to completely remove sampling error. Consequently, there was a conscious tendency in this study toward the use of entire populations. In the discriminant model, however, the limitations on computer programme parameters necessitated the incorporation of less than the entire population in the analysis. In that instance, adequate precaution was taken to minimize bias. As used here, the term "bias" refers to the extent to which the mean of the frequency distribution of the estimates produced by the sample differs from the population characteristic which is being estimated. Specifically[1], a biased sampling procedure can be defined as:

$$\beta = \sum_{i=1}^{k} p_i \xi_i - \theta_i$$

where

ξ_i = estimate provided by sample $s_i (i = 1, 2, \ldots, k)$

p_i = probability of being selected, and

θ_i = population value being estimated.

A table of random numbers as presented by Alvin E. Lewis[2] was used to randomly select 138 out of 531 approved projects, without replacement, for use in the discriminant analysis. The process was

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[1]William G. Cochran, Sampling Techniques (New York: John Wiley & Sons, Inc., 1953), p.8.

[2]Alvin E. Lewis, Biostatistics (New York: Reinhold Publishing Corporation, 1966), Table A-1, p.211.

repeated until every approved project was included in the analysis. The number of unapproved projects was within the computer programme specification.

In the analyses for sources of variation in the mean score, every application containing the necessary data in a usable form was included.

Aggregation of Data

Section 4 (1) of Public Act 108 of 1969 stipulated that funds would be allocated to regions on a per capita basis. For this purpose the Act divided the state of Michigan into seven regions as shown on Table 4 and Figure 1.

Up to June 30, 1971 projects originating within a region were to be funded up to the allowable per capita allocation for the project area. Between July 1, 1971 and June 30, 1972 uncommitted local funds were to be pooled into regional funds and made available to projects originating from each of the regions. In cases where there were unused regional funds after June 30, 1972, such funds were to be converted into state money "from which grants may be made for any local unit project within the state".

The multiple units of aggregation (counties, regions, state) described above complicated the selection of an analytical unit for this study. While regionalization has the advantage of minimizing the number of data units handled, it has the disadvantage of creating aggregation error. This is a statistical error arising from the pooling together of dissimilar magnitudes such that:

TABLE 4.--Regional groupings for allocation of the local unit portion of the Michigan recreation bond funds.

Region Number	Counties	Amount Allocated ($)
1	All the counties of the Upper Peninsula	1,173,300
2	Emmet, Charlevoix, Antrim, Leelanau, Benzie, Grand Traverse, Kalkaska, Manistee, Wexford, Missaukee, Osceola, Lake, Mason, Newaygo, Mecosta and Oceana.	971,400
3	Cheboygan, Presque Isles, Ostego, Montmorency, Alpena, Crawford, Oscoda, Alcona, Roscommon, Clare, Ogemaw, Iosco, Arenac and Gladwin.	525,300
4	Muskegon, Ottawa, Kent, Montcalm, Ionia, Eaton, Clinton, Ingham, Barry, Allegan, Van Buren, Kalamazoo, Calhoun, Branch, St. Joseph, Cass and Berrien.	7,457,400
5	Bay, Midland, Isabella, Gratiot, Saginaw, Tuscola, Huron, Sanilac, Lapeer, Genesee, and Shiawasee.	3,838,200
6	Livingston, Oakland, Macomb, St. Clair, Monroe, and Washtenaw	5,809,800
7	Wayne	10,224,600

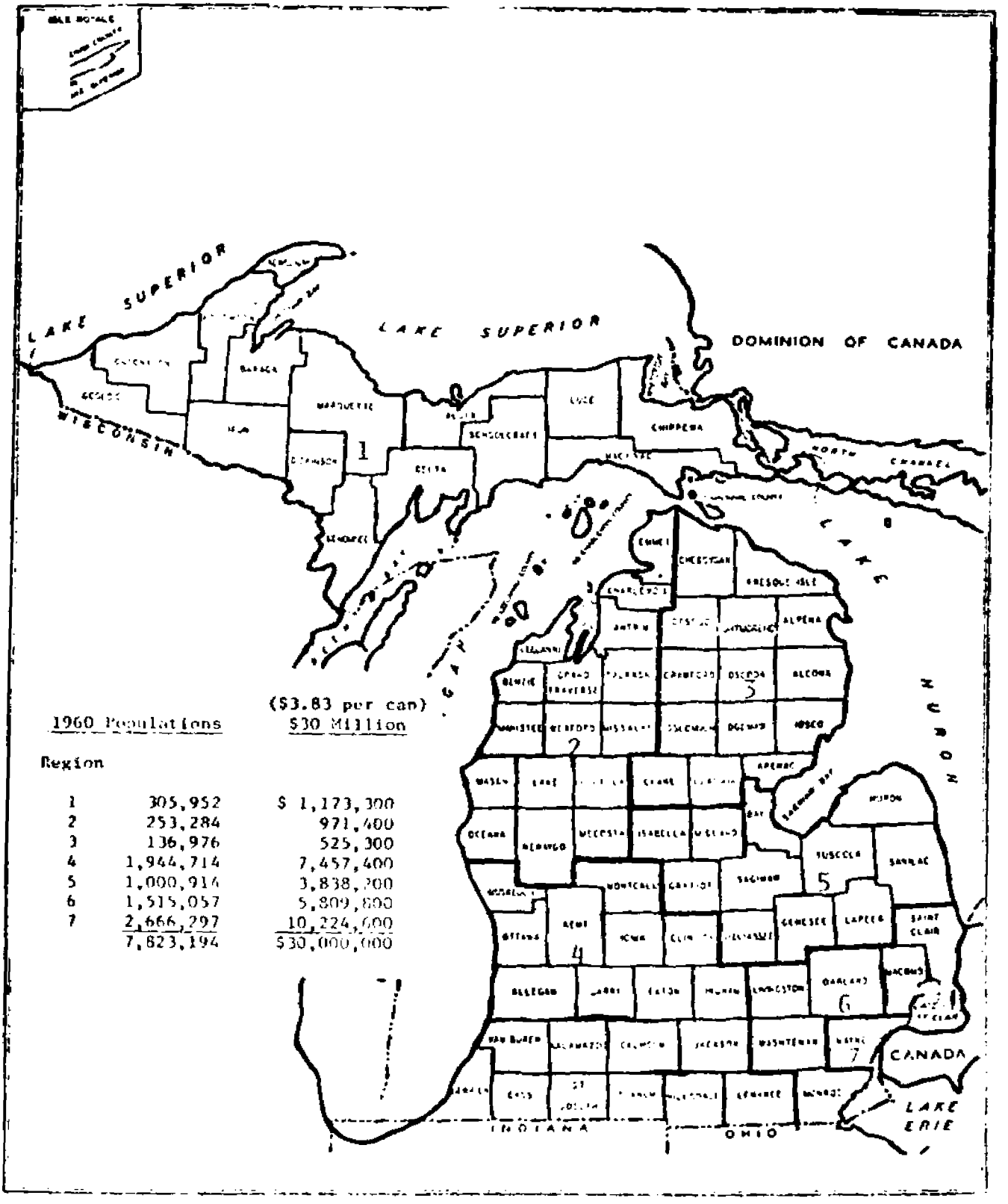

FIGURE 1.--Regional groupings for allocation of the local unit portion of the Michigan recreation bond funds.

$$\sum_{i=1}^{n} x_i^2 - \frac{1}{n}\left[\sum_{i=1}^{n} x_i\right]^2 \neq 0$$

where x_i = observable value.[3]

To minimize such error, each project was individually analyzed. Regional, county and other aggregates were used only when information on related magnitudes was specifically required.

The Dependent Variable

The analysis of funds allocation was aimed at isolating and ranking the variables upon which the decision to approve an application for grants depended. The dependent variable was, therefore, "approval status". With that, it was possible to define a functional relationship such that:

$$A = A(C)$$

where

A = approval status, and

C = criteria for approval.

In its present form, (A) is a dummy variable which assumes the following values:

1 = approved

0 = rejected.

Since (A) assumes a dichotomous value, its magnitude is dependent on the relationship between approval and rejection. Thus if "y" applications are approved, then (1-y) applications are rejected. The

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[3]For further discussion see J. Ward, "Hierachical Groupings to optimize an objective function", Journal of American Statistical Association, 1963, pp. 236-244.

dummy dependent variable then violates the regression theory assumption that given the probability functions of Y's for given X's, $p(Y_i/X_i)$, "the random variables Y_i are statistically independent".[4] To ensure statistical independence and to better simulate the decision process used by the Department of Natural Resources, the total score of each project (T_i) was used as the dependent variable in the discriminant analysis. Adjusted total score (S*) was used as the dependent variable in the analysis of variance. The rationale for the adjustment as well as the specifications for both models are given in Chapter IV.

Independent Variables

In this section the criteria used by the Michigan Department of Natural Resources (DNR) in determining the approval status of each project will be discussed.

Citizen Participation

Each community applying for grants was requested by the DNR to enlist the participation of its citizens in project selection. Hearings and local meetings were the usual methods used in accomplishing such participation.

The legislature intended that each funded project, to the extent possible, contribute toward the satisfaction of the recreation needs of the entire community in which it was located. To ensure that attribute, the DNR made citizen participation one of the items to be evaluated in the determination of approval status.

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[4]Roland J. Wonnacott and Thomas H. Wonnacott, Econometrics, (New York: John Wiley & Sons Inc., 1970), p. 15.

Operating and Administrative Structure

For a full utilization of the benefits of a facility, it was necessary that the facility should be well managed and kept fit for public use. The extent to which this function could be carried out largely depended on availability of an organized structure recognized by, and accountable to, the community. Such a body should be sufficiently flexible as to offer leadership in new and creative directions. Typically, the existence of a local Parks and Recreation Commission or any local body exercising authority over the administration of an area's parks and recreation programme was accepted by the DNR as evidence of an organized administrative structure.

Project Location

This item assumed that the level of recreation deficiency was not homogeneously distributed within each community. It sought, therefore, to ensure the location of a funded project where there was the greatest need.

Income Level

In the simple Keynesian consumption formulation, aggregate consumption is usually a function of disposable income. That is:

$$C = \alpha_0 + \alpha_1 Y^*, \quad \alpha_0 > 0, \quad \alpha_1 < 1$$

where

C = aggregate personal consumption expenditure

α_0 = constant intercept

α_1 = the marginal propensity to consume

Y* = disposable personal income (i.e. total personal income minus taxes).

A casual examination of the pattern of recreation consumption in the United States between 1909 and 1962 (see Table 5) shows that recreation expenditure and disposable personal income tend to vary together. Using the data shown on Table 5, this writer fitted a regression estimate as follows:

$$Y = -918.29 + 56.38X$$

where

Y = personal consumption expenditure for recreation, $ million

X = disposable personal income, $ billion.

The correlation coefficient (R) was .9942 and the coefficient of determination (R^2) was .9885. The F statistic (= 3354.3646) was significant at $p < 0.0005$. On the basis of these findings it appeared that disposable personal income (X) accounted for more than 90 per cent of the behaviour in personal consumption expenditure for recreation (Y). If the above relationship is assumed, it could be generalized that the poor are less capable of participating in recreation consumption than the rich. Very likely, this relationship provides the rationale behind the DNR's inclusion of community "income level" among the determining criteria for approval.

Population Density

This qualifying criterion was used by the DNR to ensure that as many people as possible were served by the proposed facilities.

TABLE 5.--Recreation expenditure and disposable income in the United States, 1909 - 1962.

Year	Personal consumption expenditure for recreation ($ million)	Disposable personal income ($ billion)	Recreation expenditure as a percentage of disposable personal income (%)
1909	860	26.6	3.2
1914	1,000	29.6	3.4
1919	2,180	63.3	3.4
1921	2,055	60.2	3.4
1923	2,620	69.7	3.8
1925	2,835	73.0	3.9
1927	3,120	77.4	4.0
1929	4,331	83.1	5.2
1930	3,990	74.4	5.4
1931	3,302	63.8	5.2
1932	2,442	48.7	5.0
1933	2,202	45.7	4.8
1934	2,441	52.0	4.7
1935	2,630	58.3	4.5
1936	3,020	66.2	4.6
1937	3,381	71.0	4.8
1938	3,241	65.7	4.9
1939	3,452	70.4	4.9
1940	3,761	76.1	4.9
1941	4,239	93.0	4.6
1942	4,677	117.5	4.0
1943	4,961	135.5	3.7
1944	5,422	146.8	3.7
1945	6,139	150.4	4.1
1946	8,621	160.6	5.4
1947	9,352	170.1	5.5
1948	9,808	189.3	5.2
1949	10,122	189.7	5.3
1950	11,278	207.7	5.4
1951	11,704	227.5	5.1
1952	12,257	238.7	5.1
1953	12,892	252.5	5.1
1954	13,256	256.9	5.2
1955	14,220	274.4	5.2
1956	15,161	292.9	5.2
1957	16,082	308.8	5.2
1958	16,842	317.9	5.3
1959	18,309	337.3	5.4
1960	19,524	350.0	5.5
1961	20,533	364.4	5.6
1962	21,555	385.3	5.6

Source: Marion Clawson and Jack L. Knetsch, op. cit., p. 318.

Accessibility

In addition to the costs of recreation equipment and user fees (where they are applicable), a significant part of the expenditure associated with the total recreational experience involves transportation and related costs (e.g. food and accommodation). The more accessible a facility, the greater the likelihood of a high rate of usage.[5]

Deficiencies

Since the object of the local programme was to help in alleviating the recreational needs of Michigan communities, the DNR insisted that projects for which funds were requested should be designed to meet the greatest deficiency of the communities concerned.

Priority Justification

Each applicant for grants was requested to prepare a "recreation plan". Among other things, the plan included a documentation of the recreation needs of each participating community. In evaluating the approval status of a project, therefore, the DNR attempted to give preference to those projects which represented the most urgent recreation need of the community involved.

Multiple Use

"Multiple use" was the criterion used by the DNR to ensure the utilization of funded facilities by various public interests and groups. Accordingly, projects with multiple uses were supposed to be

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[5]For further discussion, including some reservations on this assertion, see M. Clawson and Jack L. Knetsch, Ibid., Ch. 5.

given priority consideration for funding.

Interagency Cooperation

This criterion was partly based on the need to facilitate the spread of project benefits and more importantly on the need to insure the continued availability of financial support for funded projects. Preference was given to projects having financial support from several agencies or organizations.

Weighting and Scoring

The Department of Natural Resources (DNR) assigned a weight to each of the independent variables discussed above. The weights were essentially a measurement of the relative impact which the DNR wanted each variable to have in the determination of approval status.

The evaluation criterion with the greatest weight was "income level". The criteria with the least weight were "citizen participation" and "interagency cooperation". The pattern of weight assignment seemed to suggest that the DNR's intention was to encourage the provision of recreation facilities to low income communities, without being too meticulous about provision for facility administration. The status of this assertion will be discussed in Chapter V.

Each variable was scored on a trichotomous scale, (0-1-2), by the DNR:

0 = poor: criterion does not meet the required standard

1 = fair: the required standard is partly met

2 = good: the criterion completely meets the required standard.

The product of each item's score and its assigned weight gave the total

score for the variable (see Table 6). The summation of the total scores for all the independent variables gave the "Total project Score". In other words, for each project-application, the total project score was determined by:

$$\sum_{i=1}^{10} z_i \omega_i$$

where

z_i = score on criterion i

ω_i = weight on criterion i.

The role of the DNR's project criteria as actual determinants of approval status could not be determined by casual observation. A detailed analysis was necessary. The following chapter will be devoted to discussing the format of that analysis.

TABLE 6.--Project application review criteria.

Criteria	(1) Project Fit (score) (0-1-2)	(2) Weight	(3) Total [(1)(2)]	Comments and references
1. Citizen Participation		1		Is there evidence that the community has endorsed or participated in the selection of this project?
2. Structure for Administration, Operation and Programmes		2		Is there evidence of an organized structure to administer the facility and provide programme direction?
3. Project Location		3		Is the project located to serve that segment of the population with the greatest need and in the area of greatest deficiency?
4. Income Levels		5		To what extent will project provide recreation opportunities for low income people?
5. Population Density		3		To what extent will project serve people living in high density areas?
6. Accessibility		2		How accessible is the project to all users by foot, automobile or public transportation?

TABLE 6 contd.

7.	Deficiencies	4	Does project meet one of the greatest deficiencies as identified in plan?
8.	Priority Justification	2	How well is the project documented in the plan as to priority i.e., is this the best project which could be submitted at this time?
9.	Multiple Use	2	To what degree will the project offer a variety of activities for year round use?
10.	Interagency cooperation	1	Is the project sponsored or financially supported by more than one agency or organization? Are there formal interagency agreements?

