Draft study plan: socioeconomic assessment, Exxon Crandon Project. 1979

Austin, Texas: RPC, Inc., 1979

DRAFT STUDY PLAN

SOCIOECONOMIC ASSESSMENT

EXXON CRANDON PROJECT

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EXXON CRANDON PROJECT

prepared for
Exxon Minerals Company, U.S.A.

by

RPC, Inc.
Austin, Texas

December 17, 1979

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1. THE CRANDON PROJECT

A substantial deposit of copper and zinc is located near the town of Crandon in northeastern Wisconsin. Its development will require construction of a mine/mill complex to extract ore via underground techniques and subject it to concentrating before shipment for further processing. Construction and operation of this facility may substantially increase the population and economic activity of parts of Forest, Langlade, and Oneida Counties and may have other socioeconomic effects.

Figure 1 is a map locating the proposed project site in relation to cities, highways, and lakes. The ore body lies in an area of rolling glacial terrain that is almost completely forested with second-growth hardwoods consisting primarily of maple, birch, basswood, and oak. The northern portion of the area drains northward into Swamp Creek, which flows westward into Rice Lake. The southern part of the site drains southward through Little Sand Lake and into Rolling Stone Lake. Low-lying areas nearby contain tamaracks, balsam fir, and spruce. The surrounding area contains several relatively small, shallow lakes, marshes, and swamps. The Mole Lake Indian Reservation, surrounding Rice Lake, lies two miles west of the ore body. The Powawatomi Reservation lies east of the ore body at a somewhat greater distance. Many of the lakes in the area surrounding the proposed mine support resorts, cottages, and summer homes.

The mine and the primary crushing machinery to break up the ore will be underground. However, Exxon expects to construct a cluster of buildings on the surface for offices, maintenance, and to concentrate the ore. These surface facilities will require about 100 acres, about one-third occupied by the buildings. The tallest structure will be about 160 feet high. Most of the noise will be confined underground or by the buildings that enclose the machinery. Figure 2 is a preliminary drawing of the possible configuration of the surface facilities. Exxon expects to use an additional 600 to 1,000 acres for tailings, waste rock, and water treatment.

To develop this mineral deposit, Exxon Minerals Company U.S.A. must secure several dozen state and local approvals. Exxon must obtain zoning approval from Forest County. Wisconsin requires Exxon to secure a metallic mining permit as well as air, water, solid waste, and related approval. Exxon must also provide sufficient information so the Wisconsin Department of Natural Resources (DNR) can comply with the Wisconsin Environmental Policy Act (WEPA). State regulations, summarized in "Preliminary Draft Number 2, Environmental Regulations, Data and Monitoring Requirements for Metallic Mineral Development in Wisconsin," give the DNR principal responsibility for regulation of the effects of mining. The regulations require particular attention to potential socioeconomic effects of mining projects.

Figure 1

RELATION OF POSSIBLE PLANT SITE TO CITIES, HIGHWAYS, AND LAKES

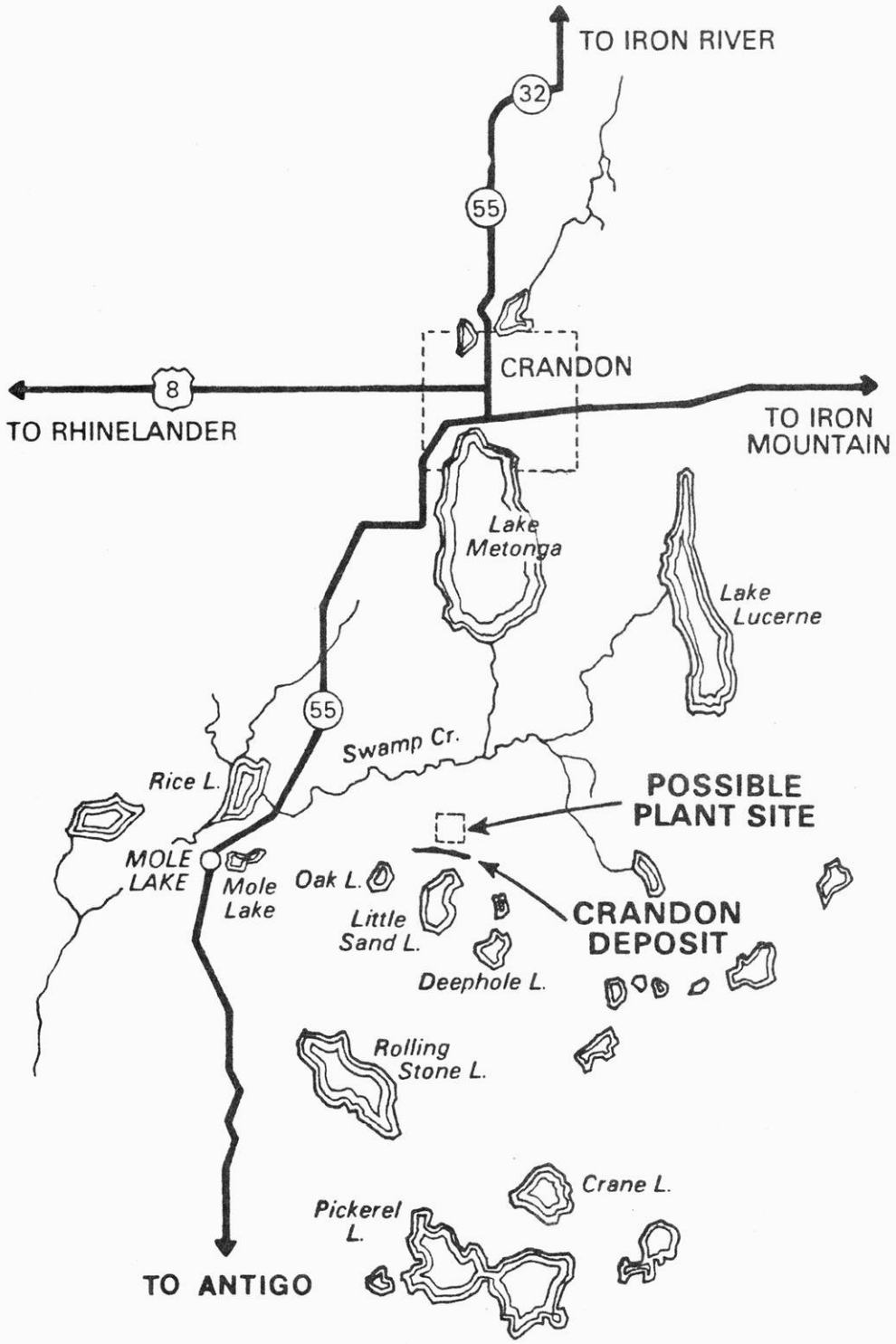
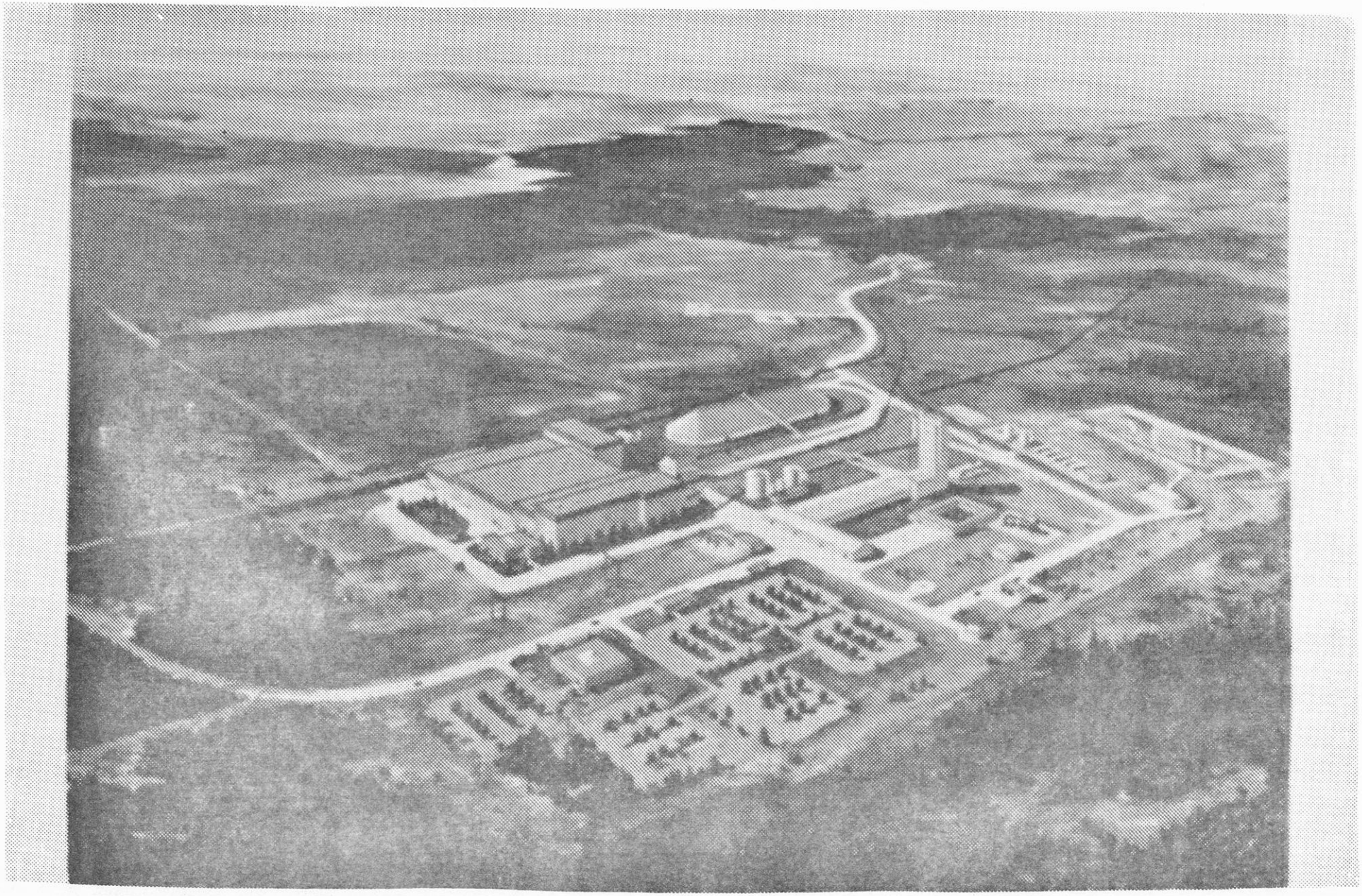


Figure 2

PRELIMINARY DRAWING OF CRANDON PROJECT FACILITIES



PURPOSE OF THE DRAFT STUDY PLAN

Exxon has selected RPC, Inc. as its principal socioeconomic consultant. This draft study plan describes the socioeconomic assessment Exxon will commission as a major part of its effort to provide information necessary for good company and community planning and to acquire necessary regulatory approvals for the proposed Crandon project. We will incorporate the assessment resulting from this study into the Environmental Impact Report (EIR) required by WEPA, and into supporting documentation for other regulatory approvals.

We are circulating this draft to state officials, local officials, tribal officers, and other interested parties at the beginning of the study to:

1. Let all interested parties know what work Exxon considers adequate to describe the possible socioeconomic effects of the Crandon project to provide for company planning and to satisfy regulatory requirements

2. Hear from all interested parties on the adequacy of the scope and methods in this draft in light of regulatory requirements

3. Find out what modifications may be necessary to compile a final study plan that describes an adequate socioeconomic assessment in the opinion of state officials, local officials, tribal officers, and other interested parties

We will receive comments through February 1, 1980. We will revise the study plan based on evaluation of comments received and we will forward copies of the revised plan to those who commented on the draft or otherwise expressed interest in the study plan. During the comment period, we will be collecting baseline data that we feel will be required regardless of the details of the final study plan.

HOW THIS DRAFT IS ORGANIZED

In chapters 1 through 3, this draft study plan provides background material on the project, the entire study, and RPC, Inc. Chapter 4 describes the communications aspects of the study; chapter 5 provides procedural information on the central elements of the study; chapter 6 provides information on data gathering. In chapters 4 through 6, we describe the objectives and approach involved in completing each study element. For some elements, we have also included important technical details.

Some definitions of terms used in this study plan are in order at this point. We use the term "local study area" to refer to the area that is likely to be affected by the project. Regional effects will most likely be statewide, therefore "state" refers to greater-than-local project impacts and benefits. "Project site" refers to the immediate vicinity of the proposed mine/mill complex. These and other definitions also appear in the glossary.

SUMMARY OF TECHNICAL APPROACH

The Crandon project is a large one, both on its own terms and in comparison to the population and economy of the local study area. Furthermore, it will go on for many years. The socioeconomic study will forecast the effects of the project so Exxon, state government, local governments, and project neighbors will have time to react and respond to them.

The basic philosophy of this prediction process is to describe the differences in the local study area as it is most likely to be in future years without the project (without-project future) and as it will be as the project goes ahead (with-project future). We will compare the without-project and with-project futures to determine what changes result from the project and what changes would occur anyway over the course of time.

For a project of this size, analysts typically use several different analytic techniques for different parts of the prediction. The prediction problem is further complicated by the fact that different aspects of the quality of life interact: the state of the housing market in Crandon in 1985 will affect the population and the decisions made by local governments in 1987. This study plan describes a rather complicated process of predicting many different dimensions of the quality of life in the local study area and their interactions in great detail. However, the basic approach is fairly simple:

1. We will identify the important social and economic aspects of the local study area that the project may affect, and we will carefully describe current conditions.

2. We will also carefully describe mechanisms by which actions by Exxon, governments, or individuals will affect these values in subsequent years. We will summarize those descriptions in models.

3. Each of these models will allow inclusion of different assumptions and possible actions by the important parties.

4. These predictive models will describe several different futures the local study area can expect, depending on decisions made by Exxon, state and local governments, and the project neighbors, not only at the beginning of the project, but in subsequent years as development proceeds.

5. The most important difference, of course, is the difference between the future without the mine development and with the development. "The development" or "the project" can mean several different things depending on the way both Exxon and local governments respond to events. Many of these responses are currently planned or under consideration, and it is the scenarios that result from these plans that will be evaluated first. Part of this evaluation will be a comparison of scenarios to a projection of what the area would be like without the project. All of the changes that may occur with development of the project are not necessarily attributable to the project. Change is inevitable with time.

6. An important part of the study plan is to categorize the impacts of development relative to the without-project future on different people and groups in the local study area. Not all of these impacts will be positive; one of the principal reasons for doing this socioeconomic study is to discover the negative impacts that would occur if everyone went ahead as planned. Thus, we can discuss changing the plans to mitigate or avoid undesirable impacts.

7. In the final part of this study, we will select the combination of scenario elements and mitigation strategies that make the development project as nearly as possible beneficial to everyone concerned. We will use this information as a basis for cooperation between Exxon, local governments, and interest groups in dealing with the effects of the project.

We must point to some general qualities of this process at the outset. First of all, any predictive process, especially one running more than a decade into the future, is approximate and includes important uncertainties. There is simply no way to predict the future with great precision. Therefore, we will often have to state our forecasts as ranges covering probable variations. We have chosen elements of the study described in this document to allow us to predict the future as accurately as possible. These elements represent the state-of-the-art in prediction and forecasting of socioeconomic

effects. We will highlight and explain the uncertainties that remain as the analysis proceeds.

Second, the study plan includes not only research but also important components of planning and decision making. We have designed the study plan to encourage feedback for the communication and balancing of interests among the parties involved in the proposed Crandon project.

GETTING FEEDBACK ON STUDY RESULTS

We will make all interim and final reports of the study available for professional and public review as the work progresses. We have also retained a number of senior social science professionals to review each step of the research and analysis. These professionals will examine the completeness and validity of the work and will suggest revisions to the study plan as circumstances dictate. We selected the study team members because of their national reputations in their fields; in addition, many are residents of Wisconsin (see Table 1, page 12).

We will distribute interim results of the study to government officials and the interested public through a series of technical papers and discussion papers. Technical papers will describe the methodology used to perform a certain analysis, the data used, and full reference to the authorities consulted. Discussion papers will present the results of analyses organized by jurisdiction and economic sector. In addition, as we complete portions of the EIR, we will distribute them for public review. We are circulating these documents so we can find out how those affecting and affected by the project feel about the study as it progresses. If we are told of gaps or inaccuracies in the work as the study progresses, we can make the final document a better guide to planning and decision making by state and local governments.

