

# REVISED FINAL REPORT

## SfAA/EPA Environmental Anthropology Fellowship: Risk Perception Mapping Demonstration Project

By

John V. Stone  
Environmental Anthropology Research Fellow

On behalf of

The Great Lakes Commission  
Great Lakes Fellowship Program  
400 Fourth St., Argus II Bldg.  
Ann Arbor, MI 48103-4816  
Michael J. Donahue, Ph.D., Executive Director

Sponsored by

The Environmental Anthropology Cooperative Fellowship Program

of

The Society for Applied Anthropology  
Barbara Johnston, Ph.D., Fellowship Program Director  
Richard W. Stoffle, Risk Perception Mapping Demonstration Project Mentor

and

The United States Environmental Protection Agency, Region 5  
George Clark, EPA Region 5 Social Scientist and Fellowship Program Liaison

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# **SfAA/EPA Environmental Anthropology Fellowship: Risk Perception Mapping Demonstration Project**

## **ABSTRACT**

This report presents the activities and preliminary findings of an environmental anthropology fellowship at the Great Lakes Commission (GLC). The fellowship project demonstrated the utility of an ethnographic approach called Risk Perception Mapping (RPM) to the public consultation and social research interests of the Great Lakes Commission and other relevant regional organizations. These interests are reflected in the interrelated activities of a network of Great Lakes management agencies and organizations, including the GLC. In this report I refer to this network as “the Great Lakes Management Network,” or “GLM Network” for short, although no formal institutional structure exists by that name. An RPM demonstration project was conducted in a five county area surrounding the Fermi II nuclear power plant in southeastern Michigan, and focused on cultural, geographical, and social-contextual factors that can influence the nature and distribution of perceived risk among potentially affected populations. Key findings pertain to perceptually-specific communities of environmental risk, with implications for what I call “participatory equity” in environmental management. Parallels are drawn with RPM research applied previously to other environmental management issues. Applicability to GLM Network interests was established in consultation with GLC commissioners, staff, and collaborators and focused on developing a method of population-specific information/education exchange through which more culturally sensitive indicators of Great Lakes ecosystem integrity may emerge.

## **CREDITS AND ACKNOWLEDGEMENTS**

This report derives from work supported by several sources. The initial project design and fieldwork were conducted through the Department of Anthropology at the University of Michigan (UM), under the title *Ecological Awareness and Risk Perception* (EARP) study. That portion of the project was supervised by Dr. Conrad Kottak, a professor of anthropology at the UM, and supported by existing grants through the National Science Foundation (NSF) and the Consortium for International Earth Science Information Network (CIESIN). I subsequently received further supervisory support from Drs. Gilbert Kushner and Alvin Wolfe, professors of applied anthropology at the University of South Florida.

I later obtained additional financial support to continue data management and analysis through *the Risk Perception Mapping (RPM) Demonstration Project*, sponsored by the Environmental Anthropology Cooperative Fellowship Program of the Society for Applied Anthropology (SfAA) and the United States Environmental Protection Agency (EPA). This project was mentored on behalf of the SfAA by Dr. Richard Stoffle, of the Bureau of Applied Research in Anthropology at the University of Arizona, and was conducted on behalf of the Great Lakes Commission (GLC), in Ann Arbor, Michigan, which provided office support throughout the project. The fellowship program is administered by Barbara Rose-Johnston (SfAA) and Theresa Trainor (EPA), although this particular demonstration project was channeled through the EPA Region Five (Great Lakes), where George Clark served as project liaison. Michael Donahue, Executive Director at the GLC, served as the host agency supervisor and helped position the project for maximum visibility within the institutional framework of Great Lakes ecosystem management.

The positions I take in this report are mine alone and do not necessarily reflect those of the study hosts, sponsors, or supervisors. Please cite, quote, or reproduce only with the author's consent: [jystone@umd.umich.edu](mailto:jystone@umd.umich.edu).

## LIST OF ACRONYMS

This report contains numerous acronyms and abbreviations. Their use can be confusing at times, but I believe they enhance a report's overall readability, provided they are spelled out clearly at first mention and are listed together in a reference table. To that end, I have provided in alphabetical order in Table 1, below, a list of the acronyms and abbreviations included in this Final Report.

**Table 1: List of Acronyms and Abbreviations**

ACRONYM	DEFINITION	ACRONYM	DEFINITION
ANS	Aquatic Nuisance Species	ND	No Date
BDS	Behavioral Data Services	NEJAC	National Environmental Justice Advisory Council
CIESIN	Consortium of International Earth Science Information Network	NPR	National Public Radio
CN	Canada	NSF	National Science Foundation
DOE	Department of Energy	OH	Ohio
EARP	Ecological Awareness and Risk Perception Study	ORNL	Oak Ridge National Laboratory
EPA	Environmental Protection Agency	RFP	Request for Proposal
GIS	Geographic Information System	RPM	Risk Perception Mapping
GLB	Great Lakes-St. Lawrence Basin	RPS	Risk Perception Shadow
GLC	Great Lakes Commission	RSOW	Revised Statement of Work
GLM	Great Lakes Management Network	SAB	Great Lakes Science Advisory Board
GLRC	Great Lakes Radio Consortium	SfAA	Society for Applied Anthropology
IAGLR	International Association for Great Lakes Research	SIA	Social Impact Assessment
IATA	International Association for Impact Assessment	SSC	Super-conducting Super Collider
IAP2	International Association for Public Participation	TBA	To Be Announced
IRM	Inter-rater Reliability Method	UM	University of Michigan
ISR	Institute for Social Research	US	United States
LAP	Locally Affected Population	USC	United States Congress
LLRW	Low-Level Radioactive Waste	USGS	United States Geological Survey
MI	Michigan	USNRC	United States Nuclear Regulatory Commission

# **SfAA/EPA Environmental Anthropology Fellowship: Risk Perception Mapping Demonstration Project**

## **INTRODUCTION**

In 1996, the Society for Applied Anthropology (SfAA) and the United States Environmental Protection Agency (EPA) established a cooperative agreement to support an environmental anthropology fellowship program to increase the access of communities and policy makers to anthropological and other social science expertise in the solution of environmental management problems. Under that agreement fellowship projects were initiated in 1999 in EPA Region Five to provide technical assistance and information to community-based project sponsors to enable them to better understand the cultural complexity and needs of citizens and other stakeholders in project areas. Environmental anthropology fellows identified community-based hosts for their respective fellowship projects, established project-specific needs and activities, and negotiated terms of engagement between themselves and their fellowship project host.

I established my fellowship project with the Great Lakes Commission (GLC) in Ann Arbor, Michigan. My SfAA/EPA fellowship project was conducted in conjunction with the GLC's own Fellowship Program in which the GLC provides office space and support to Great Lakes professionals from outside programs to work with GLC staff on issues of shared interest (Donahue 1998:2). My project, titled the "Risk Perception Mapping Demonstration Project" began in August 1999, and formally concludes with this final report. Through this project I demonstrated the utility of an ethnographic approach called Risk Perception Mapping (RPM) to the public consultation and social research interests of the GLC and other relevant regional organizations.

My project built upon a database generated by an RPM study previously conducted in a five-county area in southeast Michigan and northwest Ohio. That study was called the Ecological Awareness and Risk Perception (EARP) study. It is important to note that the EARP study was supported with National Science Foundation (NSF) and Consortium for International Earth Science Information Network (CIESIN) funds that were left over from related work that had been conducted previously in Brazil. These remaining funds were committed to EARP study design and fieldwork only; thus, no data management, analysis, or project write-up was ever conducted or completed on the EARP project.

The SfAA/EPA and GLC fellowship programs jointly provided the support necessary for me to complete the data management portion of the EARP study and begin its analysis. Specifically, I used the EARP database to demonstrate to the GLC the methodological capacity of RPM to identify the geographical extent and unique sociocultural contexts of populations potentially affected by environmental projects – an effort referred to in this report as the "RPM Demonstration Project" (Demonstration Project). This work was beneficial to the network of Great Lakes management agencies and organizations (GLM Network) seeking to develop population-specific information/education exchanges through which culturally sensitive social indicators of Great Lakes ecosystem integrity may emerge.

To the greatest extent possible, I try to reflect through the major headings in this report the relationship between the RPM Demonstration Project and the EARP study from which it derived. For example, I present the research methodology section in the context of the EARP study within which the research was conducted. Subsequently, I present the data management and analysis sections in the context of the Demonstration Project, recognizing, of course, that those activities derived from and built upon the EARP study. For the purpose of this fellowship report, I include all of these sections within the major heading “Fellowship Project Description and Findings.”

## **Organization of the Final Report**

This Revised Final Report (Final Report) marks the conclusion of my SfAA/EPA fellowship with the GLC. It builds upon a journal-style report of methodology and findings that I presented and later revised based upon input received at professional conferences of the SfAA and the International Association for Great Lakes Research (IAGLR), and it includes further revisions suggested by the fellowship mentor, the GLC, and the Region Five EPA fellowship project liaison.

I’ve divided the remainder of the Final Report into five major sections. In the first of these I discuss the GLC and its interests in using the uncompleted EARP study as the basis for an RPM Demonstration Project. I then reiterate the fellowship project goal, objectives, and associated activities and deliverables I provided in a Revised Statement of Work (RSOW) that I prepared for this fellowship. The RSOW identified 13 “key activities” that comprised the Demonstration Project, and is included in its entirety in Appendix 1 to this report.

The second remaining section of this report covers my progress toward completing these activities and so comprises the bulk of this report. I documented my progress on key project activities first in a Mid-Term Progress Report (Mid-Term Report), subsequently in a Project Update (Project Update), and finally in two professional reports (Professional Reports) of RPM methodology and demonstration project findings that I presented at the annual meetings of the SfAA and IAGLR, respectively. The Professional Reports largely subsumed the information presented in the Mid-Term Report and Project Update, which I have included respectively as Appendices 2 and 3 to this Final Report. As the latter of the two Professional Reports, the IAGLR paper built upon and incorporated comments received from the SfAA presentation and thus comprises – albeit in a slightly modified and expanded format – the majority of the second major section of the Final Report.

Neither the EARP study nor the Demonstration Project was without its shortcomings, and so in the third major section of this report I offer recommendations for potential modification and improvement. I focus particularly on the EARP study upon which the demonstration project was based, as well as on the RPM methodology itself. I conclude the section by discussing what I believe are anthropology’s primary contributions to public consultation, especially given the experiences gained through both the EARP study and the RPM Demonstration Project.

In the fourth major section of this report I identify and discuss internal evaluation procedures for public consultation and community outreach activities, including RPM, in the Great Lakes Basin (GLB). This section is retrospective and largely speculative, as formative evaluation of these activities was not required in this fellowship project. Rather, I identify and to some extent integrate the current literature in this area, including insights from having presented on the topic at the annual meeting of

the Great Lakes Chapter of the International Association for Public Participation (IAP2) back in 1998. I discuss how this information pertains to the RPM methodology demonstrated through this project.

In the fifth and concluding section of this report I take a prospective look at the potential application of the EARP Study/RPM Demonstration Project, and specifically the RPM methodology, to future GLC/GLM interests and activities. Special attention is paid to work proposed through a collaborative GLC/GLM grant proposal that I helped prepare *Pro Bono* during non-fellowship hours and how this potentially advances the mission of the SfAA/EPA Cooperative Agreement beyond this particular fellowship project.

## **GLC INTERESTS AND DEMONSTRATION PROJECT OBJECTIVES**

The RPM Demonstration Project was hosted by the Great Lakes Commission (GLC). The GLC is a binational agency that promotes the orderly, integrated, and comprehensive development, use, and conservation of the water and related natural resources of the Great Lakes Basin and St. Lawrence River (GLB). Its members include the eight Great Lakes states with associate member status for the Canadian provinces of Ontario and Québec. The GLC was established by joint legislative action of the Great Lakes states in 1955 (the Great Lakes Basin Compact) and granted congressional consent in 1968 (USC 1968). A "Declaration of Partnership" established associate membership for the provinces in 1999. Since its establishment the GLC has consistently applied principles of sustainability to the development, use, and conservation of the natural resources of the GLB. Three principal functions support this effort: (1) information sharing among the membership and the entire GLB community; (2) policy research, development, and coordination on issues of regional interest; and (3) advocacy of those positions on which members agree. Further information about the GLC may be obtained through its website: <http://www.glc.org> and associated links.

### **Informational and Methodological Needs**

I was meeting with the GLC as early as 1992 regarding potential social science applications in GLB planning and management. At that time, the GLC was involved in drafting what later came to be known as the *Ecosystem Charter for the Great Lakes-St. Lawrence Basin* (Charter) (GLC 10/94). The Charter is important to this fellowship because it explicitly includes human factors as part of the ecosystem equation, thereby laying the foundation for social science input to Great Lakes ecosystem management programs. Moreover, the Charter defines principles for Great Lakes ecosystem integrity that include, among other things, the development and implementation of public participation procedures (Principles XV-XVII) that incorporate or build upon common data collection measures and indicators of Great Lakes ecosystem health (Principle XI). These principles and definitions specify a purpose for social science methods and data within the broader framework of Great Lakes ecosystem management.

The RPM Demonstration Project responded to the GLC's interest in further developing the methodological rigor that it brings to the public consultation and social research activities it conducts on behalf of the network of agencies and organizations that share an interest in Great Lakes management. Throughout this fellowship I have referred to this network as "the Great Lakes Management Network," or "GLM Network" for short, although no formal institutional structure exists by that name. This interest in public consultation and social research emanates from the

GLC's more general commitment to integrating social science within the broader framework of Great Lakes ecosystem management, which by and large served as the basis for negotiating this fellowship.

I began the fellowship by participating in the GLC's annual meeting, held in September 1999, in Pittsburgh. This meeting afforded the opportunity for me to hear and meet with environmental managers working among the institutional structures that have evolved to collaboratively manage Great Lakes resources across numerous jurisdictional and programmatic boundaries. Following the meeting I met with GLC's Executive Director to articulate specific GLM Network interests in public consultation and social research. Three interests in particular emerged from these discussions:

- (1) demonstrate a methodological framework for identifying and characterizing human communities that are potentially affected by Great Lakes management activities. This framework could potentially be used by the GLM Network to
- (2) develop population-specific information and education exchanges between affected populations and responsible agencies. And through the knowledge gained in these exchanges the GLM Network could further its related interest in
- (3) developing more culturally sensitive social indicators of Great Lakes ecosystem integrity.

In consultation with the fellowship host, mentor, and sponsors, I then revised my project's scope of work to more accurately address these interests (see Appendix 1). Following acceptance of the RSOW by the project host, mentor, and supervisors, the GLC posted a notice of the RPM Demonstration Project on its website. A copy of that notice is included as Appendix 4 to this Final Report.

### **RPM Demonstration Project Goal and Objectives**

The primary goal of my fellowship project was to further develop the methodological rigor that the GLM Network already brings to its public consultation and social research activities. My project addressed this goal by demonstrating how Risk Perception Mapping (RPM) – an ethnographic approach to public consultation – can be used to meet three specific participatory objectives identified in consultation with GLC commissioners, staff, and collaborators. These objectives included demonstrating the methodological capacity to:

- (1) Define the geographical boundaries of the locally affected population (LAP) for a given project or activity;
- (2) Identify “perceptually-specific communities of environmental risk” within the LAP. This demonstrated capacity should enable Great Lakes environmental managers to:
- (3) Develop locally appropriate and culturally sensitive procedures for exchanging information between affected populations and responsible agencies in future Great Lakes environmental management activities.

## **Key Activities, Outcomes, and Deliverables**

To meet these objectives, I identified in the RSOW 13 “key activities,” which I have listed below in Table 2. The completed outcomes and deliverables associated with these activities provide the content of this Final Report. In meeting the objectives of the RPM Demonstration Project I provided the GLM Network with an ethnographic methodological framework for identifying and elaborating population-specific social indicators of Great Lakes ecosystem integrity.

The following section of this report documents my progress in completing these activities, and is composed largely of the professional report of project methodology and findings presented for peer review and comment at the annual meetings of the SfAA and IAGLR.

## **FELLOWSHIP PROJECT DESCRIPTION AND FINDINGS**

As noted in the introduction, I previously documented my progress on RPM Demonstration Project activities in both the Mid-Term Report and the Project Update of fellowship activity (see Appendices 2 and 3, respectively). I present in this section of the report the outcomes of my work on this project, with special emphasis on methodological write-up, data management, and analysis of findings, as these activities comprised the bulk of my work on the project. I cover item 11 from Table 2 (internal evaluation measures and procedures), however, exclusively in a latter section of this report.

### **The “Ecosystem Charter” and Environmental Management in the Great Lakes**

The *Ecosystem Charter for the Great Lakes-St. Lawrence Basin* (Charter) was established in 1994 among various government jurisdictions, private sector, and citizen interests that have roles, responsibilities, or interests associated with the Great Lakes-St. Lawrence Basin (GLB) (GLC 10/94). The Charter summarizes commonly held principles for implementing an “ecosystem approach” to environmental management in the GLB. As noted in the Charter’s preamble, the ecosystem approach recognizes that the environmental and socioeconomic attributes of the GLB are fundamentally linked and interdependent, as are the goals for its environmental management. The Charter states that Great Lakes resources must be managed as part of dynamic and complex communities and ecosystems, rather than as separate and distinct elements. Practicing the ecosystem approach in the GLB means that all partners – government, private sector, and citizen-based institutions alike – understand the implications of their actions and strive to avoid unintended adverse consequences.

**Table 2: RPM Demonstration Project Activities, Deliverables, and Timelines**

<u>Key Activities</u>	<u>Outcomes/Deliverables</u>	<u>Timelines</u>
1. <i>Network</i> with GLC staff and fellowship partners (mentors, administrators, liaisons, etc.) regarding project applications, web-site representation, and other project-related issues.	Networking.	Ongoing.
2. <i>Manage</i> GLC-related project expenses. As a no-cost obligation to the GLC, I <i>track</i> and <i>tabulate</i> phone, postage, and other office-related expenses pertaining to demonstration project activities.	Project Management.	Ongoing.
3. <i>Write</i> a detailed description of RPM methodology pertaining to this demonstration project.	RPM methodology.	Ongoing; to be included in final report.
4. In consultation with GLC staff, <i>identify</i> key analytical issues to be addressed through the demonstration project.	List of key analytical issues.	9-10/1999
5. Per the initial Contract, <i>prepare</i> a mid-term report of completed project activities.	Mid-term report.	11/1999
6. <i>Code</i> RPM database for key analytical issues in demonstration project.	Coded RPM database.	11-12/1999
7. In consultation with GLC staff, <i>develop</i> GIS-based RPM data management & mapping system.	GIS-based RPM data management & mapping system.	11/99-1/2000
8. <i>Enter and verify</i> key RPM data in GIS-based RPM data management & mapping system.	Sample RPM database for demonstration project.	12/99-1/2000
9. <i>Analyze and Map</i> key issues from sample RPM database.	Sensitivity Maps: (a) Fermi II RPS, (b) Perceptually-specific communities of environmental risk, (c) Community-specific participatory preferences.	1-2/2000
10. <i>Interpret</i> key findings and <i>identify</i> potential implications for and utility to the GLM Network.	List of Potential Implications: (e.g., participatory equity, targeted outreach, social indicators), and Ethical Issues (e.g., practitioner, project, procedural, and implementation levels).	1-2/2000
11. <i>Identify</i> internal evaluation measures and procedures for RPM in GLM Network activities.	List of Internal RPM Evaluation Measures (e.g., formative, outcome, and monitoring).	1-2/2000
12. Per the initial Contract, <i>prepare</i> a final demonstration project report.	Final Report.	2-4/2000 (TBA), see paragraph above).
13. <i>Present</i> findings from the RPM demonstration project at various scientific conferences and agency seminars.	RPM Demonstration Project Presentations (Required): (a) EPA-5 fellowship project seminar, Chicago; (b) Society for Applied Anthropology annual meeting, San Francisco; (Potential) (c) Great Lakes Commission semi-annual meeting, Duluth; (d) International Association for Great Lakes Research (IAGLR), annual meeting, Cornwall, Ontario.	TBA (4/2000?) 3/21-26/2000 TBA (5/2000) 5/21-26/2000

## Public Participation in Environmental Management

Large-scale projects, such as nuclear power plants, can have significant impacts on the natural and social environments in which they are located. In the United States federal mandates such as the National Environmental Policy Act (USC 1969), and various state-level versions of the federal act, require that assessments be made of these potential impacts. These impact assessments help to guide decisions regarding whether or not and/or how to proceed with a project, and if so, to identify appropriate mitigation strategies to minimize its potentially adverse consequences. Two key components in social impact assessment (SIA) studies are the definition and identification of the local populations potentially affected by the project, a collectivity commonly referred to as the “locally affected population,” or LAP. Consultative relationships are typically established among the LAP, project proposers, and relevant environmental management agencies. Thus, the LAP provides the geographic and sociocultural framework for public participation programs in environmental management.