CHAPTER IV

ANALYTICAL METHODS

One of the principal methods of analysis used in the study was the Discriminant Analysis for several groups. The technique was selected because it seemed to be the most applicable analytical method for the problem under study. With the discriminant analysis, not only could relative weights of approval criteria be determined, but the total project scores which led to approval could also be specified. An excellent summary of the general characteristics of the technique is given by Kay and Kirk as follows:

> (Discriminant analysis for several groups) directs the computation of a set of linear functions for the purpose of classifying an individual into one of several groups. The input data consist of a set of observations for each of the classification groups; each observation consists of the values of a set of variables, and each observation contains a value for each of the variables.
>
> The group assignment procedure followed is derived from a model of a multivariate normal distribution of observations within groups such that the covariance matrix is the same for all groups. An individual is classified into the group for which the estimated probability density is largest. The equivalent computational procedure followed evaluates the computed linear function corresponding to each of the groups and assigns an individual to the group for which the value is largest.[1]

The classification of objects drawn from a mixed population

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[1]Kevin Kay and Rodney Kirk, BMD05M - Discriminant Analysis for Several Groups, CISSR Technical Report No. 31, (East Lansing: Michigan State University, 1967)

comprising two distinct groups of objects entails a risk of misclassification. Discriminatory analysis seeks to classify distinct objects into their appropriate groups while keeping the risk of misclassification to a minimum. To do so is analogous to dividing a p-dimensional space into regions (R_1 and R_2) and assigning an object to that region which accommodates the point representing the measurements associated with the particular object. The boundary between R_1 and R_2 is defined by the constant likelihood ratio. Thus, for two populations with multivariate normal probability densities and the same dispersion matrices, the likelihood ratio (or its logarithm) is:[2]

$$\Sigma\Sigma\alpha^{ij}[(x_i-\mu_{i1})(x_j-\mu_{j1}) - (x_i-\mu_{i2})(x_j-\mu_{j2})]$$

where α^{ij} = reciprocal of dispersion matrix (α_{ij})

$\mu_{11},\ldots,\mu_{p1}$ = mean values for first group

$\mu_{12},\ldots,\mu_{p2}$ = mean values for second group

x = measurements attributed to objects in each group.

The above expression can be rewritten as:

$$\sum_{i=1}^{p}(\alpha^{1i}d_1+\ldots+\alpha^{pi}d_p)x_i = \psi \qquad (1)$$

where $d_j = \mu_{j1}-\mu_{j2}$, $(j = 1,2,\ldots,p)$

ψ = constant.

Equation (1) divides the p-dimension in space into regions R_1 and R_2

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[2]C. Radhakrishna Rao, Advanced Statistical Methods in Biometric Research, (Darien, Conn: Hafner Publishing Company, 1970), pp. 287-288.

respectively and thereby minimizes the risk of misclassification.[3] It is a discriminant function. Those applications for recreation funding for which the value on the left-hand side of equation (1) exceeded a chosen constant were assigned to the group for approval; those with smaller values were assigned to the group for rejection. "In the particular sense implied by the derivation, this is a more efficient method of classification than any other."[4]

Statistical Model (1)

The operational specification for the discriminant model used in this study was as follows:

$$T_m = \sum_{i=1}^{11} a_i X_i + e_n, \quad m,n = 1,2,\ldots,N.$$

where

T_m = total score on project m

a_i = estimated relative weight assigned to variable i

X_i = variable inputs (independent variables)

e_n = random error.

Independent Variables

The following independent variables were used in the discriminant model:

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[3]For a more detailed discussion of various aspects of the above formulation see Rao, ibid., Chapter 8.

[4]Oscar Kempthorne, Theodore A. Bancroft, John W. Gowen, Jay L. Lush (eds.), Statistics and Mathematics in Biology (Ames, Iowa: The Iowa State College Press, 1954), p.75. For a less optimistic view of this method of decision making see H. Robbins, "Assymptotically subminimax solutions of Compound Statistical Decision Problems", in Proceedings of the Second Berkeley Symposium in Mathematical Statistics and Probability, (Berkeley: University of California Press, 1951), pp. 131-148.

X_7 = Citizen participation

X_8 = Administrative structure

X_9 = Interagency cooperation

X_{10} = Income levels

X_{11} = Population density

X_{12} = Accessibility

X_{13} = Deficiencies

X_{14} = Priority justification

X_{15} = Multiple use

X_{16} = Interagency cooperation

X_{21} = Funds availability.

The first ten variables (X_7 to X_{16}) were defined in Chapter III. They were identical variables to those used by the DNR as the "criteria for project evaluation". Fund availability (X_{21}) was included in the study to test the extent to which the relationship between requested and existing funds influenced approval decisions. X_{21} was, therefore, a transformed variable defined as X_6/X_{20},

where

X_6 = Grants requested, dollars

X_{20} = Available funds at review period.

"Approval status" (X_{19}) was used to identify DNR's approved and rejected projects as follows:

X_{19} = 1 if approved

= 0 if rejected.

The results of the analysis using the discriminant model are discussed in Chapter V.

Statistical Model (2)

The second major model used in the study was the Analysis of Variance. This model was used to test the effect of selected independent variables which were sets of unordered categories[5] on the DNR's allocation decisions.

Independent Variables

The independent variables used in the model were:

X_2 = Project Type

= 1 if development project

= 2 if acquisition and development

= 3 if acquisition

X_3 = County identification (see Appendix B for listing)

X_4 = Regional identification (as defined in Chapter I)

X_5 = Facility type

= 03 if courts (tennis etc.)

= 04 if field

= 07 if marinas/beach

= 09 if outdoor education centre

= 10 if park development

= 11 if play area (tot-lots etc.)

= 12 if play equipment

= 13 if pools

= 15 if recreation center

= 16 if roads, parking lots or bridges

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[5]These are variables which range over various categories without any possibility of their being ordered.

X_5 = 17 if shelter (bandshell etc.)

= 18 if ice rink

= 19 if ski area

X_6 = Project reviewer.

Each project application review sheet was supposed to bear the initials of the reviewer. Of the 608 projects included in the study, only 54 had unidentified or no reviewer's identification. Those will be hereafter referred to as projects with "unidentified reviewers" in contrast to "identified reviewers" for the remaining projects. In all, 20 reviewers were identified. The projects with unidentified reviewers were put into one category. Two seperate tests were then conducted on "Project Reviewer", X_6. One test used all reviewers (identified and unidentified) as the independent variable; the other test used only the identified reviewers.

An uncoded variable, X_1, corresponding to the file number kept by the DNR was used to identify each project.

The Dependent Variable

As in the discriminint analysis, total project score, (T), was the dependent variable. However, since this section of the study was aimed at explaining the variation in project scores, it was considered necessary to make adjustments for "standardized scores". Of the ten "project evaluation criteria" used by the DNR (see Table 6), "Income level", X_{10}, and population density, X_{11}, were assigned standardized scores on the basis of the 1960 census data. For the standardized format used by the DNR see Table 7.

To confine the test of score variance to those criteria

TABLE 7.--The Department of Natural Resources' Regional Standards for scoring "Income Level" and "Population Density"

Region	Income Level		Population Density	
	Range ($)	Score (Fit)	Range	Score (Fit)
1	5200 +	0	500 -	0
	4200 - 5200	1	500 - 1000	1
	4200 -	2	1000 +	2
2	5000 +	0	500 -	0
	4000 - 5000	1	500 - 1500	1
	4000 -	2	1500 +	2
3	5000 +	0	500 -	0
	4000 - 5000	1	500 - 1500	1
	4000 -	2	1500 +	2
4	6500 +	0	1000 -	0
	5000 - 6500	1	1000 - 3000	1
	5000 -	2	3000 +	2
5	6500 +	0	1000 -	0
	5000 - 6500	1	1000 - 3000	1
	5000 -	2	3000 +	2
6	6500 +	0	2000 -	0
	5000 - 6500	1	2000 - 4000	1
	5000 -	2	4000 +	2
7	6500 +	0	3000 -	0
	5000 - 6500	1	3000 - 5000	1
	5000 -	2	5000 -	2

which were subjectively evaluated, the dependent variable, (T), was redefined as:

$$S^* = T - (X_{10} + X_{11})$$

where S* is the adjusted total score.

Specifications for Model (2)

The model specified for analyzing the variation in S* was as follows:

$$S^*_{ij} = \mu + a_i + \varepsilon_{ij}$$

where

μ = overall population mean

a_i = effect due to i^{th} independent variable

ε_{ij} = error term.

An F statistic was then used to test how statistically significant each of the independent variables contributed to the variation in S*. The results of the test would be reported in Chapter V.

Significance Level

A significance level of 0.05 was selected for all statistical tests conducted in the study. This indicated that this author was willing to tolerate 5% probability of rejecting a null hypothesis when it was true. The results of the test were intended to be used primarily as guides to future decision making and research on collective resource allocation. With those uses in mind, $\alpha = 0.05$ was considered tolerable.

Computer Analysis

The data were key-punched on data processing cards and analyzed on Michigan State University's CDC 3600 computer (see processed data in Appendix C). Two routines were used in the analysis: the BMD05M routine for Discriminant Analysis for Several Groups and the UNEQ1 routine for the One-way Analysis of Variance with unequal number of replications.

The BMD05M computed the discriminant functions and classified the input data into "approved" and "rejected" groups.

UNEQ1 was used to calculate the Analysis of Variance Table for each of the five independent variables defined earlier (see pages 40 and 41 above). Basic statistics such as the frequency, sum, mean, standard deviation, sum of squares, and sum of square deviations from the mean were also calculated for each independent variable.

Analysis of Revealed Preference for Recreation Facilities

This section of the analysis was aimed at providing information on regional concentration patterns for those recreation facilities for which funding was requested. A coefficient of localization model was used to calculate an index of interregional preferences for each of the recreation facilities. A coefficient of "0" would mean that inhabitants of all the regions in Michigan had the same revealed preference for the particular facility being examined. On the other hand, a coefficient of "1" would indicate that the revealed preference for the facility was entirely concentrated in one region.

The coefficient of localization (L_i) was defined as:

$$L_i = \sum_j [e_{ij} - e_j] / 100 \quad \text{for either } (e_{ij} - e_j) > 0 \text{ or } (e_{ij} - e_j) < 0,$$

$$e_{ij} = \frac{E_{ij}}{E_i} \qquad e_j = \frac{E_j}{E}$$

where[6]

e_j = percentage of the state-wide recreation projects which were in region j

e_{ij} = percentage share of recreation facility type i in region j

E_{ij} = number of recreation facilities of type i in region j

E = total number of recreation facilities used in the study

$$= \sum_{i=1}^{Q} \sum_{j=1}^{R} (E_{ij})$$

E_j = number of all recreation facilities located within region j

$$= \sum_{i=1}^{Q} (E_{ij})$$

E_i = total number of recreation facilities which were of type i

$$= \sum_{j=1}^{R} (E_{ij})$$

R = number of recreation facilities (see definition of X_5 given earlier in this chapter).

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[6]Based on notes from Daniel Chappelle's lectures on "Regional Science Methods", Michigan State University, 1972.

Q = number of regions.

The pattern of revealed preferences for recreation facilities will be discussed, along with other results, in the next chapter.

CHAPTER V

RESULTS AND DISCUSSION

Two major models were used in the study. The first was the discriminant analysis for several groups and the second was the one way analysis of variance with unequal subclasses. The specifications for each of the models were given in Chapter IV. The presentation of the results as well as the attendant discussion to be given in this chapter will be organized in two sections - one for each model. In addition, the results of the analysis of revealed preference for recreation facilities will be seperately discussed.

Discriminant Analysis

The main purpose of this portion of the analysis was to statistically allocate each application for public recreation funding to either the "approved" or "rejected" group. It was also the intention of this phase of the study to estimate the weight of each of the eleven independent variables used in the study. In other words, it was thought necessary to ascertain the extent to which each of the independent variables exerted influence in determining the population to which each application should be assigned.

Before proceeding with the analyses it was considered necessary to first determine whether the mean values were, in fact, the same in the "approved" and "rejected" groups for the eleven

independent variables. The Generalized Mahalonobis D^2 statistic[1], calculated for this purpose, was found to be 244.72303. When interpreted in a sampling distribution of chi square[2] (χ^2; d.f. = 11; $p<.05$) the hypothesis that the mean values were the same was rejected with $p< 0.005$. That is, in more than 995 times out of 1000 the means cannot be expected to be equal purely by chance. With the existence of more than one population thus established, the next phase of the analysis was to establish a decision rule with which the computer would assign each application to the group for approval or for rejection. Thus, two discriminant functions were computed, one for each group, as follows:

$$Y_A = - 32.78823 + 1.79320X_1 + 3.03155X_2 + 0.31412X_3 + 1.83545X_4 + 1.20303X_5 + 2.20853X_6 + 1.39826X_7 + 0.92464X_8 + 3.15443X_9 + 4.36614X_{10} + 17.61639X_{11}$$

and

$$Y_R = - 20.11948 + 1.45184X_1 + 2.90673X_2 - 0.26378X_3 + 1.47964X_4 + 0.67378X_5 + 1.83797X_6 + 0.99589X_7 + 0.65137X_8 + 2.50523X_9 + 4.47037X_{10} + 26.13221X_{11}$$

---

[1]Named after P. N. Mahalonobis who introduced this method of distinguishing between multivariate populations in p-space. For the similarity among the D^2, the Hotelling T^2, and the Snedecor F statistics see H. C. Fryer, Concepts and Methods of Experimental Statistics, (Boston: Allyn and Bacon Inc., 1966), pp. 519-526. For P. C. Mahalonobis' contribution to the development of discriminatory analysis see M. G. Kendall, A Course in Multivariate Analysis, (London: Charles Griffin & Company Ltd., 1957), pp. 111-116.

[2]Since our interest was mainly in determining differences in terms of assignments into categories which were specified in the nominal scale, χ^2 was chosen over the more powerful but more restrictive parametric tests of differences.

where Y_A = discriminant function for "approved" population,

Y_R = discriminant function for "rejected" population,

$X_1, X_2, \ldots, X_{11}$ = independent variables indentical to variables X_7 to X_{16} and X_{21} as specified on page 39.

The coefficients of Y_A and Y_R can be viewed as the weights of each of the X_{Ai}, X_{Rj}, (i,j, = 1,...,11) variables used in determining approval status. Table 8 compares the statistically fitted weights to those of the Department of Natural Resources (DNR). It can be seen that whereas the DNR thought that "income level" was the most important criterion in determining approval status, in actuality, the most important single determinant of approval (or rejection) was the availability of funds, followed by "interagency cooperation". The priority ordering of the other variables are shown on the table. However, it is worth noting that "project location" which was intended by the DNR to have a third priority in influencing approval status, had in fact the least (11th) effect on the outcome of each project evaluated. The general pattern of priority ordering was validated by three follow up analyses conducted on the rest of the study population. The results of each of the replications are compared with the DNR weights in Appendix D.

Thus, if the intention of the DNR was to encourage the location of projects in, or near to, low income level communities there is no evidence that top priority was given to those criteria in the actual evaluation process.

Each application was classified as "rejected" or "approved"

TABLE 8.--Actual (statistical) and Intended (DNR) Weights and Priority Orderings for Project Evaluation.

Criteria (Independent Variables)	Variable Identification Number	DNR's Weight	Priority Ordering (DNR)	Y_A Coef.[1]	Priority Ordering (Y_A)	Y_R Coef.[1]	Priority Ordering (Y_R)
Citizen Participation	X_7	1.00	5	1.79	7	1.45	7
Structure for Administration etc.	X_8	2.00	4	3.03	4	2.91	3
Project Location	X_9	3.00	3	0.31	11	-0.26	11
Income Levels	X_{10}	5.00	1	1.84	6	1.48	6
Population Density	X_{11}	3.00	3	1.20	9	0.67	9
Accessibility	X_{12}	2.00	4	2.21	5	1.84	5
Deficiencies	X_{13}	4.00	2	1.40	8	1.00	8
Priority Justification	X_{14}	2.00	4	0.92	10	0.65	10
Multiple Use	X_{15}	2.00	4	3.15	3	2.51	4
Interagency Cooperation	X_{16}	1.00	5	4.87	2	4.47	2
Funds Availability	X_{21}	n.a.	n.a.	17.62	1	26.13	1

[1]adjusted to two decimal places

n.a. : information was not explicitly used as an evaluation criterion by the DNR.

on the basis of the relative magnitudes of Y_A and Y_R associated with the particular application. Due to its length, the table for the evaluation of the classification function for each case is placed in the appendix (see Appendix E). However, a classification matrix summarizing the placement of the grant applications analyzed in this study is shown on Table 9.

It can be observed from Table 9 that out of the 138 DNR approved applications included in this study, only two were statistically classified for rejection. This shows a better than 98 per cent precision for the DNR's decision on approved projects. "Precision", as used here, refers to the extent with which repeated measurements of the same quantity cluster around one another.

The Department of Natural Resources' (DNR's) decision on rejected projects was not as strongly confirmed by our statistical results. Twenty three of the seventy seven projects rejected by the DNR were found to merit approval on the basis of the independent variables used in the study.

In order to confirm the above findings similar analyses were conducted on three random samples making up the rest of the study population. The results of the follow up tests closely paralleled the original findings. The classification matrices for the three follow up analyses are shown in Appendix F.

To verify whether the apparent differences between the DNR and the statistical classifications were significant it was hypothesized that there was no discrepancy between the two classifications. The rejection level for the null hypothesis was set at $p < 0.05$ (see page 43). The χ^2 distribution used in the test suggested the rejection of

TABLE 9.--A Classification Matrix for Approved and Rejected Projects

Function / Approval Status	Y_A	Y_R	$Y_A + Y_R$
Approved	136	2	138
Rejected	23	54	77
Total	159	56	215

the null hypothesis with $p < 0.005$. That showed that there was a difference between the two classifications which could not be attributed to chance alone.