The effects of the Crandon project are not preordained. They will depend on decisions made by Exxon, state and local governments, and by residents of the area. This study will be one of the most complete bodies of facts and projections ever assembled on the local study area. Because of this, the study will be an important resource for those in both public and private sectors. We intend to make the study and its supporting documentation available to the people of Wisconsin to enable them to better manage growth in the area.

HOW TO COMMENT ON THE STUDY

Ultimate responsibility for the conduct and release of the socioeconomic study rests with Exxon. Direct comments, suggestions, and requests for information to:

Daniel J. Derfus
Manager, Socioeconomic Study
Exxon Minerals Company, U.S.A.
P.O. Box 813
Rhinelander, Wisconsin 54501
Tel: 715/369-2800

You may also direct comments and suggestions to RPC, the principal contractor. We will distribute copies of discussion papers and draft materials, but only with prior authorization from Exxon. We have offices in Austin, Texas, and in Madison. You may direct communications to:

Ronald Luke, Ph.D.
RPC, Inc.
1705 Guadalupe
Austin, Texas 78701
Tel: 512/472-7765

-or-

Roy Tull
RPC, Inc.
7 North Pinckney
Madison, Wisconsin 53703
Tel: 608/251-7610

3. BACKGROUND OF RPC, INC.

Exxon chose RPC as its principal socioeconomic contractor through a long and careful selection process. The following information describes the background of the professionals we have assigned to the study team. Table 1 lists members of the study team with their institutional affiliations and professional credentials. Those with university affiliations are subcontractors. If you would like more information about us, contact Dr. Luke or Mr. Tull.

DEMOGRAPHIC, ECONOMIC, AND FISCAL IMPACTS

We have a great deal of experience in the assessment of demographic, economic, and fiscal impacts. The central model for the assessment of these impacts is one developed by the state of North Dakota. Dr. Leistritz served as a principal investigator on research projects sponsored by the Department of Energy for development of this model, and he recently participated in adapting the latest version of the model for use in East Texas. The adaptation is now operational. This experience in the problems and quirks of transferring a model from one state to another and from one computer to another is an important contribution to the project execution. Mr. Tull has, for the past three years, directed development of demographic, economic, and fiscal models for the Minnesota Copper/Nickel Project.

In addition to our experience in adapting these types of models, we have had considerable experience in developing them. We conducted a two-year study for the state of Texas on the onshore impacts of outer continental shelf oil and gas development. During this study, we developed a comprehensive methodology for the assessment of economic and fiscal impacts. In a followup effort, we generalized this methodology and computerized it into the social and economic component of the activity assessment routine. We have used this methodology to prepare assessments used for testimony on socioeconomic impacts of water developments, pipelines, liquefied natural gas terminals, oil terminals, and a proposed inland canal industrial park.

Table 1

MEMBERS OF THE STUDY TEAM

Bill Brogden	Ph.D.; computer sciences
Denise Girard	B.A. in Biology
William Gorman (New Mexico State University)	Ph.D. in Agricultural Economics
Nancy Grona	M.A. in Communications
Barbara Haefeli	M.S. in Community and Regional Planning
Neil Hahn	B.S. in Engineering; M.B.A, Finance
Jack Huddleston (UW-Madison)	Ph.D. in Agricultural Economics
Kathy Kennedy	M.B.A in Market Research
Jim Kimmel	M.Ph. in Resource Sociology
Allan King (UT-Austin)	Ph.D. in Economics
Robert Lansford (New Mexico State University)	Ph.D. in Agricultural Economics
Larry Leistritz (North Dakota State University)	Ph.D. in Agricultural Economics
Ronald Luke	Ph.D. in Public Policy; J.D.
Jim Mertes	Ph.D. in Recreation Planning
Steven M. Murdock (Texas A&M University)	Ph.D. in Sociology
Jim Murray (UW-Green Bay)	Ph.D. in Economics
Mike O'Hare (Mass. Institute of Technology)	M.Arch; Ph.D. in Engineering
Ann Orzech	M.A. in Economics
Andy Reed	M.S. in Park Administration
Roy Tull	B.A. in Biology
Edwin Warren	B.A. in Economics

We will use a subregional modification of the INFORUM model developed by the University of Maryland as the principal economic model for the study. We have worked with input/output models over the past several years in all the studies listed above. Ms. Orzech has contributed to the development of the regional input/output models for five areas on the Texas coast. This work involved the same steps required to apply the input/output model to the study area in Wisconsin.

Dr. Lansford and Dr. Gorman also have experience with the use of input/output models and impact analyses. They have prepared economic impact studies on irrigated agriculture, grazing schemes, transmission lines, and mineral development in New Mexico. They have applied economic models to Native American reservations for the Navajo Tribe and the Bureau of Indian Affairs. Through contacts with Los Alamos Laboratory, they have experience with the INFORUM model. Mr. Tull supervised the development and implementation of an I/O model for forecasting regional economic impacts from copper/nickel mining in northeastern Minnesota.

The economic studies encompass much more than modeling. They require the development of profiles and projections of future development of industries in the local study area. Dr. Murray has performed this sort of analysis for a variety of cities, corporations, and planning councils in Wisconsin, Michigan, and Minnesota. He has examined prospects for industrialization in various small towns and Native American reservations. Likewise, Dr. Luke has prepared studies of potentials for nonindustrial economic development for the state of Maine. These studies examined fisheries, agriculture, and tourism/recreation for the entire Maine coast. Mr. Tull directed an I/O study of Ely, Minnesota, and a fiscal analysis and impact study of eight communities in northeastern Minnesota.

One of the most important studies within the assessment is the development of a clear understanding of the dynamics and contribution to the economy made by tourism and recreation. In addition to Dr. Luke's experience, Dr. Mertes and Mr. Reed have performed a variety of studies regarding the dynamics and economics of recreational areas and facilities. These studies have been performed for the U.S. Forest Service, the U.S. Corps of Engineers, the American Metals Climax Corporation, Texas Tech University, North Texas Council of Governments, and the Brazos River Authority.

Mr. Hahn is particularly qualified to provide management consultation on fiscal impacts of projects. For many years he served as the regulatory affairs manager to the City Public Service Board for the city of San Antonio. During this time he was responsible for cost of service studies, rate designs, and regulatory filings. He is familiar with the various rate designs which can be used to effect certain distributions of costs of municipal services. He is also capable of directing cost of service studies in order to determine more precisely the types and levels of municipal service costs which may be encountered during rapid growth.

HOUSING, LAND USE, AND MUNICIPAL SERVICES

We have many years of experience in the analysis of land use questions. Our first project was the development of an eight-volume study on land-use management policies in Texas. Dr. Luke was the principal author of the policy analysis and recommendations contained in this study. Previously, he was responsible for developing the land use and land banking concepts contained in the study, A Maine Manifest, prepared by the Allagash group for the state of Maine.

We have also prepared over a dozen comprehensive plans for cities and counties in Texas. These plans have addressed housing conditions, housing development trends, necessary land-use controls, and the development of capital improvements. Many of these towns, such as Mt. Pleasant, have experienced rapid growth related to the development of natural resources. We are presently preparing a series of impact planning reports funded by the Coastal Energy Impact Program of the Department of Commerce for cities and counties on the Texas coast that have experienced rapid growth from energy-related developments. These studies all concern the housing and municipal service needs of these areas. They also address the need for adoption or revision of land-use controls in order to better manage growth impacts.

Mr. Kimmel previously worked with 23 small towns and counties in East Texas to develop the necessary information on housing, municipal services, and land use to qualify these communities for HUD-sponsored community development block grants. He has recently completed an area Housing Opportunity Plan for the Middle Rio Grande Valley Council of Governments. This plan addresses current housing conditions, housing trends, possible assistance to alleviate needs in the area, and recommendations for action by federal, state, and local governments. Mr. Tull directed a computer-based land use study of rural areas and communities of the potential copper-nickel mining region of northeastern Minnesota.

Drs. Gorman, Lansford, and Mertes have directed various studies for government agencies in the western United States concerning the proper role of government in Native American land development, agriculture, mineral development, and forestry. Dr. Mertes is also involved in studies for the U.S. Corps of Engineers and Forest Service on the proper policies for development of second homes in forest areas and the development of green space in relation to major water-development projects.

The social and economic component, which we developed for the Texas Coastal Management Program, required us to become familiar with the interrelationships of economics and municipal services in rapidly growing areas.

We also have extensive experience in helping communities, counties, and state agencies meet the requirements for federally funded projects. This experience will serve us well in analyzing the implications of federal regulations that might have a bearing on the project, the local study area, and the state of Wisconsin.

In addition to the foregoing research experience, Mr. Kimmel, Dr. Luke, and Mr. Tull have worked with local governments. Dr. Luke has been a senior staff member and a board member for regional human service delivery agencies. These positions have involved responsibility for the general planning of service delivery programs in both urban and rural areas. His doctoral dissertation concerned systematic design of a state and local mental health system using established principles of operations research and organizational dynamics. The same principles can be applied to an analysis of the managerial needs of the impact area and its development of various services to meet the demands of rapidly expanding population. Mr. Tull served as an advisor to local units of government while at the Sigurd Olson Institute of Wisconsin's Northland College, and he has written articles on community planning and zoning.

CULTURAL ASSESSMENT

For preparation of the cultural assessment, we will call on the experience of Mr. Kimmel, who has had principal responsibility for performing all cultural assessments involved in previous RPC socioeconomic and environmental impact studies. We have performed cultural assessments in regard to industrial park siting, development of water resources projects, and port development.

Several of these projects involved the design and administration of questionnaires as contemplated in this study. In administering such questionnaires, we draw on our seven years of experience in market and opinion research. Our market and opinion research staff has conducted hundreds of commercial and political marketing surveys for firms throughout the nation. This experience enables us to organize, supervise, and control the quality of a field effort in Wisconsin.

NATIVE AMERICAN STUDY

Dr. Murray, of the University of Wisconsin at Green Bay, has worked on a number of economic development projects for Native Americans, including those groups in the study area. Dr. Gorman and Dr. Lansford of New Mexico State University have also been very much involved both in economic development projects for Native American groups and in the assessment of socioeconomic impacts resulting from development projects in the territories of Native Americans. Work performed by Dr. Leistritz in North Dakota has involved considerations of the socioeconomic impacts of energy development on Native Americans.

ANALOGOUS COMMUNITIES

For the past two years, Dr. O'Hare and the MIT energy research project have been collecting and analyzing studies of energy impacts on rural communities. They have also examined siting controversies surrounding projects which have gone forward and projects which have not. Dr. O'Hare has a broad knowledge of the literature available in the field. This will enable us to assemble not only relevant work already published, but work in progress.

We have also done extensive case study work on energy impacts in small communities. As part of the outer continental shelf study, we assembled case studies on five communities, including Morgan City, Louisiana, and Mt. Pleasant, Texas. In another element of the Texas Coastal Management Program, we conducted case studies of energy developments in Bay City and Corpus Christi. In a contract for the Department of Energy, we conducted a study of the siting and growth management techniques used in siting a major refinery in Garyville, Louisiana.

4. COMMUNICATIONS

OBJECTIVES

1. Gain acceptance of the study plan for socioeconomic impact by state and local government officials, community groups, and professionals

2. Obtain a thorough professional review of the approach and results of all study elements

3. Provide government officials, local residents, and other interested parties full information on the scope, approach, and results of the study as they are developed

4. Secure feedback from affected parties on the socioeconomic issues raised by the project and the adequacy of the study effort

5. Suggest policies for use by Exxon and government agencies to deal with project impacts

6. Develop a consensus on the probable socioeconomic effects of the Crandon project on the local study area and on the state

APPROACH

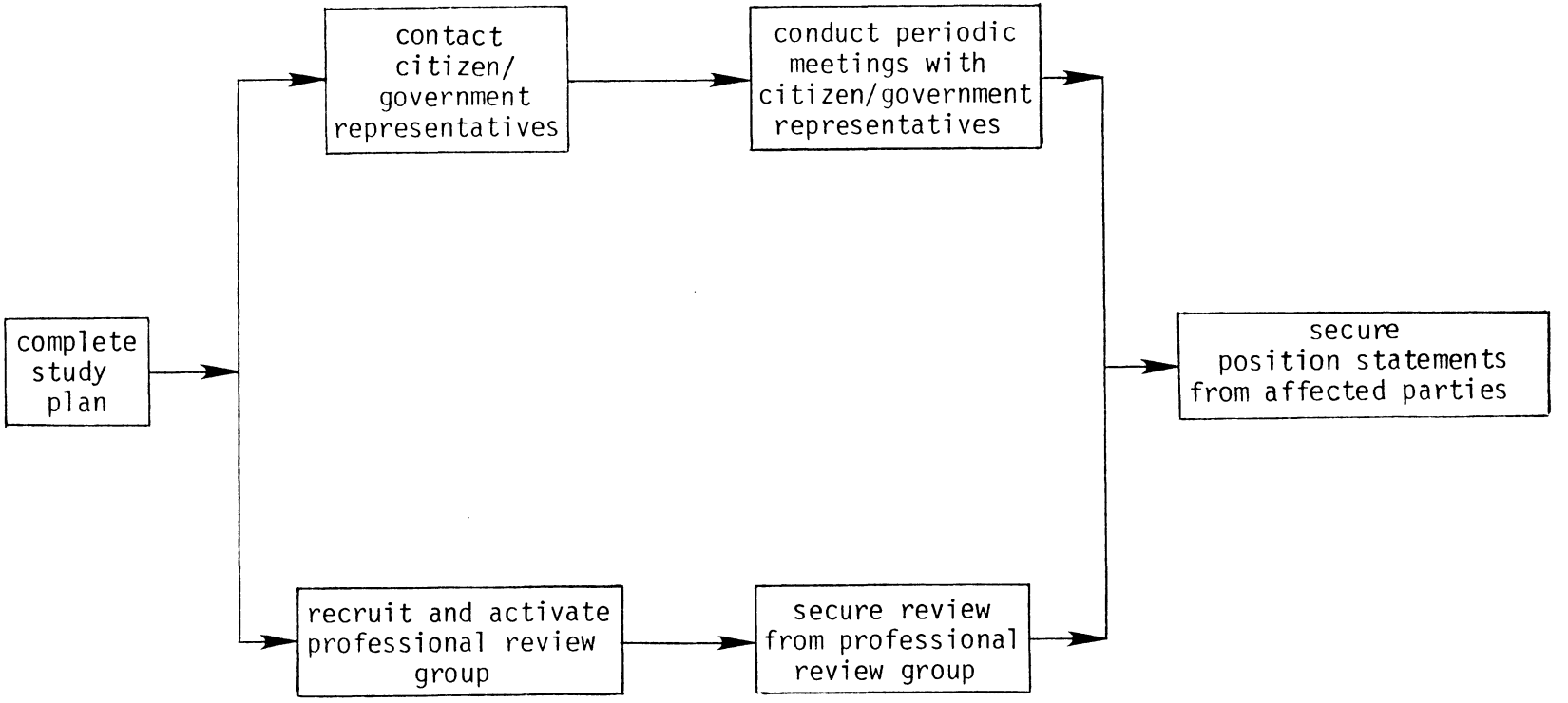
Figure 3 illustrates the tasks involved in the communications effort. The following text describes these tasks.

Complete Study Plan

We will discuss this draft study plan with a broad range of government officials and interested citizens in order to identify any deficiencies in the plan. We will also ask people involved in the discussions to review the study documents.

Figure 3

COMMUNICATIONS FLOWCHART



Presence in Wisconsin

Roy Tull will head our Madison, Wisconsin, office. Mr. Tull will live in Madison and is assigned to this office full-time. He will be supported by a full-time administrative assistant and by research assistants as needed.

Most of the state officials and much of the data necessary for the study are located in Madison, and the resources of the University of Wisconsin and certain business services make Madison an efficient location for much of the work. A substantial amount of communications activity will occur in Madison.

We will perform an equally important part of the communication work in the local study area. We will gather information from local government files, interview officials and citizens, and conduct other field work in the local study area. We will hold informal meetings in and near Crandon to discuss preliminary results of the study and to obtain feedback to guide revisions.

All of our key staff will spend a significant amount of time in Madison and in the local study area during the study. Officials and others reviewing parts of the study will be able to discuss their comments directly with the personnel responsible for that section of the report.