### At Issue: Differential Social Access to Public Participation in Environmental Management

LAPs have been defined by a variety of measures, such as: (1) pre-existing political jurisdictions (USNRC 1983:4.18-15); (2) pre-determined distance-from-site criteria (USNRC 1983:4.18-14); (3) various ecosystems approaches at levels ranging from macro-systems (Puntenney 1995), to regional (SAB 1991:90-101), to local (Moran 1990; Cortese and Firth 1997); and (4) extent of known contamination (Edelstein 1988). These definitions have proved problematic from a participatory standpoint because they have not been grounded in the social data necessary to identify the geographical extent and distribution of the LAP and to document its unique sociocultural characteristics that may predispose some populations to particular types of impacts.

#### *Specially Affected Populations and Environmental Discrimination*

Consider the example of “specially affected” populations in the preparation of project-specific impact statements. The International Association for Impact Assessment (<http://www.iaia.org>) notes that just as the biological sections of impact statements devote particular attention to species having special vulnerabilities, the socioeconomic sections must also devote particular attention to potential impacts on vulnerable segments of the human population (Inter-organizational Committee 1993:6). These “vulnerable segments” -- variously referred to as “specially affected populations” (Stoffle et al. 1990), “marginalized communities,” (Guyton and Yamashita 1997), “groups of isolated individuals,” (Whitfield and Rimkus 1997), and “vulnerable subpopulations” (Schierow 1999) -- may include the poor, the elderly, adolescents, or unemployed women; members of minority or other groups that are racially, ethnically, or culturally distinctive; or occupational, cultural, political, or value-based groups for whom a given community, region, or use of some component of the biophysical environment is particularly important.

Specially affected populations are often socially isolated from the larger communities within which they are embedded and typically are unaware of and therefore implicitly excluded from environmental decision-making processes. Not surprisingly, these same groups often bear the greatest environmental and social impacts of projects, such as nuclear power plants, that require

environmental management at potentially extensive geo-political, sociocultural, and ecosystem scales. “Environmental discrimination” can be said to exist to the extent that such impacts are born consistently and disproportionately by the same groups across numerous projects.

At issue are the procedures used to *define* the boundaries of the LAP, *identify* its socially relevant constituent populations, and *access* the knowledge these people possess regarding their local environment and how they stand to be affected by deliberate changes to it. Public hearings, for example, are notoriously self-selective and frequently fail to incorporate important population-specific issues into environmental management decisions. Environmental discrimination is a product of, among other things, consultative procedures that do not provide equitable social access to participatory processes. I use the term “participatory equity” to refer to a principle that I think should guide public participation in environmental management, and I think anthropology provides conceptual and methodological tools to help implement it.

### *Toward a “Participatory Equity Principle” in Environmental Management*

Participatory equity derives from a predominantly egalitarian philosophical perspective. Broadly speaking, philosophical perspective may be viewed along a continuum on which, at one extreme, individual liberty and “free will” are held in highest regard. This position, often referred to as “libertarianism,” emphasizes the right of the individual to control his or her destiny, unfettered by collective group constraint (Smith 1937). The other extreme of the continuum, often referred to as “egalitarianism,” is marked by individual acquiescence to group maintenance and emphasizes an equality of outcome in which individuals will sacrifice autonomy should it result in an unequal distribution of outcome (Rawls 1971).

These contrasting perspectives can profoundly influence how public participation programs are conceived and implemented in environmental management. The libertarian model, for example, is structured around the assumption that people have free and equal access to the decision-making process. Participation is the civic responsibility of those who have a potential stake in the environmental management issues over which decisions are being formulated. It is assumed that potentially affected individuals are equally aware of these issues, and that they all have equal opportunity to participate in environmental decision-making. Whether or not one actually does so, -- or perhaps more importantly, any potentially undesirable outcome related to *not* having done so (i.e., inequitable social distribution of environmental risks) – is the individual’s responsibility, with whom participatory accountability must ultimately reside. The egalitarian model, on the other hand, emphasizes participatory equity over participatory liberty, the responsibility for which necessarily resides with the agency(s) that control the decision-making process. That is to say, the scope of participatory equity involves numerous variables that are necessarily beyond individual control. In this model the relevant agency is responsible for implementing a participation process that is sensitive to, and to the greatest extent possible compensates for, sociocultural and geo-political conditions that differentially restrict social access to decision-making processes.

### *The Participatory Implications of Environmental Risk Perception*

SIA studies have documented that a project’s social effects occur to the extent that local populations perceive themselves to be at risk from the project. “Project awareness” is a necessary

criterion for project-specific risk perception, and it has been used successfully to define the LAP in project-specific SIAs (Stoffle, Stone, and Heeringa 1993). Other researchers (Ellis et al., 1992:44-54; Unger, Wandersman, and Hallman 1992:55-70; Waller and Mitchell 1991:302-329; Gibbs 1990:10-11; Edelstein 1988; van der Pligt, Eiser, and Spears 1986:1-15; Werner 1985:161-167; Ridington 1982:36-42) have demonstrated that the awareness and perception of potentially hazardous conditions or projects provides sufficient impetus for social and psychological impacts to occur. Still others (Gatchel and Newberry 1991:1961-1976; Vynner 1988, 1984:5-10; Flemming et al., 1982:14-22) have shown that such impacts can be psychophysiological as well. Similarly, research on the nature, extent, and causes of environmental awareness and remedial action suggests that local people will not participate in actions designed to manage their environment if they are unaware of or perceive no risks to it (Kottak 1992:295).

Risk Perception Mapping (RPM) is an ethnographic method developed explicitly to identify and map the geographical extent and sociocultural characteristics of an LAP and to document the impact and mitigation issues raised by its various constituents. To the extent that the RPM method seeks to access these issues directly from all segments of the LAP, it stands to provide a more equitable social access to public participation in environmental management.

### **RPM Conceptual Development**

In the mid-1980s a team of applied anthropologists headed by Dr. Richard Stoffle (project mentor for this fellowship) was conducting social assessment research of a proposed Superconducting Super Collider (SSC) in Michigan. Comparable data from two potential host communities revealed that both differed significantly in their perception of risk from the facility despite their social and cultural similarity (Stoffle et al., 1988, 1987).

### **Risk Perception Shadows**

Stoffle's team developed the concept of a "risk perception shadow" (RPS) to account for this phenomenon. The RPS concept was initially based on the premise that past projects, either completed or simply proposed, can create a collective perception of risk that is "applied" to newly proposed projects. The RPS was defined as a generally contiguous human collectivity that calculates itself to be at risk from a proposed or operating project. After becoming aware of the project this entity essentially defines itself as being "at risk" thereby opening itself to measurable social impacts regardless of whether or not adverse human or environmental risks have been scientifically established. Because an RPS is defined by perceived risk, its size, shape, and sociocultural composition may differ significantly from affected communities defined solely by probabilistically derived risk assessments.

### **RPS and Public Consultation**

The SSC studies called for a *data-based procedure* for identifying the LAP for a project by measuring its RPS. The extent and influence of an RPS can be determined by many factors, including how the members of a LAP perceive a project might affect their lives. Often the LAP is identified *a priori*, that is, according to existing or predetermined criteria so that the agency in charge of managing the social and environmental assessments can issue a Request for Proposal that has a definite study area. Distance-from-site measures -- for example, all residents living or working within a 10-mile radius

of a facility -- often are used, as are the boundaries of the political jurisdictions within which a project is located or has been proposed.

Political units can be major channels for public response to specific projects and thus are frequently used to define the boundaries of the LAP for project-specific consultation and participation programs. This procedure, however, can limit participation to an overly restricted population and a limited set of impact issues. The SSC research demonstrated that RPSs typically cross political boundaries, rendering such boundaries inaccurate, hence, inappropriate units for defining LAPs, for analyzing potential social impacts, and for accessing and incorporating local knowledge in project-specific decision-making. Stoffle's team worked to develop a data-based procedure for measuring and characterizing a project's RPS by mapping it across a geographical and sociocultural plane. That procedure is called Risk Perception Mapping (RPM).

### **Risk Perception Mapping**

I joined Stoffle's team at the conclusion of the SSC studies and the start of social assessment research on a proposed low-level radioactive waste (LLRW) facility in Michigan. We contracted with the state to map the RPS for each of three candidate sites as the basis for consultative relationships between the initiating agency and the LAPs for each site. We developed the ethnographic research method called Risk Perception Mapping (RPM) to map the geographical extent of the project RPS and to document key sociocultural characteristics of the populations existing within it. The RPS documented in the LLRW study was operationally defined as "project awareness" because it represented the widest range of potential concerns and impact issues within the study area.

Key RPM findings revealed that the RPS consisted of: (1) a 15 mile radial core area where awareness and intensity of perceived risk and potential social impact were evenly distributed; (2) areas contiguous to the core area but distributed non-linearly in various directions up to an additional 15 miles beyond the core; and (3) "islands," or areas separated from both the core and contiguous areas. Through RPM, both the type and distribution of impact issues defined the LAP, providing a more accurate social basis from which public consultation could then proceed (Stoffle et al., 1991).

### **Ecological Awareness and Environmentalist Participation**

Concurrently, another team of anthropologists headed by Dr. Conrad Kottak was conducting research on the effects that awareness of ecological risks had on the development of Brazilian grassroots environmental organizations and their participation in national environmental decision-making (Kottak and Costa 1993; Costa, Kottak, and Prado 1997; Costa et al., 1995). Kottak's research focused on Angra dos Reis, a coastal town in Rio de Janeiro State, and the site of Brazil's only operational nuclear power plant. Kottak noted that increased perception of environmental risk furthered participation in environmental decision-making, and he was interested in examining his observations cross-culturally within an RPM methodological framework. I partnered with Kottak during the early to mid-1990s to design, conduct, and manage that project, which we titled the Ecological Awareness and Risk Perception (EARP) study.

## **The Ecological Awareness and Risk Perception Study**

The EARP study focused on the Fermi II nuclear power plant in Monroe, Michigan because it is comparable in several ways to the Angra dos Reis site. For example, both communities are of roughly equal size (approximately 25,000); both are situated on large bodies of water (Lake Erie and Ilha Grande Bay, respectively); both are proximal to major urban centers (Detroit and Rio de Janeiro, respectively); both have a history of past environmental degradation (particularly of coastal waters); both have operational nuclear power facilities; and both are reasoned to have cast significant RPSs that could be measured and characterized by the RPM methodology.

### **Relationship to GLC/GLM Network Interests in an RPM Demonstration Project**

I chose to use the EARP study as the basis for the RPM Demonstration Project because it provided an extensive RPM database for a sizeable area within the Great Lakes ecosystem, and as such would be of value to the GLM Network. It should be noted, however, that although the EARP study was centered on the Fermi II facility, the GLC had no specific interest in or direct involvement with that facility. As stated previously, the Fermi II facility was selected to meet specific criteria for the EARP study apart from this fellowship. Most notably with respect to the RPM methodology, nuclear power plants typically generate considerable community risk perception and therefore present ideal RPM methodological demonstration case studies. The EARP study was applicable to this fellowship because elements of it could be used to meet the GLM Network interests identified earlier in this report.

### **EARP Project Methodology**

Previous RPM research suggests that a project-specific RPS will exist in a discrete geographical area and will be distributed generally concentrically from the point of origin. The Fermi II facility was selected for the EARP study because nuclear power plants typically generate considerable community risk perception and are therefore ideally suited to RPM research. Moreover, the EARP study was conducted on a shoe-string budget, and the close relative proximity of the Fermi facility to the University of Michigan, from where the study was being conducted, helped save on transportation and field costs associated with the study. Also, as mentioned previously, both Fermi and the communities surrounding it provided many similarities to the ecological awareness and environmentalist action studies conducted earlier in and around Angra dos Reis, Brazil, the home of Brazil's only functional nuclear power plant. Thus, the Fermi II facility was designated as the center point of the EARP study.

In this section I discuss the major methodological steps involved in the field portion of the EARP study. These steps generated data that were later managed, analyzed, and reported through the RPM Demonstration Project jointly supported by the SFAA/EPA and GLC fellowship programs.

## Study Area Definition

The study area for the EARP was defined as the 25-mile radius surrounding the Fermi II nuclear power plant, an area encompassing five counties: Wayne, Washtenaw, and Monroe in Michigan, and Lucas and Ottawa in Ohio; it also extended into extreme southwestern Ontario, although time and budget constraints did not allow us to seek permission to conduct research in the Ontario portion of the study area. Figure 1 presents a regional view of the geographical area within which the EARP study was conducted, while Figure 2 presents a close-up view of the five counties included in the study area.

## Sampling Design

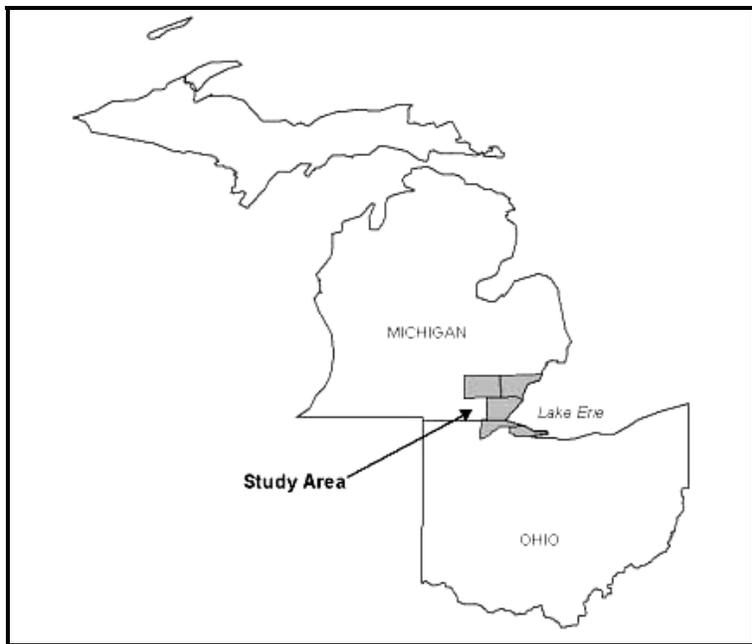
A center-point radial sampling design was used to define the distribution of sample areas throughout the study area. This procedure, developed in collaboration with the Sampling Section of the University of Michigan's Institute for Social Research, is central to the RPM methodology. The center-point radial sampling design has been discussed in detail elsewhere (Stoffle, Stone, and Heeringa 1993:321-322), which I paraphrase below and consider in the context of the EARP study.

In considering probability sample design options for measuring the extent and intensity of RPSs, important guidance can be found in earlier work done in fields as diverse as agriculture (Cochran 1977), forestry (Pielou 1969), environmental science, geology, and hydrology (Gilbert 1987), Archaeology (Bellhouse and Finlayson 1979), and epidemiology (Manton et al. 1981).

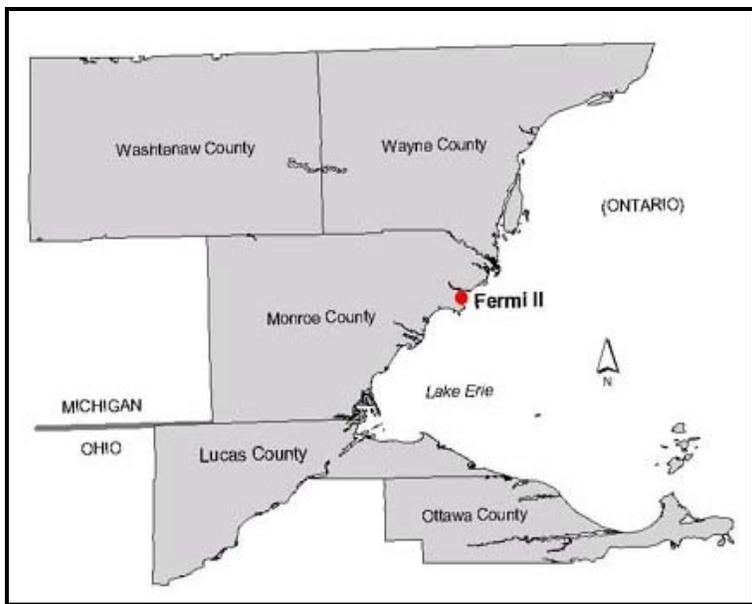
Scientists working in these fields are faced with a common problem – the need for sample designs and estimation techniques that are optimal for studying the spatial (two- and even three-dimensional) distributions of resources and other natural or induced phenomena. Based on considerable theoretical and empirical work, the search for optimal sample designs for spatial estimation has focused primarily on multidimensional variations of systematic and stratified sampling. Special statistical techniques such as trend surface analysis and “kriging” have been developed to estimate spatial relationships from the sample data (Gilbert 1987).

To choose an optimal sample design, it is important to have a basic understanding of how the characteristic of interest (here, the intensity of the perceived risk from the Fermi II nuclear facility) is distributed. The theoretical model – confirmed in part in empirical results from earlier research – suggests such a general functional form for the surface of an RPS. The surface of an RPS can be visually represented by borrowing a physical analogy from geology. An RPS can be viewed as a somewhat irregular volcanic cone. In developing this analogy, the caldera of the cone is the location of the project in question (i.e., Fermi II), and the vertical relief of the cone represents the local intensity of perceived risk. Perceived risk is greatest immediately adjacent to the proposed site (the rim of the caldera) and diminishes slowly in all directions away from the central site. The slope of the RPS away from the center point is for the most part monotonic but not entirely linear. The rate of change in the slope (i.e., variance in an RPS) is expected to decrease with distance from the center. Figure 3 shows how this theoretical RPS would appear if viewed from above.

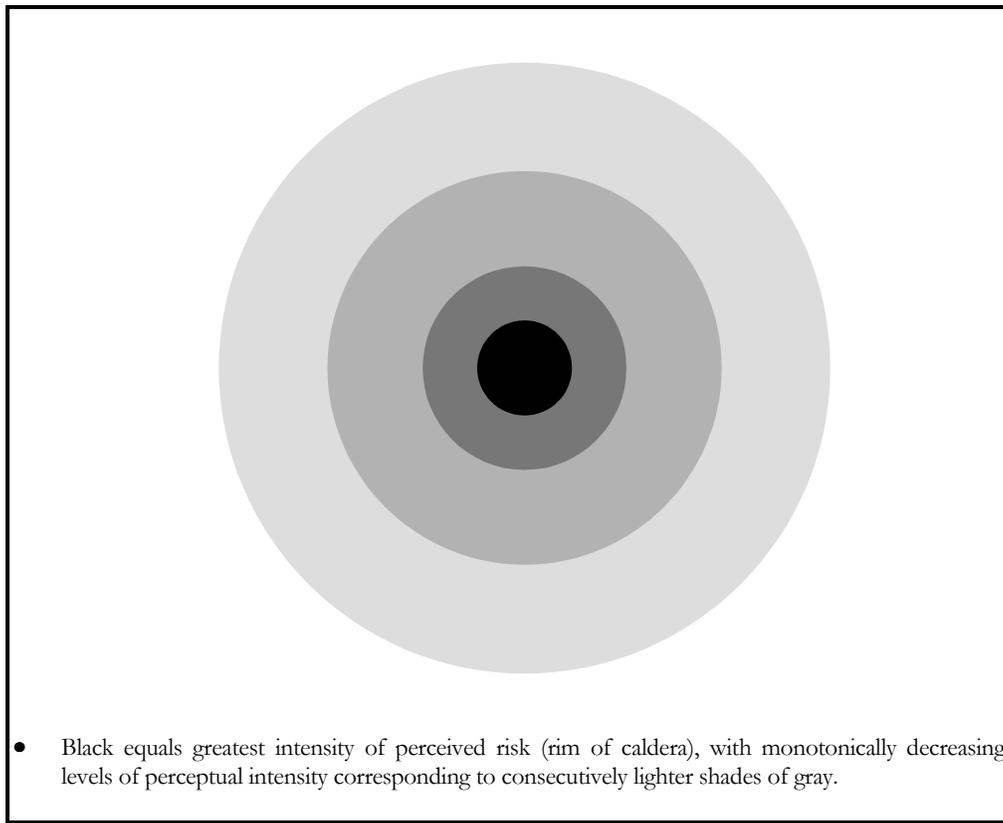
**Figure 1: Regional View of EARP Study Area**



**Figure 2: State and County Boundaries of the EARP Study**



**Figure 3: Theoretical RPS as Viewed from Above**



### *Key RPM Design Features*

In real (as opposed to theoretical) situations, the complexity and irregularity of actual RPS surface functions makes the specification of a perfectly optimal sample design an impossibility. For example, the design further assumes that confounding factors such as prevailing climatic conditions, geographical features, and sociocultural attributes, to name but a few, can distort the spread of perceived risk in non-linear ways. Nevertheless, the theoretical RPM model points to several sample design features that can be used to improve the data-gathering process in RPM studies. One of the goals of RPM is to ascertain those factors and their role in distributing project-specific risk management issues throughout an LAP.