The search for a partial explanation of this discrepancy is the thrust of the analysis reported in the following section.

Analysis of Probable Sources of Variation

A one-way analysis of variance with unequal subclasses was used to test the extent to which regional differences, county differences, project type, facility type and differences among reviewers affected the adjusted score of each application. The rationale for adjusting the dependent variable (total score) together with other specifications of this model were given in Chapter IV.

The null hypothesis for this phase of the analysis was that variations in the adjusted scores were not due to the different mean tendencies of the component units of the independent variables. In mathematical form, the research hypothesis was the statement that:

$$\mu_1 \neq \mu_2 \neq, \ldots, \mu_n.$$

Hence the null hypothesis: $\mu_1 = \mu_2 =, \ldots, \mu_n$ for each independent variable, where 1, 2,...,n = independent variable categories.

An F statistic was then used to test the null hypothesis. The rejection was specified at $p < 0.05$. Table 10 shows the sums of squared deviation (SS), the applicable degrees of freedom (d.f.), mean squares (MS), F statistic for testing the null hypothesis for each independent variable, the approximate significance probability for each F statistic and eta (η) coefficients which explain how much of the total sum of square deviation from the overall mean is accounted

TABLE 10.--Analysis of Variance Table for 5 Independent Variables.[1]

Independent Variables	Source of Variance	SS	d.f.	MS	F	p	R2
Project Type (X_2)	B	105.118	2	52.559	2.551	0.079	0.008
	W	12,466.045	605	20.606			
	T	12,571.763	607				
County (X_3)	B	3,414.454	75	45.526	2.645	0.0005	0.272
	W	9,157.309	523	17.213			
	T	12,571.763	607				
Region (X_4)	B	172.640	6	28.773	1.395	0.214	0.014
	W	12,399.123	601	20.631			
	T	12,571.763	607				
Facility Type (X_5)	B	722.346	12	60.196	3.023	0.0005	0.058
	W	11,849.417	595	19.915			
	T	12,571.763	607				
Reviewer (X18) (identified and unidentified)	B	1,264.328	20	63.216	3.282	0.0005	0.101
	W	11,307.435	587	19.263			
	T	12,571.763	607				
Reviewer (X_{18}) (identified only)	B	1,229.419	17	72.319	3.607	0.0005	0.103
	W	10,687.241	533	20.051			
	T	11,916.661	550				

[1]Figures are rounded to three decimal places except for "p". B, W, and T in column 2 represent Between-group variance, Within-group variance, and Total Variance respectively. Adjusted Total Score (as defined in Chapter IV) was the dependent variable in every case.

for by the seperate category means. Thus eta (η) coefficients in this case serve the same purpose as the coefficient of determination (R^2). The more familiar R^2 notation is used in the table and in the rest of this chapter.

The results of the analysis are as follows:

1. The frequency distribution of the applications indicated that 525 were for "development" as against 63 for "acquisition and development", and only 20 for "acquisition". However, regardless of the disproportionate distribution, the results showed that Project Type (X_2) did not significantly affect how the applications were scored. The F value for "project type" was 2.551 and the significance probability for the F was 0.079. The R^2 value was 0.008. The null hypothesis was not rejected.
2. County of origin significantly accounted for variation in project scores. The F value for "County", (X_3), was 2.645. This was significant at $p < 0.0005$. The R^2 value was 0.272. The hypothesis was rejected.
3. The region from which an application originated was not found to have any significant effect on how the application was scored. The F statistic for "region", (X_4), was 1.395 and its significance probability was $p = 0.214$. The R^2 value was 0.0137. The null hypothesis was not rejected.
4. Grants were requested for the acquisition and/or development of different types of recreation facilities. The study showed that "facility type", (X_5), significantly accounted for variation in project scores. The F value for "facility type"

was 3.023 with a significance probability of $p < 0.0005$ and an R^2 value of 0.058. The null hypothesis was rejected.

5. "Reviewers" significantly accounted for variations in project scores. Two sets of tests were conducted using "identified reviewers" and "identified and unidentified reviewers" as the independent variables. Table 11 shows the distribution of projects according to reviewers. The result of both tests showed that reviewers partly accounted for differences in project scores. For the 554 projects whose reviewers were identified, the F statistic was 3.607 with a significance probability of $p < 0.005$ and an R^2 value of 0.103. For all 608 projects (with and without identified reviewers) included in the study, the F statistic was 3.282. The significance probability was $p < 0.0005$ with an R^2 value of 0.101. It was, therefore, evident that whether or not an adjustment was made for the 54 projects whose reviewers were not identified, Reviewer, (X_{18}), was a statistically significant variable. The null hypothesis was, therefore, rejected.

Revealed Preference for Facility Types

The coefficient of localization for each recreation facility is shown on Table 12. It could be seen that the most localized facilities were "Roads etc.", "Outdoor Education Center", "Play Equipment", and "Ski Area". To the contrary, the least localized (i.e. most dispersed) facilities were "Park Development" and "Field". In other words, most regions in Michigan requested bond money to finance park and/or field related recreation projects. Few requests were made for the purpose of building access roads, outdoor recreaton centers, ski

TABLE 11.--Frequency distribution and Mean Scores of Projects according to Reviewer Identification.

Reviewers (X_{18})[1]	Frequency	Mean Score*
1	54	26
2	7	26
3	1	28
4	16	30
5	57	29
6	146	28
7	1	30
8	90	29
9	7	27
10	43	31
11	2	23
12	1	29
13	1	24
14	8	30
15	2	32
17	59	30
18	12	26
19	5	29
20	37	29
21	5	22
Un-identified 23	54	29

*Adjusted Mean, to the nearest integer.

[1]Projects whose reviewers could not be identified were assigned number 23. All other reviewers were identified.

TABLE 12.--Coefficients of Localization for Recreation Facilities in Michigan.

Facility	Identification Number	Coefficient of Localization (L_i)
Courts	03	.41
Field	04	.16
Marinas/Beach	o7	.44
Outdoor Education Center	09	.88
Park Development	10	.1
Play Area	11	.28
Play Equipment	12	.82
Pools	13	.42
Recreation Center	15	.23
Roads, Parking Lots & Bridges	16	.95
Shelter	17	.22
Skating (Ice Rink)	18	.46
Ski Area	19	.82

areas or for purchasing play equipment. The high concentration in the revealed preference for ski area could have been due to the fact that the topography of some regions of the state are more suitable than others for that kind of recreation activity.

CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

This study was an attempt to evaluate a public decision-making process outside the market mechanism. To the extent that part of the total cost of proposed projects had to be locally funded, project applications were revelations of community effective demand for public recreation. The actual supply of recreation was, however, contingent on project approval for state financial support; the state of Michigan assumed a maximum of 80 per cent of the total cost. Thus, the decision to "approve" or "reject" a project was one of great economic significance. In the aggregate, it determined in part, the responsiveness of publicly supplied recreation facilities to the expressed demand for such services. The nature of the decision-making also had some distributive implications. Since Public Act 108 of 1969, Sec. 7(2), requested approval to be made on "a priority of need basis", the decision to approve or reject implied a judgement regarding the recreation needs of each participating community. The study attempted to assess the pattern of grant allocation as well as the inputs of some independent variables.

The conclusions and recommendations which follow are based only on the analyses and statistical results arising from this study. In so doing, it should be realized that decision-making is not a unidimensional undertaking. However, since the variables used in the study were

primarily those defined by the Department of Natural Resources as the "criteria" for evaluation, it would seem proper to hold all other variables constant.

CONCLUSIONS

1. The population of approved projects was found to be different from that of rejected projects. The classification of an application as "approved" or "rejected" did not occur by random chance. The null hypothesis that approved and rejected projects belonged to the same population was rejected.
2. More than 98 per cent of the applications approved by the Department of Natural Resources (DNR) were also statistically classified as "approved" by the computer programme used in the study. However, 29.87 per cent of the projects rejected by the DNR were found to have qualified for "approval". By rejecting that many applications when they should have been approved, it would seem that the DNR was excessively cautious in its decision-making, probably because of budget constraint. The hypothesis that the statistically-determined decision on approval status would not significantly differ from that of the DNR was therefore rejected.
3. "County", "Facility Type" and "Reviewers" appear to be significant sources of variation in the total score assigned to each application for funding. Although statistically significant, none of the three explanatory variables had a coefficient of determination (R^2) sufficiently high as to adequately account for the variation in score values. The highest R^2 was

0.272 for "County" and the least was 0.058 for "Reviewer". In effect, while the variables might have partly accounted for some of the variation around the mean of the score values, other variables not included in this study also contributed to the score variance.

4. The analysis of "criteria for project evaluation" did not confirm the priority ordering claimed by the DNR. Whereas the Department of Natural Resources' weights suggested that top priority would be given to projects in low income and recreation-deficient communities, the actual allocation pattern suggested that top priority was given to projects which rated highly in "interagency cooperation", "multiple use", and "structure for administration". "Priority justification" and "project location" were the least influential criteria. It was observed that the three top priority variables, ("interagency cooperation", "multiple use", and "structure for administration") were efficiency indicators. They showed the extent to which a proposed project was to continue to receive administrative and financial support on the local level. It was not obvious that community need for recreation was the primary determinant of approval status.

RECOMMENDATIONS

1. This study was meant in part to be introductory to future research in the subject area. Further inquiry into the methodology and administrative implications of an increasing use of quantitative methods in decision making is strongly

urged. The application of such techniques to decision making processes would not only standardize decision rules, but would also allow administrators and analysts more time for non-programmed decision making.

2. The conflict between efficiency and distribution as policy criteria for public resource allocation was discussed in the early part of this chapter. The present state of knowledge in economic profession does not allow for a conclusive definition of the optimal trade-off between efficiency and distribution. Such knowledge is very necessary. Until there is an optimal index so defined - in operational terms - the efficiency/distribution mix will continue to be a function of taste, ideology, and "good judgement" of policy makers.
3. Although some independent variables were shown to have significantly accounted for the variation in total score, the exact pattern of, and the rationale for, those variations need further investigation.
4. More knowledge is needed on the impact of the public recreation project on the private sector of the Michigan recreation industry. Do public and private recreation projects qualitatively belong to the same population? Is the structure of their relationship complementary or competitive? How does public participation affect the conduct and performance of the private recreation industry? These and similar questions deserve further clarification.
5. It is suggested that the economic feasibility of the recreation bond programme be studied. Accurate information

in this regard would show how the returns on the recreation bond programme compare with the market rate of interest. Given such information, it would be possible, at least in theory, to compute the nominal costs and benefits of the bond programme to Michigan residents. The recommended study should be conducted after each subsidized facility has been in operation for at least five years, so as to allow for discernible "production" and "consumption" characteristics.

6. Finally, it is the opinion of this author that the principal model used in this study - the discriminant analysis for several groups - holds great potential for social science research. Its use in classificatory experiments is strongly recommended.

LIST OF REFERENCES

Books

Barlowe, Raleigh. Land Resource Economics. Englewood Cliff, N.J.: Prentice-Hall Inc., 1972.

Baumol, W. Welfare Economics and the Theory of the State. Cambridge: Harvard University Press, 1952.

Black, D. The Theory of Committees and Elections. Cambridge: Cambridge University Press, 1958.

Buchanan, J. M. and Tullock, G. The Calculus of Consent. Ann Arbor: University of Michigan Press, 1962.

Clawson, Marion and Knetsch, Jack L. Economics of Outdoor Recreation. Baltimore: The Johns Hopkins Press, 1966.

Cochran, William G. Sampling Techniques. New York: John Wiley and Sons, Inc., 1953.

Downs, Anthony. An Economic Theory of Democracy. New York: Harper & Row Publishers, 1957.

Ferguson, C. E. Microeconomic Theory. Illinois: Richard D. Irwin, 1966.

Fryer, H. C. Concepts and Methods of Experimental Statistics. Boston: Allyn and Bacon, Inc., 1966.

Hunker, Henry L. Eric W. Zimmermann's Introduction to World Resources. New York: Harper & Row Publishers, 1964.

Kempthorne, O., Bencroft, T. A., Gowen, J. W., and Lush, J. L. Statistics and Mathematics in Biology. Ames: The Iowa State College Press, 1954.

Kendall, M. G. A Course in Multivariate Analysis. London: Charles Griffin & Company Ltd., 1957.

Keynes, John Maynard. The End of Laissez-faire. London: L & V Woolf, 1926.

Lewis, Alvin E. Biostatistics. New York: Reinhold Publishing Corporation, 1966.

Marshall, Alfred. Principles of Economics. London: Macmillan Press, 1916.

Maslow, A. H. Motivation and Personality. New York: Harper & Row Publishers, 1954.

Pareto, V. Cours d'Économic Politique. Rogue: 1877.

Roa, C. R. Advanced Statistical Methods in Biometric Research. Darien, Conn.: Hafner Publishing Co., 1970.

Robinson, Joan. The Economics of Imperfect Competition. London: Macmillan and Co., Ltd., 1933.

Sen, A. K. Collective Choice and Social Welfare. San Francisco: Holden-Day Inc., 1970.

Smith, Adam. An Inquiry into the Nature and Causes of the Wealth of Nations. Oxford: Clarendon Press, 1869.

Taylor, F. J. A. The Masks of Society; an inquiry into the covenants of civilization. New York: Appleton-Century-Crofts, 1966.

Tiebout, Charles M. The Community Economic Base Study. Supplementary Paper 16, Committee for Economic Development, 1962.

Wonnacott, Roland J. and Wonnacott, Thomas H. Econometrics. New York: John Wiley & Sons Inc., 1970.

Articles

Birdsall, William C. "A Study of the Demand for Public Goods" in Musgrave, Richard A. Essays in Fiscal Federalism. Washington D. C.: The Brookings Institution, 1965.

Boulding, Kenneth. "The Economics of the coming Spaceship Earth" in Jarrett, Henry. Environmental Quality in a Growing Economy. Baltimore: The John Hopkins Press, 1966.

Breton, Albert. "A Theory of the Demand for Public Goods". Canadian Journal of Economics and Political Science, November, 1966.

Hicks, J. R. "The Rehabilitation of Consumers' Surplus". Review of Economic Studies. XIX, 1942.

Hill, Forest G. "The Government and Institutional Adjustment: The American Experience" in Thompson, Carey C. Institutional Adjustment: A Challenge to a changing economy. Austin: University of Texas Press, 1967.

Mass, Arthur. " Systems Design and the Political Process: A General Statement" in Design of Water Resource Systems. Cambridge, Mass: Harvard University Press, 1962.

Maslow, A. H. "A Theory of Human Motivation". Psychological Review, 50, July, 1943.

Robbins, H. "Asymptotically subminimax solutions of compound statistical decision problems" in Proceedings of the Second Berkeley Symposium in Mathematical Statistics and Probability. Berkeley: University of California Press, 1951.

Strotz, Robert H. "Two Propositions related to Public Goods". Review of Economics and Statistics. November, 1958.

Ward, J. "Hierarchical Groupings to Optimize an Objective function". Journal of American Statistical Association. 1963.

Reports, Letters, and Public Documents

Anderson, Thomas J. Letter to Conservationists: July 8, 1969.

Bureau of Outdoor Recreation. "Outdoor Recreation Action". Washington D. C.: U. S. Department of the Interior, 1966-1969.

Gillette, Genevieve E. Letter to Michigan State Legislators: April 8, 1968.

Katz, Myron. Potential for the Recreation and Tourist Industry in the Pacific Northwest. Portland, Oregon: U. S. Department of the Interior, Bonneville Power Administration, 1969.

Kay, Kevin and Kirk, Rodney. "BMD05M Discriminant Analysis for Several Groups", CISSR Technical Report Number 31. East Lansing: Michigan State University, 1967. (Mimeographed).

Lanier, L. L. "$100 million Recreation Bond Issue for Michigan". An unpublished report. East Lansing, Michigan, October, 1969.

Madar, Olga M. Press Release: April 14, 1969.

Michigan Department of Conservation. "Land and Water Conservation Fund". Lansing, Mich.: Michigan Department of Conservation, October, 1968.

Michigan Department of Natural Resources. "Evaluation of Recreation Bond Program". Intra-departmental correspondence. Lansing, Mich.: Michigan Department of Natural Resources, August, 1971.

Michigan State University, Agricultural Experiment Station. "UNEQ1: One-way Analysis of Variance with Unequal Number of Replications Permitted". STAT Series Description Number 13, East Lansing, 1967. (Mimeographed).

Sackett, Wayne B. Position Statement, Michigan House of Representatives. Lansing, Michigan: 1969.

State of Michigan. "Public Act 353". Lansing, Michigan: 1968.

_____, "Public Act 108". Lansing, Michigan: 1969.

Steiner, Peter O. "The Public Sector and the Public Interest". Analysis and Evaluation of Public Expenditures: The PPB System, Vol. 1. Washington, D.C.: U. S. Government Printing Office, 1969.

The State Journal. "Bond Issue Formula, a good Compromise". Lansing, Mich.: The State Journal, July 8, 1969.

_____, "Capitol Affairs". Lansing, Mich.: The State Journal, May 7, 1969.

Westbrook, John. Letter to Michigan State Legislature: February 6, 1969.

Other Sources

Chappelle, Daniel. Department of Resource Development, Michigan State University. Lectures in research Methods.