Citizen/Government Review

We will forward copies of each discussion paper to citizens and government representatives with an interest in the project. We consider feedback from the interested public a vital aspect of our communications effort. We encourage people to let us know their opinions of the study as it progresses. To elicit their feedback, we will conduct periodic informal meetings with interested parties to encourage their participation in the socioeconomic study. Our goal in these meetings will be to discuss any objections they may have, consider any suggestions they may offer, and work cooperatively with them to secure their support for the project.

Professional Review

We have contracted with experts in the various subjects addressed by the study (see Table 1, page 12). These experts will review the various reports for professional quality and make recommendations for any modifications or additional work they feel is necessary. We have selected some of these reviewers because they are professionals familiar with Wisconsin. We chose others for their knowledge of techniques used to predict and analyze possible project effects.

REPORTS

Each element of the study will result in one or more written reports. When the reports are completed, Exxon will release them for public review. After release, any interested party may obtain copies from Exxon's office in Rhinelander or from our office in Madison. Anyone wishing to comment on any document may do so orally or in writing to either office. Table 2 is a complete list of the anticipated reports. We will design the reports so the reader can easily find discussion of his or her particular concerns. We will include in each report a summary and an index by jurisdiction and economic sector. To the greatest extent possible, we will standardize the format of these reports.

Table 2

LIST OF OUTPUTS

No.	Title	Type*	Responsibility
1	Preliminary housing market analysis report	T	Luke
2	Methodology descriptions for all study elements	T	Team leaders
3	Sample design and questionnaires for surveys	T	Kimmel
4	Baseline data for all study elements	T	Team leaders
5	Final reports on statistical surveys	T	Kimmel
6	Baseline reports on state, counties, communities, reservations, and industries	P	Luke
7	Literature survey and analysis of community case studies and growth management strategies	T	Tull
8	Description of analysis on analogous community and control sites	T	Tull
9	Survey, ranking, and selection of community and control sites for case study	T	Tull
10	Baseline and historical data on analogous community, case study control site, and Crandon control site	T	Tull
11	Comparison of growth and control case study communities	T	Tull
12	Analysis of available case studies and new case study	T	Tull
13	Estimates of without-project conditions for recreation/ tourism, forestry, and mining and mine-related activity	T	Team leaders
14	Documentation of computer models	T	Orzech
15	Estimate of economic conditions without project, including regional population distribution	T	Orzech
16	Estimate of demographic conditions without project, including regional population distribution	T	Orzech
17	Residence distribution technique	T	Reed
18	Estimate of housing market conditions without project (residential allocation)	T	Luke
19	Estimate of land-use characteristics without project	T	Reed
20	Estimate of public service conditions without project	T	Reed
21	Estimate of fiscal conditions without project	T	Orzech
22	Estimate of cultural conditions without project	T	Kimmel
23	Estimate of Native American conditions without project	T,P	Kimmel

(continued)

(Table 2, continued)

No.	Title	Type*	Responsibility
24	Reports of estimated conditions without project for state, counties, communities, reservations, and special industries	P	Luke
25	Description of Crandon project scenarios	T	Luke
26	Prediction of impacts on Crandon from analysis of case studies	T,P	Tull
27	Printouts of economic conditions for project scenarios	T	Orzech
28	Printouts of demographic conditions for project scenarios	T	Orzech
29	Residence distribution technique (factors and weightings for with-project future)	T	Luke
30	Project scenarios for preliminary land use, recreation/ tourism, agriculture, retail trade, forestry, and mining and mining-related activity	T,P	Team leaders
31	Revised economic conditions for project scenarios	T,P	Orzech
32	Revised demographic conditions for project scenarios	T,P	Orzech
33	Housing market conditions for project scenarios	T,P	Luke
34	Estimate of land-use characteristics with the project	T,P	Reed
35	Public service conditions for project scenarios	T,P	Reed
36	Fiscal conditions for project scenarios	T,P	Orzech
37	Cultural conditions for project scenarios	T,P	Kimmel
38	Native American conditions for project scenarios	T,P	Kimmel
39	Comparison of scenario and case study predictions of impact on Crandon project	T,P	Tull
40	Draft reports for state, counties, communities, reservations, and special industries	P	Luke
41	Draft material for EIR	P	Luke
42	Mitigation analysis and alternatives	P	Luke
43	Draft report on analogous communities study	P	Tull
44	Final reports for state, counties, communities, reservations, and special industries	P	Luke
45	Final material for EIR	P	Luke
46	Public involvement report	P	Luke
47	Final report on analogous communities study	P	Tull

*T = technical paper
P = public report

DEMOGRAPHIC ANALYSIS

OBJECTIVES

1. Determine the present size and age-sex composition of population in the local study area for each significantly affected jurisdiction

2. Complete adaptation of the models to make projections of population with and without the Crandon project using alternative values for key variables, including Exxon's employment and training policies

3. Integrate the demographic analysis with the economic, fiscal, and housing analyses via a programmed interface between the models

APPROACH

Figure 4 shows the approach to the demographic analysis. The following pages describe the steps involved.

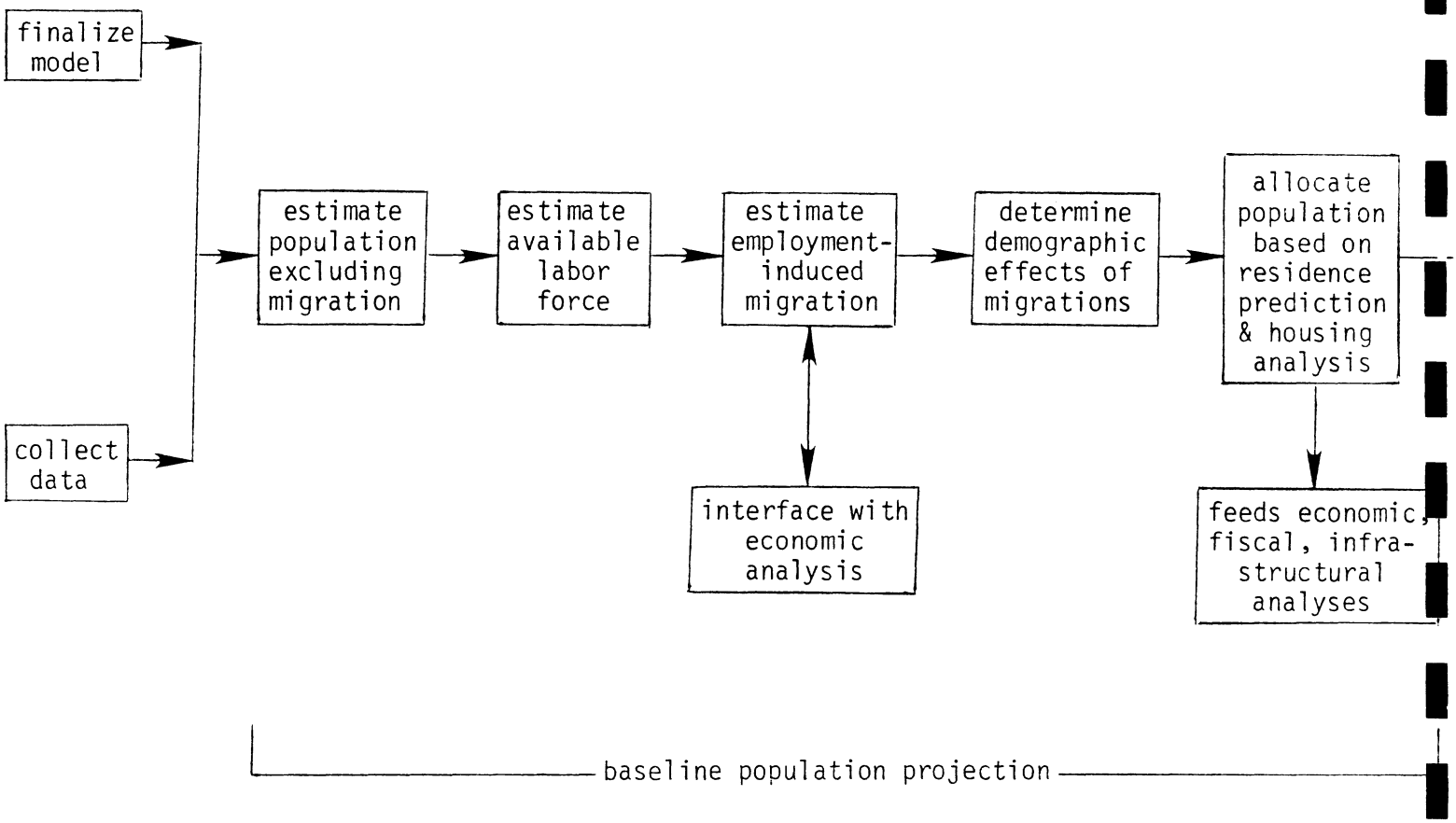
Develop Model

The cohort-survival technique, commonly used for population projections, can satisfy the objectives listed above. The underlying logic for the method is that population at some future date is equal to the present populations plus the number of people who are born or move into the area, less the number who die or move away.

Projections using this technique are more precise if the population is divided into age-sex cohorts (groups), each with its own rate of fertility,

Figure 4

DEMOGRAPHIC ANALYSIS FLOWCHART



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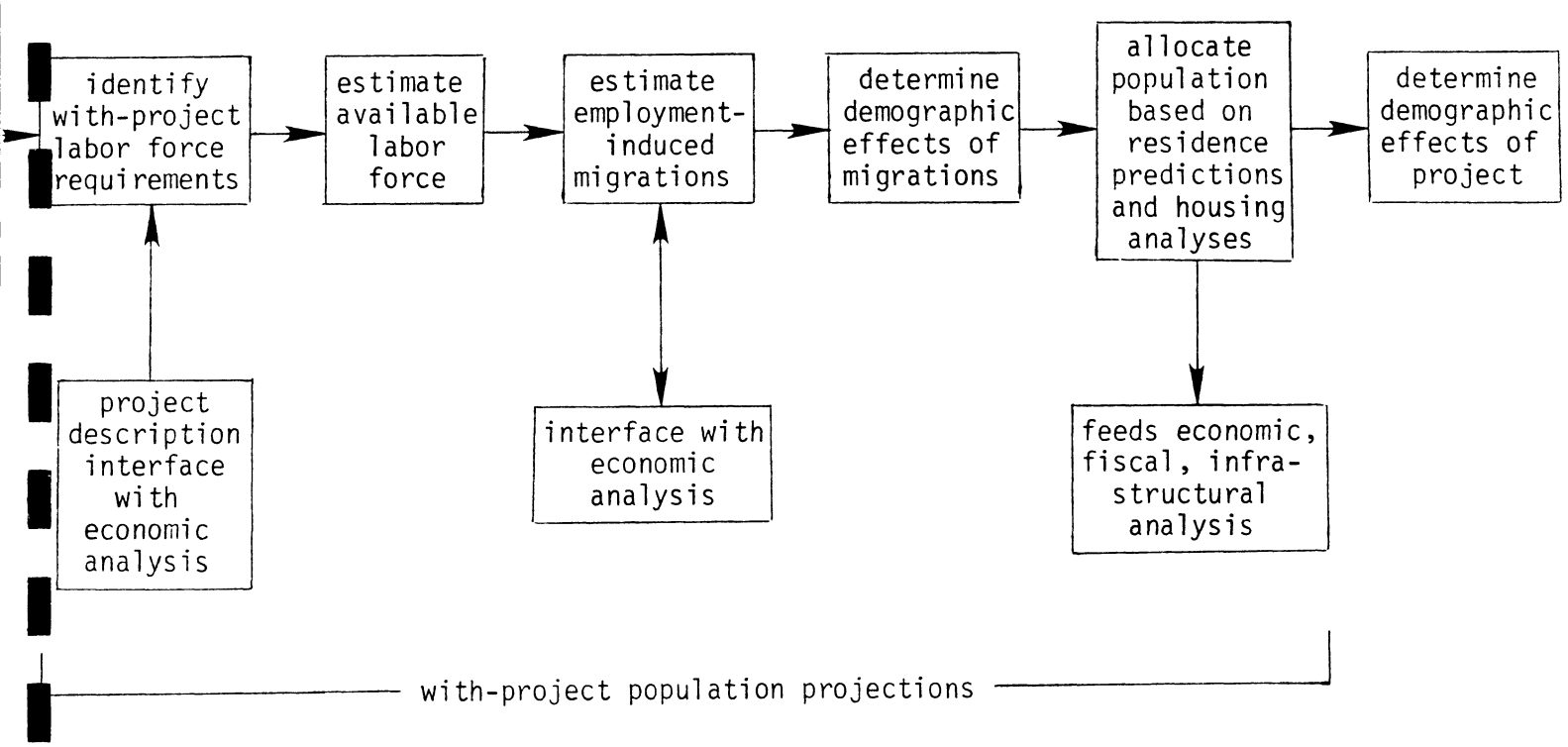


mortality, and migration. Total population at the end of a period is the sum of projected population of all cohorts. The population of the cohort at the end of a given period is the population of the cohort at the beginning of the period, minus the number of people who die or move away, plus the number of people who move in. Projected births define the youngest cohort. We will then adjust each cohort to account for the aging of people.

The state of North Dakota has developed computer programs for the cohort-survival technique. These programs are generally suitable for this study, although some adaptations may be necessary.

Demographic models such as the cohort-survival model do not account for seasonal population fluctuations due to seasonal and second-home residents and recreational visitors. We will analyze seasonal/second-home residents as part of a special study of the recreation/tourism industry and will draw on an attitude survey of seasonal residents. Questions to be addressed in the study include number and origin of such residents and the employment patterns (e.g., seasonality) and wage structures of the recreation industry.

Collect Data

Data requirements for the demographic analysis include the following:

1. Base-year population for each age-sex cohort
2. Age-sex-specific migration rates
3. Age-sex-specific mortality rates
4. Age-specific fertility rates
5. Age-sex-specific labor force participation rates
6. Project-related work force requirements
7. Characteristics of inmigrant populations, such as marital status, family size, age-sex distribution
8. Inter-industry relationships (derived from economic analysis)
9. Employment requirements of local industries (derived from economic analysis)

We will obtain these data from on-site field work and published sources. We will gather information on the existing population's labor force participation rates as part of the attitude surveys of permanent residents and of Native Americans. We will also review existing information on characteristics

of construction and operation workers. If necessary, we will develop a profile of such workers through interviews with major firms associated with similar projects. Finally, we will examine published analyses of future demographic trends.

Because worker characteristics may change over time, it is crucial to develop a demographic model that can analyze a variety of assumptions concerning inmigrant worker characteristics, rather than to attempt to precisely predict worker characteristics. Such flexibility will permit an examination of potential project effects under different scenarios of worker characteristics such as marital status, age-sex distributions, and the like. The use of scenarios prevents an incomplete analysis tied to only one set of assumptions.

Estimate Without-Project Population

We will estimate the without-project population for each of 55 years through a four-stage process:

1. Calculate resident population by age-sex cohort based on prior year's population, plus births minus deaths
2. Calculate available labor force by comparing population to age-sex-specific labor force participation rates
3. Determine net migration requirements of available jobs by adding or subtracting population to hold unemployed percentages within acceptable ranges
4. Determine effects of migration on population distribution

Estimate With-Project Population

We will derive forecasts of population with the project for each project scenario in essentially the same manner as the baseline projections, with some modifications. The following list briefly outlines the process:

1. Identify with-project labor requirements
2. Calculate available labor force, given other employment opportunities
3. Calculate net migration induced by project employment, given net demand for labor and job characteristics
4. Determine demographic effects of migration on total population

Determine Effects of Each Scenario on Population

We will compare with-project and without-project population projections for the local study area and for each substantially affected jurisdiction within the local study area to determine project-related population changes.

ECONOMIC ANALYSIS

OBJECTIVES

1. Determine the positive, negative, and net economic impacts of the proposed Crandon project on the local study area and on the state

2. Develop models to evaluate the possible scenarios of economic development in the local study area, with and without the project, for a 55-year period; the models will:
   a. Differentiate impacts on output, earnings, and employment by economic sector
   b. Account for indirect and induced employment
   c. Account for underemployment

3. Develop growth management strategies to address any adverse economic impacts of the project

APPROACH

Figure 5 outlines the major steps in the economic analysis. A discussion of these steps follows.