### Distance and Direction of Sample Points

The first design feature concerns the distance and direction of sample points. Since both distance and direction from the central point are important parameters in describing an RPS, sample points should be taken both at different distances and in different directions from the center. This can be accomplished by randomly selecting sample points at different distances along randomly selected radial transects. The number of radial transects can be adjusted to meet the specifications of a particular study. By randomly selecting multiple points at different distances along each of these

transects the design facilitates the estimation of distance and direction effects as well as any interaction between distance and direction.

### Sample Zones (Strata)

The second design feature concerns the identification of sample zones or strata. The RPM model suggests that in any given direction from the central point, the slope of the RPS will be a monotonic, decreasing function of distance. For such a trend, Cochran (1977) demonstrates that a sample that is explicitly stratified by distance should be more precise than either a simple random sample or a systematic sample. Stratification by distance can be accomplished by dividing the circular study area into concentric zones. The number and width of these zones also can be adjusted to meet the specifications of a particular study.

### Variability and Intensity of the RPS

The third design feature concerns the variability of intensity of an RPS. Under the proposed volcano model for perceived risk about a central source, both the intensity (altitude) and variance (slope gradient in the volcano analogy) are expected to decrease with increasing distance from the central point source of risk. Given that the shape of the volcano is unknown prior to the study, the ideal sampling strategy would require two stages or phases. The first would involve a smaller exploratory sample sufficient to obtain rough estimates of intensity and variance in intensity across the surface of the volcano. The results of the first-phase sample would then be used to refine the larger second-phase sample design in accordance with the principles of optimal allocation for stratified sampling (placing a greater number of observations at distances where the variance in intensity is greatest). In effect, the sample design for the EARP study accomplished the first of this two-phase sample design.

The following paragraphs describe the specific definitions and procedures used in developing and implementing the RPM sampling procedure in the EARP study.

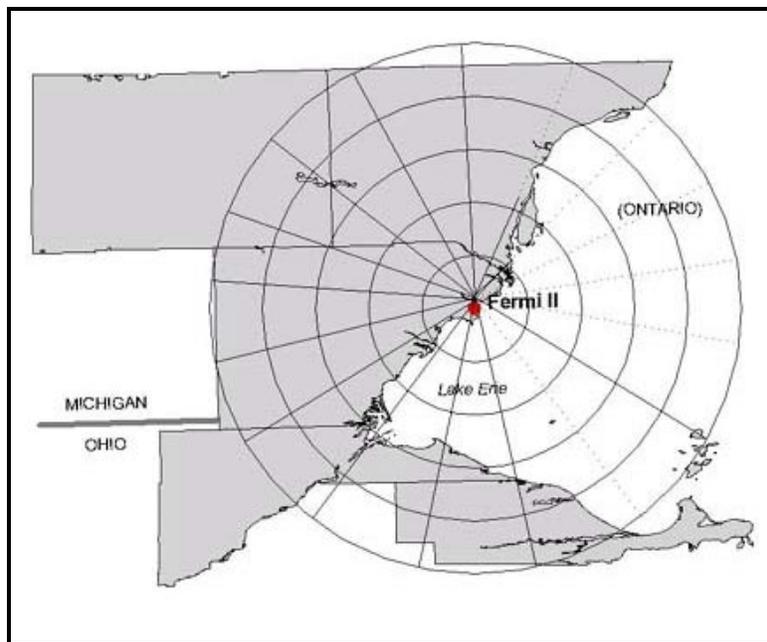
### **Sample Strata/Area Definitions**

RPM follows a standard center-point radial sampling design in which the center point is assumed to be the point of greatest perceived risk. Thus, the EARP sample strata were defined as five concentric five mile zones around Fermi II, to 25 miles away from the facility. This distance corresponds to one-half the "50-mile Ingestion Pathway" for Fermi II as defined in the Monroe County Emergency Mgt. Plan (Monroe County Emergency Management Division 1991). The EARP study was budgeted only to cover only half that distance, thus the 25-mile radius.

Sample areas were operationally defined as one-square-mile areas corresponding to United States Geological Survey (USGS) section lines. Sample areas were randomly designated at five-mile increments along 17 transects emanating outward from the point of origin. These lines appear similar to the spokes of a wheel. The position of the first guiding transect was determined by randomly generating an angle from due north (127 degrees). The remaining transects were drawn at equal intervals from this transect. Because of the study area's proximity to Lake Erie, some transects extended exclusively over water, or into the Province of Ontario, Canada, where permission was not

secured to conduct the study, and these transects therefore contained no sample areas along them. As such, the study area included 14 transects along which at least one or more sample areas could be established. In this way a total of 43 viable sample areas were identified. Sample areas surrounded equally spaced points generated randomly between one and 50 tenths-of-a-mile along each of these 14 viable transects. This spacing provided representative coverage for each of the five sample strata. Figure 4 presents the relationship of the RPM sampling frame (zones, transects, and areas) to the primary geo-political boundaries in the EARP study area. Table 3 presents the sample frame information for the EARP study. Each transect was named according to the major town or geographical feature it crossed.

**Figure 4: Relationship of RPM Sampling Frame to Geo-political Boundaries in the EARP Study**



### Household Selection Procedure

Household selection followed a random selection procedure based on the mapping of sample areas. First, all occupied structures within a sample area were sketched and numbered on a field map. For each sample area three structures were randomly selected. If more than one household was present in the structure, each was numbered and the household to be interviewed selected at random. In densely populated urban areas city blocks were identified and numbered within the sample areas and one of these blocks was randomly selected to represent the USGS section within which it fell. Residential structures existing on this block then were mapped with three structures randomly selected from that block.

**Table 3: EARP Sample Frame**

<b>Transect #</b>	<b>Transect Name</b>	<b>Sample Area Distance Interval</b>
1	North Bass Island, OH	5.4 Miles
2	Lake Erie, US	Not Applicable
3	Toussaint Creek State Wildlife Area, OH	5.4 Miles
4	Cedar Point National Wildlife Refuge, OH	3.9 Miles
5	Oregon, OH	3.4 Miles
6	Toledo, OH	3.9 Miles
7	Monroe, MI	3.7 Miles
8	Dundee, MI	0.6 Miles
9	Milan, MI	4.1 Miles
10	Ypsilanti, MI	5.1 Miles
11	Romulus, MI	2.6 Miles
12	Dearborn Heights, MI	4.6 Miles
13	Grosse Isle, MI	1.4 Miles
14	Pointe Mouille State Game Area, MI	5.2 Miles
15	Ontario, CN	Exempt
16	Lake Erie, CN	Not Applicable
17	Lake Erie, CN	Not Applicable

### **Participant Selection Procedure**

For each selected household all adult members (18 years and older) were listed by gender and age on an interview cover sheet. The cover sheet was kept separate from the interview questionnaire to preserve confidentiality. From this list a potential participant was chosen at random. All potential participants were informed of the voluntary nature of their participation and were requested to give either written or verbal consent before participating in the interview. A one-page project description included space for the participant's signature and served as the written informed consent release form required by the University of Michigan's Human Subjects Review Committee. With respondent permission, interviews were tape recorded to preserve the richness of extended responses.

### **Pre-Field Community Consultation**

Prior to the RPM fieldwork, I arranged and attended meetings with local community officials, opinion leaders, media, and law enforcement agencies to describe the proposed research and elicit their support for the study. The explicit goal of pre-field community consultation was to establish a reciprocal relationship between researchers and locally trusted and respected community leaders, in which the research process was opened to local scrutiny at all phases of the research in exchange for

the opportunity to conduct the study in the community. The EARP study would not have been as successful, nor would it have been desirable, without these leaders' understanding of and participation in this reciprocal relationship.

Over a three week period I met personally with the following people and/or organizations and agencies: (1) the mayor of the city of Monroe, Michigan – the county seat of the county in which the Fermi II facility; (2) the Monroe County Board of Commissioners; (3) the Monroe County Sheriff, (4) the Monroe County Planning Department; (5) the Monroe Township Supervisor; (6) the Editor of the Monroe Evening News, (7) the Vice President for Public Affairs at Detroit Edison, which operates the Fermi II nuclear power plant; (8) the Environmental Writer for the Detroit Free Press; (9) the Editor-in-Chief of the Toledo Blade Newspaper; (10) the Supervisor of the Lake Erie Islands Township Board of Trustees; (11) the Deputy Director for the Michigan Department of Natural Resources; (12) the Sumpter Township Planning Department; (13) the Monroe Environmental League, (14) the Lake Erie Advisory Council; (15) the Student Environmental Action Coalition; (16) the Michigan Citizens Against Toxic Substances; and (17) representatives of a local ad-hoc group that monitors news and government activities pertaining to the Fermi II facility and nuclear power generally. These meetings afforded the opportunity for community input regarding related issues to be considered in the development of the structured RPM survey instrument. In addition to describing the proposed study and receiving local input, I also extended my availability to them throughout the course of the study to share preliminary findings and assure that community views would not be misrepresented.

Following these personal meetings, and with the support of these local officials and opinion leaders, I then sent 53 “letters of notification” describing the study and its local support to township supervisors, county commissioners, mayors, and sheriff's offices throughout the study area. These people were encouraged to contact either myself or the study's principal investigator with any questions or concerns they might have had regarding the study.

### **Survey Instrument Design/Pre-Test**

The RPM survey instrument used in the EARP study was developed concurrently with the sampling design and community consultation phases of the research, and was designed to build upon the local input received during community consultation. The instrument covered a range of issues relating to environmental risk perception, social impact, and other topics of interest to myself and the principle investigator. These were divided among 13 sections in the questionnaire. Of these, the most relevant to this fellowship project was a section on “Perceptions of and Responses to the Fermi Facility,” because it enabled the mapping of the Fermi II RPS. A combination of open- and closed-ended questions, including rating scales and either/or questions, was used (Dillman 1978; Miller 1983:69-190; Geer 1991:360-370). “Investigator effects” – the potential skewing of data due to the RPM study itself – was also a concern of the researchers. The EARP instrument included a line of questioning concerning whether respondents had heard of the EARP study, the source(s) through which they had heard, and a self-assessment of how their knowledge of the study had influenced their perceptions of the Fermi II facility.

The RPM survey instrument used in the EARP study was pre-tested in four iterations among 20 people of varying ages and backgrounds during the two month period immediately preceding the fieldwork portion of the study. Corrections and modifications were made to the instrument according to pre-test respondent feedback.

## **Ethnographic RPM Fieldwork**

Ethnographic RPM research can be conducted in varying time frames, usually dependent on the time and resources committed to the scoping phase of the SIA process. For example, a restrictive scoping period is typically more labor-intensive, requiring a larger RPM research staff over a shorter scoping phase. Such constraints, however, do not drastically affect the quality or quantity of data gathered through ethnographic RPM research, nor do they necessarily increase research costs (i.e., more people over shorter period versus fewer people over longer periods). These important considerations must be made in contractual work involving RPM, but were of less relevance in the EARP study because it was conducted more as a methodological demonstration project than as part of a formal SIA scoping process.

RPM fieldwork typically consists of seven major steps: (1) field preparation, (2) contacting sample households and selecting respondents, (3) administering the structured RPM interviews, (4) resolving interview refusals, (5) engaging in participant observation, (6) conducting informal key-informant interviews, and (7) reviewing historic documents and monitoring media coverage. Depending on the nature of the issue under study, some of these steps may be emphasized to varying degrees over others. For example, resolving interview refusals requires the use of multiple fieldworkers, which the EARP study did not support. As the sole ethnographer working on the EARP study, I spent a total of eight months (approximately 240 days) in the field. Of that time, roughly half (120 person-days) was spent mapping sample areas (see “household selection procedure,” above) and seeking and completing the RPM interviews. The remaining time was split among participant observation, informal key-informant interviews, historic documents and media review, and field data management. All these tasks were conducted over the entire eight-month field period.

### *RPM Field Preparation*

A popular misconception regarding much scientific research is that it is conducted under “laboratory” conditions, usually located at or near the scientist’s research center. While this may be the case during some stages of research, social scientists, particularly ethnographers, have traditionally collected their research data by living among the people and/or organizations they are studying and by observing and participating in formal and informal community activities. This type of ethnographic research – often called “fieldwork,” typically requires significant preparation for and coordination of fieldwork activities. In the EARP study this entailed securing transportation and living arrangements, and travel and expense advances.

In some ways, I find field preparation to be the most exciting part of fieldwork because it is the period of greatest anticipation and visioning. One literally has to live the fieldwork in one’s mind prior to actually conducting it so as to help anticipate, to the greatest extent possible, a wide range of logistical requirements (i.e., travel and living arrangements), field conditions, ethical responsibilities, and the like. For example, I knew that one of my sample areas encompassed North Bass Island (also called Isle St. George), roughly 15 miles off shore in Lake Erie, and would demand special travel and living arrangements. In consultation with the township supervisor, who lived on the island, I learned that I would be able to camp there for the duration of the interviews. North Bass is predominantly vineyard, supplying grapes for the northeast Ohio wine industry. The supervisor suggested that I could

also participate to some extent in the daily activities of the local residents who primarily worked the harvesting operations on the island. Doing so, however, required that I be there during the autumn harvest season, beginning in October and running through late autumn, and this posed special considerations for cold-weather camping on a Great Lakes island. Thus, I had to make special arrangements for the appropriate camping gear and take special precautions to protect my research instruments and collected data. Such “special precautions” significantly increased the bulk quantity of my field supplies, which in turn I had to balance against any potential travel restrictions posed by my transportation to and from the island. The fastest and most reliable transportation, particularly during these months, was aboard a postal delivery plane that made weekly flights to and from the island’s dirt landing strip. But space was limited aboard the single engine Cessna, so I had to be frugal in considering what I could and could not bring with me. I offer this example simply to illustrate the kinds of considerations that must be made during field preparation to ensure – or at least approximate – a smooth and productive field experience.

By its nature, RPM fieldwork covers an expansive geographical area and therefore entails significant travel to and from study areas for mapping, interviewing, and participant observation, and other RPM-related research activities. During the EARP study I lived for several months in the community in which the Fermi II facility is located. This was particularly crucial to interviewing in the southern portion of the study area; however, upon completing interviews there I was able to move back to my home residence near the University of Michigan, as the northern portions of the study area were as close to my home residence as they were to my field lodging. As noted earlier, this was an important design consideration in choosing to focus on the Fermi II location, thereby keeping lodging costs lower than they might have been had field lodging needed to be secured for the entire field portion of the study. To that end, I also used my own vehicle and charged mileage against a travel budget that had been calculated and approved previously based on methodological data from other RPM studies. Other travel advances were necessary, however, particularly as noted above, regarding the interviews sought on North Bass Island.

A total of 7,758 miles were covered during the course of EARP fieldwork. This translates into roughly 60 miles per attempted interview, but also includes the mapping of sample areas, multiple return trips to selected residences (e.g., in the case of appointments or cancelled and rescheduled attempts), informal key-informant interviews, and participant observation and other RPM-related research activities.

### *Contacting Sample Households and Selecting Participants*

I directly contacted residents of the selected households and provided them with background materials on the EARP project. Included among these materials was a one-page project description that identified law enforcement agencies, local governmental officials, and media organizations that had been previously notified of the study (see “pre-field community consultation, above). The project description also contained the phone numbers and other contact information for both the principal investigator and the study manager. Other background materials included a newspaper article discussing the project and featuring the field researcher. All potential participants were encouraged to follow up on this project information if they questioned the study’s legitimacy or intent. In cases where I was unable to contact any residents in the selected households I would place these materials in a University of Michigan letterhead envelope, along with a “call letter,” and place the envelope either in the resident’s mailbox or entrance door.

### *Administering the Structured RPM Interviews*

Face-to-face interviews were conducted to facilitate an open exchange of information. The survey instrument was the focal point of the interview, but I also kept separate field notes to record qualitative data. Interviews also were tape recorded (with participant consent) to preserve richer responses than I could write in the survey instrument or in my field notes. Comments from other household members were noted in separate field notes. Interviews lasted anywhere from 15 minutes to several hours depending on the participant's awareness of the Fermi II facility and/or willingness to discuss specific issues in detail. Some participants even invited me to conduct the interview with them over the course of a day or evening. For example, one participant invited me to spend the day observing him at work while we conducted the interview; another had me over for lunch and to walk his farm property; another offered to speak with me on the condition that we tour the old homes he was remodeling in the area; several others had me over for dinner and beverages, with one such interview lasting well into the early morning hours. In the end, 128 potential respondents were contacted for interviews, from which 108 complete interviews were obtained, producing a robust response rate of 84.4 percent.

### *Resolving Interview Refusals*

Roughly 16 percent of the selected participants were not interviewed, constituting interview refusals. Interview refusals were operationally defined as persons who could not be contacted after multiple attempts (at least five, but in some cases as many as eleven), those who missed interview appointments and could not be contacted later, those who were not interested in participating, and those who were not capable of responding to the questionnaire. In the latter case selected respondents were judged by other family members and myself to be incapable of participating due to mental illness or traumatic physical illness.

Some refusals were believed to be the result of participant bias based on gender, age, or race. In past RPM studies participant bias was successfully treated methodologically by sending a different fieldworker (i.e., different gender, age, race, or combination thereof) back to the selected household to request an interview (Stoffle et al. 1990: 247). This procedure was not used in the EARP study, though, as I was the sole fieldworker. Judging by past RPM studies, though, it is reasonable to suspect that this process could have raised the overall response rate in the EARP study by as much as three percentage points.

### *Engaging in Participant Observation*

As noted earlier in this section, I was able to observe and to some extent participate in the activities of the people I interviewed, for example, during the grape harvest on North Bass Island. This work, done partly in exchange for the opportunity to conduct RPM interviews, was tape recorded where feasible or documented in my field notes. Throughout the fieldwork I was able to attend local meetings on various topics and visit informally with community officials, opinion leaders, and area residents. This process of informal participant observation and structured survey interviews helped maintain an ongoing rapport between myself and the local community while also providing data

essential for mapping the extent of the Fermi II RPS and for identifying key local environmental issues and the potential relationships between them.

### *Conducting Informal Key-Informant Interviews*

Informal key-informant interviews are common to ethnographic research, producing what is called a “social network” or “snowball” effect in which informants (key informants or randomly selected RPM participants) direct researchers to local people whom they regard as particularly knowledgeable of local issues and conditions. In the EARP study, this process began as I met with local opinion leaders and elected officials during pre-field community consultation and continued through participant observation and structured RPM interviewing. These contacts were invaluable during the study, as I would regularly meet with them to discuss how the study was progressing and share questions regarding the community, the Fermi II facility, and the RPM research process. Key-informant interviews lasted anywhere from a few minutes to several hours and occurred throughout fieldwork. As the EARP study progressed the network of key informants enlarged and provided information to supplement that which was obtained through the structured RPM interviews. This process was particularly valuable in the identification of potential spokespersons for specially affected populations that might otherwise be overlooked by more conventional random sample surveys. Data from these interviews were kept separately as field notes and, where applicable, on cassette tape.

### *Reviewing Historic Documents and Monitoring Media Reports*

Throughout RPM research field staff typically review community historical documents and monitor media reports of the central project and associated environmental issues around which the RPM research is being conducted. Although I did manage to conduct a measure of documents and media review, the EARP budget did not allow for this to occur to an ideal extent.

Ideally, the RPM fieldworker should review historical documents through local and county libraries and other governmental sources, media organizations, bookstores, schools, churches, and cemeteries. In some instances, key informants and even randomly selected participants have allowed RPM researchers to review personal or family historical documents such as photographs, books, and in one case, a family’s private collection of Native American artifacts uncovered on their centennial farm (Stoffle 1990; Stoffle, Stone, and Heeringa 1993:325). By reviewing historical documents, researchers can construct the cultural, environmental, and technological contexts within which an RPS develops. Knowledge of these contexts can sensitize field staff to the local conditions influencing local risk perception, thereby enabling them to communicate more effectively with residents during respondent interviews and other fieldwork activities.

Similarly, various media sources also were monitored throughout the EARP study, but again, not to the extent desirable in more elaborate RPM research. Local print media was the primary source monitored in the EARP study. With a minimal diameter of 50 miles, the EARP study encompassed many separate communities, several of which maintain their own newspapers. Newspapers from urban areas adjacent to and in some cases well outside the RPM study area also maintained significant readership throughout the study area (e.g., participants identified a total of 33 different newspapers as primary sources of local environmental information). As time and budget permitted, I would purchase the newspapers in the communities in which I was working. I also obtained flyers and other local

announcements I found posted in communities in the study area. In addition, I monitored local radio and television news programs for stories pertaining specifically to the Fermi II facility, but also to nuclear power in general and other local environmental issues. Monitoring the local media in this way also aided in the detection of new events that could potentially influence local perceptions of environmental risks. This information was either recorded in field notes, or, in the case of newspaper articles and community flyers, clipped and stored in a media file.