APPENDICES

APPENDIX A

VOTING PATTERN OF MICHIGAN COUNTIES IN THE RECREATION BOND REFERENDUM

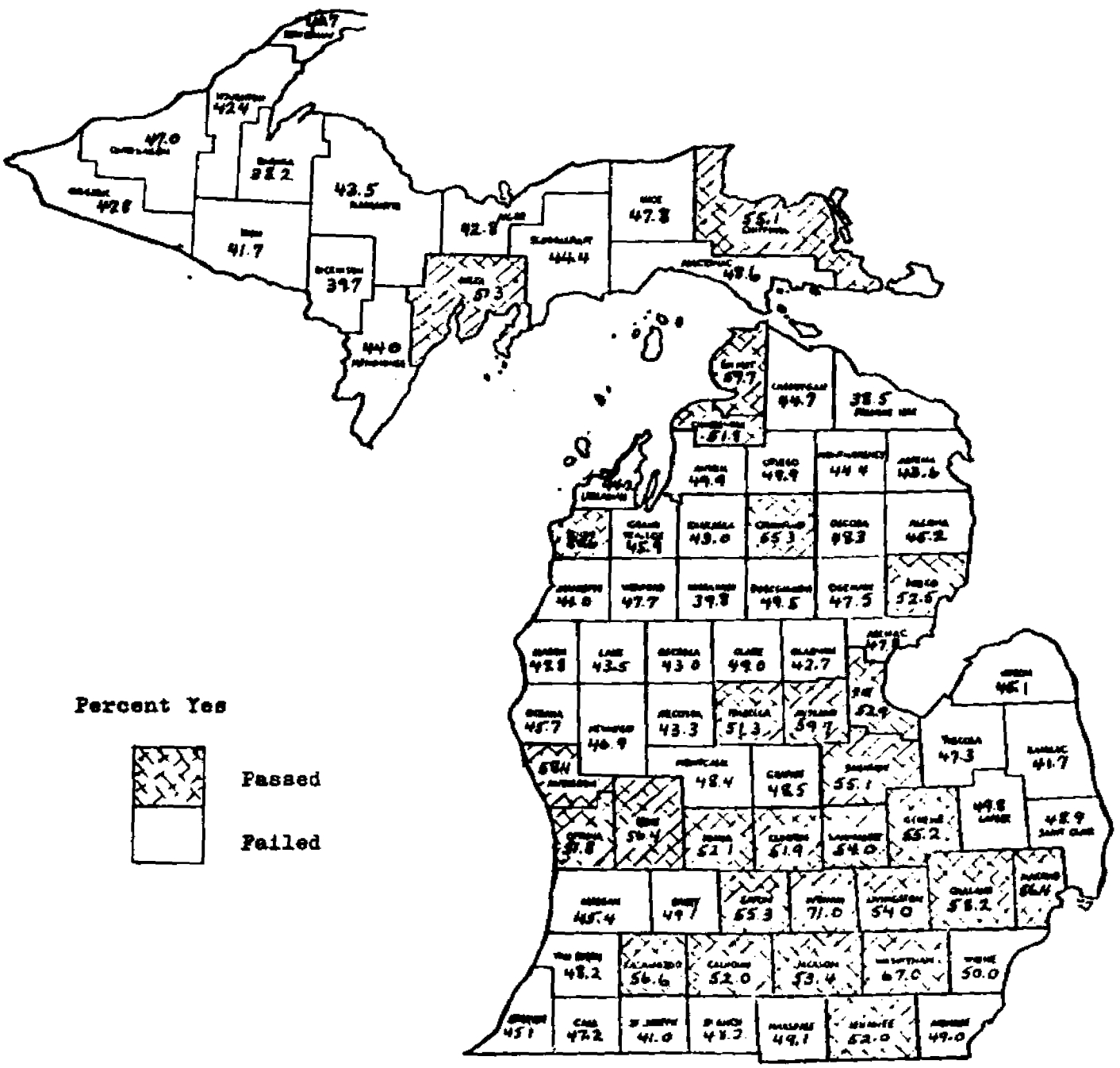

FIGURE 2.--Voting pattern of Michigan Counties in the Recreation Bond Referendum.

APPENDIX B

COUNTIES AND COUNTY IDENTIFICATION NUMBERS

TABLE 13.---Counties and County Identification Numbers

County	Identification Number	County	Identification Number
Alcona	01	Emmet	24
Alger	02	Genesse	25
Allegan	03	Gladwin	26
Alpena	04	Gogebic	27
Antrim	05	Grand Traverse	28
Arenac	06	Gratiot	29
Baraga	07	Hillsdale	30
Barry	08	Houghton	31
Bay	09	Huron	32
Benzie	10	Ingham	33
Berrien	11	Ionia	34
Branch	12	Iosco	35
Calhoun	13	Iron	36
Cass	14	Isabella	37
Charlevoix	15	Jackson	38
Cheboygan	16	Kalamazoo	39
Chippewa	17	Kalkaska	40
Clare	18	Kent	41
Clinton	19	Keweenaw	42
Crawford	20	Lake	43
Delta	21	Lapeer	44
Dickinson	22	Leelanau	45
Eaton	23	Lenawee	46

TABLE 13.-contd.

Livingston	47	St. Clair	73
Luce	48	St. Joseph	74
Mackinac	49	Saginaw	75
Macomb	50	Sanilac	76
Manistee	51	Schoolcraft	77
Marquette	52	Shiawassee	78
Mason	53	Tuscola	79
Mecosta	54	Van Buren	80
Menominee	55	Washtenaw	81
Midland	56	Wayne	82
Missaukee	57	Wexford	83
Monroe	58		
Montcalm	59		
Montmorency	60		
Muskegon	61		
Newaygo	62		
Oakland	63		
Oceana	64		
Ogemaw	65		
Ontonagon	66		
Osceola	67		
Oscoda	68		
Otsego	69		
Ottawa	70		
Presque Isle	71		
Roscommon	72		

APPENDIX C

TABLE OF VALUES FOR PROJECT CHARACTERISTICS AND EVALUATION VARIABLES

APPENDIX C

TABLE 14.--Table of Values for Project Characteristics and Evaluation Variables.

Project Identification	Project Type	County	Region	Facility Type	$ Requested	Citizen Participation	Administrative Structure	Project Location	Income Levels	Density	Accessibility	Deficiencies	Priority Justification	Multiple Use	Interagency Cooperation	Total Project Score	Reviewer	Approval Status	$ Available at Review Time
11250	50	6	10		0278100	0	3	6	00	6	4	8	4	4	2	36	01	1	01524996
00030	50	6	15		0072000	0	2	6	00	6	4	8	2	4	1	33	01	1	05802668
06160	82	7	04		0120000	1	4	6	10	6	2	4	4	2	1	40	01	1	05731226
00830	82	7	10		0117114	2	4	6	10	6	4	8	2	4	2	48	01	1	07739115
01080	82	7	10		0174961	2	4	6	00	6	4	4	4	4	2	36	01	1	06734014
06180	82	7	10		0100000	1	2	6	00	6	4	8	4	4	1	37	01	1	05731226
06171	82	7	11		0256000	1	4	6	10	6	4	8	4	4	1	47	01	1	05731226
00630	82	7	13		0600000	1	4	6	10	6	4	8	4	0	2	45	01	1	06734014
02620	82	7	13		0190190	0	4	6	05	6	4	8	2	4	1	40	01	1	07739115
09580	82	7	13		0300000	0	4	6	10	6	2	8	4	0	2	42	01	1	02238262
09570	82	7	13		0320000	2	2	6	05	3	4	8	2	2	1	35	01	1	02238262
01540	82	7	13		0025600	1	4	6	10	6	4	4	4	2	2	43	01	1	07739115
00600	82	7	15		0400000	1	4	6	10	6	4	8	2	2	1	44	01	1	10211918
06210	82	7	15		1160000	2	4	6	00	6	4	8	2	4	1	37	01	1	05731226
06201	82	7	15		0800000	2	4	6	10	6	4	8	4	4	1	49	01	1	05731226
06470	66	1	11		0004079	2	4	6	10	0	4	8	4	4	2	46	01	1	00855933
04870	10	2	10		0001000	2	4	6	05	0	4	8	4	2	2	37	01	1	00776449
03310	05	2	10		0007200	2	4	6	10	3	4	4	2	2	1	38	01	1	00889368
03160	60	3	10		0064000	1	4	6	10	0	4	4	4	4	1	38	01	1	00523370
01290	41	4	04		1070560	0	4	6	10	6	2	8	0	4	2	42	01	1	06523348
01200	41	4	04		0060000	0	4	6	05	6	4	8	2	4	2	41	01	1	06523348
01170	41	4	10		0060000	0	4	6	00	6	4	8	2	4	2	36	01	1	06523348
01210	41	4	10		0052000	0	4	6	10	6	4	8	2	4	2	46	01	1	07440255
02781	61	4	10		0231451	1	4	6	10	6	4	4	2	4	2	43	01	1	06523348
02720	33	4	10		0300000	1	4	6	05	3	4	8	4	4	1	40	01	1	06523348
06580	13	4	10		0004330	0	2	6	05	3	4	8	4	2	1	35	01	1	04445878
07320	70	4	10		0329981	2	4	6	05	3	4	4	2	4	2	36	01	1	03848857
02261	61	4	11		0025760	2	2	3	05	0	4	8	4	2	2	32	01	1	05101164
02712	33	4	15		0096720	1	4	6	05	6	4	8	4	4	2	44	01	1	06523348
05960	23	4	18		0019782	1	4	3	05	6	2	4	4	4	2	35	01	1	04445878
03080	76	5	10		0003835	2	2	6	10	0	4	4	2	2	2	36	01	1	01483633
02970	76	5	10		0004730	1	4	6	10	0	2	4	4	2	2	35	01	1	01483633

TABLE 14.--contd.

06540	07	1	11	0000851	1	4	6	05	0	4	8	4	4	2	39	05	1	00855933
04910	02	1	18	0006450	2	2	6	10	0	2	8	2	4	2	38	05	1	00855933
10660	83	2	10	0011000	1	4	6	00	6	4	8	4	4	2	39	05	1	00615042
10670	83	2	10	0009600	1	4	6	00	6	4	8	4	4	2	39	05	1	00615042
10680	83	2	10	0009600	1	4	6	00	6	4	8	4	4	2	39	05	1	00615042
10100	83	2	10	0009200	2	4	6	05	6	4	4	4	4	2	36	05	1	00615042
10110	83	2	10	0001760	2	2	6	05	3	4	8	4	2	2	38	05	1	00615042
10120	83	2	10	0001080	2	2	6	05	3	4	8	4	2	2	38	05	1	00615042
10130	83	2	10	0001440	2	2	6	05	3	4	8	4	2	2	38	05	1	00615042
10140	83	2	10	0004048	2	2	6	05	0	4	8	4	4	1	36	05	1	00615042
10170	83	2	10	0007536	1	2	6	05	0	4	8	4	4	2	36	05	1	00615042
10180	83	2	10	0003600	1	2	6	05	0	4	8	4	4	1	35	05	1	00615042
10160	83	2	15	0002160	1	2	6	05	0	4	8	4	4	1	35	05	1	00615042
09120	16	3	10	0001875	2	2	6	05	0	4	8	4	4	2	37	05	1	00271034
04320	69	3	15	0024260	2	4	6	00	6	4	8	4	4	2	40	05	1	00427480
00620	46	4	03	0002202	2	4	6	05	0	4	8	4	4	2	39	05	1	03848857
08801	08	4	10	0009180	2	4	6	05	0	4	8	4	2	2	37	05	1	03848857
08701	08	4	10	0009180	2	4	6	05	0	4	8	4	2	2	37	05	1	03848857
08771	08	4	10	0009180	2	4	6	05	0	4	8	4	2	2	37	05	1	03848857
08760	08	4	10	0032670	0	2	6	05	3	4	8	4	2	2	36	05	1	03848857
08750	08	4	10	0013069	2	2	6	05	0	4	8	4	2	2	35	05	1	03848857
08740	08	4	10	0024476	1	4	3	05	0	4	8	4	4	2	35	05	1	03848857
08650	80	4	10	0014400	0	4	6	05	3	4	8	4	2	0	36	05	1	03848857
06500	41	4	11	0032000	0	2	6	05	3	4	8	4	4	0	36	05	1	04445878
08260	19	4	18	0010705	2	2	6	05	3	4	8	4	2	1	37	05	1	03848857
00601	75	5	10	0060577	1	4	3	05	0	4	8	4	4	2	35	05	1	02603559
05280	32	5	10	0005000	0	2	6	10	0	4	8	4	2	1	37	05	1	01483633
07620	79	5	10	0019600	1	2	3	10	0	4	8	4	4	1	37	05	1	01483633
08150	56	5	10	0012099	2	2	6	05	0	4	8	4	4	1	36	05	1	01483633
09100	79	5	10	0005306	0	2	6	10	0	4	8	4	4	1	39	05	1	01483633
09200	32	5	10	0005124	2	2	6	10	0	4	8	4	2	1	39	05	1	01483633
09422	25	5	10	0005343	2	4	6	05	0	4	8	4	4	2	39	05	1	01483633
10510	79	5	10	0003802	0	2	6	10	0	4	8	4	4	1	39	05	1	01483633
10640	32	5	15	0002000	2	2	6	10	0	4	8	4	4	1	41	05	1	01483633
09340	58	6	10	0000973	0	4	6	05	0	4	8	4	4	1	36	05	1	03209475
10250	50	6	10	0016000	1	4	6	05	3	4	4	4	2	2	35	06	1	03209475
10700	63	6	10	0032000	2	2	6	00	3	4	8	4	4	2	35	06	1	01524996
11261	58	6	10	0030400	0	4	6	05	0	4	8	4	2	2	35	06	1	01524996
05870	63	6	11	0002000	1	4	6	00	6	4	8	4	2	1	36	06	1	03777226
06720	58	6	13	0004000	0	4	6	05	3	4	8	2	2	2	36	06	1	03777226
06600	58	6	13	0004000	0	4	6	05	3	4	8	2	2	2	36	06	1	03777226
06680	58	6	13	0004000	0	4	6	05	3	4	8	2	2	2	36	06	1	03777226
06670	58	6	13	0004000	0	4	6	05	3	4	8	2	2	2	36	06	1	03777226
04230	82	7	04	0008498	1	4	6	05	6	4	8	2	4	2	42	06	1	06734014
02611	82	7	10	0272987	2	4	6	00	6	4	8	4	2	1	37	06	1	05731226

TABLE 14.--contd.

03612	82	7	10	0013175	1	4	6	05	0	4	8	4	2	1	35	06	1	05731226
03622	82	7	10	0007175	1	4	6	05	0	4	8	4	2	1	35	06	1	05731226
04300	82	7	10	0001252	1	4	3	05	6	4	8	2	2	2	37	06	1	06734014
06251	82	7	10	0058300	0	4	6	05	0	4	8	2	4	2	35	06	1	02238262
04310	82	7	10	0001456	1	4	3	05	6	4	8	2	2	2	37	06	1	06734014
04250	82	7	10	0000935	1	4	3	05	6	4	8	2	2	2	37	06	1	06734014
04270	82	7	11	0002295	1	4	6	05	6	4	8	2	2	2	40	05	1	06734014
04280	82	7	11	0010845	1	4	6	05	6	4	8	2	2	2	40	06	1	06734014
04290	82	7	11	0001196	1	4	6	05	6	2	8	2	2	2	38	06	1	06734014
04241	82	7	11	0006903	1	4	6	05	6	4	8	2	2	2	40	06	1	06734014
03060	08	4	10	0013707	2	2	6	05	0	2	8	4	4	2	35	06	1	05101164
04560	21	1	03	0004000	1	2	6	05	6	2	8	4	2	2	38	06	1	00855933
07300	21	1	03	0006787	1	4	6	00	6	4	8	2	2	2	35	06	1	00563407
04640	21	1	04	0002400	1	2	6	05	6	2	8	4	2	2	38	06	1	00855933
08930	55	1	04	0005362	0	2	6	10	0	4	8	2	2	1	35	06	1	00563407
07260	21	1	04	0020000	1	4	6	00	6	4	8	2	2	2	35	06	1	00563407
03810	17	1	10	0002975	1	4	6	05	0	4	8	4	2	1	35	06	1	00855933
04610	21	1	10	0003200	1	2	6	05	6	4	8	4	2	2	40	06	1	00855933
02900	77	1	10	0003092	1	2	6	05	0	4	8	4	4	1	35	06	1	00973857
08380	31	1	10	0013734	2	2	6	05	6	4	4	2	2	2	35	06	1	00563407
07500	21	1	10	0005000	1	4	6	05	0	4	8	4	2	1	35	06	1	00563407
07460	21	1	10	0007620	1	4	6	05	0	4	8	4	2	1	35	06	1	00563407
07280	21	1	11	0004800	1	4	6	00	6	4	8	2	2	2	35	06	1	00563407
04580	21	1	11	0006400	1	2	6	05	6	4	8	4	2	2	40	06	1	00855933
03840	17	1	11	0011000	1	2	6	05	0	4	8	4	2	2	34	06	1	00855933
08860	55	1	11	0005374	1	2	6	10	0	4	8	2	2	2	37	06	1	00563407
09760	55	1	11	0005400	1	2	6	10	3	4	4	2	2	1	35	06	1	00563407
09780	55	1	11	0003620	1	2	6	10	0	4	8	2	2	1	36	06	1	00563407
07280	21	1	11	0004800	1	4	6	00	6	4	8	2	2	2	35	06	1	00563407
07260	21	1	11	0019351	1	4	6	00	6	4	4	4	4	2	35	06	1	00563407
07200	21	1	11	0012000	1	4	6	00	6	4	8	2	2	2	35	06	1	00563407
10860	21	1	13	0020000	1	4	6	00	6	4	8	2	2	1	34	06	1	00095764
08820	10	2	03	0001473	1	2	6	05	3	4	8	2	2	2	35	06	1	00615042
09860	15	2	03	0010536	2	4	6	05	6	4	8	2	2	1	40	06	1	00615042
07600	24	2	03	0001200	0	2	6	05	3	4	8	2	4	1	35	06	1	00615042
08850	10	2	04	0003000	2	2	6	05	0	4	8	4	2	2	35	06	1	00615042
04080	51	2	10	0002331	1	4	6	00	6	4	4	4	4	2	35	05	1	00776449
03700	51	2	10	0031780	2	4	6	05	0	4	8	4	2	2	37	06	1	00615042
08720	42	2	10	0006427	0	4	6	05	0	4	8	4	2	2	35	06	1	00615042
07700	26	2	10	0004268	0	2	6	05	3	4	8	2	4	1	35	06	1	00615042
08840	10	2	10	0003000	2	2	6	05	0	4	8	4	2	2	35	06	1	00615042
10300	10	2	10	0004800	1	2	6	05	3	4	8	2	2	2	35	06	1	00615042
03320	05	2	10	0002808	2	4	6	05	3	4	8	4	2	2	40	06	1	00889388
10340	64	2	10	0001500	1	2	6	05	0	4	8	2	4	2	35	06	1	00615042
00200	15	2	15	0040000	2	4	6	05	0	2	8	4	2	2	35	06	1	00615042

TABLE 14.--contd.