Define Local Study Area

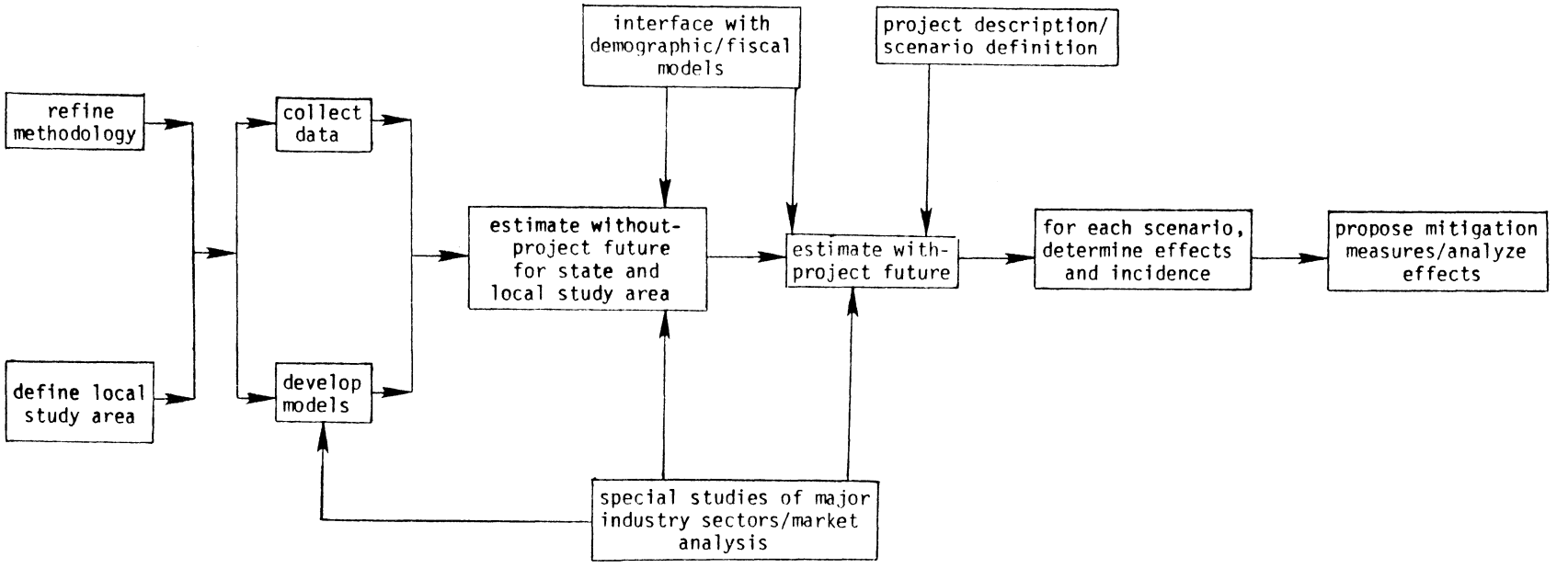
Along with housing and population data, we will consider the secondary economic effects of the project in defining the local study area. The final boundaries of the local study area will be drawn to allow us to use existing data on employment and income.

Collect Data

Much of the economic data necessary for the analysis is already available through government agencies. Employment and income data are available from the North Central Wisconsin Regional Planning Commission, the Wisconsin Department of Business Development, the Wisconsin Department of Industry, Labor and Human Relations, the U.S. Bureau of Economic Analysis, and the U.S. Bureau of the Census. We will also collect certain data ourselves. For example, to obtain detailed information on certain industries, we will interview managers in key local firms.

Figure 5

ECONOMIC ANALYSIS FLOWCHART



Develop Models

We will use two types of models to forecast the economic effects of the project and of existing economic trends on the state and on the local study area. (The appendix to this study plan is a technical discussion of these models.) We will use the Wisconsin Econometric Model to estimate effects on the state. The Department of Revenue developed this model in conjunction with Data Resources, Inc., and Wisconsin presently uses the model to estimate tax revenues based on levels of state economic activity. We will consult with the Department of Revenue in adapting the Wisconsin Econometric Model for this project.

The University of Maryland INFORUM project has developed a national I/O model, which we will use to develop an I/O model for the local study area. The INFORUM model is dynamic; that is, it is iterative, and the technical coefficients are varied to account for postulated changes in technology and relative prices. The INFORUM model forecasts economic conditions under a variety of assumptions concerning energy, population, and growth in GNP. The local model will provide the framework for projections of economic conditions with and without the project. The process consists of the five stages described below.

Compress the INFORUM model to the required number of sectors. The INFORUM model consists of 200 processing (industrial) sectors. We will compress this national model into a local structure similar to that indicated in Table 3.

Adapt the compressed national model to the local study area through application of location quotient techniques. Standard computer programs are available to develop a local model with location quotients verified though the special studies of major industrial sectors.

Adjust the technical coefficients to account for changes in inter-industry relationships and probable import substitution. We will apply the methodology developed as part of the INFORUM project to the inter-industry coefficients to account for probable changes in inter-industry relationships. As part of the special studies (discussed in more detail below), we will perform a market analysis to identify the demand thresholds at which certain types of retail trade and service activity would be expected to enter the area. Taking this analysis into consideration, we will adjust the local model to account for probable import substitution as growth in the area occurs.

Estimate final demand, output, employment, and income for the state and the local study area. We will combine national and state forecasts derived from the INFORUM model and the Wisconsin Econometric Model with the results of the special studies and population forecasts to derive estimates of final demand, output, employment, and income. The special analysis of major industry sectors will include an investigation of seasonality of employment.

Table 3

PROPOSED STRUCTURE OF LOCAL I/O MODEL

A. Processing Sectors
   1. Agriculture
   2. Forestry
   3. Mining
   4. Construction
   5. Manufacturing
   6. Transportation, communication, and utilities
   7. Wholesale and retail trade
   8. Finance, insurance, and real estate
   9. Tourist and recreation services
   10. Business and personal services
   11. Professional and social services
   12. Households

B. Final Payments Sectors
   1. Government
   2. Imports

C. Final Demand Sectors
   1. Government
   2. Exports
   3. Capital investment

Address questions regarding timing and geographic distribution of secondary employment. An I/O model is an equilibrium model that indicates the estimated economic effects after a local economy has fully adjusted to a change in economic activity. Furthermore, we assume the estimated secondary effects will occur somewhere in the I/O region. Use of an I/O model may raise questions concerning the time period required for the economy to adjust to change and concerning the geographic distribution of secondary impacts within the I/O region. We will address these issues through interpretation of published analyses of these questions.

Analyze Major Industry Sectors

We will conduct special studies of major industrial sectors to identify development patterns in existing sectors and to estimate probable import substitution. We will use the results to derive estimates of final demand for these sectors, to verify the I/O model, and as inputs to the without-project and with-project future projections. We will conduct special studies for recreation/tourism, agriculture, forestry/forest products, mining, and retail trade.

We will quantify the analyses to the maximum extent possible. However, data limitations may prohibit more than a qualitative discussion of some aspects of the analysis. We will make best estimates to meet data requirements of other elements of the assessment. Even though much of these analyses may be qualitative, they are not without value. It can be of value to know simply whether a variable will decrease or increase over time without a prediction of the amount of change. Similarly, we can benefit from knowing that some groups will be affected more than others, even though we don't know how much they will be affected.

Recreation/Tourism

Recreation and tourism in Wisconsin in general, and in the Northwoods in particular, is a major sector of the economy as well as a central component of the quality of life. Therefore, we will develop a profile of the existing recreation/tourism industry linkages between this industry, retail trade, and other sectors. We will identify potential impacts of the proposed project on tourism by comparing the without-project future with potential project impacts on the industry.

Profile of recreation/tourism. As a first step in constructing a recreation/tourism profile, we can identify at least four categories of resources:

1. Seasonal and second homes
2. Hotels, motels, and resorts
3. Campgrounds and recreational vehicle parks
4. Day-use recreation facilities, including hunting, fishing, skiing, snowmobiling, driving for pleasure, and boating

We will refine categories of participants and inventory the firms and facilities in the local study area in the process of the housing and cultural analyses.

We will also consider the sensitivity of the various recreation resources to direct or induced changes. This will require breaking each resource into components of attraction including such factors as visual quality, accessibility, noise, available land area, remoteness, and compatibility with other land uses. Finally, we will compare the recreational resource attractions in the local study area with those in the general vicinity of the local study area to determine those resources that may be competitive. We will also identify resources outside the local study area to which recreational users would typically be diverted.

Sources of information for the analysis include the proposed attitude survey of seasonal residents and recreation users, required as part of the cultural analysis, and interviews with retail service firms.

Recreation/tourism without-project future. We will use the preceding recreation/tourism profile, a consideration of the overall economic growth projected for the area, and an analysis of the land-use implications of such growth to estimate the without-project future for recreation/tourism in the local study area. Trends we will identify include number and type of users, spending patterns, types of retail services demanded, employment patterns (including seasonality), wage structure in the recreation industry, and recreational facility or residence ownership. We will quantify the analysis of trends to the extent possible and where needed by other elements of the assessment.

Recreation/tourism with-project future. We will analyze possible effects on the recreation and tourism industry as part of the determination of economic effects of the project. The major types of effects we will consider with respect to recreation/tourism include not only the standard factors from the economic model (changes in output, employment, and income), but also a consideration of the following effects:

1. Shifts from seasonal to permanent residents
2. Shifts in employment and wage patterns
3. Potential increase in property values or rental rates of second homes
4. Land-use impacts
5. Change in quality of recreational experiences

Agriculture

The agricultural sector deserves special attention in the economic analysis because it is a primary employment sector. Moreover, it depends on availability of natural resources and land, and thus is subject to direct and indirect effects of changing land-use patterns. In this analysis, we will document the number of establishments in agriculture, the extent of their land holdings and their dependence on land availability, their contributions to the local economy, and the potential effects on these industries of changes in available land area, employment, and wage levels.

Forestry/Forest Products

The special study of the forestry/forest product industry in the local study area will focus on the existing roles of the sector in the local economy and the extent to which land-use conversions, changes in employment and population, the increase in the number of permanent residences, and changes in wage structure and income affect this sector.

Trends in the forestry/forest products industry without the project. As part of the economic without-project future projections, we will identify trends in the forestry/forest products industry. These include the amount of available timber production land relative to projected patterns of land use and anticipated conversions to nonforest and agricultural uses, anticipated changes in the timber supply from the individual "woodlot" land owner, and employment and wage patterns (including seasonality of employment). In addition, we will consider trends in the demand for forest products, such as an increase in demand for wood for fuel consumption and shifts in demand for hardwood, soft wood, or pulp wood. Finally, we will review state and national forest management objectives and incentive programs and factor these objectives into the without-project future.

Forestry/forest products industry future with the project. The analysis of the forestry/forest products industry with-project future will focus on particular positive and negative effects that may be felt in this industry as a result of the proposed project, above and beyond the effects on income, output, and employment, and that would typically be derived through the economic model.

Mining

The primary objectives of the special study of the mining industry for the Crandon project are to compile the necessary information for the forecasts of the economic impact of the Crandon mine on the area's economy and to identify the extent to which other mining operations might locate in the local study area during the life of the Crandon mine. The ability to project mining development is limited by the public geologic record.

The Crandon mine will introduce a new economic sector into the local economy. Thus, we must determine the effect the mine could have on the local economy from industry-wide expenditure patterns and from data supplied by Exxon concerning probable expenditures that would be made in the local and state economies. We will identify satellite industries for the mining project and explore the probability of such firms locating in the local study area.

Retail Trade

The purpose of the market analysis is to account for probable import substitution in the local economy as a result of the area's growth. As the population and income base of an area grows, it can support expanded, more diverse, trade and service sectors. Consumer expenditures outside of the area by local residents will diminish correspondingly. In addition, the structure of the retail sector may shift from locally owned small establishments to chain stores and franchise operations.

We will profile the existing structure of the trade and service sectors and identify demand thresholds at which we can expect certain types of trade and service activities. We will explore probable changes in the structure of the trade and service sectors resulting from changes in population and income for both the without-project and with-project futures. Finally, we will adjust the I/O model to reflect probable changes in imports resulting from economic growth.

This completes the discussion of the special studies. The following steps apply to the overall economic assessment.

Estimate Without-Project Future

We will estimate probable future conditions for the state and local economies using the models we developed and the special studies discussed above. We will estimate output, employment, and income by sector for both the state and the local study area.

Estimate With-Project Future

We will use the models, the special industry/market analyses, and a detailed project description (including labor force, wage, and expenditure information provided by Exxon) to estimate future conditions with the project for each scenario chosen for analysis. The description for each scenario will include the following factors:

1. A timeline in terms of years and proposed stages of mine development
2. The percent of each employment category that will be filled by residents in the local study area, nonlocal Wisconsin residents, and out-of-state workers
3. The average salary level for each employment category
4. Expected employment levels during construction and operation of the mine
5. A description of types and timing of secondary economic activities expected to be engendered by the project

Determine Effects and Their Incidence

For each scenario, we will compare conditions with the project and conditions without the project to determine relative economic effects and their incidence. We will estimate and measure net economic effects for the local economic impact area in terms of net changes in output, employment, and income resulting from the project.

Propose Mitigation Measures and Analyze Effects

We will identify significant adverse effects and, where appropriate, we will propose mitigation strategies to counter the impacts. Finally, we will analyze the effects of each mitigation strategy.

DETAILS

The appendix to this study plan is a technical explanation of econometric models and the input/output approach.

HOUSING ANALYSIS

OBJECTIVES

1. Describe the existing housing stock and identify factors affecting future housing development

2. Given the demographic and economic analysis and objective 1 above, define the local study area

3. Identify the probable patterns of growth within the local study area with and without the project

4. Predict the likely locations, sizes, prices, and types of additional housing

5. Develop models or techniques of analysis that can evaluate various assumptions and accommodate the scenarios generated by demographic and economic analysis

APPROACH

The distribution of population growth generated by the project determines the distribution of most of the impacts. Although population growth generates demand for additional housing, distribution of population is, in the final analysis, determined by the location of the housing stock.

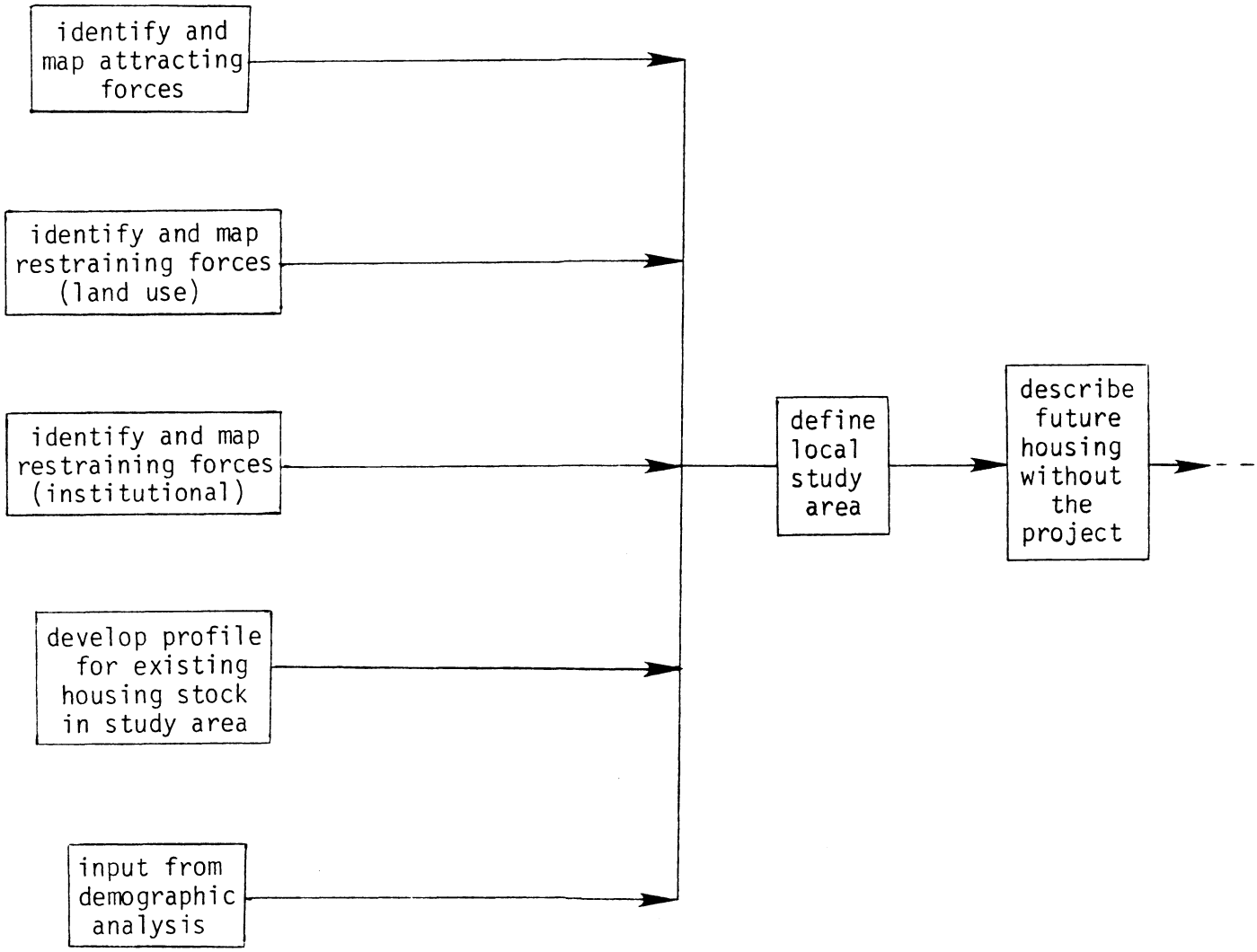
Socioeconomic impact assessments frequently use a gravity model to estimate residence location. However, for a study to be specific in areas of potential impact, gravity models are inadequate. A more refined approach to the problem of housing location incorporates the same methods that a housing developer would use in siting a development: the location of suitable land; size of available tracts; acquisition and development costs; constraints imposed by topography, drainage, erosion, soils, and access; the restrictions of utility service; current political attitudes toward development; and characteristics of current housing supply and demand.