### **EARP/RPM Demonstration Project: Data Management**

As noted previously, the EARP budget did not provide support for data management and analysis. My fellowship project with the GLC provided that support by enabling me to manage and analyze the EARP data set to demonstrate its applicability to the GLC/GLM Network interests identified earlier in this document. To that end I describe in the following sections the RPM data management activities which comprised the bulk of activity on the RPM Demonstration Project. Here I use the heading “EARP/RPM Demonstration Project: Data Management” to reflect both the association between the EARP study and the RPM Demonstration Project as well as the support for data management and related activities provided by the SFAA/EPA and GLC fellowship programs.

RPM data management consisted of five primary stages: editing completed questionnaires, developing the EARP data codebook, coding open-ended responses, creating the EARP database, and data entry and verification. Each of these stages is described in detail in the sections below.

#### **Editing Completed Questionnaires**

I edited completed questionnaires for internal consistency and legibility. “Internal consistency” refers to the logical flow of the RPM survey questions. For example, some questions were designed as yes/no “skip” questions in which, if the response is “no,” the interviewer is directed to skip to a different section of the questionnaire. So each questionnaire had to be edited to ensure that internal directions were followed properly, and in cases when they were not, to correct the inconsistencies. There were also a significant number of “open-ended” questions included in the questionnaire. Responses to these questions are written verbatim, or as close to verbatim as the interviewer is able, and in my case in long-hand, in lined spaces provided beneath the question. The often rapid delivery of responses to such questions requires the interviewer to write quickly, and in my case, often in rather poor penmanship. For this reason I also edited open-ended responses to clarify the penmanship and meaning of any particularly garbled transcriptions. All editing marks were made in green ink to distinguish them from the black ink that was used to record initial responses in the questionnaire.

#### **Developing the Data Codebook**

Developing a data codebook is a multi-step process. Describing this process warrants some discussion of the terms used to describe the information contained within a codebook. One of the key terms in that regard is “variable.” As noted earlier, the EARP questionnaire contained numerous questions, the answers to which were expected to vary from respondent to respondent. Thus, each question constituted a “variable” because it potentially generated variable responses among survey participants. Names were assigned to each variable to describe the kind of information it contains. For

example, the variable for a demographic question regarding respondent income was named INCOME\_LEV.

Another key term is “codes.” Great care was taken to “pre-code” the EARP questionnaire. For example, “closed-ended” or “forced choice” questions contained a pre-assigned range of responses, or answers. Each choice within this range was assigned a value, or code number (e.g., 01 = ‘No;’ 02 = “Yes,” and so on), that the interviewer simply circled as the interview was being administered. These pre-assigned code numbers would later be manually entered into a database program to enable statistical analysis of numerical data.

I constructed a data codebook to describe the variables and the code numbers assigned to the choices available within them. The codebook links a question number (i.e., variable) with its descriptive name, and links specific code numbers within the variable to the specific responses they represent. In this way the codebook also enables one to link statistical analyses conducted on the code numbers back to the variables to which they refer. Moreover, the codebook describes the type and size of variables. With regard to type of variable, the codebook specifies whether it is numeric, alphabetical (text), alphanumeric, or a date; with regard to size of variable, it specifies the number of columns, or character spaces, the variable occupies in the database. The example above of the variable named “INCOME\_LEV,” for instance, is characterized by a two-column numeric code ranging in value from “01” to “99,” where each numeric value represents a different income level.

However, whereas the closed-ended responses were pre-coded in the questionnaire, and therefore fit rather neatly into the codebook format, responses to open-ended questions were not. Establishing numerical code categories for open-ended responses to survey questions was a complicated task that required independent coders to devise mutually agreeable code categories and to achieve a measure of inter-coder consensus, or reliability, in placing open-ended responses within the categories they helped to establish. This procedure, called the “inter-rater reliability method,” is described below.

### *Inter-rater Reliability Method*

The Inter-rater Reliability Method (IRM) refers to a technique developed by researchers at the University of Michigan's Institute for Social Research (ISR) (Stoffle et al., 1991:622; Stoffle et al., 1990:247-248) to establish code categories for open-ended responses to social science survey questions and increase the reliability with which independent coders placed the same open-ended responses into these categories. It is similar to other reliability- and validity-building procedures for qualitative data analysis in the social sciences (Cary, Morgan, and Oxtoby 1996:1-5; Denzin and Lincoln 1994:1-18; Miles 1994; Romney, Weller, and Batchelder 1986:313-339; Carmines and Zeller 1982:1-5; Mitchell 1979:376-390). Pelto and Pelto (1984:33) define reliability as "the repeatability, including inter-person replicability, of scientific observations." The IRM thus was used to categorize open-ended responses to the EARP questionnaire. IRM is not a standardized coding procedure, however, and may be adapted to meet the needs of specific research projects. For example, the ISR study cited above utilized the technique to both increase the reliability of its code categories and to retrieve and evaluate the qualitative data from recorded interviews.

## Purpose of Coding Schemes.

Social researchers develop coding schemes for open-ended responses to enable them to aggregate and analyze the statistical data contained in those responses while maintaining their rich diversity of information. Bernard (1988:347-348) notes that researchers accomplish this by grouping similar responses to the same question into broader and more general categories within which more specific detail may be preserved.

The process of devising these “broader categories” is similar to the ethnosemantic process in cognitive anthropology. Ethnosemantics is the study of folk conceptual systems in order to discover the conceptual world of a people through their linguistic categories (D’Andrade 1995, 1976; Dougherty 1985; Spradley 1972; Tyler 1969; Sturtevant 1964). Ethnosemanticists seek to tease categorical and componential information out of broader cultural domains. For example, D’Andrade (1976) studied lay-persons’ placement and meaning of specific illnesses within broader disease categories to understand how Americans experience and respond to disease; Kempton (1987a,b) applied similar techniques to understand variation in folk models of appropriate energy conservation behaviors; McCall, Ngeva, and Mbebe (1997) used “ethnosemantic domain definition” (Harding and Livesay 1984) to map community beliefs about interpersonal disputes and dispute handling. It has most recently been used to identify culturally-specific environmental taxonomies within which people perceive and act upon environmental management issues, and to facilitate communication of environmental risks among environmental managers and the populations potentially affected by their decisions (Stoffle, Halmo, and Evans 1999:416-429).

Coding schemes follow a sort of “reverse ethnoemantic” process. Whereas ethnosemanticists tease ever more specific componential information *out of* existing broader cultural domains, coding schemes reflect an attempt to construct mutually agreeable domains *from the* componential information provided in response to open-ended social science survey questions (see, e.g., Schnegg and Bernard 1996:7-10). IRM seeks a measure of consensus regarding the development of these domains and categories and of the placement within them of their component parts. In that regard, the coding scheme is a very powerful component of the data management process because it has the greatest potential to influence the direction of subsequent analyses. That is to say, the code categories developed for analysis reflect interpretive issues *before* the “interpretation of findings” even occurs. Bernard (1988:348) points this out by discussing how a community may be defined by ethnic composition, population density, distance from an international border, and so on. The same issues apply to the development of categories in the EARP study insofar as the categories that are developed necessarily reflect a certain measure of bias introduced by the researchers and coding staff. IRM was developed in part to address such interpretive issues.

## Bias in Code Categories

At its most basic level the IRM seeks to minimize “coder bias” which is commonly introduced into code categories when they are constructed either by one person (usually the principal investigator on a study) or by a group of researchers who are either of the same disciplinary background or are intimately familiar with the data set. I’ve heard it said that in coding, similarity of coders breeds analytical contempt for the categories devised. IRM minimizes categorical bias by having the coding scheme be developed by independent coders of different disciplinary paradigms who are not intimately familiar with the data set. An odd number of coders, usually three, is most commonly used to offset

any "ties" or "even disputes" over the development of code categories. Romney, Weller, and Batchelder (1986:313-339) note that only a few coders are necessary provided they attain a high average agreement regarding open-ended responses in a data set.

### Convergence of Codes

Coder bias is reflected in the relative subjectivity of the code categories developed, and this subjectivity is often a point of methodological criticism of the social sciences (Dey 1993; Poggie, DeWalt, and Dressler 1992; Becker 1958:652-660). These researchers call for systematic procedures for managing both the code development process and the relative assignment of codes to the data they represent. But not all qualitative researchers are convinced of this need to systematically address subjectivity in code construction. For example, Ryan (1999:314) notes that some question whether concepts such as reliability and validity are relevant to the analysis of qualitative data (Denzin & Lincoln 1994:1-18; Morse 1994:220-235; Hammersley 1992; Lincoln and Guba 1985). Aside from minimizing categorical bias, the IRM is also a consensus-building technique (Romney 1986:313-339), similar in many ways to the Delphi Technique (Soderstrom 1981; Mercer 1980; Linstone & Turoff 1975; Coates 1974; Johnston 1970; Helmer 1968). Each coder independently develops her or his own code categories, and their rationale for them, into which the opened-ended responses may be grouped for later statistical analyses. Once this has been done the coding group meets again to compare notes and otherwise discuss the code categories each has developed.

The idea is to develop a "convergence of codes" -- code categories that satisfy the rationale underlying each coders' categories (see, e.g., Carey, Morgan, and Oxtoby 1996:1-5). There is generally much convergence right from the start, but areas of disagreement are also to be expected. The process is repeated with each coder familiar with the rationale behind other coders' categories, and revised categories are discussed at a subsequent meeting. This is repeated until all code categories have been developed to the satisfaction of the coding staff. Any areas in which a convergence of codes can not be reached are duly noted in subsequent research reports. This latter instance is rare, though, and might suggest a problem with the research question from which the opened-ended responses were obtained. Such questions are typically disregarded in later statistical analyses and project reporting.

#### *Code Convergence in the EARP/RPM Demonstration Project*

I used the IRM to establish a reliable degree of convergence among the code categories developed for the EARP/RPM Demonstration Project and the independent placement of open-ended responses within those categories. To accomplish this, I first assembled a coding staff of graduate students of differing disciplinary backgrounds who were familiar with neither the EARP topic nor data set. The coding staff was comprised of one male and two females, all in their 20s, with disciplinary backgrounds including sociology, nutrition, and medicine. They offered their coding services in exchange for the opportunity to participate in the EARP/RPM Demonstration Project and gain valuable experience in the data management process.

With the coding staff in place, I then abstracted the responses to all 25 open-ended questions included in the EARP questionnaire and listed them on separate sheets corresponding to each question. I distributed these sheets, along with a list of IRM background and instructional materials, at the first of several coding staff meetings. Consistent with the IRM process described above, each

coder independently reviewed the responses and constructed broad categories and subcategories of types of responses to each question. We then met to discuss each others' preliminary code categories, explain and defend the rationale each used in devising their categories, and address any procedural questions that might have arisen in the process. Each coder brought an original plus three copies of their work to share with each of the coding staff members. Questions with high levels of categorical convergence were removed from the list, and the review process was reiterated for the remaining questions, although this second time with the benefit of having heard the rationales of the other coding staff members. This process was repeated four times, as that was the number of times necessary to obtain a high degree of code convergence for this data set.

Once the code categories were in place, I had the coding staff engage in a "code convergence exercise." This was done to establish a measure of the reliability of independent coders to place the same open-ended responses to an EARP survey question within the same code categories constructed for that question. As such, this exercise was used to judge the relative inter-rater reliability of code categories developed for the EARP/RPM Demonstration Project. This is particularly important step in social science research, where the relative subjectivity of code categories is often a point of methodological criticism (Dey 1993; Poggie, DeWalt, and Dressler 1992; Becker 1958:652-660).

Code convergence is generally expressed as a percentage of independent agreement among coders, and it may be calculated for individual open-ended responses as well as for all open-ended questions taken together. The range of convergence may be expressed as the difference between the lowest and the highest convergence scores (e.g., 80% -- 100%), with a mean convergence score reflecting the average of all scores. The higher the code convergence the more reliable are the open-ended code categories. So, for example, a mean convergence score of 90 percent would suggest that the same code categories would be independently assigned to the same open-ended responses 90 percent of the time. And a convergence range of 80 to 100 percent would indicate that the independent agreement among the assigned codes would not fall below 80 percent, while in some instances there would be total agreement.

For the code convergence exercise in the EARP/RPM Demonstration Project, I provided the coding staff with a random sample of responses to each of the open-ended questions on the EARP questionnaire and asked that they independently place them into what they believed were the appropriate code categories. Coders were allowed to identify as few as one or as many as three code categories for any one response, listed in descending order of preference. I then compiled their responses and calculated convergence rates based simply on the percentage agreement for each question among the coders. The question-by-question values for this code convergence exercise are contained in Appendix 5. Mean convergence was 97 percent, with a range of 100 – 75 percent. Of the 25 open-ended questions contained in the EARP questionnaire, 17 had 100 percent convergence, three had 92 percent, and the five remaining questions had 98, 94, 88, 83, and 75 percent, respectively. Thus, 97 percent was the average reliability with which independent coders were expected to assign the same code categories to the same responses; for 17 questions 100 percent reliability was expected, while it was expected to range from 98 to 75 percent for five others.

Despite recent calls for inter-rater reliability in social science data management (Dey 1993; Poggie, DeWalt, and Dressler 1992; Becker 1958:652-660), social scientists do not often track this kind of information. It is therefore difficult to judge whether code convergence in the EARP/RPM

Demonstration Project represented a respectable degree of inter-rater reliability in social science code construction and placement.

### *Final Product: A Data Codebook for the EARP/RPM Demonstration Project*

The final product of the IRM process was what I considered to be reliable code categories for the EARP/RPM Demonstration Project data codebook, which I have included in its entirety in Appendix 6. This codebook is the researcher's guide to the EARP/RPM Demonstration Project database. It contains a total of 290 questions, of which 25 were open-ended. Because some open-ended questions allow up to five responses per question, and each response is considered a separate variable, these questions covered a total of 434 variables. Variables range in size from 2 to 10 columns. All but two of them (date and time of interview) are numerically coded. Questions are listed and numbered sequentially in the codebook as they appeared on the EARP questionnaire. In the codebook, variable names are listed in parentheses in capital letters following the question wording, and code numbers and values are listed in bold beneath the question to which they refer.

### **Coding Open-Ended Responses**

The coding staff and I assigned code numbers to the open-ended responses in the EARP questionnaire. Code numbers were placed next to the responses to which they referred, and were circled in red ink to distinguish them from the black and green ink marks made earlier on the questionnaire. This was a tedious task that required more than three months to complete. During the coding process a problem was detected with the internal logic of the questions in Section 9 of the survey questionnaire. I subsequently decided that those questions – nine in all, four of which were open-ended – therefore would be neither coded for nor included in the EARP/RPM Demonstration Project database. Once all the questionnaires had been coded I checked every third open-ended response (seven per questionnaire) from every fourth questionnaire (32 overall) to verify internal code consistency. As expected, consistent codes were assigned to these questions roughly 95 percent of the time, thereby providing further assurance that codes had been assigned consistently to open-ended responses throughout the questionnaire.

### **Creating the EARP/RPM Demonstration Project Database**

The EARP/RPM Demonstration Project database and codebook were designed to mirror each other. However, as noted above, an entire section of the questionnaire – nine questions covering 49 variables – was excluded from coding and therefore was not included in this database. Thus, the EARP/RPM Demonstration Project database contains only 385 of the 434 variables identified in the data codebook. These variables range in size from two – 10 columns, with the vast majority only two columns wide. All but two variables -- time and date -- are numeric. The database exists as a matrix, with variables listed sequentially as columns across the top, and interview numbers listed sequentially as rows along the left side.

I created the database using the Microsoft Excel software, as it was readily available to me and, if necessary, files within Excel could be easily converted into other database management formats. Because Excel only allows a maximum of 255 variables per file, and the EARP/RPM Demonstration Project data set contains 385, it was necessary to split the data set into two separate files, the first covering the first eight sections of the questionnaire, the second covering sections 10 through 13. I

included at the front of both files the same five variables -- interview number, location, date, time, and length – as a means of linking the data from the same interview across both database files. This latter point is important, as it enables statistical analyses of the entire data set as well as enabling the two files to be merged as one in the ARC-VIEW GIS program for later mapping of key EARP/RPM Demonstration Project findings.

## **Data Entry and Verification**

Having done data entry on past projects, I was well aware of my relatively slow pace and low accuracy levels. Given the considerable size of the EARP/RPM Demonstration Project data set, I figured it would be more efficient and accurate to hire out the work. I obtained cost estimates from several data entry services in greater Ann Arbor, Michigan. I ultimately selected Behavioral Data Services (BDS), a social science data management firm in Ann Arbor, because of its relatively quick turn-around, guaranteed accuracy, and relatively low cost. BDS personnel converted the Excel data files into the FoxPro data management program for entering coded data from the questionnaires. BDS chose the FoxPro program because it automatically jumps from variable to variable as code numbers are entered, whereas the Excel program does not. Entered data were verified for accuracy by cross-checking the data entered for every tenth variable from every tenth questionnaire, with an overall accuracy rate of 99 percent. The entire data entry and verification process took 18.41 hours to complete, and cost \$443.87.

Subcontracting the data entry and verification components of data management freed up considerable time that I was able to spend more productively consulting with the GLM Network to identify key variables and analyses that would have the greatest relevance to its interest in participatory equity in Great Lakes environmental management.

## **EARP/RPM Demonstration Project: Analysis of Key Findings**

SIA studies have documented that *project awareness* represents the widest range of potential concerns and impact issues within a project study area (Stoffle, Stone, and Heeringa 1993). Thus, the key analytical section of the EARP questionnaire focused on “Perceptions of and Responses to Fermi 2.” Within that section, “project awareness” – i.e., respondent awareness of the Fermi facility – was identified in consultation with the GLM Network as the key analytical variable. Moreover, “awareness” could be spatially mapped rather straightforwardly, so in addition to marking the extent of a project’s risk perception shadow (RPS), it also provided a sound analytical basis upon which to explore potential correlation among this and other key variables. These “other key variables” included standard demographic characteristics – particularly from an environmental justice standpoint, such as race, income, age, and gender, as well as lines of questioning on “Technology and Environment Analogs.”

As noted previously, key RPM findings from an earlier study of a proposed LLRW facility revealed that the RPS for that facility consisted of (1) a 15 mile radial core area where awareness and intensity of perceived risk and potential social impact were evenly distributed; (2) areas continuous to the core area but distributed non-linearly in various directions up to an additional 15 miles beyond the core; and (3) “islands,” or areas separated from both the core and contiguous areas. Through RPM, both the type and distribution of impact issues defined the LAP, providing a more

accurate social basis from which public consultation could then proceed (Stoffle et al., 1991). These earlier findings were relevant to this analysis because they established key features of an RPS. I attempted in this analysis to identify these same features in the Fermi RPS and link them to demographic characteristics of the *sample* population.

## **Spatial Distribution of the Fermi RPS**

The EARP/RPM Demonstration Project documented the presence of an RPS for the Fermi II nuclear facility. The Fermi RPS was operationally defined as "project awareness" because this definition is consistent with that used in previous RPM studies which documented that local level social impacts occur when two thirds or more of the local population is aware of a specific project (Stoffle, Stone, and Heeringa 1993). Other researchers (Ellis et al., 1992:44-54; Unger, Wandersman, and Hallman 1992:55-70; Waller and Mitchell 1991:302-329; Gibbs 1990:10-11; Edelstein 1988; van der Pligt, Eiser, and Spears 1986:1-15; Werner 1985:161-167; Ridington 1982:36-42) have demonstrated that the awareness and perception of potentially hazardous conditions or projects provides sufficient impetus for social and psychological impacts to occur. Still others (Gatchel and Newberry 1991:1961-1976; Vyner 1988, 1984:5-10; Flemming et al., 1982:14-22) have shown that such impacts can be psychophysiological as well. Similarly, research on the nature, extent, and causes of environmental awareness and remedial action suggests that local people will not participate in actions designed to manage their environment if they are unaware of or perceive no risks to it (Kottak 1992:295).

With "project awareness" as the operative variable in the EARP/RPM Demonstration Project, 86 percent of the responding sample claimed to be aware of the Fermi facility, while only 14 percent claimed that they were not aware of it. RPM is uniquely designed to address questions concerning how project awareness is distributed spatially, in this case across the geographic boundaries of the EARP/RPM Demonstration Project study area, and secondly, what are the unique demographic characteristics of the respondents within both the aware and unaware populations.

The Fermi RPM data were spatially analyzed with the ARCVIEW GIS program. Figure 5 presents the geographic distribution of the percentages of project awareness, by sample area, for the Fermi RPS. The awareness percentages from Figure 5 have been grouped and color coded in Figure 6 according to descending levels of project awareness, where red indicates areas with at least two-thirds awareness and dark blue indicates areas of no awareness. Intermediate awareness levels are represented by light red and light blue.

An important analytical note must be made here. The RPM data for Fermi exist as discrete or discontinuous data points on a map. Shading them as I have in Figure 6 suggests that these variables are continuous rather than discrete. Monmonier (1995; 1991) has warned of the dangerous potential misuse of GIS technology, and I am acutely aware of these constraints.