05630	79	5	10	0008340	2	4	6	05	0	4	4	4	4	2	35	01	1	02169233
02980	76	5	17	0016000	1	4	6	10	0	4	4	2	2	2	35	01	1	01483633
00140	73	6	10	0320000	2	4	6	05	6	2	8	4	4	2	43	01	1	04288892
00171	73	6	10	0017416	1	4	6	00	3	4	8	4	4	2	36	01	1	03209475
01260	50	6	10	0037424	0	4	6	00	6	2	8	2	2	2	32	01	1	05802668
01710	50	6	10	0074979	2	4	3	00	6	4	8	2	2	1	34	01	1	01524996
01730	50	6	10	0020271	2	4	6	00	6	4	6	1	2	1	32	01	1	01524996
01720	50	6	10	0090358	2	4	6	00	6	4	8	2	4	2	38	01	1	01524996
00850	82	7	10	0068880	2	4	3	05	3	2	8	4	4	2	37	02	1	10211918
01300	82	7	10	0056570	1	4	0	05	3	2	4	2	4	1	26	02	1	10211918
00121	82	7	11	0217500	0	4	6	05	6	4	8	2	4	0	33	02	1	10211918
04120	17	1	11	0010640	2	4	6	05	6	4	4	2	4	2	39	02	1	00973857
03800	48	1	18	0004705	2	4	6	00	6	4	8	4	4	2	40	02	1	00973857
00040	63	6	10	0128000	0	4	6	00	3	4	8	4	4	0	33	02	1	05802668
00111	82	7	11	0152240	0	4	6	05	6	4	8	2	4	0	39	03	1	10211918
01580	82	7	04	0032000	2	4	6	10	6	2	8	4	4	1	47	04	1	07739115
00940	82	7	10	0140000	2	2	6	10	6	4	8	4	4	2	48	04	1	07739115
01590	82	7	18	0082000	2	4	6	10	6	4	4	4	2	1	43	04	1	07739115
00140	27	1	10	0064000	2	2	6	10	6	4	8	4	4	2	48	04	1	01104066
03860	49	1	11	0002000	2	2	6	05	0	4	8	4	4	1	35	04	1	00855933
00370	53	2	03	0018250	2	4	6	05	6	4	8	4	4	2	45	04	1	00925470
01560	54	2	10	0015000	1	2	6	00	6	4	8	4	4	2	37	04	1	00889388
01470	64	2	10	0004800	2	2	6	05	3	4	8	2	4	2	38	04	1	00889388
01650	53	2	17	0026750	2	4	6	05	3	4	8	2	2	2	38	04	1	00925470
03371	29	5	09	0144000	1	4	6	05	3	4	8	2	4	2	39	04	1	02603559
03360	29	5	09	0048000	2	4	6	05	3	4	8	4	0	2	38	04	1	02603559
00930	79	5	10	0022448	2	0	6	10	0	4	8	2	4	2	39	04	1	02603559
02700	79	5	10	0034933	2	4	6	05	6	4	8	4	4	2	45	04	1	02603559
03410	29	5	10	0011480	2	2	6	05	3	4	8	4	4	2	40	04	1	02603559
03400	29	5	10	0001992	1	2	6	05	0	4	8	4	4	1	35	04	1	02603559
09430	58	6	10	0010984	2	2	6	05	0	4	8	4	4	0	35	05	1	03209475
09330	82	7	04	0046056	2	4	6	05	6	4	4	2	4	1	39	05	1	02238262
09320	82	7	10	0008000	2	4	6	05	3	4	8	2	2	1	37	05	1	02238262
09340	82	7	11	0008000	2	4	6	05	6	4	4	2	2	1	36	05	1	02238262
09350	82	7	13	0004000	2	4	6	05	6	4	8	4	0	0	39	05	1	02238262
06800	82	7	15	0044045	2	4	6	00	3	4	8	4	4	1	36	05	1	02238262
04590	82	7	18	0112617	1	4	6	00	6	4	8	4	4	1	38	05	1	05731226
08781	08	4	10	0009180	2	4	6	05	0	4	8	4	2	2	37	05	1	03848857
06490	02	1	04	0002465	1	2	6	10	0	4	4	4	4	2	37	05	1	00563407
05160	52	1	10	0006800	2	4	6	05	0	4	8	4	4	2	39	05	1	00855933
05710	52	1	10	0003792	1	2	6	05	0	4	8	4	4	1	35	05	1	00855933
05930	17	1	10	0046620	2	4	6	05	6	4	4	2	2	1	36	05	1	00855933
04540	21	1	10	0003800	2	4	6	05	0	4	8	4	2	2	37	05	1	00855933
04780	21	1	11	0004241	2	2	6	05	0	4	8	2	4	2	35	05	1	00855933
05130	21	1	11	0009789	2	2	6	10	0	4	4	4	2	2	36	05	1	00855933

TABLE 14.--contd.

07350	31	1	10	0001500	1	2	6	05	6	4	8	4	4	2	42	08	1	00563407
08340	31	1	10	0000550	1	2	6	10	0	2	8	4	2	2	37	08	1	00563407
08330	31	1	10	0000381	1	0	6	10	0	4	8	4	4	2	39	08	1	00563407
10080	21	1	10	0008916	1	2	6	05	6	4	4	2	4	2	36	08	1	00563407
06450	02	1	11	0006200	2	4	6	00	3	4	8	4	2	2	35	08	1	00563407
10360	02	1	11	0002066	2	4	6	00	3	2	8	4	2	2	35	08	1	00563407
09250	07	1	11	0001176	0	2	6	05	0	4	8	4	4	2	35	08	1	00563407
04600	21	1	11	0003200	1	4	6	05	0	2	8	2	4	2	36	08	1	00855933
05331	52	1	11	0007200	2	2	6	05	0	4	8	4	4	2	37	08	1	00563407
03980	49	1	11	0006748	2	2	6	05	0	4	8	2	4	2	35	08	1	00563407
07440	31	1	11	0015260	1	4	6	00	6	4	4	4	4	2	35	08	1	00563407
07430	31	1	11	0010563	1	4	6	00	6	4	4	4	4	2	35	08	1	00563407
07400	31	1	11	0000800	1	2	6	05	6	4	4	4	2	2	36	08	1	00563407
07390	31	1	11	0000800	1	2	6	05	6	4	4	4	2	2	36	08	1	00563407
07380	31	1	11	0000800	1	2	6	05	6	4	4	4	2	2	36	08	1	00563407
07370	31	1	11	0004000	1	2	6	05	6	4	4	4	2	2	36	08	1	00563407
00550	31	1	15	0007680	2	2	6	05	0	4	8	4	4	1	36	08	1	00973857
01680	31	1	15	0005450	1	2	6	05	0	4	8	4	4	1	35	08	1	00973857
08680	66	1	18	0011278	0	4	6	05	3	4	8	2	4	2	38	08	1	00563407
07340	31	1	18	0022966	2	2	6	05	6	4	8	4	4	2	43	08	1	00563407
10330	64	2	04	0002750	2	2	6	05	0	4	8	4	2	2	35	08	1	00615042
04060	51	2	11	0028108	2	4	6	00	6	4	4	4	4	2	35	08	1	00776449
04510	24	2	11	0060912	2	2	6	05	0	4	8	2	4	2	35	08	1	00615042
10070	51	2	15	0006653	0	4	6	05	0	4	8	4	4	2	37	08	1	00615042
08460	24	2	17	0001776	1	2	6	05	0	4	8	4	4	2	36	08	1	00615042
04400	15	2	17	0012000	1	4	6	05	6	4	4	2	2	1	35	08	1	00776449
05210	20	3	03	0005000	1	4	6	05	6	4	4	2	2	2	36	08	1	00427480
04680	65	3	10	0007618	2	2	3	10	0	2	8	4	4	2	37	08	1	00427480
05200	20	3	10	0009800	1	2	6	05	6	4	4	2	4	2	36	08	1	00427480
08890	35	3	10	0008429	1	4	3	05	3	2	8	4	4	2	36	08	1	00271034
04960	11	4	03	0003935	2	4	6	00	3	4	8	4	4	2	37	08	1	04445878
04970	11	4	03	0003935	2	4	6	00	3	4	8	4	4	2	37	08	1	04445878
04980	11	4	03	0003935	2	4	6	00	3	4	8	4	4	2	37	08	1	04445878
04990	11	4	03	0003935	2	4	6	00	3	4	8	4	4	2	37	08	1	04445878
05000	11	4	03	0003935	2	4	6	00	3	4	8	4	4	2	37	08	1	04445878
05010	11	4	03	0010630	2	4	3	05	0	4	8	4	4	2	36	08	1	04445878
05020	11	4	03	0003935	2	4	6	05	0	4	8	4	4	2	39	08	1	04445878
05030	11	4	03	0001015	2	4	6	00	3	4	8	4	2	2	35	08	1	04445878
05100	11	4	03	0019994	2	4	6	00	3	4	8	4	4	2	37	08	1	03848857
05090	11	4	03	0005200	2	4	6	00	3	4	8	4	2	2	35	08	1	04445878
050A0	11	4	03	0006746	2	4	6	05	0	4	8	4	2	2	37	08	1	04445878
01160	41	4	04	0036000	0	4	3	05	6	4	8	2	4	2	38	08	1	07448255
05060	11	4	04	0013946	2	4	6	05	0	4	8	4	2	2	37	08	1	04445878
01150	41	4	10	00A0000	0	4	6	10	6	4	8	4	4	2	48	08	1	07448255
01140	41	4	10	0060000	0	4	6	10	6	4	8	4	4	2	48	08	1	07448255

TABLE 14.--contd.

11330	11	4	18	0010416	2	4	6	00	3	4	8	4	4	2	37	06	1	01863568
03920	44	5	04	0008609	2	4	6	05	0	4	8	4	2	2	37	06	1	02169233
05430	09	5	04	0025800	2	4	6	05	6	4	4	2	2	2	37	06	1	02169233
03140	76	5	04	0009650	2	2	6	10	3	4	4	2	4	2	39	06	1	02169233
03130	76	5	10	0004000	2	2	6	10	3	4	4	2	2	2	37	06	1	02169233
03070	76	5	10	0003079	1	2	6	10	0	4	4	4	2	2	35	06	1	02169233
02960	76	5	10	0009743	1	4	6	10	0	4	8	2	2	2	39	06	1	02169233
03781	44	5	10	0022000	2	2	6	05	0	2	8	4	4	2	35	06	1	02603559
05460	09	5	10	0044000	2	4	6	05	3	4	4	2	4	2	36	06	1	02169233
05450	09	5	10	0044000	2	4	6	05	3	4	4	2	4	2	36	06	1	02169233
05440	09	5	10	0044000	2	4	6	05	0	2	8	4	2	2	35	06	1	01483633
06270	76	5	10	0002187	2	2	6	10	0	4	4	2	4	2	36	06	1	02169233
03000	76	5	11	0013117	1	4	6	10	0	4	4	2	2	2	35	06	1	02169233
05420	09	5	15	0245095	1	4	6	05	6	4	4	2	4	2	39	06	1	02169233
05850	63	6	04	0028000	1	4	6	00	6	4	8	4	2	1	36	06	1	03777226
06000	58	6	10	0028800	1	4	6	05	3	4	4	4	2	2	35	06	1	03777226
06790	58	6	10	0009000	1	4	6	05	3	4	4	4	2	2	35	06	1	03209475
08170	58	6	10	0046724	2	4	6	05	0	4	8	2	2	2	35	06	1	03209475
08050	63	6	10	0031020	2	4	6	00	6	4	8	2	4	1	37	06	1	03209475
08040	63	6	10	0011120	2	4	6	00	6	4	8	2	4	1	37	06	1	03209475
08030	63	6	10	0011120	2	4	6	00	6	4	8	2	4	1	37	06	1	03209475
08010	63	6	10	0003280	2	4	6	00	6	4	8	2	2	2	35	06	1	03209475
08000	63	6	10	0013600	2	4	6	00	6	4	8	2	4	1	37	06	1	03209475
07990	63	6	10	0003280	2	4	6	00	6	4	8	2	2	1	35	06	1	03209475
07980	63	6	10	0063600	2	4	6	00	6	4	8	2	2	1	35	06	1	03209475
00420	58	6	10	0010000	2	4	6	05	0	4	8	2	2	2	35	07	1	03209475
02660	63	6	10	0026800	1	4	6	00	3	4	8	4	4	2	36	08	1	04747931
03200	63	6	11	0011629	2	4	6	00	0	4	8	4	4	2	34	08	1	03209475
01780	63	6	15	0132000	0	4	6	05	3	4	4	4	4	1	35	08	1	04747931
06230	58	6	17	0012286	0	4	6	05	0	4	8	4	2	2	35	08	1	03777226
06220	58	6	17	0012286	0	4	6	05	0	4	8	4	2	2	35	08	1	03777226
06150	82	7	10	0100000	1	4	6	05	6	2	4	4	4	1	37	08	1	05731226
06100	82	7	13	0300000	1	4	6	10	6	4	4	4	0	2	41	08	1	05731226
07450	31	1	04	0001543	1	4	6	00	6	4	4	4	4	2	35	08	1	00563407
07420	31	1	04	0006922	1	4	6	00	6	4	4	4	4	2	35	08	1	00563407
00330	22	1	10	0068360	2	2	6	10	6	4	8	4	4	2	48	08	1	01104066
00320	22	1	10	0068360	2	2	6	10	6	4	8	4	4	2	48	08	1	01104066
02870	36	1	10	0003134	2	4	6	05	0	4	8	2	4	1	36	08	1	00973857
09370	77	1	10	0002390	1	2	6	10	0	4	4	4	4	1	36	08	1	00563407
08700	66	1	10	0003133	0	4	6	05	0	4	8	4	2	2	35	08	1	00563407
08690	66	1	10	0003945	2	2	6	05	0	4	8	4	4	2	37	08	1	00563407
08670	66	1	10	0004918	2	4	6	05	0	4	8	2	4	2	37	08	1	00563407
09480	52	1	10	0001693	1	2	6	05	0	4	8	4	4	1	35	08	1	00563407
06420	42	1	10	0003683	1	2	6	10	0	4	4	4	4	2	37	08	1	00563407
07360	31	1	10	0000692	1	2	6	05	6	4	8	4	2	2	40	08	1	00563407

TABLE 14.--contd.