This market approach requires much more time and data than would the use of a gravity model. However, the results are much more reliable and responsive to the needs of local jurisdictions. In addition, the results of such an approach can be used in subsequent planning for housing development and public services to meet project-induced demands. Even at its best, however, housing prediction cannot be a perfect forecast. Housing construction typically depends, among other factors, on a few decisions, each of which commits large amounts of housing to particular locations.

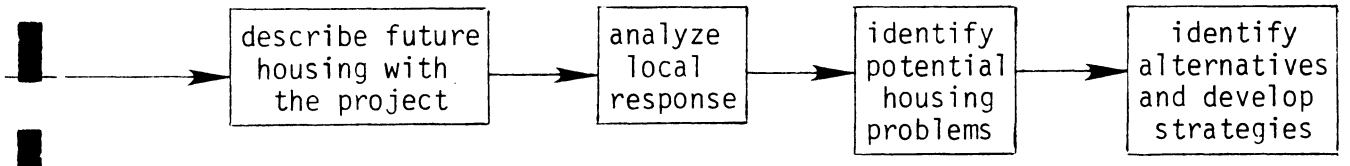
Figure 6 illustrates the steps in the housing analysis. The following pages describe these steps.

Figure 6

HOUSING ANALYSIS FLOWCHART



(Figure 6, continued)



Identify and Map Attracting Forces

The major attracting forces for housing development are the driving time from the work site, driving time to local retail trade centers, and driving time to local lakes and rivers as sites of recreation. We will measure the driving times from the proposed project site, from the communities of Crandon, Rhinelander, and Antigo, and from major recreation attractions in the area for both winter and nonwinter conditions. We will prepare baseline maps showing time and distance contours for each of these factors.

We will use the analysis of the driving time contours to determine overlap between driving times to the proposed project site, to the trade centers, and to the recreation attractions. This overlap will establish the area of greatest attractiveness for housing development from the standpoint of convenience. The attitudes of local residents regarding reasonable and desirable driving times and distances, including future fuel costs and availability, will be a consideration in defining this area.

Identify and Map Restraining Forces (Land Use)

Several current land uses or conditions preempt housing developments of various types. These include federal and state forest land, county-owned land, land committed to forest crops, wetlands and floodplains, erodable slopes, and percolation characteristics prohibiting septic systems. We will map each of these factors for the local study area. We will use these restraining force maps, along with those institutional restraining force maps described below, to delimit areas of attractiveness.

Identify and Map Restraining Forces (Institutional)

In addition to the land use and physical restraining forces described above, there are several legal, institutional, and political restraining forces that shape or limit housing development. Those forces include local housing codes and State Uniform Building Code, water and sewer capacities of the various municipalities, building permit and zoning requirements, subdivision regulations and certified surveys, differing approaches to planning and growth by local administrations, and prices. Several of these factors lend themselves to mapping.

We will use the results of this task in conjunction with the maps to identify the most likely areas for housing development. The data management procedure for this section will allow an interactive consideration of various alternative relationships between attracting and restraining forces.

Develop a Profile of the Existing Housing Stock in the Study Area

The housing profile will document the number and type of existing residential structures, including owner-occupied; single-family and multi-family rental units; and year-round and seasonal residences and mobile homes. We will also determine the range of residential unit sizes and describe the most typical styles of residential units. We will use this description as the baseline against which to compare compatibility of potential new development. We will determine the range of housing costs for existing structures, new construction, and single-family and multi-family rental units; the range and distribution of values and costs; and the most common construction methods and characteristics. We will estimate the percentage of substandard dwellings and units suitable for rehabilitation, and where appropriate, we will map these data.

Define Local Study Area

We will use the housing analysis together with demographic and economic analysis to define the local study area. This is the area that encompasses all jurisdictions that are substantially affected by the proposed Crandon project. We will base this determination on the premise that the effects of the project occur in the places where the project is, and where the workers connected with the project reside. Residential decisions, in turn, depend on and influence the housing market.

Describe Future Housing Without the Project

We will estimate the current supply of housing in the local study area by documenting the number, size, types, and prices of units currently on the market for sale, rent, or lease. We will also estimate the current occupancy rate of new construction in the area.

To obtain an indication of local capacity to respond to new demands for housing, we will analyze the private sector home construction industry and availability of mortgage funds. We will estimate the most likely mix of housing types (single-family and multi-family) and construction modes (manufactured or site-built).

Analysis of residential building permits will reveal trends regarding size, location, and rates of construction of single-family and multi-family residences, construction of and additions to mobile home parks, and residential (including mobile homes) renovations and additions. We will document trends in regulations, particularly regarding mobile homes.

Describe Future Housing With the Project

We will estimate the locations and amount of probable new residential development with the project by combining population estimates and economic analysis with the housing analysis. We will estimate the types and values of those residences by extrapolating the trends in the housing type, value, and characteristics and refining this extrapolation by the results from the economic analysis, which will provide the most likely range of household income, with a resultant estimate of the amount of money which can be spent on housing (usually 25% to 30% of income). We will combine this estimate with a prediction of the family types expected to move into the area. Thus, we will be able to estimate the type and price of housing for which a market will exist.

We will be able to describe several scenarios of the demand for housing units resulting from the project, including temporary housing that might be needed for the construction work force. The demand for housing generated by the project may be met by temporary housing, new construction, existing units on the market, and units placed on the market in response to increased demand. We will use the trend analysis in the housing baseline section to estimate the most likely types and price range of housing that might be purchased by long-term residents who sell their existing housing to mine-related employees.

Analyze Local Response

After we estimate locations and number of potential housing development, we will review the ordinances, policies, and political climate of those localities to judge their potential response.

Identify Potential Housing Problems

The foregoing analysis may reveal specific problems in the capacity of the local study area to meet increased housing demands resulting from the proposed Crandon project. We will describe specific problems, locations, extent of shortfalls, and other potential difficulties.

Identify Alternatives and Develop Strategies

To the extent that we identify problems as discussed above, we will identify a range of alternatives to meet those problems. Clearly, the long-term capital investment involved in the housing sector leads to a proper conservatism. However, increased costs of materials, land, and capital, plus more stringent public regulation of all aspects of housing and infrastructural development have changed the nature of the sector to the extent that it may be essential to seriously consider various alternatives.

PUBLIC FACILITIES AND SERVICES ANALYSIS

OBJECTIVES

1. Determine present capacity, distribution, and quality of public facilities and services in the local study area
2. Determine local preference for mix and level of public services
3. Determine the capital and operating costs of increases in public services to meet project and nonproject increases in demand
4. Determine administrative, institutional, and financial limitations on expansion of public facilities and services
5. Determine possible funding sources for various kinds of public facility construction and expansion

APPROACH

Public facilities and services are those provided by state and local governments, public utilities (generally electricity and natural gas), public transportation (air, rail, and bus), and health care providers. Figure 7 outlines the steps in this analysis of public services, and the following text describes the procedure.

Describe Baseline for Public Facilities and Services

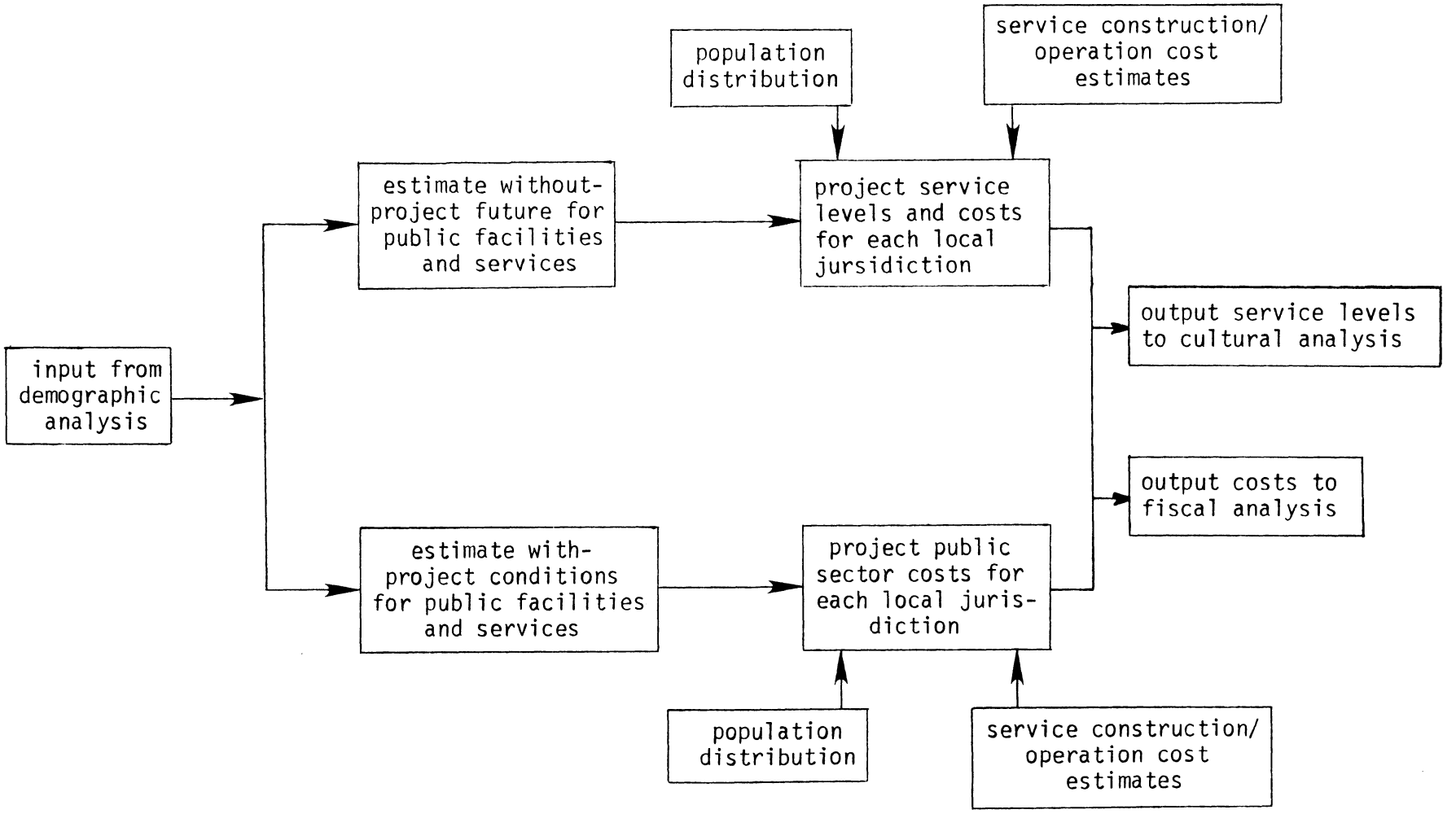
We will document baseline conditions of public facilities and services through interviews with public officials and their engineering consultants in the local study area. Where appropriate, we will also map these conditions. The description of baseline conditions will focus on electricity, fuels, water supply, waste water treatment, solid waste disposal, police and fire protection, and parks and recreation. The baseline documentation will include problems, limitations, age, and regulatory variances of these systems.

We will describe and document existing conditions of police and law enforcement services in terms of personnel numbers, experience, and training; communication equipment, physical facilities, and vehicles; and fiscal and administrative characteristics and capacities.

We will analyze fire protection using state fire insurance key rate analyses to determine the adequacy and future capacities of staff (including

Figure 7

PUBLIC FACILITIES AND SERVICES ANALYSIS FLOWCHART



number, training, and administration), equipment, physical conditions and locations of fire stations, and characteristics of the water distribution system of the service area.

Documentation of baseline conditions of all social services provided in the area will include provisions for physical and mental health, welfare and public assistance, education, public libraries, and other factors of local concern that may be identified. We will document baseline conditions of these services on the basis of secondary data from state and local governments and interviews with the providers of the individual services. The description of baseline conditions will consist of the number and capacities of facilities, staffing, physical and fiscal limitations, and per capita demand rates where relevant.

In describing public facilities and services, and quasi-public services such as utilities, transportation, and health care, we will document present capital and operating costs to use in projecting the costs of future expansion and for input to the fiscal analysis.

Estimate With-Project Future

We will use the scenarios describing with-project estimates of housing development and population increase to estimate project-related demand for public services and utilities. We will compare project-related demands and without-project demands to existing reserve capacities and system limitations to determine the capability of the individual public facilities and services to absorb the additional project-related demand. Interviews with managers and administrators of these public services and utilities will help us assess the reasonableness of our estimates and provide us with their perceptions of system capacities to absorb demands.

We will use the housing and population projections to estimate project-related demands for social services for each of the scenarios of the housing and population analyses. After we estimate project-related demands, we will interview administrators of various services. As necessary, we will modify our estimates to take into account comments from local officials.

Estimate Project-Related Public Sector Costs for Each Local Jurisdiction

We will estimate capital costs for required new facilities identified as part of the foregoing analysis primarily on the basis of recent engineering data obtained from local officials and civil engineers with experience in the local study area. We will base operation and maintenance cost estimates primarily on time-series and/or cross-sectional analyses of local government budget data and national expenditure multipliers for local governments of comparable size and growth rate.

In our estimate of total costs we will include the following public services and facilities for the indicated areas of study:

Facilities and Services	Area of Impact
Education	School districts
Law enforcement	Cities, county
Fire protection	Cities, county
Health care	County
Municipal water supply	Cities
Wastewater treatment and disposal	Cities
Solid waste disposal	Cities, townships, and counties
Streets and roads	Road segments
Railroads	County
Air transportation	County
Social Services	Cities, county
Library services	Cities, county
Senior citizens programs	Cities, county
Recreation	Cities, county
Electricity	Cities, special district
Natural gas	Cities, special district
General government administration	Cities, counties

We will also consider the planning and management problems inherent in rapid expansion of public services in making cost estimates, as well as possible economies of scale through joint provision of services by small jurisdictions.

Identify Shortages and Difficulties Attributable to the Crandon Project

We will identify any shortages in the provision of public facilities and services and any financial or institutional difficulties likely to be encountered in expansion of services. We will use this analysis along with the fiscal analysis to identify alternatives for municipal action.

FISCAL ANALYSIS

OBJECTIVES

1. Estimate annual costs and revenues for each jurisdiction likely to be significantly impacted by the project over the estimated life of the project
2. Determine the impact on taxpayers of maintaining a balanced budget in each jurisdiction
3. Develop a model that is compatible with the models for demographic, economic, and housing analyses
4. Develop a model that allows adjustment for inflation rates and tax collection practices

APPROACH

In this analysis we will use, with modifications, the computer programs for fiscal analysis developed by the state of North Dakota. Equations for Wisconsin taxes and costs of service will replace those for North Dakota. Figure 8 shows the adaptation process. The following text describes the steps.