Figure 5: Awareness Percentages for the Fermi II RPS

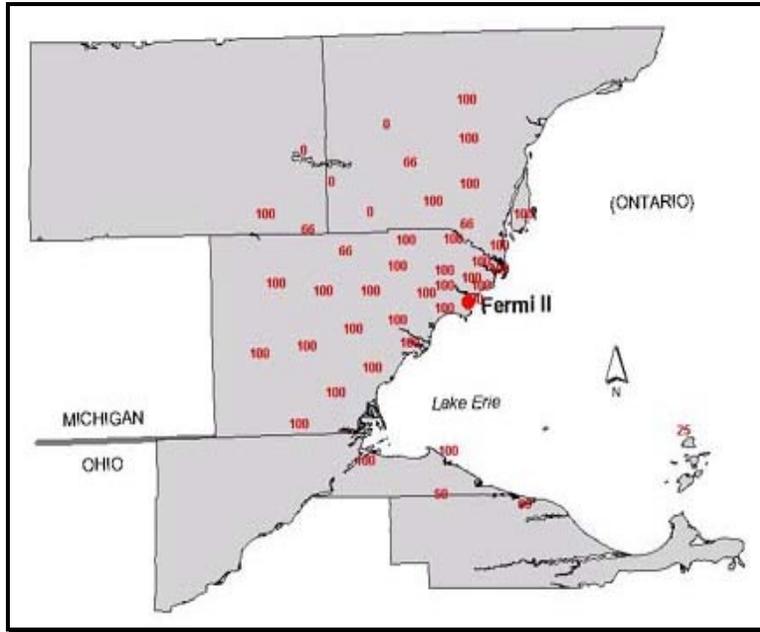
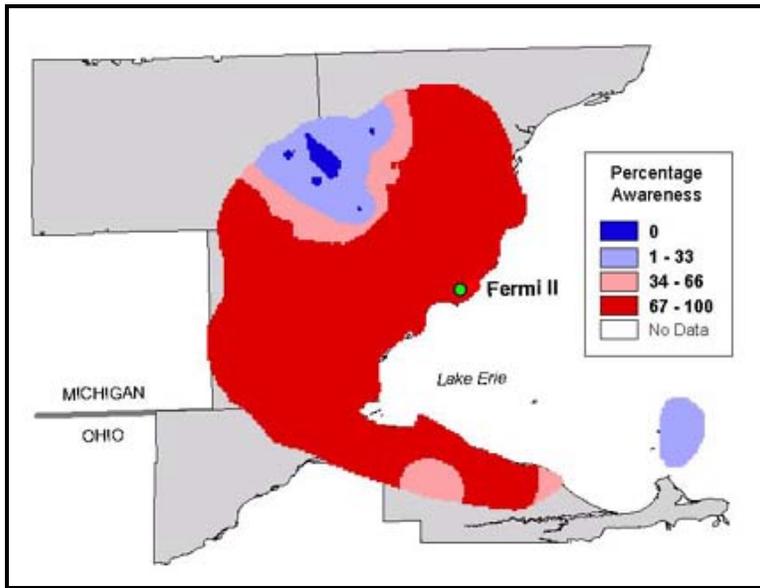


Figure 6: Shaded Characteristics of the Fermi II RPS



One cannot assume that values increase or decrease linearly between discrete points. The function of such maps is not to interpolate values for the areas between the data points but rather to illustrate a hypothetical topography of the Fermi RPS. Recall that the purpose here was to demonstrate the utility of social data in defining the LAP for consultation in environmental management. It may be possible through GIS to infer values for the rest of the study area population by comparing RPM sample characteristics to those of census data for the study area.

To the extent that "unaware" populations are less likely to participate in environmental management programs, such RPM maps can reveal to public participation professionals, environmental decision-makers, and affected populations alike, the potential spatial implications of environmental discrimination. In so doing, RPM maps can help them to visualize this phenomenon so that their efforts to redress it may be focused more efficiently and responsibly. Indeed, this was the impetus behind the GLM Network's interest in this project.

### **Characteristics of the Fermi RPS**

Figure 6 reveals that, as with the Michigan LLRW RPS, the Fermi RPS had at least three distinct features. Both had core and contiguous areas, but whereas the LLRW RPS contained islands of perceived risk, the Fermi RPS contained risk perception *voids*, or areas in which none of the sample respondents were aware of the Fermi facility, but which were surrounded by areas of higher awareness.

#### *RPS Core and Contiguous Areas*

The core component of the Fermi RPS was marked by two-thirds or greater awareness of the facility and extended radially for up to 10 miles from the facility. The contiguous areas of the Fermi RPS extended broadly up to at least 25 miles to the southwest and the northeast and also were marked by at least two-thirds awareness. Previous RPM studies have actually detected the outer edges of the RPS for their respective projects (Stoffle, Stone, and Heeringa 1993); this has not been the case with the Fermi RPS. Additional interviews in successive sampling zones would be necessary to detect the hypothetical edge of the Fermi RPS. Our inability to detect risk perception islands in this study may be a function of our not having detected the edge of the RPS.

#### *RPS Voids*

Perhaps most intriguing was our finding of risk perception voids. As stated above, RPS voids are defined as areas where awareness is absent but which are surrounded by areas of higher awareness. This characteristic of the Fermi RPS was detected in the northwest quadrant of the study area. However, because the outer edge of the Fermi RPS was not detected in this study I cannot state for sure that this would, in fact, constitute an RPS void as defined above. As such, this area might also be thought of as an "RPS trough" or "valley." Again, additional interviews in successive sampling zones would be necessary to accurately identify this phenomenon. In calling it a "void," I'm referring more to its characteristic absence of awareness rather than its situation relative to other areas of higher awareness. The presence of this void or trough was intriguing to me because it occurred so close, relatively speaking, to the Fermi facility -- as close as 12 miles.

Another area where awareness was very low but not entirely void was detected at the far southeastern edge of the study area. This sample area was on North Bass Island, in Lake Erie, and its low level of awareness might be attributable to its geographical isolation relative to the other sample areas. If so, this finding might suggest geographic *isolation*, not necessarily distance, as an environmental discrimination variable.

## Contours of the Fermi RPS

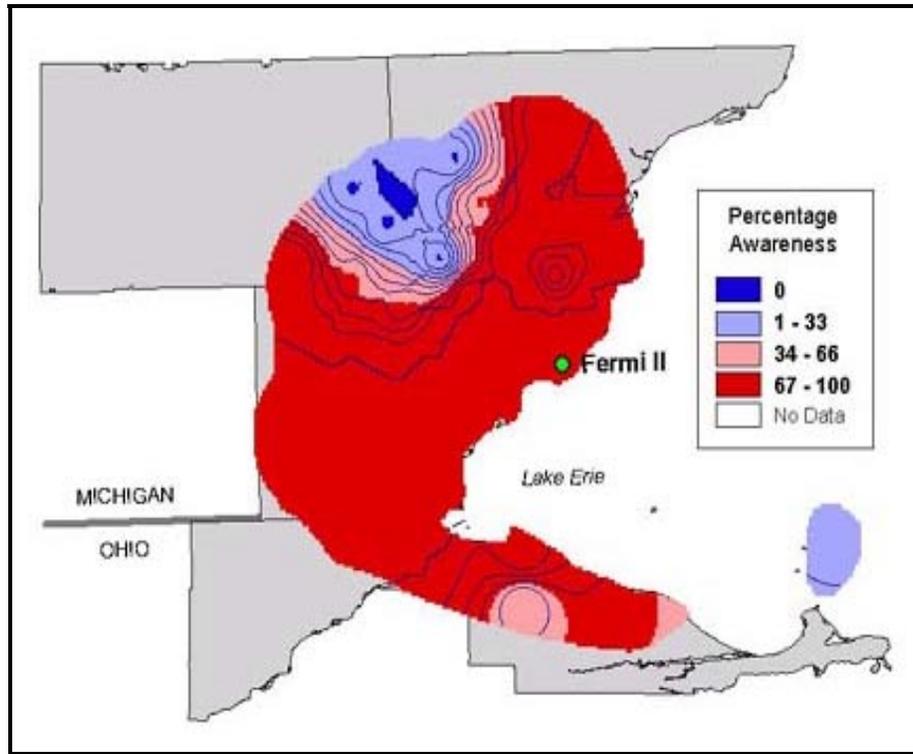
GIS enables spatial analysis of RPM data and, as such, presents the opportunity to display and view attitudinal social impact data across a geographical plane. For the first time, such data can be viewed in terms of a contoured topography where, for instance, greatest potential impact is analogous to the highest ground -- mountains and plateaus, and least potential impact is analogous to low ground -- valleys, troughs, depressions. Conversely, in terms of public participation, lowest levels of "project awareness" correspond to least potential for participation in environmental decision-making, and these would appear on an RPM map as valleys, troughs, and depressions; highest levels of awareness correspond to the greatest potential for participation and, on an RPM map, would appear as high plateaus.

But contour mapping alone tells us little about the *direction* of slope on the contours. For example, a risk perception void could easily be misinterpreted as an awareness "peak," if you will. Figure 7 shows how we compensated for this by integrating awareness contour lines with the shaded RPS presented in Figure 6. Most noteworthy is the degree of the slope at the inner most edge of the void, that is, at its point closest to Fermi. The close proximity of contour lines in that area suggested that awareness of the facility dropped off quickly and deeply. And this raised some intriguing questions: What accounts for such a drastic topographical relief? Are there differences between the sample respondents in the RPS void and those in the adjoining core area that might account for this difference in project awareness? The EARP/RPM Demonstration Project sample was too small to establish causal relationships regarding these questions, but it certainly suggested potential correlation between them and could be the subject of further analysis.

## Demographic Characteristics of "Aware" versus "Unaware" Populations

It is worth noting that the 14 percent "unaware" population was comprised of 100 percent of the non-white portion of the responding sample but only 12 percent of the white portion of the responding sample. The unaware population also included higher than average percentages of elderly, disabled, low-income, female, and newly residential -- all considered in the literature to be "environmental discrimination" variables (see, e.g., Petrikin 1995).

Figure 7: Shaded Contour Map of the Fermi II RPS



### Connotations of Risk Perception Voids

Risk perception voids *connote* differential social access to public participation in environmental management, and they illustrate the potential spatial implications of environmental discrimination. People who are not aware of a specific environmental project necessarily do not participate in decision-making processes associated with the project. To the extent that these “unaware” people tend to share certain socio-demographic and geographical factors, their lack of participation suggests a potential “participatory” link to the phenomenon of environmental discrimination. Case in point, more than 25 years after the construction of the Fermi II facility, a sample of a rural, low-income, predominantly African-American community less than 15 miles from the facility revealed that very few if any of its members were aware that the facility even existed.

Given these findings, and from a broader environmental justice perspective, we should be asking how, if at all, is not being aware of a specific environmental project or program related to social, demographic, and geographical factors, and what implications might these have for participatory equity in environmental management? Such questions are particularly germane to the GLM Network’s interest in utilizing social science methodology to identify perceptually-specific communities of environmental risk for consultation in its Great Lakes management activities.

Through the RPM Demonstration Project, for example, we now know that environmental discrimination is related, at least in part, to a community's perception of project-specific environmental risk. The key findings of this project have revealed that population-specific risk perception is dependent upon the population's awareness of a given project. Those populations that are least aware of a project are least likely to perceive environmental risks associated with it and therefore are least likely to participate in decision-making processes regarding how best to manage a project's potential social and environmental impacts. This decreased likelihood for participation necessarily decreases the likelihood that these populations' impact and mitigation issues will be reflected in environmental management decisions pertaining to a given project. This, in turn, *increases* the likelihood that these populations will bear the brunt of negative project impacts. "Environmental discrimination" exists to the extent that such impacts are born disproportionately by the same groups across numerous projects through time.

RPM maps can reveal to public participation professionals, environmental decision-makers, and affected populations alike, the potential spatial implications of environmental discrimination. In so doing, RPM maps can help them to visualize this phenomenon so that their efforts to redress it may be focused more efficiently and responsibly. Further work needs to be done to develop more complete criteria for defining a locally affected population based on community risk perception. "Project awareness" may be illustrative and instructive as a first order criterion in such definitions, but it may be insufficient, for example, as a frame for more elaborate social impact analyses. Past studies suggest considering at least four additional criteria when seeking a definition for a locally affected population, including the perceived directness, significance, number, and duration of impacts (Stoffle et al., 1991).

Locally affected populations must be defined broadly and inclusively in environmental management. Special emphasis must be placed on both the identification of "vulnerable subpopulations" *and* the social, cultural, contextual, and geographic factors that influence the relative likelihood that members of such populations will become aware of a project in the first place. In short, the *process* of public consultation must be broadly inclusive, culturally sensitive, and locally appropriate. As a methodological foundation for public consultation driven by social data, RPM enables the identification of perceptually-specific communities of environmental risk and lays the procedural basis from which population specific information and education exchanges may be developed.

## **Technology and Environment Analogs**

Data were obtained on technology and environment analogs by asking study respondents to identify up to five local projects, proposals, or events, if any, past or present, that they felt had most significantly influenced their perception of local environmental risk. In past RPM studies such information has enabled researchers to construct an environmental risk perception history within an LAP. Future analyses will examine the spatial and/or social distribution of risk perception analogs among the LAP's constituent groups.

Respondents identified a total of 274 technology and environment analogs either within or in the vicinity of the EARP/RPM Demonstration Project area. The data coding team collapsed these into nine more general categories or types, each of which contained sufficient subcategories to account

for the breadth of analogs mentioned. Table 4 lists the most commonly identified analogs (those mentioned by more than five percent of the responding sample).

It is worth noting that the Fermi II facility was identified more than twice as frequently as the next most frequently identified analog (another nuclear power facility on the outer edge of the EARP/RPM Demonstration Project area). This was not a product of having discussed the Fermi facility in the study questionnaire, as the Technology and Environment Analogs section preceded the section on Perceptions of and Responses to the Fermi II facility. Rather, it was quite likely a product of the center-point radial sampling design, which provided a greater number of interview observations nearer the center-point project under consideration (Fermi II). Still, one should not overlook the fact that another nuclear facility was the second most frequently identified analog, and this facility, called Davis-Bessey, was situated at the outer most edge of the outer most sample zone in the study area.

**Table 4: Rank Order of Top Technology and Environment Analogs in the EARP/RPM Demonstration Project**

<b>Percent of Respondents</b>	<b>Type and Location of Analog</b>
38%	Fermi II Nuclear Power Plant, Newport, MI
14%	Davis-Bessey Nuclear Power Plant, Port Clinton, OH
10%	Proposed Envotech Hazardous Wastes Incinerator, Milan, MI
9%	Detroit Edison Coal Plant, Monroe, MI
7%	Carleton Farms Landfill, southern Wayne County, MI
7%	Detroit Metropolitan Airport Expansion Project, Romulus, MI
7%	Dundee Cement Factory, Dundee, MI
6%	Lake Erie Pronounced “Dead” of Pollution in 1960s & 70s
6%	New France Stone Quarry, Monroe, MI
6%	Pesticide Use on Farms in the Region*
6%	Sterling State Park, Monroe, MI
5%	Proposed Low-Level Radioactive Waste Storage Facility, Riga, MI

Clearly, nuclear facilities – be they power generation or waste containment facilities -- can profoundly influence collective environmental risk perception. Public consultation and outreach programs targeted to perceptually-specific communities of environmental risk in southeastern Michigan and northwest Ohio must necessarily account for the socio-perceptual impact these facilities have had on local communities. For example, respondents also were asked to describe the effect, if any, that they felt these local analogs had on their perception of local environmental risk – whether positive, negative, neither, or both. A total of 90 different descriptions were given. Respondents characterized 49 percent of these as having a negative effect on their environmental risk perception. They characterized 29 percent as having both negative and positive effects, 17 percent as having a positive effect, and six percent as having neither a positive nor a negative effect. The coding team collapsed respondent descriptions into three more general categories or types that would enable more reliable statistical analyses of their spatial and/or social distribution throughout the EARP study area.

The implication here is that nuclear power plants and similar high-tech facilities typically cast a “Risk Perception Shadow,” or “RPS,” that can be expected to influence an LAP’s response to emerging environmental management issues. Thus, the RPS is a socio-perceptual phenomenon that should be addressed methodologically when implementing public participation programs in environmental management. The ability to map a project’s RPS – as demonstrated through the EARP/RPM Demonstration Project – is a methodological step in that direction. However, further adjustments to the RPM process will be necessary to advance this state-of-the-art in public participation for environmental management, and these are discussed in the recommendations section, below.

## **RECOMMENDATIONS**

The EARP/RPM Demonstration Project has been instrumental in furthering the state-of-the-art in RPM research, testing measures of cross-cultural risk perception, identifying perceptually-specific communities of environmental risk, and demonstrating methodological capacity for equitable public consultation in Great Lakes environmental management. Yet, there were potential shortcomings to the study. In this section I identify these potential shortcomings – not as a complete list, but rather what I believe to be the most pressing needs -- and recommend ways of addressing them.

### **Include the Ontario Portion of the Sample**

To more fully understand the extent and nature of the Fermi RPS the EARP study would have had to be expanded to include the Ontario sample areas. As noted previously, permission was not obtained from the relevant Canadian government sources in time to conduct the Ontario interviews; nor was permission sought from local opinion leaders in Ontario during the pre-field community consultation phase of the research. The budget would have had to be expanded to support these activities, as the initial funding was insufficient to cover the costs associated with pre-field consultation, travel, lodging, and interviews in Canada. But doing so would have provided further information on the effects that large lakes, national boundaries can have on the type and spread of environmental risk perception, and it would have provided the opportunity to characterize perceptually-specific communities of environmental risk for the Ontario portion of the study area.

### **Further Characterize the Fermi II RPS**

It is also apparent that the outer edge of the Fermi RPS was not entirely detected, with the possible exception of the northwestern quadrant of the study area in which the risk perception void was detected. This is certainly the case in the Ontario portion of the study area, where interviews were neither sought nor obtained. Moreover, I think the RPS voids warrant further attention, because this was the first RPM study to have detected this phenomenon. More in-depth ethnographic work would need to be completed in these areas. For example, a statistically valid sample of those areas would help determine the percentage distribution of awareness among the various social groups existing within them, and ethnographic interviewing would help shed light on the potential relationships between RPS voids and the geo-cultural characteristics of the people who constitute them.

## **Streamline the Questionnaire**

The questionnaire used in the EARP study was far larger than is typically used in RPM research. I noted earlier that the size of the instrument was directly related to the combined interests of three separate lines of inquiry. The first of these involved measures used previously in the Brazilian ecological awareness and environmentalist action studies, the second involved standard RPM measures, and the third involved various measures used in other social science surveys of environmental issues. Looking back on it, I'm amazed that I was able to achieve as high a response rate as I did in this study, particularly considering that the average length of interview was roughly one hour and forty minutes. But the goals and objectives of the EARP study were such that these measures and their associated interview time requirements were necessarily built into the instrument.

My recommendation to streamline the questionnaire is aimed not so much at the EARP study per se as to RPM research in general. Generally speaking, shorter interviews garner higher response rates, as potential participants are taken from their daily routines for shorter amounts of time and thus are typically more willing to participate in such studies. Past RPM studies have tested key measures of environmental risk perception, for example, regarding awareness of a given project, and the number, significance, direction, and duration of perceived impacts from it. These items are discussed in the following section on recommendations for the RPM methodology, and they are currently being incorporated into project designs for public consultation and impact assessment in future RPM studies (see, e.g., DOE 2000). I mention them here only to suggest that RPM research need not cover as extensive a range of issues as was covered in the EARP study. A streamlined RPM data collection instrument can be administered much more quickly and cheaply and perhaps at even higher response rates than were achieved in the EARP study; it is not my intention to imply that all RPM research must necessarily be as extensive as the EARP study has been.

## **Expand the Budget to Support Entire Study**

The budget for the EARP study was large enough only to cover project design, preparation, and fieldwork. To that end, and with the money-saving field strategies that were implemented throughout the study, the budget was adequate. However, substantial time and effort were later committed to seeking supplementary sources of support for data management and analysis, project write-up, and post-study community feedback (e.g., the SfAA/EPA and GLC fellowship programs). The delays associated with these efforts ultimately disrupted the study's continuity, and long periods of inactivity marked these latter phases of the project. Such delays are significant, particularly between fieldwork and analysis phases, because intervening factors can occur – such things as new environmental incidents, changes in local leadership, changes in residency, and the like – and these can potentially alter the character of a project's RPS. It is important to remember that RPM research is ultimately conducted to inform decision-makers of the geographical boundaries and perceptual/behavioral characteristics of a locally affected population. So it is vital that RPM research move as quickly as possible from fieldwork through analysis and write-up so that key impact information can be conveyed to decision-makers before intervening factors alter the character of the project's RPS.