04820	06	3	10	0005193	0	4	6	05	0	4	8	4	2	2	35	06	1	00427480
04850	06	3	10	0004528	0	4	6	05	0	4	8	4	2	2	35	06	1	00427480
08950	16	3	10	0000960	0	4	6	05	3	4	8	2	2	2	36	06	1	00271034
08940	16	3	10	0000960	0	4	6	05	3	4	8	2	2	2	36	06	1	00271034
01690	04	3	17	0109359	2	4	6	00	6	4	4	4	4	2	36	06	1	00523370
09040	11	4	03	0028800	2	4	6	05	0	2	8	2	4	2	35	06	1	03848857
06340	14	4	04	0014400	1	4	6	05	3	4	8	4	2	2	39	06	1	03848857
07950	41	4	04	0003200	1	2	6	05	0	4	8	4	2	2	35	06	1	03848857
03090	59	4	10	0002160	2	4	6	05	3	4	8	4	4	2	42	06	1	05101164
03191	80	4	10	0038040	2	4	6	05	3	4	4	4	2	2	36	06	1	04445878
03190	59	4	10	0009405	2	4	3	00	3	4	8	4	4	2	34	06	1	05101164
03101	59	4	10	0010720	2	4	6	05	3	4	8	4	2	2	40	06	1	05101164
03440	19	4	10	0004300	2	2	6	05	0	4	8	4	4	1	36	06	1	05101164
03431	19	4	10	0006532	2	2	6	05	0	4	8	4	4	1	36	06	1	05101164
03600	61	4	10	0005600	1	2	6	05	0	4	8	4	4	2	36	06	1	05101164
03541	34	4	10	0044000	2	4	6	05	3	2	8	2	4	2	38	06	1	05101164
04000	61	4	10	0003600	1	4	6	05	0	4	8	2	4	2	36	06	1	04445878
03990	61	4	10	0011000	1	4	6	05	0	4	8	2	4	2	36	06	1	04445878
03930	61	4	10	0007000	1	4	6	05	0	4	8	2	4	2	36	06	1	04445878
03791	13	4	10	0161120	2	4	6	05	6	4	4	2	4	2	39	06	1	05101164
05720	70	4	10	0027193	2	2	6	05	0	4	8	4	2	2	35	06	1	04445878
06100	59	4	10	0006400	1	2	6	10	0	4	8	2	2	2	37	06	1	04445878
06310	14	4	10	0014960	1	4	6	05	3	4	4	4	2	2	35	06	1	04445878
06740	23	4	10	0004555	2	2	6	05	3	4	8	2	2	2	36	06	1	03848857
06901	03	4	10	0023351	2	4	6	05	0	4	4	4	4	2	35	06	1	03848857
07100	33	4	10	0034303	1	2	6	05	0	4	8	4	4	1	35	06	1	03848857
08090	11	4	10	0035400	2	4	6	00	6	4	8	2	2	1	35	06	1	03848857
10200	23	4	10	0002204	2	2	6	05	3	4	4	4	4	2	36	06	1	03848857
10630	61	4	10	0004000	2	2	6	05	0	4	8	4	2	2	35	06	1	03848857
10620	61	4	10	0006400	2	2	6	05	0	4	8	4	2	2	35	06	1	03848857
11071	33	4	10	0022000	0	2	6	05	3	4	8	4	2	1	35	06	1	01863568
11000	11	4	10	0017600	2	2	6	00	6	4	8	2	4	2	36	06	1	01863568
08381	61	4	10	0011200	2	4	6	05	0	4	8	2	4	2	37	06	1	05101164
06000	61	4	10	0009900	2	4	6	00	3	4	8	4	2	2	35	06	1	04445878
05241	46	4	10	0025000	2	2	6	05	0	4	8	2	4	2	35	06	1	03848857
01520	61	4	11	0023000	1	2	6	05	0	4	8	4	4	1	35	06	1	04445878
02800	12	4	11	0011240	1	4	3	05	3	4	4	4	4	2	34	06	1	05101164
04010	61	4	11	0002400	2	4	6	05	0	4	8	2	2	2	35	06	1	04445878
03971	61	4	11	0007800	1	4	6	05	0	4	8	2	2	2	34	06	1	03848857
06301	14	4	11	0007760	1	4	6	05	3	4	8	4	2	2	39	06	1	01863868
07880	41	4	11	0001760	2	2	6	05	0	4	8	4	2	2	35	06	1	03848857
07860	41	4	11	0001760	2	2	6	05	0	4	8	4	2	2	35	06	1	03848857
05761	03	4	15	0008000	0	2	6	05	0	4	8	4	4	2	35	06	1	04445878
07110	33	4	15	0018800	1	2	6	05	3	4	8	4	4	1	38	06	1	03848857
07910	41	4	15	0008000	1	2	6	05	3	4	4	4	4	2	35	06	1	03848857

TABLE 14.--contd.

05800	32	5	10	0021463	1	0	3	10	3	4	4	4	4	2	35	18	1	02169233
05730	25	5	10	0032242	2	2	3	05	3	4	8	4	4	2	37	18	1	02169233
05701	37	5	11	0007177	2	4	6	05	6	2	8	4	2	1	40	18	1	02169233
05741	79	5	11	0017622	1	2	6	10	3	4	4	2	2	2	36	18	1	02169233
08480	19	4	10	0010514	1	4	6	05	0	4	8	4	4	1	37	19	1	03848857
07130	29	5	10	0012800	2	2	6	10	0	2	8	4	4	0	38	19	1	01483633
07320	50	6	10	0028596	2	4	3	00	6	4	8	4	2	2	35	19	1	03209475
05660	82	7	10	0030000	2	4	6	00	6	4	8	2	2	1	35	19	1	02238262
05670	82	7	10	0050000	2	2	6	00	6	4	8	2	4	1	35	19	1	02238262
09901	17	1	10	0003240	1	4	6	05	0	2	8	4	4	1	35	20	1	00563407
09950	17	1	10	0014000	2	4	6	05	3	2	8	4	4	2	40	20	1	00563407
09900	17	1	10	0002000	2	4	6	05	0	4	8	4	2	1	36	20	1	00563407
09980	17	1	11	0002000	1	4	6	05	0	4	8	4	2	1	35	20	1	00563407
09960	17	1	11	0003500	2	4	6	05	0	4	8	4	4	2	39	20	1	00563407
09910	17	1	11	0004055	2	4	6	05	0	2	8	4	4	2	37	20	1	00563407
09920	48	1	11	0010000	2	4	6	05	0	2	8	4	4	2	37	20	1	00563407
09940	49	1	11	0006371	1	2	6	05	0	4	8	4	4	1	35	20	1	00563407
09970	17	1	18	0003000	0	2	6	05	0	4	8	4	4	2	35	20	1	00563407
10900	24	2	10	0010000	2	4	6	05	0	4	8	4	2	2	37	20	1	00160567
09100	71	3	03	0006815	2	4	3	05	3	2	8	4	2	2	35	20	1	00271034
09090	71	3	03	0003407	2	4	6	05	3	4	8	2	2	2	38	20	1	00271034
09150	16	3	10	0001000	2	4	6	05	0	4	8	4	2	2	37	20	1	00271034
09110	71	3	10	0003723	2	4	6	05	0	2	8	4	4	2	37	20	1	00271034
09160	16	3	11	0003500	2	4	6	05	0	2	8	4	4	2	37	20	1	00271034
08980	16	3	11	0000505	2	2	6	05	0	2	8	4	4	2	35	20	1	00271034
08440	33	4	10	0002400	2	4	3	05	3	2	8	4	4	2	37	20	1	03848857
08430	33	4	10	0001920	2	4	3	05	3	4	8	4	4	2	39	20	1	03848857
08420	33	4	10	0041360	2	4	6	05	3	4	8	2	2	2	38	20	1	03848857
08400	33	4	10	0004520	2	4	6	05	3	4	8	4	2	2	40	20	1	03848857
09030	41	4	10	0003456	2	4	6	05	3	4	8	4	2	2	40	20	1	03848857
09020	41	4	10	0003316	2	4	6	05	3	4	4	4	2	2	36	20	1	03848857
10040	13	4	10	0013600	2	4	6	00	3	4	8	4	4	2	37	20	1	03848857
09010	63	6	03	0007675	1	4	6	05	6	4	4	2	4	1	37	20	1	03209475
08361	63	6	10	0066691	2	4	6	00	3	4	8	4	4	2	37	20	1	03209475
09771	63	6	10	0009000	1	4	6	05	0	4	8	2	4	1	35	20	1	03209475
09761	73	6	10	0020500	2	4	6	05	0	2	8	4	4	2	37	20	1	03209475
09650	63	6	10	0023013	2	2	6	05	6	4	8	4	2	2	41	20	1	03209475
10060	47	6	10	0008740	1	4	6	05	0	4	8	2	4	2	36	20	1	03209475
09750	82	7	10	0060560	1	4	3	05	6	2	8	4	2	1	37	20	1	02238262
09730	82	7	11	0005600	0	4	6	05	6	4	8	4	2	1	40	20	1	02238262
09741	82	7	15	0059200	1	4	3	05	6	4	8	4	4	1	40	20	1	02238262
02440	50	6	04	0108000	0	4	3	00	3	4	8	2	4	2	30	21	1	04747931
04360	77	1	04	0005500	2	4	6	05	0	2	8	4	4	2	37	23	1	00563407
04100	17	1	10	0004400	2	4	6	05	6	4	8	2	4	2	40	23	1	00973857
01910	27	1	11	0003400	1	4	6	05	0	4	8	4	4	2	38	23	1	00973857

TABLE 14.--contd.

01110	41	4	10	0041600	0	4	6	10	6	4	8	4	4	2	48	08	1	07448255
01120	41	4	10	0060000	0	4	6	05	6	4	8	4	4	2	43	08	1	07448255
01100	41	4	10	0072000	0	4	6	10	6	4	8	4	4	2	48	08	1	07448255
05751	70	4	10	0002800	0	4	6	05	3	4	4	4	4	2	36	08	1	04445878
09540	03	4	10	0060000	1	4	3	05	0	4	8	4	4	2	35	08	1	03848857
10020	13	4	10	0024800	2	2	6	00	3	4	8	4	4	2	35	08	1	03848857
10212	23	4	10	0006400	2	2	6	05	3	4	8	2	2	2	36	08	1	03848857
10030	13	4	10	0005600	2	4	6	00	3	4	8	4	4	2	37	08	1	03848857
09300	70	4	10	0014000	2	2	6	05	3	4	4	4	4	1	35	08	1	03848857
04951	11	4	11	0006000	2	4	3	05	3	4	4	4	4	2	35	08	1	04445878
05041	14	4	11	0006195	2	4	3	05	0	4	8	4	4	2	36	08	1	04445878
05051	14	4	11	0006195	2	4	6	05	0	4	8	4	4	2	39	08	1	04445878
09500	03	4	11	0008000	1	4	6	05	0	4	8	2	4	2	36	08	1	03848857
06850	03	4	17	0014600	2	2	6	05	0	4	8	2	4	2	35	08	1	03848857
02800	75	5	10	0039485	2	2	6	05	0	2	8	4	4	2	35	08	1	02603559
09681	75	5	10	0012474	2	4	6	05	0	4	8	2	4	2	37	08	1	01483633
05570	79	5	13	0165858	2	4	6	05	3	4	4	2	4	2	36	08	1	02169233
08070	58	6	10	0017277	2	2	6	05	0	4	8	4	4	2	37	08	1	03209475
00712	63	6	10	0011400	1	0	6	05	6	4	8	4	2	1	37	09	1	05802668
00950	31	1	10	0024050	1	4	3	10	3	2	8	4	4	0	39	09	1	01171776
01650	77	1	10	0030754	2	4	6	10	3	4	4	4	4	2	43	09	1	01104066
01870	52	1	11	0075840	0	4	6	10	3	4	8	4	2	2	43	09	1	01104066
04070	51	2	10	0002086	1	4	6	00	6	4	4	4	4	2	35	06	1	00776449
05580	67	2	10	0007600	2	4	6	05	0	2	8	4	4	2	37	01	1	00776449
00730	63	6	10	0032000	1	0	6	05	3	4	8	4	4	1	36	09	1	05802668
00740	63	6	10	0012000	1	0	6	05	6	4	8	4	2	1	37	09	1	05802668
00701	63	6	10	0055200	1	0	6	05	6	4	8	4	2	1	37	09	1	05802668
10350	21	1	10	0007477	2	4	6	05	0	4	4	4	4	2	35	10	1	00563407
06760	51	2	10	0002320	2	4	6	00	0	4	8	4	4	2	34	10	1	00615042
06780	05	2	10	0007680	2	4	3	05	3	2	8	4	4	2	37	10	1	00615042
03510	64	2	10	0012000	2	4	6	05	0	4	4	4	4	2	36	10	1	00615042
07030	51	2	11	0005977	1	4	6	05	0	4	8	4	2	2	36	10	1	00615042
06870	43	2	15	0005458	1	2	6	10	0	4	8	4	4	2	41	10	1	00615042
06840	20	3	03	0006400	2	0	6	05	0	4	8	4	4	2	35	10	1	00427480
05561	01	3	15	0024300	0	2	6	05	0	4	8	4	4	2	35	10	1	00271034
08100	11	4	04	0009600	0	4	6	00	6	4	8	4	2	1	35	10	1	03848857
01920	61	4	04	0006400	2	2	6	05	0	2	8	4	4	1	35	10	1	03848857
04540	38	4	10	0003755	2	4	6	05	3	4	4	4	2	1	35	10	1	03848857
05560	23	4	10	0012822	1	2	6	05	3	4	8	4	4	1	38	10	1	03848857
07120	33	4	10	0036925	2	4	6	05	3	2	8	4	4	1	39	10	1	03848857
06500	19	4	10	0013000	1	2	6	05	0	4	8	4	4	2	36	10	1	03848857
09000	41	4	10	0030800	2	4	6	00	3	4	8	4	4	2	37	10	1	03848857
09640	19	4	10	0006055	2	4	6	05	0	4	4	4	4	2	35	10	1	03848857
09631	33	4	10	0064000	2	4	3	05	0	4	8	4	4	2	36	10	1	03848857
10010	61	4	10	0008000	1	4	6	05	3	4	4	2	4	2	35	10	1	03848857

TABLE 14.--contd.

07480	25	5	10	0154280	0	4	6	10	6	2	4	4	4	2	42	10	1	01483633
09081	75	5	10	0044767	1	2	6	05	0	4	8	4	4	2	36	10	1	01483633
06970	63	6	10	0003600	1	2	6	00	6	4	8	4	2	2	35	10	1	03209475
06960	63	6	10	0003600	1	2	6	00	6	4	8	4	2	2	35	10	1	03209475
06950	63	6	10	0002000	1	2	6	00	6	4	8	4	2	2	35	10	1	03209475
06940	63	6	10	0006400	1	2	6	00	6	4	8	4	2	2	35	10	1	03209475
06930	63	6	10	0006000	1	4	6	00	6	4	4	4	4	2	35	10	1	03209475
06920	63	6	10	0012000	1	2	6	00	6	4	8	4	4	2	37	10	1	03209475
06910	63	6	10	0030000	1	2	6	00	6	4	8	4	4	2	37	10	1	03209475
06900	63	6	10	0012000	1	2	6	00	6	4	8	2	4	2	35	10	1	03209475
06890	63	6	10	0012000	1	2	6	00	6	4	8	2	4	2	35	10	1	03209475
06880	63	6	10	0018960	1	2	6	00	6	4	8	2	4	2	37	10	1	03209475
07290	63	6	10	0015840	1	4	6	00	6	4	4	4	4	2	35	10	1	03209475
08582	73	6	10	0017380	1	4	3	05	0	4	8	4	4	2	35	10	1	03209475
10440	63	6	10	0012500	2	4	6	00	0	4	8	4	4	2	34	10	1	03209475
00790	63	6	11	0084000	2	2	6	00	6	4	8	2	4	2	36	10	1	05802668
06980	63	6	11	0007983	1	2	6	00	6	4	8	4	2	2	35	10	1	03209475
01050	46	4	10	0126270	0	2	3	10	6	2	8	2	4	2	39	11	1	07448255
00960	75	5	15	0019200	1	2	6	05	3	2	4	4	2	2	31	11	1	03833500
00880	70	4	10	0000000	2	2	6	10	3	4	8	2	4	1	42	12	1	07448255
04110	17	1	03	0009588	2	4	6	05	6	4	4	2	0	2	35	14	1	00973857
01250	41	4	04	0092000	0	4	6	05	0	2	8	4	4	2	35	14	1	03848857
01240	41	4	04	0120000	0	4	6	05	3	2	8	4	4	2	38	14	1	03848857
01590	34	4	10	0072000	2	2	6	00	6	4	8	4	4	1	37	14	1	06523348
02731	23	4	10	0013024	2	2	6	05	3	4	8	4	2	2	38	14	1	05101164
00080	30	4	13	0020000	2	4	6	05	0	4	8	4	0	2	35	14	1	06523348
03631	50	6	11	0044000	2	4	6	00	0	4	8	4	4	2	34	14	1	04288892
01481	75	5	10	0073876	1	4	6	05	3	4	8	4	4	1	40	15	1	00639768
02770	75	5	10	0010417	2	4	6	05	3	4	8	2	4	1	39	15	1	02680991
06460	02	1	04	0002500	2	4	6	00	3	4	8	4	2	2	35	17	1	00855933
04150	77	1	10	0003672	1	4	6	05	0	2	8	4	2	1	33	17	1	00855933
05360	52	1	10	0011987	2	4	6	05	6	4	4	2	2	4	39	17	1	00855933
05340	52	1	10	0002715	2	2	6	05	0	2	8	4	4	2	35	17	1	00855933
04570	31	1	10	0001200	0	2	6	05	0	4	4	2	4	1	28	17	1	00563407
06620	52	1	11	0000904	2	4	6	05	6	4	8	2	4	2	43	17	1	00855933
06610	52	1	11	0000904	2	4	6	05	6	4	8	2	4	2	43	17	1	00855933
06610	52	1	11	0000904	2	4	6	05	6	4	8	2	4	2	43	17	1	00855933
05360	52	1	11	0010020	2	4	6	05	6	4	4	4	2	2	39	17	1	00855933
04460	31	1	15	0012000	2	4	6	05	0	4	8	2	2	2	35	17	1	00855933
04990	02	1	15	0006500	2	4	6	00	3	4	8	4	4	2	37	17	1	00855933
06430	02	1	18	0004500	2	4	6	00	3	4	8	4	4	2	35	17	1	00855933
10590	54	2	10	0010823	0	4	6	10	0	4	4	4	2	2	36	17	1	00615042
06720	54	2	10	0003680	2	4	6	05	0	4	8	2	4	2	37	17	1	00776449
06560	67	2	10	0008694	2	4	6	05	3	4	8	4	4	2	42	17	1	00776449
06540	67	2	10	0006934	2	4	6	05	3	4	8	4	4	2	42	17	1	00776449

TABLE 14.--contd.