Identify Local Taxing Jurisdictions

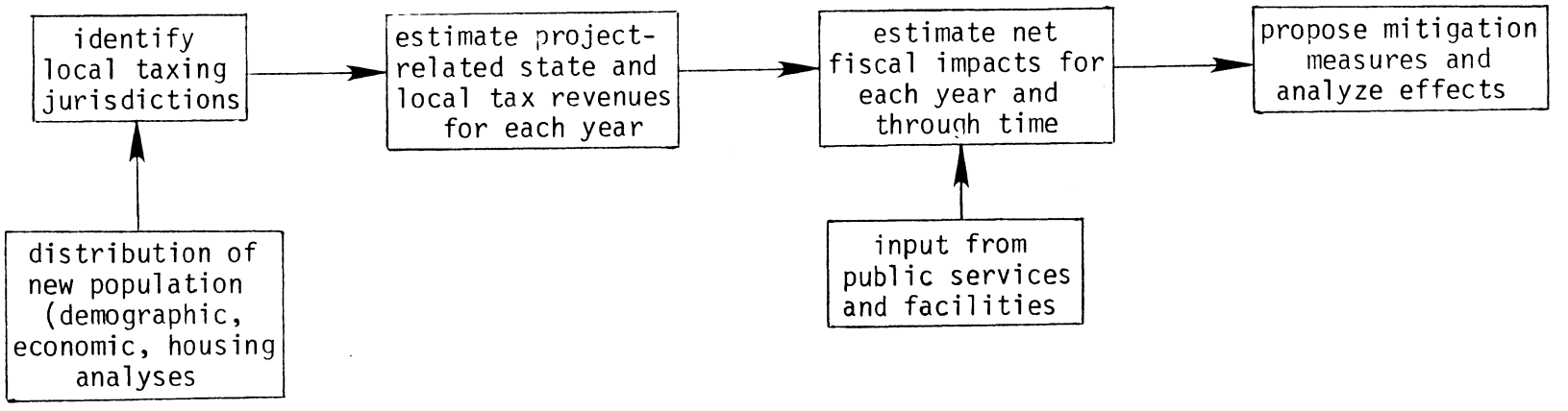
We will use the results of the demographic, economic, and housing analyses to identify each township, municipality, school district, and county projected to receive new population as a result of the project.

Estimate Project-Related State and Local Tax Revenues for Each Year

We will analyze existing state and local tax structures to identify sources of revenue, methods of computation of revenues, distribution formulas, and federal aid programs to state and local governments and to reservations. We will then determine the methods for estimating project-related tax revenues and transfer payments, based on the preceding analysis and discussions with staff of Exxon, the Wisconsin Department of Revenue, the Wisconsin Department

Figure 8

FISCAL ANALYSIS FLOWCHART



of Local Affairs and Development, and local taxing jurisdictions. Estimating equations will reflect taxing and distribution procedures and will generally reflect relationships between costs, revenues, and predicting variables such as population, industry output, and income.

We will use the Wisconsin Econometric Model to estimate project impacts on state tax revenues. No model modification will be necessary. At the local level, we will include the following sources of revenue in the model:

1. Local property tax

2. State-to-local transfer payments
   a. Investment and local impact fund (also known as the mining impact fund)
   b. Share revenues (utility, per capita, aidable revenues are three major subcomponents)
   c. General property tax relief
   d. School aids
   e. Highway aids
   f. Natural resource aids

3. Federal-to-local transfer payments

We will address the state and local effects of the net proceeds tax.

Estimate Net Fiscal Impacts

The net fiscal impact of the project for a given jurisdiction in a given year is the difference between the project-related revenues and project-related costs. Cost estimates will come from the public services analysis. We will then sum annual surpluses or deficits over the entire analytical time period (55 years) to determine net fiscal effects through time.

We will compute all costs and revenue estimates on the basis of the most current data available and adjust them to the base year price level. The user will be able to inflate those components postulated to be subject to price level changes at any assumed annual inflation rate.

Propose Mitigation Measures and Analyze Effects

We will identify significant adverse fiscal effects, and we will propose mitigation strategies. We will then analyze the effects of each mitigation strategy.

CULTURAL ANALYSIS

OBJECTIVES

1. Determine baseline social and cultural patterns using objective indicators

2. For permanent residents, seasonal residents, and tourists, determine attitudes toward economic growth in the local study area

3. Determine what quality of life means to local residents and how they feel their quality of life compares to others

4. Predict how social and cultural patterns and quality of life will evolve with and without the Crandon project

APPROACH

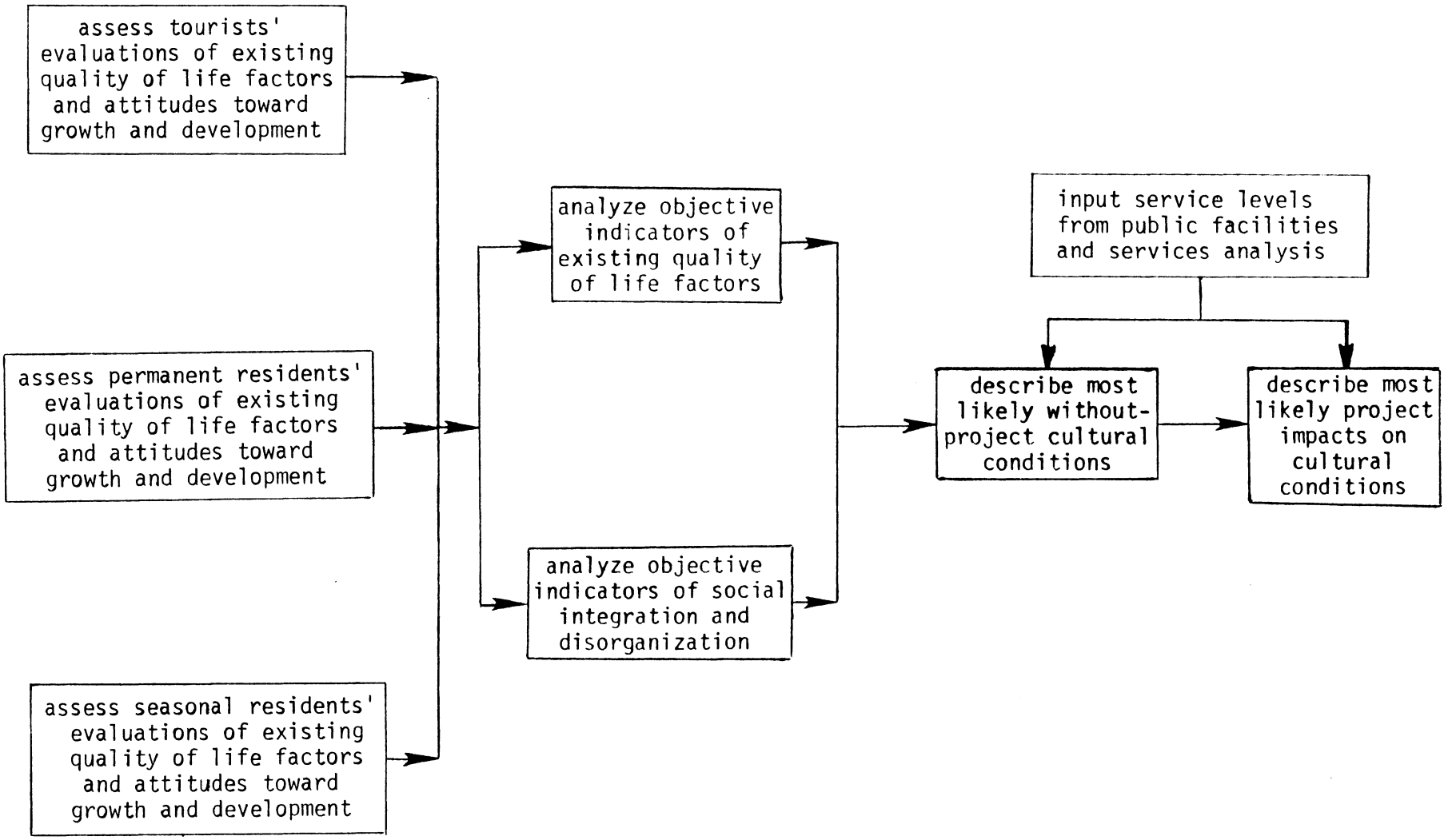
The cultural analysis subsumes a sociological approach to documenting cultural characteristics. This sociological approach provides the best basis for documentation of current conditions and assessment of actual changes during any stage of project construction and/or operation. Figure 9 outlines the steps in this analysis. The following text describes the approach.

Survey Perceptions and Attitudes of Tourists

We will develop a questionnaire to elicit from recent tourists in the local study area their views on the desirability of the area for recreational activities. We will also ask them to rank the local study area against other Wisconsin recreation areas for quality, price, and accessibility. We will also seek to determine what effect certain possible characteristics of the Crandon project may have on the attractiveness of the area to tourists.

Figure 9

CULTURAL ANALYSIS FLOWCHART



Assess Subjective Evaluation of Existing Quality of Life Factors as Perceived by Permanent Residents

We will elicit responses from permanent residents of the study area regarding their subjective evaluations of outdoor recreation quality, accessibility, and problems (with emphasis on lake and river recreation); satisfaction with housing quality and neighborhood conditions; perceptions of the quantity, quality, and location of commercial facilities and medical facilities; and evaluation of public schools, streets and roads, police and fire protection, and taxes.

We will use these subjective evaluations to identify issues as perceived by local residents and to determine what data we will need to measure the impact of the project on quality of life.

The interview schedule will draw on a previous longitudinal, nationwide research effort. Information developed through the interviews will yield cross-tabulations of residents' perceptions and attitudes by age, sex, income, ethnic background, occupation, length of residence in the area, and place of residence.

We will use the information developed in this survey in conjunction with information from other parts of the cultural analysis to document existing cultural conditions in the impact area and to identify potential problem areas that must be addressed during development and operation of the Crandon project.

Assess Attitudes Toward Growth and Development

An additional part of the survey research will include questions designed to elicit responses from residents of the local study area regarding their attitudes toward local growth and development. The questions designed for this part of the survey will draw on the large body of work previously performed in the area of economic and industrial development in rural areas.

We will combine the results of this task with other aspects of this analysis to establish a baseline of existing attitudes toward growth and development as well as to identify those particular areas that present either problems or opportunities. We must address problems concerning residents' attitudes toward growth and development as part of the construction and operation mode of the Crandon project. However, we can point out opportunities (e.g., residents may desire small-scale low-skill industries) for planning secondary development in the local study area.

Analyze Objective Indicators of Existing Quality of Life Factors

While the information gained through surveys will validly portray residents' perceptions of existing conditions, those perceptions are influenced by many factors that may be external to the reality of the situation. Thus, it is necessary to balance information on perceptions with objective indicators of existing conditions. We will gather much secondary information regarding objective indicators of quality of life factors from documents of local, state, and federal agencies. This task will consist of a literature search and analysis of all pertinent publications and file data sources, which will provide objective and statistical indicators of lake and river water quality and accessibility for recreation; housing and neighborhood conditions; type and location of commercial and medical care facilities; and descriptions of publicly provided infrastructural facilities including schools, police and fire protection, street and road conditions and traffic rates, and water and sewer service.

Analyze Objective Indicators of Social Integration and Disorganization

The likely effect of projected impacts on the continued functioning and viability of the communities involved is a basic concern underlying a social and economic impact assessment. Thus, the questions of social integration and disorganization become central to the analysis. However, the field of sociology has not provided validated measurements of integration and disorganization, though the concepts are widely used. Use of indicators that are assumed to represent the extent of integration and disorganization is the most obvious approach to assessing these characteristics. Common indicators of social integration include participation in religious and civic organizations, political participation, and citizen support of community funding efforts.

Objective indicators of social disorganization include crime and juvenile delinquency, family dissolution, public welfare dependency, civil disorder, alcoholism and drug abuse, and mental illness and psychological stress. We will gather data on these factors from the records of the various state and local agencies involved in providing the necessary services.

The major purpose of these indicators is to provide a baseline of trends to be compared with forecasted indicators. We must interpret the indicators described above with extreme care. The assumptions on which these indicators are based are vulnerable, and we must not take the indicators at face value. These indicators should be interpreted in light of the information developed in the surveys, and in professional observation and analysis of the entire range of social and economic factors considered as part of the study.

Predict Evolution of Social and Cultural Patterns With and Without the Project

Using information from the demographic, economic, housing, and analogous communities analyses, we will develop scenarios that focus on the possible impacts of the project on the existing social and cultural patterns. These scenarios will be qualitative, but we will base them on the best available quantitative projections of changes in major social and economic factors. We will interpret the effects of social and economic changes in light of the findings of the analogous communities analysis and of the existing literature.

DETAILS

We will collect the social statistics shown below. The statistical surveys section of this study plan provides the technical details of the surveys.

Type of Data	Data Elements
Descriptions of:	Participation rates in religious and civic organizations, political participation, and citizen support of community funding efforts
	Rates of crime and juvenile delinquency, family dissolution, public welfare dependency, civil disorder, alcoholism and drug abuse, mental illness, and psychological stress
	Ranking of school performance
Observation of:	Quality of schools
	Housing and neighborhood conditions
	Types and locations of commercial establishments
	Availability of medical care
Attitudes regarding:	Growth and development
	Attractiveness of the Crandon area
	Quality and accessibility of recreation
	Housing quality and neighborhood conditions; medical, educational, and municipal services

NATIVE AMERICAN COMMUNITIES ANALYSIS

OBJECTIVES

1. Produce a highly detailed analysis of the effects of the Crandon project on the two Native American reservations in the local study area

2. Ensure that Native Americans are fully informed regarding possible project effects and have the opportunity to participate in planning

APPROACH

The approach we chose to assess the impacts of the Crandon project on the Mole Lake Chippewa and Stone Lake Potawatomi people stresses quantitative sociological and economic methodology. However, assessment of impacts on significant cultural elements will use qualitative informant methods derived from anthropological methodology. This approach requires the establishment of clear mechanisms of coordination and communication with the people who are the subject of the study.

Figure 10 outlines the steps of this approach. The following text describes them.

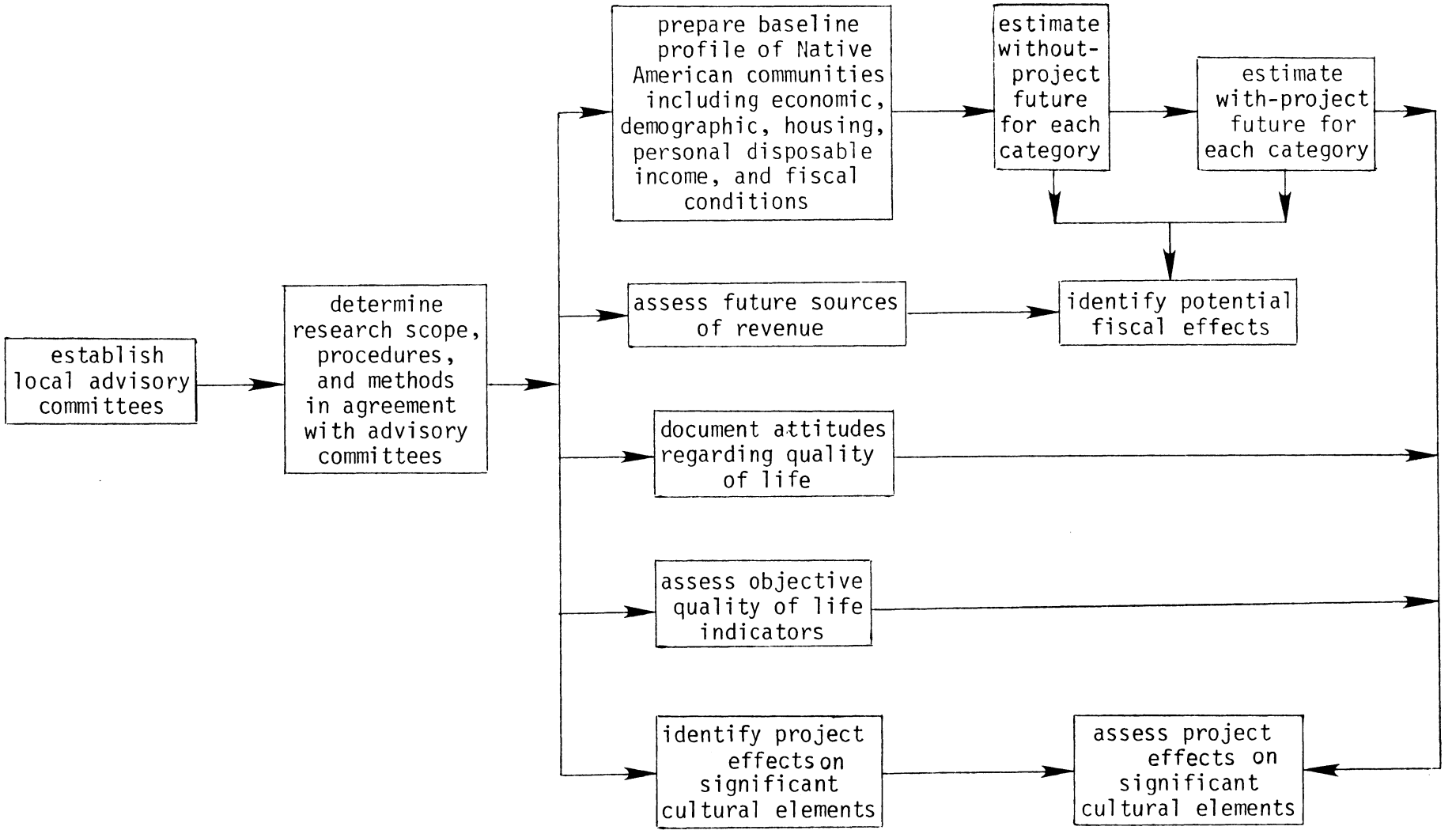
Establish Local Advisory Committees

We hope to establish an advisory committee on each of the reservations. These committees will help form the study, and they will oversee the execution and analysis of the study. The committee members will be selected in consultation with tribal leaders, both elected and reputational. The committees will have approximately five members each, and they will represent a cross-section of the respective tribes. We will compensate committee members for their time and expenses. We may find it feasible to use existing advisory committees formed in conjunction with preparation of ongoing economic development programs and comprehensive planning studies.