## **Complete the Community Feedback Phase**

The EARP questionnaire included a question asking participants if they had any additional comments, questions, or observations regarding the study. One quarter (25%) of those who responded to this question indicated that they would like to receive a copy of the final report. Yet funds were not available to support analysis or write-up, let alone to distribute a final report to this many people. As noted earlier, post-study community feedback normally occurs in conjunction with data analysis and is used to explain preliminary findings and conclusions to community representatives and opinion leaders within the study area, while ensuring that the views of their constituents are not being misrepresented. Providing completed reports to those participants who requested them might be one way of addressing the community feedback phase of the research.

As it stands, the primary mode of feedback for the EARP study was funded through my SfAA/EPA fellowship at the GLC (i.e., the EARP/RPM Demonstration Project) and consisted of professional presentation and discussion of findings at the annual meeting of the International Association for Great Lakes Research (IAGLR) (<http://www.iaglr.org>). Attendees of this meeting, held in Cornwall, Ontario, in May of 2000, included both scientists and lay people from the EARP study area, and their comments are reflected in this final fellowship report. I do believe, however, that a more localized community feedback would be necessary to completely satisfy the true intent of the community feedback phase of RPM research.

## **Monitor Changes in Perceptions, Attitudes, and Behaviors**

As noted above, a project's RPS can be expected to evolve through time and therefore reflect attitudinal/perceptual changes that occur as a result of new environmental projects, incidents, and/or changes in local leadership, residency patterns, and the like. RPM research in effect takes a "snapshot" of perceived risk that accumulates in a population through its interaction with changing environmental circumstances through time. These perceptually-specific communities of environmental risk effectively define the locally affected population, to the extent that collectively held risk perceptions translate into documentable social impacts. To better understand the relationship between a project and its social impacts through time it is therefore necessary to monitor changes in community perceptions and behaviors.

Previous RPM studies, for example, the Michigan LLRW studies discussed earlier, have actually proposed using the RPM sample as the basis for monitoring the project's social effects throughout its life cycle. As a possible measure of the willingness of RPM participants to serve in a social monitoring capacity, participants in the EARP study were asked whether they would be willing to participate in a follow-up study of the same issues. Eighty-six percent of the responding sample indicated that they would be willing to participate, six percent said they "were not sure," and only eight percent said they would not be willing to participate. If this level of response were extrapolated to other RPM studies, it is reasonable to assume that an RPM sample could be used as the basis for monitoring social impacts throughout the life cycles of future environmental projects.

## RPM Sample Design Issues

I have demonstrated in this study the methodological ability to identify at a project level the geocultural extent of an LAP and, in so doing, the population-specific issues for analysis in project-level SIA. RPM studies are generative processes and provide scientifically sound bases from which new research problems may be confronted. However, to advance the state-of-the-art in RPM research and expand its influence at the broader policy level, further methodological and analytical innovation must occur at the project level (see, e.g., Burdge 1994:3-10). Two sampling design issues in particular present the opportunity for such innovation. The first of these involves the type of project under consideration; the second the topography of the area in which the project occurs. Typological and topographical factors can have a profound effect on RPM sample designs, as such designs must be flexible enough to adapt them to these unique project characteristics.

### Issues Pertaining to Project Type

At least four major typological issues must be considered in RPM sampling designs: (1) center-point radial projects, (2) multiple-point linear projects, (3) projects that have both center-point and multiple-point linear characteristics, and (4) “diffuse” or “areal” projects.

#### *Center-Point Radial Projects*

The first refers to projects located in a central location from which the intensity and direction of perceived risk are assumed to extend radially. The Fermi RPS reported here is an example of this kind of project. The sampling design for such projects reflects the assumption that risk perception extends radially, and thus consists of equally-distanced sample strata and randomly generated transects and sample areas. The size and extent of these design features are dependent upon the scope and magnitude of the project and the scale of its anticipated effects.

#### *Multiple-Point Linear Projects*

Multiple-point linear projects, on the other hand, are those which extend between a minimum of two fixed points. The intensity and direction of perceived risk is assumed to extend outwardly and rectilinearly along the project corridor(s). Examples of multiple-point linear projects would include high-voltage power transmission lines (Casper and Wellstone 1981; Bean and Vane 1978), gas and oil pipelines (Brody 1983; Mountain West Research 1979; Gray and Gray 1977), highway construction (Schlotter 1991; Onibokum 1975), transportation corridors for hazardous or radioactive wastes (Cluett and Morris 1982), and low-level military flight training corridors (Stoffle, Halmo, and Olmstead 1989). The sampling design for such projects reflects the assumption that risk perception extends outwardly and rectilinearly along the affected corridor(s), and thus consists of equally-distanced sample strata and randomly generated transects and sample areas occurring along the length of the corridor(s). The size and extent of these design features are again dependent upon the scope and magnitude of the project and the scale of its anticipated effects.

### *Combined Center- and Multiple-Point Linear Projects*

In some rare instances elements of both project types may be present, depending on the scale used to determine such matters. The 52-mile circumference of the formerly proposed SSC project in Michigan, for example, could be viewed as a large center-point project, with a locally affected population encompassing the ring's inner area while also extending outward from the edge of the circle. On the other hand, the ring itself could be viewed as a relatively linear corridor, with a locally affected population extending inward and outward along the entire length of the corridor. The extent to which the population on the inside of the ring encompasses the project's entire inner area could be determined by RPM research. Thus, the sampling design in such cases would have to integrate features present in both center-point and multiple-point linear project types.

RPM sampling designs provide ample flexibility for a research team to adapt it to such typological issues, although the methodology has yet to be tested in either linear or combination linear/center-point formats. This may soon change, however, as RPM has recently been adopted as the central method for sociocultural consultation and assessment in the Science and Technology Roadmap Volume of the Hanford Groundwater Vadose Zone Integration Project (United States Department of Energy 2000). The Hanford nuclear site, although considered a center-point project, has produced radioactive groundwater plumes that extend both radially and linearly, and linearly downstream from where it has reached the Columbia River. The RPM sample for this project will therefore likely incorporate elements of both center-point and linear designs, thereby providing the means for implementing and testing these methodological innovations in practical contexts.

### *Non-Point Source Problems*

The fourth and perhaps most challenging typological issue in RPM sampling design is posed by, for want of a better term, "non-point source problems." I should point out, though, that the term "non-point source" is typically used to refer to water pollution that comes from sources other than identifiable, site-specific facilities. I use the term here in a much broader context, referring to "diffuse" or "areal" environmental problems that are tied to neither a central point nor linear corridors between multiple points, but rather cover large and potentially disconnected areas. The challenge from an RPM sampling stand-point is how to measure variations in risk perception when there is no central point or line where perceived risk is assumed to be greatest (i.e., recall the "volcano" analogy used for central point projects, such as the Fermi facility, where perceived risk is assumed to be greatest nearest the central point and decrease monotonically as a function of distance away from that point, much like the slope of a volcano away from its caldera). RPM sampling in non-point source problems may have to follow a more archaeological grid style from which risk perception "rich points" may emerge. RPM may soon be tested on this type of project, as I have recently submitted a proposal on behalf of the GLC to incorporate RPM as the basis of public consultation for gauging the potential social impacts of aquatic nuisance species (ANS) in the Great Lakes ecosystem.

### **Issues Pertaining to Topographical Variability**

RPM sample designs must account for topographical diversity. Topographical uniformity is not generally expected to alter the basic radial and rectilinear assumptions regarding the direction

and intensity of perceived risk. But it is not yet clear to what extent large topographical features such as mountains, lakes, and canyons might influence the spread and intensity of a project's RPS. The EARP study was conducted in part to address this issue relative to a large lake (i.e., Lake Erie), so work in this area has already begun.

## **RPM Interpretive Issues**

RPM is a method for sampling an extensive population in order to identify the people who are most likely to be affected by a proposed project or environmental management problem. The geographical extent of an LAP reflects how the concept is operationalized through survey data. The operational definition of an LAP should be inclusive because it constitutes the most sensitive of all the social impact assessment study areas and generally defines the political units of consultation between an LAP and the proposers of a project or the managers of an environmental problem. Because survey data are used in this definition, the operational criteria are specific to individuals and derive from their responses to the project or problem. This procedure is used because of inherent problems when existing political units are used *a-priori*. Once survey data are used to define an LAP, however, existing political units are used as part of the consultation process and become part of the SIA of the project or environmental management problem.

The cumulative experience gained through previous RPM studies, including those of the SSC (Stoffle et al., 1988; Stoffle et al., 1987) and LLRW (Stoffle, Stone, and Heeringa 1993; Stoffle et al., 1991; Stoffle et al., 1990) projects discussed earlier, as well as the EARP/RPM Demonstration Project and newly proposed RPM research (DOE 2000; Donahue 2000), suggests that five criteria should be considered in the definition of an LAP: (1) project awareness, (2) directness of impact, (3) significance of impacts, (4) numbers of impacts, and (5) duration of impact. Both positive and negative impacts should be considered for each of these criteria. Individual impacts involve a respondent and his or her immediate family, whereas other types of impacts are generally considered to occur at the broader community level.

### **Project Awareness**

I argued previously that "project awareness" was a sufficient criterion for defining the RPS associated with the Fermi II facility. Both the EARP/RPM Demonstration Project and previous RPM research have documented that social and cultural changes occurred in their respective local areas when two-thirds or more of the local populations were aware of the respective projects. These changes were deemed sufficient to suggest that all persons in these areas would eventually be affected by the project, and, therefore, should be operationally defined as the LAP. I noted moreover that other researchers (Ellis et al., 1992:44-54; Unger, Wandersman, and Hallman 1992:55-70; Waller and Mitchell 1991:302-329; Gibbs 1990:10-11; Edelstein 1988; van der Pligt, Eiser, and Spears 1986:1-15; Werner 1985:161-167; Ridington 1982:36-42) have demonstrated that the awareness and perception of potentially hazardous conditions or projects provides sufficient impetus for social and psychological impacts to occur. Still others (Gatchel and Newberry 1991:1961-1976; Vyner 1988, 1984:5-10; Flemming et al., 1982:14-22) have shown that such impacts can be psychophysiological as well. Similarly, research on the nature, extent, and causes of environmental awareness and remedial action suggests that local people will not participate in actions designed to manage their environment if they are unaware of or perceive no risks to it (Kottak 1992:295).

## **Directness of Impacts**

Awareness may not prove to be a sufficiently discriminative criterion for all projects or environmental problems, so other criteria can be considered. One of these is whether or not the potential impacts could directly or indirectly affect a member of the LAP. Direct impacts tend to be easier to measure and have more important effects on the individual. It is assumed that fewer indirect impacts will occur to individuals because of efforts to mitigate at the broader community level.

## **Significance of Impacts**

The significance of impacts on a respondent is expected to vary. Previous RPM research suggests that respondents discriminated between a wide range of potential impacts based on how significant they perceive a change to be to them and/or their communities. There was a tendency for respondents to assign higher significance to changes that would affect their own role performance; so, for example, primary care givers tended to focus more on health and family impacts while primary wage earners focused more on employment effects for them and other community members.

## **Number of Impacts**

The number of impacts a person expects to experience is another measure of how much the person could be affected by a project. In general, it is assumed that the more impacts a person expects to experience, the more s/he will be affected by a project or environmental problem, and the more likely the individual impacts will interact with one another, creating what has been termed “synergistic relationships” or “impact synergies” (Peterson et al., 1987; Sonntag et al., 1987).

## **Duration of Impacts**

Impacts vary in the time they can be expected to persist. Some types of impact are inherently short in duration, such as project construction jobs; others persist throughout the life of the project, as in local taxes paid by the project; and still others may last forever, such as the destruction on non-renewable resources or the introduction of non-native species to new ecosystems.

These five criteria can be used individually or collectively to define the LAP for a project or environmental problem. The professional literature on the cumulative effects of project impacts (Peterson et al., 1987; Sonntag et al., 1987) suggests that attempts be made to develop models that will assign weights to variances within each criteria, and then to provide an overall calculation of potential respondent effects that more accurately reflects local perceptions of potential project impacts (see, e.g., Stoffle, Halmo, Evans, and Olmsted 1990).

## **RPM Implementation Issues**

I participated in the write-up of a scientific journal article reporting the findings of an earlier RPM study (Stoffle, Stone, and Heeringa 1993). During the review process for that article one reviewer noted that, although the RPM methodology was procedurally sound and met its stated

goals and objectives effectively, it required more time to complete than is typically allotted for the scoping phase of public participation in environmental management.

Based on lessons learned from this and past RPM projects, and given recent advances in the power of computer hardware and software – particularly GIS -- to process complex algorithms, I think the RPM sampling procedure (i.e., transects, zone distances, household selection) should be automated and linked to GIS and statistical analysis programs. The purpose would be to expedite the process of establishing the RPM sample frame for a given project, creating a geographically referenced database for key RPM variables (e.g., “awareness,” “directness,” “significance,” etc., and “project analogs”), and generating the RPM maps of the locally affected population for public participation in environmental management.

Following my earlier discussion of the RPM sampling methodology, I envision an automated RPM system in which a proposed project location need simply be entered into an existing GIS database. An RPM sampling algorithm then automatically generates a pre-determined number of equally spaced transecting lines at an angle generated randomly from due north. Ideally, the number of transects would be evenly divisible into 360 (e.g., 12, 15, 18), depending on project type and location. The algorithm also establishes a predetermined number of equally sized concentric zones emanating outward from the facility, and along each transect in each zone assigns randomly distanced points at which one-square mile sample area maps (or city blocks within them, if in an urban area) are generated and printed for use as interviewer field maps of individual sample areas. Although it may be possible through GIS to identify available addresses and their locations within a sample area, new housing construction and razing would require that field ethnographers “ground truth” the maps to ensure that all possible residents are included in the sample. Field ethnographers would thus randomly select the households within each sample area from which the participation of potential respondents would ultimately be sought.

In this automated system, as in the EARP/RPM Demonstration Project, each sample area would be geographically referenced according to transect and zone number so that key RPM data from individual interviews could be geographically linked, analyzed, and mapped as a study progressed. With the right kinds of equipment (i.e., laptop computers, relevant software) field ethnographers could input data while in the field and transmit it electronically to a central data storage and processing facility.

I believe these modifications to standard RPM sample design, fieldwork, analysis, and display procedures will effectively address the reviewer’s comment, cited above, that RPM requires more time to complete than is typically allotted for the scoping phase of public participation in environmental management. It should be noted, however, that although these modifications cover the basic RPM sampling procedure, analytically they apply primarily to the analysis and geographical display of *key* RPM variables. Supportive and supplementary data, such as provided through open-ended questioning and informal follow-up questioning to participant responses, will still require more time to code, analyze, and link to the standard RPM maps of key variables produced through this automated procedure. This is not atypical of other forms of social science research, though, that might be used to seek and analyze public participation in environmental management.

## **An Anthropological Difference in Public Consultation**

Anthropology offers significant contributions to public consultation in environmental management. From the perspective of my environmental anthropology fellowship with the GLC, foremost among these was the ability to better conceptualize the multiple human groups that comprise an LAP. From that conceptual base I was able to demonstrate to the GLC how RPM can help identify these groups and access their knowledge of local human/environment interrelationships. These conceptual and methodological tools can be used by environmental managers to avoid potential environmental discrimination that can result when particularly vulnerable segments of an LAP are not explicitly included in public consultation.

### **Conceptualizing Multiple Publics**

Cernea's classic "Putting People First" (1991) argues for the earliest possible involvement, not just of people, but of the sociocultural factors they bring to bear on projects. This raises the question of who or what constitutes "the public" (Roberts 1998; 1995). Roberts (1995) notes that in participatory terms "the public" is actually comprised of "multiple publics," an observation made years earlier by Alvin Wolfe (1978) who recognized the importance of participatory subsystems at different levels of integration. Thus, social scientists generally accept that people organize themselves into multiple and potentially overlapping social groups.

As a long-time member of the International Association for Public Participation (<http://www.iap2.org>) I can attest to the considerable challenges that this ostensibly elementary social science principle poses to the public participation practitioner. For example, one person – that is, one potential participant from the LAP consulted in an environmental management project – will belong to multiple social groups at the time his or her input is sought. It is neither unlikely nor uncommon that these groups will have competing interests vis-à-vis the project in question. How does the individual participant balance these potentially conflicting interests, and how can the public participation practitioner best account for them when establishing consultative relationships with the LAP?

### *The Participatory Importance of Etic versus Emic Characterizations of the LAP*

Anthropologists have long used the concepts of "emic" and "etic" to deal with problems such as these. From a participative standpoint, an etically conceived public derives from human organizational definitions imposed from the outside, which may or may not have any basis in social reality. An emically-conceived public, on the other hand, derives from human organizational definitions based on social interaction in cultural context. Demographic criteria such as age, gender, race, income, and the like are prime examples of etically defined social groups. For the most part, people do not organize themselves into behavioral units that correspond to these etic group definitions. Although such groupings can provide valuable information for describing the demographic characteristics of an LAP, they provide little in the way of understanding much less utilizing for participatory purposes the behavioral aspects of the human groups potentially affected by a given project.

By contrast, emically defined groups are self-defined by group interaction and always have their basis in a group's social reality. During my fellowship I would frequently discuss with my GLC colleagues experiences I had on other RPM studies. I felt that sharing such information complemented my work on the EARP/RPM Demonstration Project, and therefore was just as vital to my fellowship effort as the EARP/RPM Demonstration Project itself. One example from an earlier RPM project was particularly effective in illustrating the participatory significance of emic social groups. I was the ethnographic field manager on an RPM study of a proposed radioactive waste facility, and during that project our research team encountered several emic groups self-defined as "milksheds" – extensive collection zones for milk harvested by dairy farmers in the area. Members of the project area milkshed expressed a different level and type of concern than did members of adjoining milksheds, even though many lived much farther away, because their milk was being mutually collected and processed with milk harvested from farms located next to the proposed radioactive waste storage facility. These people responded to this project not as occupationally defined "dairy farmers" but rather as members of their respective milksheds. Without this emic understanding subsequent participation programs would have homogenized the LAP by presuming that its members' behavior was dictated by etically derived categories, such as in this case, the occupation "dairy farmer."

### *The Participatory Importance of Behavioral Groups in Social Context*

It is also important to recognize that members of the LAP belong to *multiple* emically defined groups and embody numerous and even potentially conflicting responses to a given project. Continuing the example above, ethnographic interviews were conducted among several Amish enclaves near the study area. As members of the emically-defined milkshed these people opposed the project because they feared its technology. However, as members of the larger Amish community, these same people suggested that the rumored drop in property values associated with the project would *benefit* their community by curbing the rising property values that contributed to Amish cultural dislocation. Rising property values may bode well for the upwardly mobile suburbanite, but they forced these Amish community members onto ever more agriculturally marginal lands at increasingly greater distances from each other. The project, although feared and unwanted, was viewed as the lesser of two evils. Depending on the behavioral hat one was wearing, the same people in these two social contexts presented different impact concerns and mitigation issues.

My fellowship prompted meaningful discussions of these topics among the people who develop and implement public participation processes for Great Lakes environmental management. From my anthropological perspective, the most encouraging of these discussions concerned the potential role that "indigenous knowledge" can play in securing participatory equity in Great Lakes environmental management, and why that role is largely a function of how indigenous knowledge is conceptualized and sought for participatory purposes.

### **Conceptualizing "Indigenous Knowledge" for Participatory Equity in Environmental Management**

Partridge (1984:23) has observed that "any response to [a] project, and most specifically people's participation in [it], will be mobilized, organized, and controlled through *indigenous corporate*

*groupings*." From a participatory equity standpoint it is therefore instructive to consider the current literature on "indigenous knowledge" (Purcell 1998; DeWalt 1994; Greaves 1994) because one sees reference to the concept appearing in documents pertaining to public participation and environmental justice in environmental management (Cohen and Bleakly 1997; National Environmental Justice Advisory Council [NEJAC] 1996). For instance, NEJAC (1996:6) notes in its "Model Plan for Public Participation" that "indigenous knowledge" must be "recognized" at public meetings involving environmental justice issues. Yet "indigenous knowledge" is not defined in that document, nor why or how the concept is relevant to these issues. Moreover, there seems to be a presumption that the etic category defines the knowledge, rather than vice versa. Clarity in such matters bears practical consequences for both the conduct and output of public participation in environmental management.

Purcell (1998:258-272) notes that even anthropologists have some difficulty operationalizing indigenous knowledge. For example, Greaves (1994) has edited a source book on "intellectual property rights for indigenous peoples." The contributors to that volume have promulgated at least nine different categories or types of "knowledge," including "indigenous," "traditional," "cultural," "local," "indigenous cultural," "indigenous traditional," "native cultural," "collective," "general and collective;" as well as "traditional attitudes" and the "local people" who hold them (Greaves 1994:opcit). More recent additions have been identified by Riley (2001:11-13) and include "traditional ecological knowledge" (Maffi, Oviedo, and Larson 2000) and "endangered knowledge" (Maffi 2001). Do these categories have specific meanings, or may they be used interchangeably to refer to the same basic concept – knowledge? From a participatory standpoint, are we interested in the knowledge people possess or the categories within which we include them? The conclusion reached with my GLC colleagues was that the former would generate participatory concepts that are broad and inclusive; the latter, narrow and exclusive.