06530	67	2	10	0004920	2	4	6	05	6	4	8	4	4	2	45	17	1	00776449
06520	67	2	10	0018640	2	4	3	05	0	4	8	4	4	2	36	17	1	00776449
06500	67	2	10	0003200	2	4	6	05	6	4	8	4	4	2	45	17	1	00776449
04660	62	2	10	0040000	2	4	3	00	6	2	8	4	4	2	35	17	1	00776449
06710	54	2	15	0002414	2	4	6	05	0	4	8	2	2	2	35	17	1	00776449
04471	65	3	10	0021420	2	2	0	10	6	4	8	4	2	1	39	17	1	00427480
04700	70	4	10	0014549	2	4	6	05	6	4	4	4	2	2	39	17	1	03848857
04830	13	4	10	0008160	2	4	6	05	0	4	8	4	4	2	39	17	1	04445878
05100	30	4	10	0004000	2	0	6	10	0	4	8	2	2	2	36	17	1	03848857
05940	13	4	10	0013000	0	2	6	05	3	4	8	4	4	1	37	17	1	04445878
06600	74	4	10	0050480	1	4	6	05	3	4	4	4	4	2	37	17	1	03848857
09230	33	4	10	0003200	2	4	6	05	3	4	8	4	2	2	40	17	1	03848857
09222	33	4	10	0020000	2	4	6	05	3	2	8	2	0	2	34	17	1	03848857
09200	33	4	10	0016480	2	4	6	00	3	4	8	2	4	2	35	17	1	03848857
09060	13	4	10	0050320	1	4	3	05	6	4	4	2	4	2	35	17	1	03848857
09040	13	4	10	0012000	1	4	6	05	6	4	8	4	2	2	42	17	1	03848857
09241	33	4	10	0006000	2	4	6	05	3	4	8	4	2	2	40	17	1	03848857
04431	30	4	11	0008300	2	4	6	10	0	4	8	2	4	2	42	17	1	04445878
04741	34	4	11	0110500	2	4	3	05	3	2	8	4	4	1	36	17	1	04445878
09210	33	4	11	0008000	2	4	3	10	3	2	8	4	4	2	42	17	1	03848857
02850	75	5	10	0078868	2	4	6	05	3	4	8	4	4	2	42	17	1	02169233
04500	44	5	10	0007537	2	2	6	05	3	2	8	4	2	2	36	17	1	02169233
07810	37	5	10	0006000	2	2	6	10	0	4	4	4	2	2	36	17	1	01483633
07800	37	5	10	0006040	1	4	6	05	3	4	4	4	4	2	37	17	1	01483633
07700	37	5	10	0006200	2	4	3	10	0	2	8	2	2	2	35	17	1	01483633
07770	37	5	10	0039480	1	4	3	10	0	2	8	4	2	2	36	17	1	01483633
07760	37	5	10	0043240	1	4	0	10	0	2	8	4	4	2	35	17	1	01483633
07740	37	5	15	0009600	2	4	6	10	0	4	8	4	4	2	44	17	1	01483633
10310	25	5	15	0026333	2	4	6	00	3	4	8	4	2	2	35	17	1	01483633
04520	50	6	10	0067371	2	4	6	05	0	4	8	4	4	2	39	17	1	03777226
04530	50	6	10	0031014	2	4	6	00	3	4	8	2	4	2	35	17	1	03777226
05500	63	6	10	0016000	1	4	6	00	6	4	8	4	4	2	39	17	1	03777226
05400	63	6	10	0016000	1	4	6	00	6	4	8	4	4	2	39	17	1	03777226
05530	63	6	10	0002100	1	4	6	00	6	4	8	4	2	2	37	17	1	03777226
05520	63	6	10	0047700	1	4	6	00	6	4	8	4	4	2	39	17	1	03777226
06660	63	6	10	0045900	1	4	6	00	6	4	8	4	4	2	39	17	1	03777226
08100	63	6	10	0011629	2	4	6	00	0	4	8	4	4	2	34	17	1	03209475
04730	64	2	04	0015000	2	4	6	05	6	2	4	4	2	1	36	18	1	00776449
04690	65	3	10	0001600	2	2	3	10	0	4	8	4	2	1	32	18	1	00427480
04670	35	3	10	0006932	2	4	6	05	3	4	4	4	4	2	38	18	1	00427480
05840	70	4	10	0013699	2	4	6	05	3	4	4	4	2	1	35	18	1	04445878
05850	37	5	10	0006240	2	4	3	05	6	2	8	4	2	2	38	18	1	02169233
05600	37	5	10	0014296	2	4	3	05	6	4	4	4	4	2	38	18	1	02169233
05821	32	5	10	0013163	2	2	3	10	0	2	8	4	4	1	36	18	1	02169233
05811	32	5	10	0009016	2	2	3	10	0	4	8	2	4	2	37	18	1	02169233

TABLE 14.--contd.

04130	17	1	11	0004000	2	4	3	05	6	2	8	2	4	2	38	23	1	00973857
00520	27	1	15	0146424	0	0	6	05	6	4	8	4	4	0	37	23	1	01171776
04410	22	1	15	0035419	1	4	6	05	6	2	4	4	4	2	38	23	1	00855933
01370	31	1	15	0011000	2	4	6	05	0	4	8	4	4	1	38	23	1	00973857
02120	02	1	15	0001750	2	4	6	05	0	4	8	2	4	2	37	23	1	00973857
10840	21	1	17	0014400	1	4	6	00	6	4	8	4	4	1	38	23	1	00095764
03900	48	1	19	0011200	2	4	6	05	3	4	8	4	0	2	38	23	1	00973857
10890	53	2	10	0012960	1	4	6	05	3	4	8	4	4	2	41	23	1	00160567
04770	45	2	10	0010000	2	4	3	10	0	4	8	2	2	2	37	23	1	00776449
08140	54	2	13	0060000	2	2	6	00	6	4	8	4	4	2	38	23	1	00615042
02600	71	3	03	0038480	2	4	6	00	3	4	8	2	4	2	35	23	1	00523370
03870	65	3	10	0002700	2	2	6	10	0	2	8	2	2	2	36	23	1	00427480
01130	41	4	04	0052000	0	4	6	05	3	4	8	4	4	2	40	23	1	07448255
01230	41	4	04	1925416	0	4	6	05	6	2	8	0	4	2	37	23	1	07448255
01180	41	4	10	0036000	0	4	6	05	3	4	8	2	4	2	38	23	1	07448255
01190	41	4	10	0056000	0	4	6	05	0	4	8	2	4	2	35	23	1	07448255
02860	38	4	10	0016000	2	4	6	05	3	2	4	4	4	2	36	23	1	05101164
04050	61	4	10	0020000	1	4	6	05	0	4	8	2	4	2	36	23	1	03848857
05970	70	4	10	0016113	2	2	6	10	0	4	8	2	2	2	38	23	1	03848857
11291	61	4	10	0059289	1	2	6	05	6	2	8	4	4	1	39	23	1	01863568
10960	19	4	10	0026080	2	2	6	05	3	4	8	4	0	1	35	23	1	01863568
00310	75	5	10	0032800	0	2	3	05	6	2	8	4	4	2	36	23	1	03833500
00860	75	5	10	0016450	2	4	6	00	3	4	8	2	4	2	35	23	1	02680991
03530	09	5	10	0025152	2	4	6	05	0	4	8	2	4	2	37	23	1	02169233
04560	79	5	10	0005404	2	2	3	10	0	4	8	4	4	1	38	23	1	02169233
05571	37	5	10	0083930	1	4	3	05	6	2	8	4	2	2	37	23	1	00639768
00290	75	5	10	0060000	0	2	6	10	3	4	8	4	4	2	43	23	1	03833500
00270	75	5	10	0048000	0	2	6	10	3	4	8	2	4	1	40	23	1	03833500
00320	75	5	10	0021068	2	4	3	05	0	4	8	4	4	2	36	23	1	02603559
00301	75	5	11	0099200	0	2	6	10	4	4	4	2	4	2	38	23	1	03833500
05980	25	5	11	0001400	2	4	6	00	3	4	8	4	2	2	35	23	1	01483633
02760	25	5	13	0036170	1	4	6	05	3	4	4	4	2	2	35	23	1	02603559
01320	50	6	10	0032562	0	4	6	00	6	4	8	2	2	2	34	23	1	05802668
01310	50	6	10	0024052	0	4	6	00	6	4	8	2	2	2	34	23	1	05802668
01300	50	6	10	0054696	0	4	6	00	6	2	8	2	2	2	32	23	1	05802668
01290	50	6	10	0042699	0	4	6	00	6	4	8	2	2	2	34	23	1	05802668
01280	50	6	10	0066096	0	4	6	00	6	4	8	2	2	2	34	23	1	05802668
03570	63	6	10	0004000	2	4	6	00	0	4	8	4	4	2	34	23	1	04288892
03540	63	6	10	0017600	2	4	6	00	0	4	8	4	4	2	34	23	1	04288892
08371	63	6	10	0029550	2	4	6	00	3	2	8	4	4	2	35	23	1	03209475
11220	63	6	10	0028400	1	4	6	05	3	4	8	2	4	2	36	23	1	01524996
11210	63	6	10	0025200	1	4	6	05	3	4	8	2	4	1	38	23	1	01524996
01340	50	6	10	0019472	0	4	6	00	6	2	8	2	4	2	34	23	1	05802668
01330	50	6	10	0014545	0	4	6	00	6	2	8	2	2	2	32	23	1	05802668
07670	50	6	15	0015500	1	4	6	05	0	4	8	4	4	2	38	23	1	03209475

TABLE 14.--contd.

00840	82	7	10	0065120	2	4	6	00	6	4	4	4	4	2	36	23	1	10211918
10880	82	7	11	0036000	1	4	6	00	6	4	8	2	4	2	37	23	1	00419623
00680	82	7	17	0240000	1	4	6	10	6	4	8	4	2	1	46	23	1	10211918
09462	63	6	10	0036763	2	4	6	00	3	4	8	4	2	2	35	01	1	03209475
07970	41	4	11	0001760	1	2	0	05	0	0	4	2	2	2	18	06	0	03848857
07901	41	4	11	0008000	1	2	3	05	0	2	4	2	2	2	23	06	0	03848857
07890	41	4	11	0008000	1	2	0	05	0	2	4	2	2	2	20	06	0	03848857
10930	57	2	13	0060000	2	2	6	10	0	2	4	2	0	1	29	23	0	00160567
07870	41	4	11	0008000	1	2	0	05	0	0	4	2	2	2	18	06	0	03848857
00101	73	6	10	0511420	0	2	0	05	0	2	0	0	4	0	13	01	0	04747931
01700	73	6	10	0504000	0	0	3	05	0	2	8	0	4	0	22	01	0	04288892
00790	63	6	15	0140300	1	4	6	00	6	4	0	2	2	2	27	01	0	04747931
00620	82	7	13	0600000	2	4	6	00	6	4	4	4	0	2	32	01	0	06734014
03910	48	1	10	0012560	2	4	0	00	0	0	8	4	4	2	24	01	0	00973857
01040	38	4	10	0016000	1	2	0	05	0	2	0	0	4	1	15	01	0	06523348
01030	38	4	10	0022480	1	2	0	05	0	2	4	0	0	1	15	01	0	06523348
01010	38	4	10	0028400	1	2	0	05	0	0	4	0	0	1	13	01	0	06523348
02220	33	4	10	0055066	1	4	0	00	6	2	4	2	4	2	25	01	0	05101164
00922	39	4	11	0008000	2	4	3	00	0	2	8	4	4	2	29	01	0	05101164
01020	38	4	17	0003200	1	2	0	00	0	2	4	0	2	1	12	01	0	06523348
01460	56	5	10	0100000	2	4	3	00	0	2	4	2	4	1	22	01	0	02603559
01402	82	7	10	0200000	0	2	3	05	3	2	4	4	2	1	26	02	0	10211918
03380	29	5	10	0012800	2	2	0	05	0	4	4	0	4	1	22	04	0	02169233
04920	02	1	19	0006450	2	2	3	10	0	2	4	2	2	2	29	05	0	00855933
10100	83	2	07	0006800	0	2	3	05	0	2	0	0	0	1	13	05	0	00615042
06400	05	2	10	0001708	0	2	6	05	0	2	8	4	4	0	31	05	0	00615042
10140	83	2	11	0006000	2	2	6	05	0	4	8	4	4	1	36	05	0	00615042
04390	69	3	10	0002500	2	4	6	00	6	4	4	2	0	2	30	05	0	00427480
04480	06	3	11	0002956	0	2	6	05	0	2	0	0	2	0	17	05	0	00271034
10522	80	4	10	0008000	2	2	6	05	3	4	8	4	2	0	36	05	0	01863868
07560	58	6	10	0025600	1	4	6	05	0	2	4	2	2	2	28	06	0	03209475
06480	48	1	10	0012560	2	2	0	00	0	2	8	2	2	2	20	06	0	00855933
05470	55	1	10	0048000	1	2	0	05	0	2	0	0	2	1	13	06	0	00563407
09800	21	1	10	0005010	1	0	0	05	0	2	8	2	2	1	21	06	0	00563407
08910	45	2	10	0002210	2	2	0	05	0	0	0	2	2	1	14	06	0	00615042
03400	62	2	15	0040000	2	4	6	00	0	4	4	2	2	2	26	06	0	00689338
05260	64	2	15	0008000	1	2	6	05	0	4	4	0	2	2	25	06	0	00615042
08980	16	3	10	0000960	0	4	6	05	3	4	8	2	2	2	36	06	0	00271034
08970	16	3	10	0000960	0	4	6	05	3	4	8	2	2	2	36	06	0	00271034
08960	16	3	10	0000960	0	4	6	05	3	4	8	2	2	2	36	06	0	00271034
07930	41	4	04	0001760	1	2	0	05	0	0	4	2	2	2	18	06	0	03848857
02930	59	4	10	0004000	1	2	3	10	0	2	4	2	2	1	27	06	0	04445878
02920	59	4	10	0001600	1	2	3	10	0	2	4	2	2	1	27	06	0	04445878
02910	59	4	10	0020000	1	2	0	10	0	2	4	2	2	1	24	06	0	04445878
07960	41	4	10	0001760	1	2	0	05	0	0	4	2	2	2	18	06	0	03848857

TABLE 14.--contd.

06020	58	6	04	0002400	0	4	6	05	3	4	4	2	2	2	32	06	0	03777226
02370	58	6	10	0012000	0	4	6	00	0	4	4	2	4	1	25	08	0	04288892
023A0	58	6	11	0001920	0	4	6	05	3	2	8	2	2	1	33	08	0	04288892
02360	58	6	12	0003000	2	4	6	05	3	4	8	4	4	1	41	08	0	04288892
02360	58	6	13	0012003	0	4	3	10	3	4	4	2	0	1	31	08	0	04747931
09810	21	1	11	0003401	1	2	0	05	0	0	8	4	2	2	24	08	0	00563407
08630	24	2	04	0005000	2	2	6	05	0	4	8	2	4	1	34	08	0	00615042
05072	11	4	07	0032000	2	4	3	05	0	4	8	4	0	2	32	08	0	03848857
07850	41	4	11	0001600	1	2	0	05	0	0	0	0	0	2	10	08	0	03848857
10470	63	6	10	0012500	2	4	3	00	0	4	8	4	4	2	31	10	0	03209475
10460	63	6	10	0012500	2	4	6	00	0	4	8	4	4	2	34	10	0	03209475
10430	63	6	10	0012500	2	4	6	00	0	4	8	4	4	2	34	10	0	03209475
10420	63	6	10	0012500	2	4	6	00	0	0	8	4	4	2	30	10	0	03209475
02152	41	4	10	0174400	0	4	3	00	0	2	4	0	4	1	18	21	0	06523348
10400	63	6	10	0012500	2	4	6	00	0	4	8	4	4	2	34	10	0	03209475
103A0	63	6	10	0012500	2	4	6	00	0	4	8	4	4	2	34	10	0	03209475
09600	63	6	10	0150000	2	4	3	00	0	4	8	4	4	2	31	10	0	03209475
00480	58	6	10	0097600	1	2	6	05	3	2	4	4	4	1	32	13	0	04747931
02640	33	4	10	0053000	1	2	3	05	0	4	8	4	4	2	33	14	0	05101164
05320	16	3	16	0012000	0	4	6	05	3	4	8	2	0	2	34	17	0	00271034
03880	70	4	10	0015200	2	2	6	10	0	2	8	2	2	2	36	17	0	03848857
04100	75	5	10	0032000	1	4	3	05	0	2	4	2	4	1	26	17	0	02169233
07820	37	5	10	0003680	1	4	3	10	0	2	4	4	2	2	32	17	0	01483633
05182	82	7	10	0040000	1	4	3	00	0	2	4	4	2	2	22	17	0	05731226
04422	82	7	11	0048000	1	4	3	00	0	4	4	2	2	2	22	17	0	05731226
09800	17	1	04	0006685	1	2	6	05	0	2	0	2	0	2	20	20	0	00563407
08410	33	4	11	0015800	2	4	0	05	3	0	0	0	2	2	23	20	0	03848857
08282	47	6	04	0055000	0	2	6	05	0	4	8	4	4	2	35	20	0	03209475
09670	63	6	07	0000600	2	2	6	05	6	4	0	2	2	2	31	20	0	03209475
09680	63	6	10	0012868	2	2	6	05	6	4	8	4	2	2	41	20	0	03209475
02172	41	4	10	0050880	0	4	0	00	0	2	4	2	2	2	18	21	0	06523348
02162	41	4	10	0039440	0	4	0	00	0	2	4	2	2	2	18	21	0	06523348
02762	25	5	11	0126600	2	4	6	00	0	2	4	4	4	2	28	21	0	02603559
11190	41	4	10	0028000	0	4	6	05	3	4	4	2	2	2	32	23	0	01863868
01381	79	5	13	0196800	1	2	0	05	0	0	8	0	4	2	22	23	0	02603559
10460	63	6	10	0012500	2	4	6	00	0	4	8	4	4	2	34	10	0	03209475

APPENDIX D

REPLICATIONS OF WEIGHTS AND PRIORITY ORDERINGS FOR PROJECT EVALUATION

TABLE 15.--Weights and Priority Orderings for Project Evaluation (Replication Number 1).