This section provides little detail regarding methodology because the advisory committees must be intimately involved in setting up the study. If reservation residents and other members of the tribes are to cooperate, the study must have credibility with tribal leaders, both elected and

Figure 10

NATIVE AMERICAN COMMUNITIES ANALYSIS FLOWCHART



reputational. The advisory committees provide the mechanism for this credibility. Because the advisory committees cannot merely serve as a "front" through which predetermined study agenda and approaches are pushed, the committees must understand the nature and purpose of the study, and they must have a voice in decisions regarding approaches, methodologies, and personnel.

This approach does not assume that the advisory committees will consist of trained social scientists. Rather, it assumes that we will work closely with the committees to present information regarding the needs, purposes, and possible methodologies in such a manner that they can effectively make choices and decisions with which they will feel comfortable. We will work with the committees to arrive at mutually acceptable decisions. This is a somewhat unusual approach to studies of this type. However, we believe that the sensitivity of the study, the unique characteristics of the reservations, and the specific people involved are such that this approach is essential.

The committees will review the approach of this study, specific questionnaires and interview instruments, the sampling technique, the research methodology, the specific personnel who work on the study, and the analysis and interpretation of results of the study. Our concurrent review will ensure the resulting approach is technically valid. It is especially important to note that the advisory committees will approve all individuals who have contact with tribal members during the course of the study.

Prepare Baseline Profile of Native American Communities

We will prepare a detailed and comprehensive baseline profile for each Native American community. Except as suggested by the advisory committees or indicated by conditions, we will employ the methodologies used elsewhere in the study to examine demographic, economic, fiscal, housing, public services, and cultural aspects of these communities.

We will use census data, data from the Bureau of Indian Affairs and the Tribal Council, and household interviews to describe numbers, age, sex, natality, mortality, morbidity, and labor force participation characteristics of the population on each reservation. We will use this information to make population projections and to develop a work force profile for Native American residents of the local study area. In addition, we will collect data on objective social indicators, including housing conditions; accessibility to commercial, educational, recreational, and medical facilities; community infrastructure; crime rates; rates of alcoholism and drug abuse; rates of family dissolution (within the context of tribal culture); and educational performance and employability.

On each reservation, we will gather data from tribal records and interviews regarding the economic base conditions of the reservation. We will include in the analysis all privately owned enterprises and all activities of the Tribal Council that produce income for the tribe. We will survey

the number and conditions of the housing stock on the reservations. We will also document the current fiscal status of each tribe.

Describe Without-Project Future

Using the baseline data described above and a cohort-survival population projection model, we will derive population projections for Native Americans for conditions without the Crandon project. These projections will include total numbers and age and sex distribution.

We will base our estimates of without-project economic conditions of the reservation on analysis of past economic trends, interviews with tribal leaders, and review of all planned economic activities. These projections will include input from the demographic studies, which will estimate the number of residents expected on the reservation without the Crandon project.

We will use estimates of without-project population growth to estimate future housing needs on the reservations, including single-family (small and large family), multi-family, and housing for the elderly and handicapped.

We will use current and recent past trends in employment and personal income, in addition to the economic analysis for the nonreservation area, to estimate aggregate personal disposable income under conditions without the project.

We will estimate fiscal requirements through the projection time of the without-project future on the basis of inputs from demographic, economic, and housing analyses of the reservations without the project.

Describe With-Project Future

With data developed in the without-project description of demographic characteristics, plus Exxon's estimate of total project employment and an estimate of inmigration to the reservations as the result of increased employment opportunities, we will use the cohort-survival method to estimate the demographic characteristics of Native Americans under conditions of construction and operation of the Crandon project.

Using inputs from the demographic study of Native Americans, data from the without-project future analysis, and estimates of Native American employment by the Crandon project and by associated industries, we will estimate the with-project economic future of the reservations. We will then estimate increased demand for housing and public services and facilities resulting from the Crandon project, including types of housing, using information developed in the with-project demographic analysis.

Estimate Personal Income

We will use estimates of project and related employment of Native Americans, plus the information generated in the analysis of with-project economic conditions for the nonreservation areas, to estimate total aggregate disposable personal income for the reservations.

Assess Future Sources of Revenue

Interviews with field representatives and regional staff members of appropriate federal and Wisconsin agencies will elicit the most probable sources and levels of funding for Native Americans through the projection times of this study. With the possible exception of the Bureau of Indian Affairs, most of these descriptions and estimates will be qualitative and based on existing or anticipated programs at those agencies.

Identify Potential Fiscal Effects

Using inputs from the analysis of with-project characteristics of population, tribal economics, and housing, we will estimate fiscal requirements for conditions with the project. We will compare projected fiscal needs with likely sources and levels of funding to identify effects on the fiscal stability of the reservations.

Document Attitudes Regarding Quality of Life Factors

At the direction of each advisory committee, we will develop an interview instrument to find out adult tribal members' feelings about major quality of life indicators.

Assess Objective Quality of Life Indicators

We will supplement data derived from the interviews by review of tribal, local, and state records regarding the same quality of life indicators as discussed in the interviews. These data should provide an objective "check" on the subjective feelings described through the interviews.

Identify Significant Cultural Elements

Using methodologies developed in conjunction with the advisory committees, we will identify and analyze the significant cultural elements of tribal life.

The methodology calls for objective documentation of cultural elements to serve as a basis for future comparisons. This documentation will include photographs, tapes, maps, and other materials, which the advisory committees will authenticate and review.

Assess Project Effects on Significant Cultural Elements

In cooperation with the advisory committees, we will assess potential effects of project-related activities on significant cultural elements. We will try to separate perceived effects from actual effects. We will analyze perceived effects in terms of their incidence on various ages, sexes, locations, and status groups within the tribes.

DETAILS

Technical details on the statistical surveys are included in the statistical survey section of this study plan.

ANALOGOUS COMMUNITIES ANALYSIS

OBJECTIVES

1. Document changes resulting from industrialization in areas analogous to Crandon as a cross-check on the results of the Crandon study

2. Provide an empirical context within which we can make reasonable statements about changes

3. Determine which social and economic parameters we should monitor to effectively manage growth

4. Document the responses of industry and local government to rural industrialization, and describe the results of these responses in analogous areas

5. Provide the baseline for a comparable site so we can contrast ongoing monitoring

APPROACH

We will review the available literature to select five cases of rural industrialization for analysis. In addition, we will study an area that has experienced development similar to the Crandon project and a corresponding undeveloped control area. Finally, we will choose an area in Wisconsin that has not experienced industrialization, and that is not likely to, for long-term comparison to the local study area. However, if the previous control location chosen is in Wisconsin, and if that undeveloped site is directly comparable to the Crandon site, it can serve as the second control site.

Figure 11 outlines the steps in this approach. The following text describes the approach.

Assemble Available Case Studies

The first step in this approach is to assemble copies of all retrospective case studies of rapid growth in rural areas. We will draw on our familiarity with the literature to select these studies; in addition, we will search out studies commissioned by government agencies and foundations.

Define Analytical Framework

The assembled studies will be of diverse formats, depth, and scope. They will concern sites and activities that vary in their similarity to the Crandon project. For this reason, it is important that we systematically analyze these studies and categorize both their settings and their findings to allow clear interpretation. In this step, we will develop an analytical framework for the analogous communities studies. We will, after a survey of the literature on growth management, add to this framework categories representing the various responses industry and local government have made to the potential impacts of rapid growth. We will also note the types of special conditions, such as the presence of Native American population or certain resource industries, which may make the study more analogous to the Crandon project.

Select Analogous Area for New Case Study

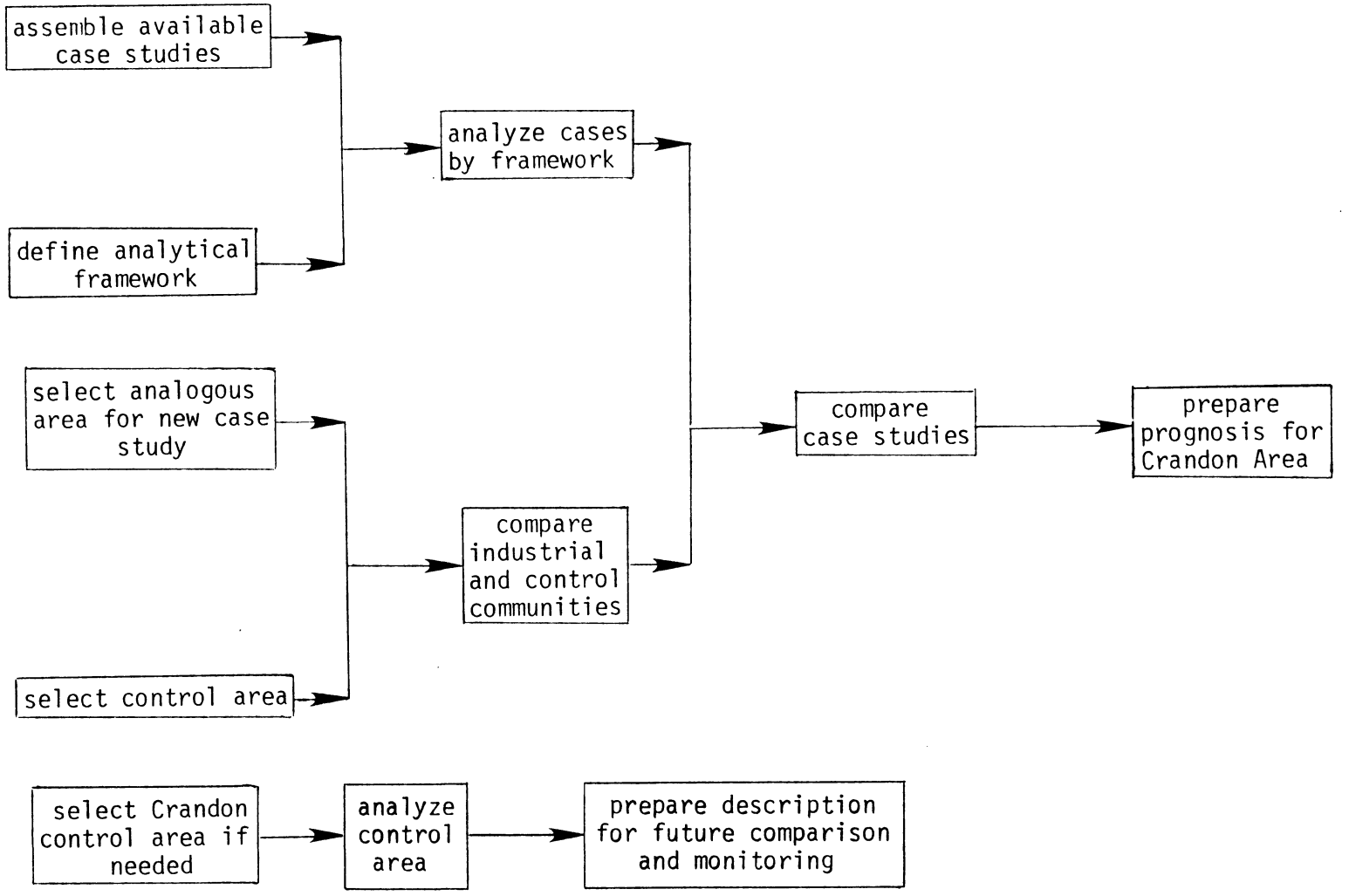
We will select an area that has experienced development similar to the Crandon project. We will analyze the selected site for changes (before, after, and midpoint) in population, economic, governmental, education, and quality of life indicators, including political/governmental response to change.

Select Control Area

We will choose a control location comparable to the case study location. However, the control area will not have experienced industrial development. We will analyze indicators for this location as we did in our analysis of the new case study area.

Figure 11

ANALOGOUS COMMUNITIES ANALYSIS FLOWCHART



Compare Industrial and Control Communities

We will compare changes measured at the control location to those measured at the development location and prepare a statement of changes attributable to the development. The industrial location will have experienced the effects of a project similar to the Crandon mine/mill and will meet specific criteria for the purpose of comparison.

Select and Analyze Crandon Control Area

We will also select a control location in Wisconsin comparable to the Crandon site and which can be used for ongoing impact monitoring comparison. We will prepare a baseline of existing conditions for that site, comparable to that prepared for the local study area. As explained in the introduction to the approach, we may not need to select an additional control area to fulfill this requirement. If we do select a second contral area for comparison to the Crandon site, we can inventory it during the data collection phase for the local study area.

Analyze Cases by Framework

We will analyze each case study according to the analytical framework established. This will involve development of worksheets on each case study, wherein we will enter information on the classification of the setting and industry, the values of the change in impact parameters, and the responses and special conditions. If significant information is missing from a case study that appears to be particularly relevant to the Crandon situation, we will do followup research on this case. First, we will contact the author of the case study to determine whether he or she has omitted the information from the analysis for editorial reasons. If the author does not have the information, we will contact the relevant industry or government personnel in an attempt to secure the missing information by mail or telephone.

Compare Case Studies

We will combine the analysis worksheets on each case study into a large matrix. Case studies will comprise one axis of the matrix; the other axis will be the analytic framework. We will be able to approach this matrix through a variety of statistical and less formal methods of analysis to sort the cases by their similarities and differences. This comparative examination of the cases should result in conclusions on the relationships between baseline conditions and the resulting impacts, the type of industrial activity and the resulting impacts, the industrial response to rapid growth and the resulting impacts, and local government response to rapid growth and the resulting impacts.

Prepare Prognosis for the Crandon Area

One of the purposes of this analysis is to use the evidence from analogous communities to estimate the type and magnitude of impact of the project on the Crandon area. We will produce this prognosis by taking the evidence and analysis from previous steps and drawing conclusions on potential impacts through a comparison of baseline conditions and the proposed project at Crandon with those in other areas. It will be particularly important to note the special conditions, both in the case study areas and in the Crandon area that can result in different impacts. Similarities between our estimates and development in analogous communities will tend to validate our forecasts. Differences will force us to question and rethink our methodology.

Prepare Description for Future Monitoring and Comparison

The purpose of this step is to provide all parties with a factual basis for longitudinal comparisons between the local study area and the control area. Exxon will consider ongoing monitoring of the control site as well as the project site to allow parties to distinguish effects of the project from effects of social and economic forces other than the project.