Purcell (1998:260) observes that "depending on the circumstances, any aspect of culture that functions toward the long-term survival of a group may theoretically be treated as indigenous knowledge." I like this definition because it is broad and inclusive and points to the relevance of human knowledge gained through extended intimate experience with specific environmental and cultural contexts. I think exclusivity of knowledge *types* dilutes the power of the concept of culture by splintering its cognitive aspects into ever more specific, albeit not necessarily mutually exclusive categories. And much like misguided concepts of racial categorization based on insufficiently discrete phenotypical characteristics, they are confusing and potentially misleading, particularly as they relate to public participation in environmental management. Consider the issue of environmental discrimination, where the problem is not over-exploitation of the knowledge possessed by an LAP (e.g., as too often occurs with respect to the intellectual property rights of indigenous peoples). Rather, the problem lies in the under-utilization of that knowledge through institutional processes, such as public hearings, that fail to equitably identify and therefore incorporate the insights of the multiple publics which comprise the LAP (Stone ND).

*Participatory equity* should be the guiding principle for public participation in environmental management. The focus ought to be on the participation of "behavioral" (emic) groups in cross-contextual settings (Wynne 1991), rather than, or in addition to, "categorical" (etic) groups participation. The nature of one's participation will vary according to one's behavioral group affiliation and those groups' situational contexts at the time one's participation is sought. It is incumbent upon those of us who practice anthropology in the context of environmental management to utilize our anthropological perspectives to identify and make explicit the cultural

bases of the multiple behavioral groups which comprise the LAP for any given project. Indeed, the Region Five Sociocultural Characterization/Assessment fellowships were conceived to “develop material that allows environmental managers to better understand the cultural complexity and sociocultural issues associated with their work” (Johnston 1999:7-8).

## **Ethnography and Participatory Equity in Environmental Management**

Ethnography alone in public participation will not create equal social access to participation for affected populations; rather, it presents a methodological framework within which environmental managers may access the knowledge these populations have of their local environment and how changes to it will affect their lives. Quite simply, ethnography provides a culturally sensitive means of accessing the insights of local people on their terms, in their timeframes, and in locations and contexts that are familiar to them. Participatory equity will not occur in environmental management simply by increasing the publics’ access to decision-making processes. We must also increase the methodological capacity of decision-makers to access the knowledge – local knowledge, indigenous knowledge, traditional knowledge – call it what you may, that defines locally affected populations as integral members of the environmental management equation.

## **INTERNAL EVALUATION MEASURES AND PROCEDURES**

In this section of the report I identify and discuss internal evaluation procedures for public consultation and community outreach activities, including RPM, in the Great Lakes Basin (GLB). Although formative evaluation of these activities was not required in the RPM Demonstration Project, I have chosen to identify and to some extent integrate the current literature in this area and briefly discuss how it might pertain to the RPM methodology. This information will be useful as a starting point for others seeking to evaluate the effectiveness of RPM in their public consultation and community outreach activities.

### **The Oak Ridge National Laboratory Studies**

Perhaps the most comprehensive if not the most current sources on evaluating public participation efforts is offered by Schweitzer, Carnes, and Peele (1999), and Carnes et al. (1996), all of whom are with the Oak Ridge National Laboratory (ORNL) in Oak Ridge, Tennessee. These researchers have written a simple yet thorough report on the topic, which served as an “Improving the Practice” insert to the quarterly newsletter of the International Association for Public Participation (IAP2). That report built upon their past work and largely integrated the scant literature on this issue (Jordan et al., 1995; Lach, Hixson, and Ramonas 1995; Young, Williams, and Goldberg 1993; Goldenberg and Frideres 1986; Posavac and Carey 1985; Rutman and Mowbray 1983; Poister 1978; and Rosener 1978), which I have paraphrased in this Final Report. Pursuant to their work, these researchers have developed easy-to-use and widely applicable performance (outcome) indicators that they claim are acceptable to diverse stakeholders and which can be used to enhance and improve existing public participation efforts (i.e., formative evaluation).

## Public Participation Attributes and Performance Measures

The ORNL researchers developed a table listing attributes of successful public participation programs, performance indicators of the relative success of those attributes, and the types of measures (e.g., perceptual or behavioral) that would be used for each. I have recreated that table here as Table 5. The authors offered important cautions to this list, noting that:

...“a thorough evaluation requires the use of the entire package of attributes and indicators presented here, because any single measure or subset of indicators would not give a complete picture of what has been accomplished... Of course, there may be some cases that call for one or more *additional* attributes or indicators, and there may be some cases where an evaluator wants to study certain attributes more frequently than others because of a perceived need to “fix” some part of a public participation activity or program” (Schweitzer, Carnes, and Peele 1999:1).

This caution is well-taken. By its nature, evaluation – particularly a formative evaluation designed to improve the performance of, in this case, a public participation program – seeks to understand the interrelationships between all aspects of a program. So, in Table 5 for instance, one would have no frame of reference for understanding how or why “key decisions were improved” (i.e., attribute #5) without first understanding for whom those decisions were being made (attribute #1). That is, “improved decisions” is largely relative to frames of reference of those people who comprise the participation process. Still, as they go on to stress, there may be instances when a particular attribute is examined more closely than (albeit never apart from) others for the purpose of modifying or enhancing that part of the larger process. And it is in that vein that, for the purpose of this Final Report, I have chosen to focus my attention on the first attribute/performance indicator, as it most closely pertains to the role of RPM in Great Lakes environmental management.

### *Participatory Attribute # 1: Full Stakeholder Representation*

The authors identify “full stakeholder representation” as the first order attribute of successful public participation, the relative success of which can be measured as “the proportion of all identifiable stakeholder groups that have taken part in public participation efforts” (Schweitzer, Carnes, and Peele 1999:2). Indeed, the authors note that “the most valuable result of using this performance indicator is that it requires the agency performing the evaluation to identify all stakeholder groups and see how many of them have been involved with local public participation efforts. The simple act of doing this allows the interested parties to see which stakeholders have been absent and should possibly be recruited for future public involvement efforts” (Schweitzer, Carnes, and Peele 1999:3).

**Table 5: Attributes of Success and Performance Indicators to Use in Evaluating Public Participation**

ATTRIBUTE	PERFORMANCE INDICATOR	TYPE OF INDICATOR
The decision-making process allows full and active stakeholder representation	The proportion of all identifiable stakeholder groups that have taken part in public participation efforts	Behavioral
The decision-making process is accepted as legitimate by stakeholders	Participants' evaluation of the legitimacy of decision-making processes at various stages in the decision cycle	Perceptual
The sponsoring agency and other stakeholders understand each others' concerns	Internal and external stakeholders' ability to identify each others' concerns and understand the bases of those concerns	Behavioral
The public has trust and confidence in the sponsoring agency	The public's self-reported levels of trust and confidence in the sponsoring agency	Perceptual
Key decisions are improved by public participation	Judgements by internal and external stakeholders that public participation has led to better decisions	Perceptual
Key decisions are accepted as legitimate by stakeholders	Participants' evaluations of the legitimacy of important decisions	Perceptual

As stated throughout this final report, it is precisely this point that RPM seeks to address; that is, knowing the *proportion* presupposes knowledge of the whole. Yet, getting to the whole has been a persistent challenge for the public participation practitioner. I recently had the good fortune of giving a keynote presentation on this topic to the Great Lakes Chapter of the IAP2. Recurrent themes at that meeting revolved around the procedures used to define geographical boundaries for consultative purposes, to identify the social groups existing within those boundaries, and to access the information these groups possess – all with the assumption that better decisions (e.g., attribute #5) can be reached through full stakeholder representation (e.g., attribute #1). Given this widely accepted concern among the community of public participation practitioners, I am inclined to amend attribute #1 to reflect an *ex ante* rather than *ex post facto* identification of stakeholder groups. That is, formatively speaking, as the *first* order of business in public consultation, public participation practitioners must identify (i.e., to the greatest methodological extent possible) all potential stakeholder groups. Certainly, the spirit of the first ORNL performance indicator is that this also should be done after-the-fact, as part of an evaluative scheme built into the larger participatory process. But no discussion is offered of how this might be accomplished, either before or after the participation effort has been implemented, and it is to this end that RPM both contributes most to the participatory process and is most amenable to evaluative protocol.

## *RPM and Formative Evaluation of Full Stakeholder Representation*

Remaining, however, is the question of how to discern the extent to which RPM has successfully defined, identified, and accessed the full range of stakeholder groups for a given project. As conceived, RPM is a generative process insofar as local people (emic data) define the geo-cultural boundaries of the consultative relationship; it therefore is highly amenable to formative evaluation processes. For example, as noted earlier in this Final Report, Stoffle et al. (1990) proposed using the RPM framework as the basis for periodic social monitoring throughout the Michigan LLRW project lifecycle. In that model the RPM sample and associated contacts served as local monitors of project-related social impacts. I believe this role could be expanded to include further identification of potentially affected (i.e., stakeholder) groups, perhaps on a semi-annual basis. In this way the public participation proponent would acquire on-going feedback regarding both project-related social impacts and locally desired RPM-related improvements.

Of course, this model of evaluation would only be as effective as the number of participants that would be willing to continue to function as social monitors. I noted earlier that as a possible measure of the willingness of RPM participants to serve in a social monitoring capacity, participants in the EARP study were asked whether they would be willing to participate in a follow-up study of the same issues. Eighty-six percent of the responding sample indicated that they would be willing to participate, six percent said they “were not sure,” and only eight percent said they would not be willing to participate. If this level of response were extrapolated to other RPM studies it would be reasonable to assume that an RPM sample could be used as the basis for monitoring social impacts and informing locally desired participatory improvements throughout the lifecycles of environmental projects in the Great Lakes and beyond.

## **CONCLUSION**

In this final section of the report I identify future outgrowths of the EARP/RPM Demonstration Project and take a prospective look at the potential application of the RPM methodology to future GLC/GLM interests and activities. Special attention is paid to work proposed through a collaborative GLC/GLM grant proposal that I helped prepare *Pro Bono* during non-fellowship hours and how this potentially advances the mission of the SFAA/EPA Cooperative Agreement beyond this particular fellowship project. I end the report with a brief closing remark.

### **RPM Demonstration Project-Related Outgrowths**

The RPM Demonstration Project generated at least two related activities worth noting in the GLB. The first of these involves the Great Lakes Radio Consortium’s planned coverage of environmental anthropology being conducted in the GLB. This may include but not be limited to the work sponsored through the SFAA/EPA Cooperative Agreement. The second activity involves publication of RPM Demonstration Project findings professional journals, including special issues of the journals “Environmental Science and Policy” and “Practicing Anthropology.”

## **Environmental Anthropology on the Great Lakes Radio Consortium**

The Great Lakes Radio Consortium (GLRC) was created in 1995 as part of National Public Radio's (NPR) structure of regionally-based environmental reporting programs. The GLRC program mission is to establish an environmental news feed of high-quality features, produced by radio producers from around the Great Lakes, that could be inserted into the news programming of local stations. Based in Ann Arbor, Michigan, with four regional bureaus, the GLRC produces a weekly 29-minute news feed of environmental stories. Those stories are carried by a network of 140 public radio stations in ten states and reach a weekly audience of well over one million listeners. More specific goals of the Consortium include, among other things: (1) providing sustained and in-depth coverage of Great Lakes issues and to demonstrate the effectiveness of regional, national, and international collaboration; (2) broadening the geographic scope of Great Lakes environmental coverage by covering issues of regional importance and distributing them to public stations throughout the Great Lakes Region and Ontario, and; (3) addressing the media's tendency to cover environmental issues as a narrowly defined "beat" by examining the environment in the context of related political, social, and economic issues. Further information regarding the GLRC may be obtained through its website: <http://www.glrc.org/index.html>.

I believed there was a potential fit between the goals of the GLRC and the work being conducted by the SfAA/EPA fellows in the GLB. Given my close proximity to the GLRC studios, I contacted the fellowship administrators to see if they would be interested in having me inquire about possible stories on the SfAA/EPA fellowships. With their approval I contacted a long-time friend and former station manager for a local NPR affiliate. He put me in touch with Dale Willman, the newly appointed Managing Editor of the GLRC, with whom I've spoken on several occasions. Through our conversations he has decided to explore running features on environmental anthropology being conducted in the GLB. These stories may include but not be limited to the work sponsored through the SfAA/EPA Cooperative Agreement. We agreed that such stories would best be produced after the Region Five fellowships had been completed. These stories will help advance public understanding of the environmental work being conducted by applied anthropologists in the GLB, and it will provide valuable feedback to the people of the region among and for whom that work is being conducted.

## **Publication in Professional and Scientific Journals**

Another outgrowth of this fellowship project was publication in professional and scientific journals. Publication is an important form of feedback to both the scientific and lay communities alike and helps advance public understanding of the environmental work being conducted by applied anthropologists in the GLB.

Two such publications are planned for the RPM Demonstration Project. The first of these will appear in a special issue of "Practicing Anthropology," a career-oriented publication of the SfAA, focused on the work of environmental anthropology fellows throughout the life of the SfAA/EPA Cooperative Agreement. This special issue is slated for publication in Summer, 2001 (Stone 2001a). The second publication will appear in a special issue of the journal "Environmental Science and Policy." The special issue is titled "Environmental Knowledge, Rights, and Ethics:

Comanaging with Communities.” My contribution was solicited by the journal’s editor, Richard Smardon, whom I met through my fellowship project presentation at the 2000 IAGLR meeting. He requested that I submit in its entirety the paper I prepared for that conference. Only five other papers were solicited for this issue, so considerable depth of coverage was obtained in each. This special issue is slated for publication in late summer or early autumn, 2000 (Stone 2001b).

### **RPM and the Proposed Great Lakes Research Collaboratory**

Perhaps most encouraging to date has been the GLC’s continued commitment to incorporating social science into its work, as evidenced in a recent grant proposal that I helped prepare *Pro Bono* during non-fellowship hours (Donahue 2000; see Appendix 7). Although not yet funded, this proposal, submitted to the NSF under its “Biocomplexity Initiative” (NSF 1999), would enable the GLC to create a *Great Lakes Research and Management Collaboratory* for Aquatic Nuisance Species (ANS) in the GLB. The proposal explicitly cited this SfAA/EPA fellowship and called for using RPM as the cornerstone social science methodology for public consultation in ANS risk management. If nothing else, this proposal represents the GLC’s support for RPM as a social science methodology that is applicable to Great Lakes ecosystem management.

This is an exciting prospect for the GLB, applied anthropology, and the SfAA/EPA Cooperative Agreement. Pending funding, the GLC proposal would link this fellowship to the future operations of the GLC. It would further the GLC’s interests in equitable public participation in Great Lakes environmental management, while further satisfying the Demonstration Project goal of “enhancing the methodological rigor that the GLC already brings to public consultation and social research in the GLB.” In so doing, it would advance the key social science principles embodied in the Ecosystem Charter for the Great Lakes-St. Lawrence Basin, and further satisfy the SfAA/EPA Cooperative Agreement mission of “increasing the access of communities and policy-makers to anthropological and other social science expertise in solving environmental problems” (SfAA/EPA 1996:4).

### **Closing**

SIA studies have documented that a project’s social effects occur to the extent that local populations perceive themselves to be at risk from the project. “Project Awareness” is a necessary criterion for project specific risk perception and it has been used successfully to broadly define the LAP in SIA for environmental management. Anthropologists and other social scientists now recognize that group affiliation and social context can create differential social access to public participation in environmental management, and that this constitutes a participatory link to the phenomenon of environmental discrimination. For these reasons, I have argued that *participatory equity*, rather than *participatory liberty*, ought to be the guiding principle for public participation in environmental management. If participatory equity is to occur in environmental management, participation programs must be conceived from a predominantly egalitarian rather than libertarian philosophical perspective; that is to say, participation in environmental decision-making should not be a function of sociocultural or geographical circumstances that differentially restrict access to the process.

This fellowship project has advanced our understanding of the relationship between environmental discrimination and a community's perception of project-specific environmental risk. The analysis of risk perception voids in particular has shown that population-specific risk perception is dependent upon the population's awareness of a given project. In theory, those populations that are least aware of a project are least likely to perceive environmental risks associated with it and therefore are least likely to participate in decision-making processes regarding how best to manage a project's potential social and environmental impacts. This decreased likelihood for participation necessarily decreases the likelihood that these populations' impact and mitigation issues will be reflected in environmental management decisions pertaining to a given project. This, in turn, *increases* the likelihood that these populations will bear the brunt of negative project impacts. "Environmental discrimination" exists to the extent that such impacts are born disproportionately by the same groups across numerous projects through time.

To that end, I demonstrated through the SfAA/EPA and GLC fellowship programs a type of ethnographic public consultation (RPM) that uses social-perceptual data to explicitly define the geographical extent, sociocultural contexts, and unique behavioral characteristics of an LAP and document the impact and mitigation issues raised by its constituent populations. To the extent that the RPM method seeks to access these issues directly from all segments of an LAP -- on their terms and in locations and social contexts that are familiar to them -- it stands to provide them with a more equitable social access to public participation in environmental management. RPM maps can reveal to public participation professionals, environmental decision-makers, and affected populations alike, the potential spatial implications of environmental discrimination. In so doing, RPM maps can help them to visualize this phenomenon so that their efforts to redress it may be focused more efficiently and responsibly.

In closing, locally affected populations must be defined broadly and inclusively in environmental management. Special emphasis must be placed on both the identification of "vulnerable subpopulations" *and* the social, cultural, contextual, and geographic factors that influence the relative likelihood that members of such populations will become aware of a project in the first place. In short, the *process* of public consultation must be broadly inclusive, culturally sensitive, and locally appropriate. In the context of Great Lakes environmental management, RPM presents a social scientific mechanism for developing equitable population-specific information and education exchanges through which more culturally sensitive indicators of Great Lakes ecosystem integrity may emerge.

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**APPENDIX 1:**  
**Revised Statement of Work**

# **REVISED STATEMENT OF WORK**

For

**John V. Stone**  
**Environmental Anthropology Research Fellow**  
**Risk Perception Mapping Demonstration Project**

On behalf of

**The Great Lakes Commission**  
**Argus II Bldg., 400 Fourth St.**  
**Ann Arbor, MI 48103-4816**  
**Michael J. Donahue, Ph.D., Executive Director**

Sponsored by

**The Environmental Anthropology Cooperative Fellowship Program**

of

**The Society for Applied Anthropology**  
**Barbara Rose-Johnston, Ph.D., Fellowship Program Director**  
**Richard W. Stoffle, Risk Perception Mapping Demonstration Project Mentor**

and

**The United States Environmental Protection Agency, Region 5**  
**George Clark, EPA Region 5 Social Scientist and Fellowship Program Liaison**

**November, 1999**

## **REVISED STATEMENT OF WORK: Risk Perception Mapping Demonstration Project**

### **ABSTRACT**

This fellowship project will demonstrate the utility of an ethnographic approach called Risk Perception Mapping (RPM) to the public consultation and social research interests of the Great Lakes Commission (GLC) and other relevant regional organizations. These interests are reflected in the interrelated activities of a network of Great Lakes management agencies and organizations, including the GLC. In this document I refer to this network as “the Great Lakes Management Network,” or “GLM Network” for short, although no formal institutional structure exists by that name. I will use an RPM study in southeast Michigan/northwest Ohio to demonstrate methodological and analytical capacity on behalf of the GLM Network. Project deliverables will include (1) an RPM methodological description; (2) a sample RPM database; (3) an RPM analysis and display system, possibly based in an ARC-VIEW Geographic Information Systems (GIS) format; (4) a "perceptual sensitivity" map of populations in the study area; and (5) discussion of potential implications, ethical issues, and evaluation measures. Key findings pertain to perceptually-specific communities of environmental risk, with implications for participatory equity in environmental management. Applications to GLM Network interests will be established, primarily through consultation with GLC commissioners, staff, and collaborators. Preliminary discussions of methodological utility have centered on the development of population-specific information/education exchanges through which more culturally sensitive social indicators of Great Lakes ecosystem integrity may emerge.

### **INTRODUCTION**

The initial Scope of Work Contract (Contract) for this fellowship, signed August 9<sup>th</sup>, 1999, summarizes the cooperative fellowship agreement between the Society for Applied Anthropology (SfAA) and the U.S. Environmental Protection Agency (EPA), identifies the Great Lakes Commission (GLC) as the host/beneficiary organization for the fellowship project, and outlines in broad terms the objectives, schedule, and budget for subsequent fellowship activities. A copy of the Contract is attached to this document for your reference (see Attachment 1). The Contract requires the fellow to prepare a Revised Statement of Work (RSOW) reflecting modifications to the fellowship project activities, deliverables, and timelines that may have arisen through negotiations with the host organization and/or fellowship sponsors and mentors. The paragraphs below address this requirement and constitute the RSOW for this fellowship.