Criteria (Independent Variables)	Variable Identification Number	DNR's Weight	Priority Ordering (DNR)	Y_A Coef.[1]	Priority Ordering (Y_A)	Y_R Coef.[1]	Priority Ordering (Y_R)
Citizen Participation	X_7	1.00	5	2.04	6	1.56	6
Structure for Administration etc.	X_8	2.00	4	2.83	3	2.60	3
Project Location	X_9	3.00	3	0.35	11	0.01	11
Income Levels	X_{10}	5.00	1	1.61	7	1.24	7
Population Density	X_{11}	3.00	3	0.76	9	0.31	9
Accessibility	X_{12}	2.00	4	2.67	4	2.00	4
Deficiencies	X_{13}	4.00	2	1.14	8	0.78	8
Priority Justification	X_{14}	2.00	4	0.62	10	0.24	10
Multiple Use	X_{15}	2.00	4	2.20	5	1.81	5
Interagency Cooperation	X_{16}	1.00	5	5.99	2	5.38	2
Funds Availability	X_{21}	n.a.	n.a.	16.53	1	20.04	1

[1]Adjusted to two decimal places

n.a. : information was not explicitly used as an evaluation criterion by the DNR.

TABLE 16.--Weights and Priority Orderings for Project Evaluation (Replication Number 2).

Criteria (Independent Variables)	Variable Identification Number	DNR's Weight	Priority Ordering (DNR)	Y_A Coef.[1]	Priority Ordering (Y_A)	Y_R Coef.[1]	Priority Ordering (Y_R)
Citizen Participation	X_7	1.00	5	1.19	8	0.96	8
Structure for Administration etc.	X_8	2.00	4	2.82	3	2.62	3
Project Location	X_9	3.00	3	0.14	11	-0.12	11
Income Levels	X_{10}	5.00	1	1.62	6	1.26	6
Population Density	X_{11}	3.00	3	1.18	9	0.69	9
Accessibility	X_{12}	2.00	4	2.37	5	1.67	5
Deficiencies	X_{13}	4.00	2	1.42	7	1.01	7
Priority Justification	X_{14}	2.00	4	0.48	10	0.24	10
Multiple Use	X_{15}	2.00	4	2.71	4	2.09	4
Interagency Cooperation	X_{16}	1.00	5	5.47	2	4.97	2
Funds Availability	X_{21}	n.a.	n.a.	35.83	1	38.68	1

[1]Adjusted to two decimal places

n.a. : information was not explicitly used as an evaluation criterion by the DNR.

TABLE 17.-- Weights and Priority Orderings for Project Evaluation (Replication Number 3).

Criteria (Independent Variables)	Variable Identification Number	DNR's Weight	Priority Ordering (DNR)	Y_A Coef.[1]	Priority Ordering (Y_A)	Y_R Coef.[1]	Priority Ordering (Y_R)
Citizen Participation	X_7	1.00	5	2.90	4	2.23	5
Structure for Administration etc.	X_8	2.00	4	2.75	5	2.63	3
Project Location	X_9	3.00	3	0.27	10	-0.01	10
Income Levels	X_{10}	5.00	1	2.03	7	1.62	7
Population Density	X_{11}	3.00	3	1.13	9	0.58	9
Accessibility	X_{12}	2.00	4	2.69	6	2.21	6
Deficiencies	X_{13}	4.00	2	1.30	8	0.87	8
Priority Justification	X_{14}	2.00	4	0.17	11	-0.05	11
Multiple Use	X_{15}	2.00	4	3.36	3	2.59	4
Interagency Cooperation	X_{16}	1.00	5	6.16	2	5.46	2
Funds Availability	X_{21}	n.a.	n.a.	18.32	1	20.76	1

[1]Adjusted to two decimal places

n.a. : information was not explicitly used as an evaluation criterion by the DNR.

APPENDIX E

TABLE FOR THE EVALUATION OF THE CLASSIFICATION FUNCTION FOR EACH PROJECT

TABLE 18.--Table for the evaluation of the classification function for each project.

EVALUATION OF CLASSIFICATION FUNCTIONS FOR EACH CASE

FUNCTION	1	2	LARGEST PROBABILITY	P(K),K), FOR LARGEST PROBABILITY
GROUP 1				
CASE				
1	0.92058	[illegible]7942	0.92058	1
2	0.88918	[illegible]11082	0.88918	1
3	0.79457	[illegible]20543	0.79457	1
4	0.91981	[illegible]08019	0.91981	1
5	0.88593	[illegible]11407	0.88593	1
6	0.91399	0.08601	0.91399	1
7	0.83630	[illegible]16370	0.83630	1
8	0.94658	[illegible]05342	0.94658	1
9	0.96830	[illegible]03170	0.96830	1
10	0.98697	0.01303	0.98697	1
11	0.93954	[illegible]06046	0.93954	1
12	0.98470	0.01530	0.98470	1
13	0.66379	[illegible]33621	0.66379	1
14	0.91052	[illegible]08948	0.91052	1
15	0.66904	[illegible]33096	0.66904	1
16	0.90036	[illegible]09964	0.90036	1
17	0.89262	[illegible]10738	0.89262	1
18	0.97511	[illegible]02489	0.97511	1
19	0.88425	[illegible]11575	0.88425	1
20	0.99392	[illegible]00608	0.99392	1
21	0.99653	[illegible]00347	0.99653	1
22	0.88893	[illegible]11107	0.88893	1
23	0.90877	[illegible]09123	0.90877	1
24	0.87118	[illegible]12882	0.87118	1
25	0.83681	[illegible]16319	0.83681	1
26	0.97351	[illegible]02649	0.97351	1
27	0.98847	[illegible]01153	0.98847	1
28	0.87078	[illegible]12922	0.87078	1
29	0.76921	[illegible]23079	0.76921	1
30	0.99595	[illegible]00405	0.99595	1
31	0.88696	[illegible]11304	0.88696	1
32	0.94966	[illegible]05034	0.94966	1
33	0.91386	[illegible]08614	0.91386	1
34	0.84736	[illegible]15264	0.84736	1
35	0.93962	[illegible]06038	0.93962	1
36	0.77169	[illegible]22831	0.77169	1
37	0.90771	[illegible]09229	0.90771	1
38	0.49453	[illegible]50547	0.50547	2
39	0.94224	[illegible]05776	0.94224	1
40	0.92823	[illegible]07177	0.92823	1
41	0.89861	[illegible]10139	0.89861	1
42	0.77767	[illegible]22233	0.77767	1
43	0.70218	[illegible]29782	0.70218	1
44	0.91412	[illegible]08588	0.91412	1
45	0.88986	[illegible]11014	0.88986	1
46	0.83275	[illegible]16725	0.83275	1
47	0.83529	[illegible]16471	0.83529	1
48	0.91063	[illegible]08937	0.91063	1
49	0.96096	[illegible]03904	0.96096	1
50	0.93954	[illegible]06046	0.93954	1
51	0.83375	[illegible]16625	0.83375	1
52	0.98170	[illegible]01830	0.98170	1
53	0.77202	[illegible]22798	0.77202	1
54	0.85175	[illegible]14825	0.85175	1
55	0.95965	[illegible]04035	0.95965	1

TABLE 18.-contd.

56	0.97967	0.02033	0.97967	1
57	0.97948	0.02052	0.97948	1
58	0.94250	0.05750	0.94250	1
59	0.87053	0.12947	0.87053	1
60	0.88285	0.11715	0.88285	1
61	0.87788	0.12212	0.87788	1
62	0.87324	0.12676	0.87324	1
63	0.88810	0.11190	0.88810	1
64	0.75761	0.24239	0.75761	1
65	0.93045	0.06955	0.93045	1
66	0.88832	0.11169	0.88832	1
67	0.87276	0.12724	0.87276	1
68	0.95480	0.04521	0.95480	1
69	0.77202	0.22798	0.77202	1
70	0.97570	0.02430	0.97570	1
71	0.93926	0.06074	0.93926	1
72	0.86756	0.13244	0.86756	1
73	0.79985	0.20014	0.79985	1
74	0.93954	0.06046	0.93954	1
75	0.71980	0.28020	0.71980	1
76	0.87310	0.12690	0.87310	1
77	0.87085	0.12915	0.87085	1
78	0.87997	0.12003	0.87997	1
79	0.79285	0.20715	0.79285	1
80	0.91874	0.08126	0.91874	1
81	0.81626	0.18374	0.81626	1
82	0.93608	0.06392	0.93608	1
83	0.92838	0.07162	0.92838	1
84	0.93954	0.06046	0.93954	1
85	0.95527	0.04473	0.95527	1
86	0.97927	0.02073	0.97927	1
87	0.83408	0.16592	0.83408	1
88	0.88403	0.11597	0.88403	1
89	0.86543	0.13457	0.86543	1
90	0.93722	0.06278	0.93722	1
91	0.80886	0.19114	0.80886	1
92	0.91403	0.08597	0.91403	1
93	0.95106	0.04894	0.95106	1
94	0.87250	0.12750	0.87250	1
95	0.97685	0.02314	0.97685	1
96	0.94954	0.05046	0.94954	1
97	0.93785	0.06214	0.93785	1
98	0.63645	0.36355	0.63645	2
99	0.90412	0.09588	0.90412	1
100	0.96563	0.03437	0.96563	1
101	0.78833	0.21167	0.78833	1
102	0.99192	0.00809	0.99192	1
103	0.65647	0.34353	0.65647	2
104	0.97954	0.02046	0.97954	1
105	0.94612	0.05388	0.94612	1
106	0.88569	0.11431	0.88569	1
107	0.89029	0.10971	0.89029	1
108	0.95771	0.04229	0.95771	1
109	0.91475	0.08525	0.91475	1
110	0.90365	0.09635	0.90365	1
111	0.80065	0.19935	0.80065	1
112	0.97152	0.02848	0.97152	1
113	0.91495	0.08505	0.91495	1
114	0.90224	0.09776	0.90224	1
115	0.93961	0.06039	0.93961	1
116	0.73400	0.26600	0.73400	1

TABLE 18.--contd.

117	0.26424	0.13509	0.95491	1
118	0.53223	0.46777	0.53223	1
119	0.96482	0.03518	0.96482	1
120	0.96916	0.03084	0.96916	1
121	0.96099	0.03901	0.96099	1
122	0.71777	0.28223	0.71777	1
123	0.91211	0.08789	0.91211	1
124	0.99535	0.00465	0.99535	1
125	0.98850	0.01150	0.98850	1
126	0.94692	0.05308	0.94692	1
127	0.83342	0.16658	0.83342	1
128	0.99766	0.00234	0.99766	1
129	0.99946	0.00054	0.99946	1
130	0.91073	0.08927	0.91073	1
131	0.98522	0.01478	0.98522	1
132	0.98584	0.01416	0.98584	1
133	0.81252	0.18748	0.81252	1
134	0.91617	0.08383	0.91617	1
135	0.89421	0.10579	0.89421	1
136	0.98046	0.01954	0.98046	1
137	0.91981	0.08019	0.91981	1
138	0.89045	0.10955	0.89045	1
GROUP 2				
CASE				
1	0.08726	0.91274	0.91274	2
2	0.18862	0.81138	0.81138	2
3	0.00234	0.99766	0.99766	2
4	0.34834	0.65166	0.65165	2
5	0.01169	0.98831	0.98831	2
6	0.21798	0.78202	0.78202	2
7	0.21112	0.78888	0.78885	2
8	0.00973	0.99027	0.99027	2
9	0.70401	0.29599	0.70401	1
10	0.98418	0.01582	0.98418	1
11	0.58101	0.41899	0.58101	1
12	0.00534	0.99466	0.99466	2
13	0.38606	0.61394	0.61394	2
14	0.14674	0.85326	0.85326	2
15	0.06451	0.93549	0.93549	2
16	0.00995	0.99005	0.99005	2
17	0.09148	0.09852	0.90148	1
18	0.61150	0.38850	0.61150	1
19	0.00043	0.99957	0.99957	2
20	0.00038	0.99962	0.99962	2
21	0.15665	0.15695	0.84335	1
22	0.17921	0.82079	0.82079	2
23	0.01892	0.98108	0.98108	2
24	0.01185	0.98815	0.98815	2
25	0.00039	0.99961	0.99961	2
26	0.01991	0.98009	0.98009	2
27	0.00514	0.99486	0.99486	2
28	0.00774	0.99226	0.99226	2
29	0.75583	0.24415	0.75585	1
30	0.75585	0.24415	0.75585	1
31	0.00061	0.13961	0.98939	1
32	0.27518	0.72482	0.72482	2
33	0.00027	0.99973	0.99973	2
34	0.02660	0.97340	0.97340	2
35	0.10957	0.89043	0.89043	2
36	0.15946	0.84054	0.84054	2
37	0.35350	0.64650	0.64650	2

TABLE 18.-contd.

38	0.75595	0.24415	0.75585	1
39	0.75585	0.24415	0.75585	1
40	0.75585	0.24415	0.75585	1
41	0.41285	0.58715	0.58715	2
42	0.73451	0.26549	0.73451	1
43	0.59567	0.40433	0.59567	1
44	0.86576	0.13424	0.86576	1
45	0.69054	0.30946	0.69054	1
46	0.01293	0.98707	0.98707	2
47	0.16778	0.83222	0.83222	2
48	0.07234	0.92766	0.92766	2
49	0.01939	0.98061	0.98061	2
50	0.26428	0.73572	0.73572	2
51	0.01491	0.98509	0.98509	2
52	0.87785	0.12215	0.87785	1
53	0.87785	0.12215	0.87785	1
54	0.87785	0.12215	0.87785	1
55	0.00032	0.99968	0.99968	2
56	0.00232	0.99768	0.99768	2
57	0.20999	0.79001	0.79001	2
58	0.00234	0.99766	0.99766	2
59	0.02671	0.97329	0.97329	2
60	0.00482	0.99518	0.99518	2
61	0.00230	0.99770	0.99770	2
62	0.00107	0.99993	0.99993	2
63	0.56585	0.43415	0.56585	1
64	0.89603	0.10397	0.89603	1
65	0.00234	0.99766	0.99766	2
66	0.86437	0.13563	0.86437	1
67	0.00138	0.99862	0.99862	2
68	0.00051	0.99949	0.99949	2
69	0.00024	0.99976	0.99976	2
70	0.09954	0.90046	0.90046	2
71	0.09895	0.90005	0.90005	2
72	0.01458	0.98142	0.98142	2
73	0.62927	0.37073	0.62927	1
74	0.07870	0.92130	0.92130	2
75	0.00071	0.99929	0.99929	2
76	0.00072	0.99928	0.99928	2
77	0.00487	0.99513	0.99513	2

APPENDIX F

REPLICATIONS OF CLASSIFICATION MATRICES FOR APPROVED AND REJECTED PROJECTS

TABLE 19.--A Classification Matrix for Approved and Rejected Projects (Replication 1).

Function / Approval Status	Y_A	Y_R	$Y_A + Y_R$
Approved	137	1	138
Rejected	22	55	77
Total	159	56	215

TABLE 20.--A Classification Matrix for Approved and Rejected Projects (Replication 2)

Function / Approval Status	Y_A	Y_R	$Y_A + Y_R$
Approved	136	2	138
Rejected	23	54	77
Total	159	56	215

TABLE 21.--A Classification Matrix for Approved and Rejected Projects (Replication 3)

Function / Approval Status	Y_A	Y_R	$Y_A + Y_R$
Approved	118	0	118
Rejected	20	57	77
Total	138	57	195