STATISTICAL SURVEYS

OBJECTIVE

Obtain statistically valid information on all populations (including Native Americans) affected by the Crandon project regarding:

a. Demographic characteristics
b. Housing
c. Labor force participation
d. Lifestyle characteristics
e. Attitudes with regard to the Crandon area and the Crandon project
f. Perceptions of services and facilities
g. Seasonal and permanent residents' and tourists' use of the area

APPROACH

We will survey five separate groups: permanent residents, seasonal residents, tourists, on-reservation Native Americans, and off-reservation Native Americans. The following paragraphs describe each of these surveys. Figure 12 is a flowchart of our overall approach to conducting the surveys. The economic analysis section includes descriptions of interviews conducted for the special studies of industry groups.

We will conduct all surveys except the Native American survey by telephone. Telephone interviews allow a much larger sample to be obtained in a shorter time period than would be possible with personal interviews, considering the scattered nature of the survey population. In addition, telephone interviews reduce the biases that can be introduced by personal interaction between the interviewer and respondent.

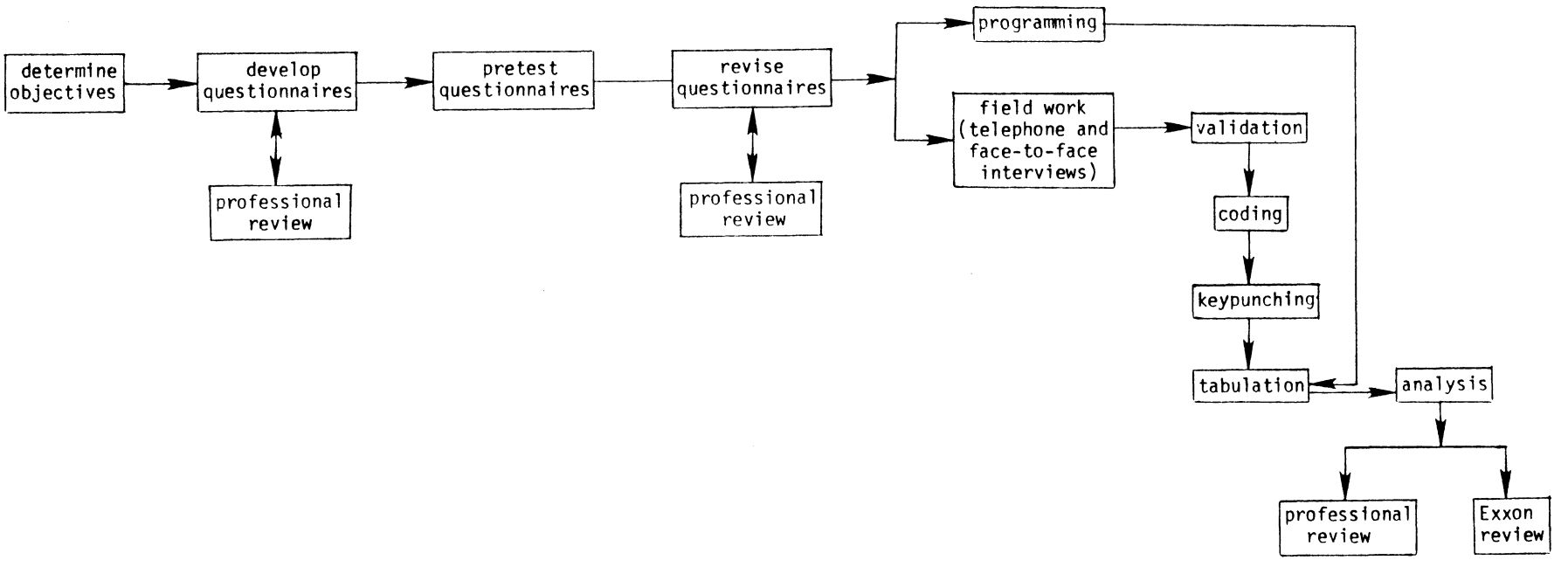
In order to ensure credibility of the survey research, the design and professional review section of each survey includes budgeted time for professional academic survey research methodologists to assist in selection of the sample, design of the survey instrument, and verification of results if necessary in hearings. We will seek the cooperation of the North Central Wisconsin Regional Planning Commission in selection of samples and preparation of questionnaires.

Permanent Residents Survey

We will obtain a total of 1,000 25-minute telephone interviews, with subsamples for counties in the local study area. We will screen respondents

Figure 12

STATISTICAL SURVEYS* FLOWCHART



*Permanent residents survey, seasonal residents survey, tourist survey, and Native American surveys

called from a computer-generated list of random numbers. The respondents will constitute an even distribution of males and females, 18 years of age or older. Sample sizes of this magnitude will allow cross-tabulation between each of the cities and the rural area. This sample size affords, at a 95 percent confidence level, a confidence interval of plus or minus 3.09 percent for the overall sample. That is, if the sample response to a particular question is 50 percent positive and 50 percent negative, we can be 95 percent sure that the positive or negative response of the total population would be between 46.91 and 53.09 percent. For samples of seasonal residents and tourists, the confidence interval will be plus or minus 4.9 percent with a confidence level of 95 percent.

These surveys will elicit information about attitudinal factors; housing characteristics and labor force participation; perceptions of the quality of outdoor recreation; perceptions of the quantity, quality, and location of commercial facilities and medical facilities; and evaluation of area public schools, streets and roads, police and fire protection, and taxes.

Seasonal Residents Survey

We will draw names and addresses of seasonal residents from the tax rolls and select a random sample. We will make calls until we have 200 males and 200 females 18 years of age or older. Such a sample size will allow a confidence interval for the entire sample of plus or minus 4.9 percent at a 95 percent confidence level. This survey will establish a baseline of attitudes and perceptions of the attractions and desirability of the general area, with an identification of those particular aspects of the area that are considered attractive and those considered unattractive. Those aspects will include isolation, services, facilities, specific recreation activities, long-term association with the area, associations with other seasonal residents and permanent residents, and distance from home residence.

Tourist Survey

We will draw our sample of tourists from the registers of motels, trailer parks and campgrounds, and lodges to establish a profile of recreational users. We will use the same criteria for selecting a random sample as described for the seasonal residents survey. The resulting profile will focus on user origin, analysis of spending patterns, preferred types of recreation, and sensitivity of the various recreation resources to direct or induced changes. Comparison of recreational resource attractions in the local study area with other attractions in the state will reveal comparable resources and how these alternatives are ranked by tourists.

Native American Surveys

We will interview two groups of Native Americans from each of the two reservations: those who live on the reservation and those who live off the reservation but who may return to the reservation at will.

We will conduct face-to-face interviews with reservation residents, and we will use mail surveys for off-reservation residents. We will send up to three followup mailings to tribal members who live off the reservations. If we don't receive adequate response after these followups, we will conduct face-to-face interviews with members of randomly selected households in sufficient numbers to ensure statistically precise results.

All respondents will be members of either the Mole Lake band of Chippewa or the Stone Lake band of Potawatomi. In each household on the reservations and within the local study area, we will interview one member of each adult (18 years or older) generation. For households outside the local study area who receive surveys through the mail, we will request that each adult member complete a questionnaire.

We will approach every household on the two reservations for an interview; we will repeat attempts for interviews until at least 90 percent of the households on each reservation have been interviewed. We will consider that a household has been completely interviewed when a representative from each adult generation in the household has been interviewed (or has refused to participate). We will establish the minimum response acceptable from off-reservation households to ensure statistical validity.

Procedural Approach for Surveys

We will survey permanent residents, seasonal residents, and tourists by 25-minute telephone interviews. The sample sizes are described above. We will have a field office in Madison, Wisconsin, with 10 WATS lines. We will recruit and train the interviewers and conduct the entire interview process.

APPENDIX

TECHNICAL DISCUSSION OF ECONOMETRIC AND INPUT/OUTPUT MODELS

Econometric models are mathematical representations of the economic activity of an area. The equations that explain and predict economic activity are determined by various estimation techniques; the most common technique is ordinary least squares estimation. A typical estimated equation in an econometric model would have the following form:

A dependent variable = a linear function of exogenous and other dependent variables

The estimation determines the values of the coefficients in the linear function. Once these are known, one can determine an estimated value of the dependent variable if values for the right-hand side variables are given.

The distinction between dependent or endogenous variables and exogenous variables is that values for dependent variables are estimated in the model and those for exogenous variables are not, but rather are given or assumed from some outside source. In models used to forecast future activity, future values of the exogenous variables must be assumed in order to use the model.

In addition to the estimated equations, an econometric model will contain a number of equations which are identities. There are two types of identities: definitional and institutional. An example of a definitional identity would be that total personal income is equal to the sum of its components (wages, salaries, rent, etc.). A typical institutional identity would be that tax liabilities equal the tax rate times the tax base.

The collection of estimated equations and identities form the model. If values for the exogenous variables are known or can be assumed and if the model fulfills certain convergent criteria, then we can determine values of the endogenous variables over the solution period.

We will use three linked econometric models in the Crandon project. These models are the Data Resources Inc. (DRI) macro model, the Wisconsin Econometric Model, and the model of Wisconsin tax collections. The last two models were developed jointly by the Wisconsin Department of Revenue and DRI. The DRI macro model is maintained and updated monthly by DRI. It is one of the most sophisticated and complete models of U.S. economic activity available. The U.S. macro model forecasts on a quarterly basis several hundred U.S. economic variables. Altogether there are over 1,000 variables (endogenous and

exogenous) in the model. DRI publishes each month a control and at least two alternative forecasts based on different assumptions about the exogenous variables. DRI makes both short-term (10 quarters) and long-term (10 years) forecasts.

The link between the macro model and the Wisconsin model is that most of the exogenous variables in the state model are variables determined in the U.S. macro model. For example total output in an industry would be a result of the U.S. macro model. This value combined with the industrial structure of Wisconsin, captured by the state model, would be the basis for the Wisconsin share of that industry's output. A similar link exists between the state model and the tax collection model. Values determined in the state model determine bases for various data. The tax bases and the tax rates determine tax liabilities. Finally, one estimates equations that translate liabilities into taxes collected by the state.

The basic use we will make of these econometric models is to estimate the Crandon project's impact on the state. This is done by altering the models to reflect the expected direct effects of the project and then using the models to estimate the impact on other sectors of the economy.

The first step in determining the project's impact is to use the models as they are to obtain a baseline forecast. Then, through a procedure known as add factoring, we can change those variables in the state model impacted by the Crandon project (mining output and employment, for example) to reflect the project's activities. We then review the state tax models and compare the results to the baseline forecast.

An alternative to the above procedure would be to alter the coefficients of the state model to reflect the anticipated impact of the project. For example, Wisconsin's share of U.S. mining output and employment might be expected to increase as the project proceeds. This can be done by increasing, over the life of the project, the parameters that allocate national shares to Wisconsin.

The basic advantage of an econometric model is its flexibility in incorporating different alternatives or scenarios into its results. Two limitations of the econometric approach are important in the project. First, the models are not geared to forecast for a small region. The state is the smallest unit for which forecasts are developed. For local impacts, we will use other techniques (see the discussion of I/O models). The other problem is that the models used do not forecast far enough into the future to cover the period needed in the project. This problem may be solved by examining the relation between the project variables and the variables of interest, e.g., taxes, in the models. A fairly simple assumption about these relations might make possible a limited forecast further into the future. If this is not possible, we will work with Department of Revenue personnel and DRI consultants to prepare an acceptable forecast.

INPUT/OUTPUT MODELS

Regional input/output models have been used extensively in impact studies. The basis of these models is the interdependence of a region's industries and households as suppliers of services and purchasers of products. Developing an input/output model for a given region involves dividing the regional economy into sectors (groups of similar economic units), and estimating the transactions among the various sectors. The quantitative estimates of the interdependencies among the various sectors provide the basis for tracing the multiplier effects of an outside impact on the economy (e.g., development of a new plant or mine) in a more detailed manner than do export base models.

In concept, a regional input/output model is a disaggregation of the export base model that allows for consideration of a large number of local sectors with varying proportions of export activity and for consideration of several sources of outside demand for the region's products. The input/output model provides a mechanism for accounting for differences in wage levels and input purchase patterns, estimates impacts in terms of three major indicators (output, employment, and income), and provides estimates of changes in output, employment, and income for each sector.

The major data requirement for implementing a regional I/O model is estimates of the technical coefficients of the region's sectors. We can develop these coefficients either from secondary sources (e.g., by adjusting coefficients developed for some larger region) or from primary data collected through an extensive survey of firms and households in the study area.

There are a number of techniques for adjusting coefficients already available for some larger area (such as the nation or a state) to approximate the interindustry relationships of the local study area. We will discuss only one of these, the location quotient technique. We chose this technique because it has been widely used and is supported by well documented and generally available software packages.

The location quotient technique is a procedure for comparing the relative importance of an industry's output in a region to that in a larger reference region (such as the nation). The equation for the location quotient (LQ_i) is:

$$LQ_i = \frac{Z_i/Z}{X_i/X}$$

Where Z_i = local study area output of industry i for the base year
X_i = national output of industry i for the base year
Z = total local study area output for the base year
X = total national output for the base year

Thus, LQ_i compares the percentage share of the i^{th} sector output of the local study area with the percentage share of the sector's output of the nation. If the local study area's share is greater than the nation's share, the LQ_i is greater than 1. The sector of the local study area in this case is assumed to export the surplus production. Similarly, if a sector of the local study area produces less than its proportional share, LQ_i is less than 1, and the region is assumed to import the deficit production.

If LQ_i is 1 or more, all national technical coefficients for that sector may directly represent the local study area's technical coefficients. If the LQ_i is less than 1, however, it is necessary to reduce the national technical coefficients of the sector proportionately to account for the local study area's deficit production.

The location quotient technique is subject to criticism because of its assumption of area self-sufficiency; i.e., that area production is used to meet area needs and only the residual is available for export. The technique assumes that cross-hauling among the areas does not occur, and hence, tends to underestimate area exports (and imports) and to introduce an upward bias into the area technical coefficients and output multipliers. Nevertheless, it represents a very cost-effective approach for developing area input/output tables when time and budget constraints preclude developing a local study area model entirely from primary data.

The second basic alternative for implementing a local study area I/O model is to undertake an extensive survey of the area's firms and households. Development of an area input/output model from primary data is a very substantial undertaking for several reasons. First, the survey involves collection of very detailed information from firms and households concerning both their total level of sales and purchases and also the sectoral distribution of their purchases and sales. Some respondents may hesitate to provide such information because they regard it as confidential. Others may be willing to cooperate, but may have substantial difficulty in providing information in the detail required. Second, after the information has been collected, the analytical task is complex and involves a rather intricate balancing of the I/O transactions table.

Because of the substantial effort and, hence, considerable expense involved in developing a local study area input/output model from primary data, many analysts question the cost-effectiveness of these efforts. For this reason, we will develop the I/O model for the Crandon local study area to the greatest extent possible from secondary sources, supplemented with primary data collected from key local sectors.

Overall, the major advantage of the I/O technique is its ability to provide estimates of secondary effects disaggregated by sectors. These disaggregated estimates of changes in output and employment are useful both directly (to demonstrate relative effects on various sectors) and also indirectly as a mechanism for estimating environmental effects, tax revenues, and the like. The major disadvantage is the greater data requirements these models impose.

GLOSSARY

analogous community - a community that is similar to Crandon or that has experienced development similar to the Crandon project

base employment sector - those employed in an area's export industries

baseline - a description of existing conditions

cohort - group

cohort-survival technique - a population projection technique in which the population is grouped according to criteria such as age or sex; population for a group at some future date equals the present population plus the number of people who are born or move in, less the number who die or move away

demographic - relating to population characteristics, including population distribution

econometric model - a mathematical representation of the economic activity of an area

endogenous - internal

exogenous - external

gravity model - a model that assumes that distribution of new population is directly proportional to the size of the city and inversely proportional to the distance from the project

input/output model - a model based on the interdependence of a region's industries and households as suppliers of inputs and purchasers of products

iterative technique - repetition of a procedure using the results of one repetition as input to the next

local study area - the area our analysis indicates is likely to be affected by the project

market response model - a model that predicts how the housing construction industry will respond to the demands of new population

project - Exxon Minerals' proposed mine/mill complex

project site - immediate vicinity of the proposed mine/mill complex

row - a horizontal element of a matrix

scenario analysis - analysis of the possible effects of different situations; "what-if" analysis

state - the state of Wisconsin; any part of the state of Wisconsin that lies outside the local study area

with-project future - estimated future with the Crandon project

without-project future - estimated future without the Crandon project