The remainder of this RSOW is organized into four major sections: (1) Background to Project Revisions, (2) Project Goal and Objectives, (3) RPM Demonstration Project Description, and (4) Key Activities, Anticipated Outcomes and Deliverables, and Revised Timelines.

## **BACKGROUND TO DEMONSTRATION PROJECT REVISIONS**

One of my first activities in this fellowship – after securing office space and equipment, transferring relevant data and background materials from my home office to the GLC office, and establishing contacts and rapport with my GLC colleagues – was attending the semi-annual meeting of the Great Lakes Commission (GLC). I’ve included with this RSOW a GLC “fact sheet” distributed at the meeting which describes, among other things, the Commission’s mission, function, and structure (see Attachment 2). The GLC meeting is significant to the development of this RSOW in at least two regards. Firstly, in bringing together state-appointed GLC Commissioners and other people who serve the Commission in advisory or other capacities, the meeting afforded the opportunity for me to describe the fellowship project and receive stakeholder input regarding how the project may best fit within the interests of the GLM Network. Secondly, the meeting was a joint session with the Interstate Council on Water Policy (ICWP) and focused on interstate and international cooperation in water resources management. As such, the meeting presented an opportunity to hear and meet with environmental managers working among the institutional structures that have evolved to collaboratively manage environmental resources across jurisdictional and programmatic boundaries.

One element common to most speakers’ presentations concerned the importance of public participation in environmental management. One presenter observed that public participation receives insufficient methodological consideration given its increasingly central role in environmental decision-making. Yet, aside from general statements in support of public participation, there was very little, if any, substantive discussion of the participatory process. This is not a criticism of the meeting or its speakers; indeed, public participation was not an explicit meeting theme, so one would not expect it to be addressed as such. Rather, I think it illustrates a common appreciation for the participatory dimensions of environmental management, underscoring an opportunity to develop methodological rigor in public consultation similar to that currently brought to bear in physical and biological resource management.

Following the GLC meeting I met on several occasions with Mike Donahue, Executive Director (ED) of the GLC, to discuss these observations and how they might influence the nature and timing of my project and its fit within the interests of the GLM Network. Three interests in particular were identified:

- (1) demonstrate a methodological framework for identifying and characterizing human communities that are potentially affected by Great Lakes management activities. This framework could potentially be used by the GLM Network to
- (2) develop population-specific information and education exchanges between affected populations and responsible agencies. And through the knowledge gained in these exchanges the GLM Network could further its related interest in
- (3) developing more culturally sensitive social indicators of Great Lakes ecosystem integrity.

## **DEMONSTRATION PROJECT GOAL AND OBJECTIVES**

The primary goal of my fellowship project is to further develop the methodological rigor that the GLM Network already brings to its public consultation and social research activities. My project will address this goal by demonstrating how Risk Perception Mapping (RPM) – an ethnographic approach to public consultation – can be used to meet three specific participatory objectives, including:

- (1) defining the geographical boundaries of the locally affected population (LAP) for a given project or activity;
- (2) identifying “specially affected” communities within the LAP – that is, communities with attributes which may predispose them to unique project related impacts, and;
- (3) developing locally appropriate and culturally sensitive procedures for exchanging information between affected populations and responsible agencies.

In meeting these objectives my demonstration project, and more specifically the RPM methodology, would ultimately provide the GLM Network with an ethnographic methodological framework for identifying and elaborating population-specific social indicators of Great Lakes ecosystem integrity.

## **DEMONSTRATION PROJECT DESCRIPTION**

I will use an existing RPM study – titled the “Ecological Awareness and Risk Perception Study” (EARP) – to demonstrate methodological and analytical capacity to satisfy the project goal/objectives. EPA reviewers of the initial fellowship contract requested that I further elaborate the EARP study in my revised statement of work. To that end the sections below outline (1) the history of RPM’s conceptual development, (2) the EARP study, (3) its relationship to the interests of the GLM Network, and (4) its key activities, anticipated outcomes and deliverables, and revised timelines. Given the current delays in producing this RSOW, I’ve taken the liberty of expanding the text a bit to fit project mid-term and final reporting requirements.

### **History of RPM Conceptual Development**

In the mid-1980s a team of applied anthropologists headed by Dr. Richard Stoffle (project mentor for this fellowship) was conducting social assessment research of a proposed Superconducting Super Collider (SSC) in Michigan. Comparable data from two potential host communities revealed that both differed significantly in their perception of risk from the facility despite their social and cultural similarity.

#### *Risk Perception Shadows*

Stoffle’s team developed the concept of a “risk perception shadow” (RPS) to account for this phenomenon. The RPS concept was initially based on the premise that past projects, either

completed or simply proposed, can create a collective perception of risk that is "applied" to newly proposed projects. The RPS was defined as a generally contiguous human collectivity that calculates itself to be at risk from a proposed or operating project. After becoming aware of the project this entity essentially defines itself as being "at risk" thereby opening itself to measurable social impacts regardless of whether or not adverse human or environmental risks have been scientifically established. Because an RPS is defined by perceived risk its size, shape, and sociocultural composition may differ significantly from affected communities defined solely by probabilistically derived risk assessments.

### *RPS and Public Consultation*

The SSC studies called for a *data-based procedure* for identifying the PAP for a project by measuring its RPS. The extent and influence of an RPS can be determined by many factors, including how the members of a PAP perceive a project might affect their lives. Often the PAP is identified *a priori*, that is, according to existing or predetermined criteria so that the agency in charge of managing the social and environmental assessments can issue a Request for Proposal that has a definite study area. Distance-from-site measures -- for example, all residents living or working within a 10-mile radius of a facility -- often are used, as are the boundaries of the political jurisdictions within which a project is located or has been proposed.

Political units can be major channels for public response to specific projects and thus are frequently used to define the boundaries of the PAP for project-specific consultation and participation programs. This procedure, however, can limit participation to an overly restricted population and a limited set of impact issues. The SSC research demonstrated that RPSs typically cross political boundaries, rendering such boundaries inaccurate, hence, inappropriate units for defining PAPs, for analyzing potential social impacts, and for accessing and incorporating local knowledge in project-specific decision-making. Stoffle's team worked to develop a data-based procedure for measuring and characterizing a project's RPS by mapping it across a geographical and sociocultural plane. That procedure is called Risk Perception Mapping (RPM).

### *Risk Perception Mapping*

I joined Stoffle's team at the conclusion of the SSC studies and the start of social assessment research on a proposed low-level radioactive waste (LLRW) facility in Michigan. We contracted with the state to map the RPS for each of three candidate sites as the basis for consultative relationships between the initiating agency and the PAPs for each site. But prior to the selection of candidate sites, one community in the state came to believe that it had been pre-selected to host the facility. In essence, this community "self-designated," prompting its residents to behave as though their area actually had been designated as the host location. We believed that the community's awareness of the self-designation event was sufficient to cast an RPS. We developed the ethnographic research method called Risk Perception Mapping (RPM) to map the geographical extent of the RPS and to document key sociocultural characteristics of the populations existing within it -- what we called the "geocultural extent" of the RPS. The RPS documented in the LLRW study was operationally defined as "project awareness" because it represented the widest range of potential concerns and impact issues within the study area.

Key RPM findings revealed that the RPS consisted of: (1) a 15 mile radial core area where awareness and intensity of perceived risk and potential social impact were evenly distributed; (2) areas contiguous to the core area but distributed non-linearly in various directions up to an additional 15 miles beyond the core; and (3) "islands," or areas separated from both the core and contiguous areas, up to 35 miles away from the rumored facility location. Ethnographic RPM interviews revealed that these "islands," for instance, corresponded to transportation interchanges along suspected LLRW delivery routes, and area residents feared a greater potential for accidents existed in those locations. And factors such as groundwater flows and prevailing wind patterns functioned to spread risk perception to the contiguous areas beyond the core. Through RPM, both the type and distribution of impact issues defined the PAP, providing a more accurate geocultural basis from which public consultation could then proceed.

### *Ecological Awareness and Environmentalist Participation*

Concurrently, another team of anthropologists headed by Dr. Conrad Kottak was conducting research on the effects that awareness of ecological risks had on the development of Brazilian grassroots environmental organizations and their participation in national environmental decision-making. Kottak's research focused on Angra dos Reis, a coastal town in Rio de Janeiro State, and the site of Brazil's only operational nuclear power plant. Kottak noted that increased perception of environmental risk furthered participation in environmental decision-making, and he was interested in examining his observations cross-culturally within an RPM methodological framework. I partnered with Kottak during the early to mid-1990s to design, conduct, and manage that project, which we titled the Ecological Awareness and Risk Perception (EARP) study.

### **The Ecological Awareness and Risk Perception Study**

The EARP study was jointly funded by the National Science Foundation (NSF) and the Consortium of International Earth Science Information Network (CIESIN). The research was focused on the Fermi II nuclear power plant in Monroe, Michigan because it is comparable in several ways to the Angra dos Reis site. For example, both communities are of roughly equal size (approximately 25,000); both are situated on large bodies of water (Lake Erie and Ilha Grande Bay, respectively); both are proximal to major urban centers (Detroit and Rio de Janeiro, respectively); both have a history of past environmental degradation (particularly of coastal waters); both have operational nuclear power facilities; and both are reasoned to have cast significant RPSs that could be measured and characterized by the RPM methodology. Although the EARP study provided a comparative framework for Kottak's earlier work in Brazil, it did not directly involve data collection from the Brazilian study site. Rather, it was focused solely on communities surrounding Fermi II in order to generate data that could later be compared to similar data obtained previously from communities surrounding the Brazilian site. The sections below outline the RPM methodological elements of the EARP study.

### *Study Area Definition*

The EARP study area was defined as a 25 mile radial area surrounding the Fermi II facility, and encompassed all or part of five counties, including Monroe, Washtenaw, and Wayne Counties in southeastern Michigan, and Lucas and Ottawa Counties in northwestern Ohio. The study area also extended in extreme southwestern Ontario, Canada, but permission to conduct the study in that region could not be obtained prior to the start of the EARP research.

### *Sampling Design*

A center-point radial sampling design was used to define the distribution of sample areas throughout the study area. This procedure, developed in collaboration with the Sampling Section of the University of Michigan's Institute for Social Research, is central to the RPM methodology and will be discussed in much greater detail in the methodological description section of the fellowship project report. Suffice it to say for the purposes of this RSOW, the RPM sampling design assumes that perceived risk is greatest nearest the source project – in this case the Fermi II facility – and decreases linearly as a function of distance away from the facility. The design further assumes that confounding factors such as prevailing climatic conditions, geographical features, and sociocultural attributes, to name but a few, can distort the spread of perceived risk in non-linear ways. One of the goals of RPM is to ascertain those factors and their role in distributing project-specific risk management issues throughout the potentially affected population.

### *Sample Area Definition*

The study area was divided into five five-mile concentric sample zones emanating from the Fermi II facility. A total of 17 equally spaced transecting lines were generated at a random angle from due north, emanating outward from the Fermi II facility much like the spokes of a wheel. Sample areas, defined as one-square mile areas conforming to United States Geological Survey section lines, were randomly generated across each sample zone at equally spaced distances along each transect. Some transects crossed the open waters of Lake Erie, or extended into Ontario where permission to conduct the research was not obtained, so not all transects contained a full complement of sample areas. A total of 43 sample areas were thus identified within the study area.

### *Pre-field Community Consultation*

Prior to the RPM fieldwork, I arranged and attended meetings with local community officials, opinion leaders, media, and law enforcement agencies to describe the proposed research and elicit their support for the study. The explicit goal of pre-field community consultation was to establish a reciprocal relationship between researchers and locally trusted and respected community leaders, in which the research process was opened to local scrutiny at all phases of the research in exchange for the opportunity to conduct the study in the community. The EARP study would not have been as successful, nor would it have been desirable, without these leaders' understanding of and participation in this reciprocal relationship.

### *Data Collection Instrument*

The EARP study utilized a structured RPM survey questionnaire as its primary data collection instrument, although survey respondents were encouraged to identify others with whom a more ethnographic style of interviewing occurred. The RPM questionnaire was developed concurrently with the sampling design and community consultation phases of the research, and built upon the local input received during community consultation. It was both broad in its range of issues covered and deep in the level of detail sought within particular issue areas. This was largely a result of combining Kottak's Brazilian ecological awareness and environmentalist action measures with standard RPM measures in a new project setting.

In addition to standard demographic information, the RPM instrument covered 11 interrelated issues mostly pertaining to perceived environmental risk and social impact. Of these the most relevant to this fellowship project will be a section on "Perceptions of and Responses to the Fermi Facility," because it will enable the mapping of the Fermi II RPS and the identification of perceptually-specific communities of environmental risk, with potential implications for participatory equity in environmental management. Other relevant sections include "technology and environment analogs," "organizational trustworthiness," and "participatory preferences." Time and budget will dictate the extent to which these latter sections are factored into demonstration project-related analyses.

The RPM instrument was pre-tested in four iterations among roughly 20 people of varying ages and backgrounds during the two month period immediately preceding the field work portion of the EARP study.

### *Respondent Selection and RPM Interview Process*

All structures in each sample area were sketched and numbered on a field map. Three potential respondents were selected at random from among the total number of residents identified in each sample area. Potential respondents were presented with a study description featuring photographs of the lead researchers and were encouraged to contact the University of Michigan or their local law enforcement agencies, which had been notified prior to the study, to verify its legitimacy. Interviews were either conducted on the spot, or more commonly an appointment to interview was made at the respondent's convenience. Respondent confidentiality disclosure and informed consent was obtained in either written or tape recorded format. A total sample of 128 interviews were sought through this procedure, 108 were obtained for a response rate of 84.4 percent.

### *Other Related Research Activities*

Other related methods used in the EARP study included participant observation, key-informant interviews, and informal "snowball" or respondent network interviews. Archival and other secondary data sources, including media and historical documents, were also monitored and reviewed throughout the study period.

## *Data Management*

Completed RPM survey instruments were edited for internal consistency. Closed-ended responses were pre-coded in the survey instrument and required no further coding prior to data entry and analysis. Open-ended responses, however, were abstracted and subjected to an inter-rater reliability process to develop code categories and establish internal consistency among coding staff. A mean reliability rate of 97 percent was obtained in this process, with a range of 75-100 percent across all code categories.

For this demonstration project coded data will be entered into a database management system, possibly based in an ARC-VIEW GIS format. Data entry accuracy will be verified by comparing every tenth entry for every tenth questionnaire with the data as originally coded in the hard-copy versions of those questionnaires. Agreement between these comparisons will be accepted as verification of data accuracy; discrepancies will be corrected as necessary.

## *Relationship to the Interests of the GLM Network*

I have chosen to use the EARP study as the basis for this demonstration project because it provides an extensive RPM database for a sizeable area within the Great Lakes ecosystem, and as such should be of value to the GLM Network. It should be noted, however, that although the EARP study is centered on the Fermi II facility, the GLC has no specific interest in or direct involvement with that facility. As stated previously, the Fermi II facility was selected to meet specific criteria for the EARP study apart from this fellowship. Most notably with respect to the RPM methodology, nuclear power plants typically generate considerable community risk perception and therefore present ideal RPM methodological demonstration case studies. The EARP study is applicable to this fellowship because elements of it can be used to meet the GLM Network interests identified earlier in this RSOW: (1) to demonstrate the methodological capacity to define the PAP for a given project or activity by mapping its community-specific risk perceptions, or RPS; (2) to use the RPM methodology as a framework for developing population-specific information and education exchanges between relevant agencies and key communities within the PAP; and (3) to ultimately utilize the knowledge gained through such exchanges to develop more culturally sensitive social indicators of Great Lakes ecosystem integrity.

## **KEY ACTIVITIES, ANTICIPATED OUTCOMES AND DELIVERABLES, AND REVISED TIMELINES**

I will engage in at least 13 interrelated activities to implement the RPM demonstration project for the GLM Network. These activities and their anticipated outcomes and deliverables are presented in chronological order in Table 1, below, with revised timelines identified for each activity.

**TABLE 1:  
RPM Demonstration Project Activities, Deliverables, and Timelines**

<u>Key Activities</u>	<u>Outcomes/Deliverables</u>	<u>Timelines</u>
1. <i>Network</i> with GLC staff and fellowship partners (mentors, administrators, liaisons, etc.) regarding project applications, web-site representation, and other project-related issues.	Networking.	Ongoing.
2. <i>Manage</i> GLC-related project expenses. As a no-cost obligation to the GLC, I <i>track</i> and <i>tabulate</i> phone, postage, and other office-related expenses pertaining to demonstration project activities.	Project Management.	Ongoing.
3. <i>Write</i> a detailed description of RPM methodology pertaining to this demonstration project.	RPM methodology.	Ongoing; to be included in final report.
4. In consultation with GLC staff, <i>identify</i> key analytical issues to be addressed through the demonstration project.	List of key analytical issues.	9-10/1999
5. Per the initial Contract, <i>prepare</i> a mid-term report of completed project activities.	Mid-term report.	11/1999
6. <i>Code</i> RPM database for key analytical issues in demonstration project.	Coded RPM database.	11-12/1999
7. In consultation with GLC staff, <i>develop</i> GIS-based RPM data management & mapping system.	GIS-based RPM data management & mapping system.	11/99-1/2000
8. <i>Enter and verify</i> key RPM data in GIS-based RPM data management & mapping system.	Sample RPM database for demonstration project.	12/99-1/2000
9. <i>Analyze and Map</i> key issues from sample RPM database.	Sensitivity Maps: (d) Fermi II RPS, (e) Perceptually-specific communities of environmental risk, (f) Community-specific participatory preferences.	1-2/2000
10. <i>Interpret</i> key findings and <i>identify</i> potential implications for and utility to the GLM Network.	List of Potential Implications: (e.g., participatory equity, targeted outreach, social indicators), and Ethical Issues (e.g., practitioner, project, procedural, and implementation levels).	1-2/2000
11. <i>Identify</i> internal evaluation measures and procedures for RPM in GLM Network activities.	List of Internal RPM Evaluation Measures (e.g., formative, outcome, and monitoring).	1-2/2000
12. Per the initial Contract, <i>prepare</i> a final demonstration project report.	Final Report.	2-4/2000 (TBA), see paragraph above).
13. <i>Present</i> findings from the RPM demonstration project at various scientific conferences and agency seminars.	RPM Demonstration Project Presentations (Required): (e) EPA-5 fellowship project seminar, Chicago; (f) Society for Applied Anthropology annual meeting, San Francisco; (Potential) (g) Great Lakes Commission semi-annual meeting, Duluth; (h) International Association for Great Lakes Research (IAGLR), annual meeting, Cornwall, Ontario.	TBA (4/2000?) 3/21-26/2000 TBA (5/2000) 5/21-26/2000

## **Request for Timeline Extension**

One item worth noting pertains to the date of completion for the final project report. The initial contract specified that the final report would be submitted by mid-April. However, the project to date has been delayed several weeks by difficulties in scheduling meetings with the GLC ED. These meetings have been crucial in clarifying GLC expectations regarding the project, tailoring project activities to meet those expectations, obtaining the ED's approval to proceed with the revised project activities, and framing those activities within the proper institutional management context. For example, in the abstract I note that the project is now geared toward meeting the methodological interests of the *network* of Great Lakes management agencies and organizations, which includes but is not restricted to the GLC (what I call the "GLM Network"). Having received the ED's approval on such matters, the project is now safely back on track, albeit several weeks behind schedule. I've spoken with the ED about this problem, and although he cannot commit office space and support beyond the period specified in the initial Contract, he is willing to delay receipt of the final report by the amount of delay experienced thus far.

I am requesting approval from the SfAA/EPA fellowship administrators to extend that date accordingly. In fact, I note in Table 1 that I could potentially present the project report, or at least be available to respond to questions pertaining to it, at the upcoming semi-annual GLC meeting, scheduled for early to mid-May in Duluth, MN. Perhaps the week prior to that meeting would be acceptable, as it would satisfy the current project delays and would give adequate time for the report (or a synopsis thereof) to be incorporated into the GLC meeting materials.

## **ATTACHMENT 1**

**Initial Scope of Work Contract**  
(hard-copy only; on file)

**ATTACHMENT 2**  
**Great Lakes Commission “Fact Sheet”**

1. **Name of Commission:** Great Lakes Commission
2. **Laws or treaties establishing commission:** The Great Lakes Commission is founded in both state and federal law. Its enabling legislation, the Great Lakes Basin Compact, was ratified by the legislature of each of the eight Great Lakes states between 1955 and 1963. Congressional consent, as required via the U.S. Constitution, was secured through P.L. 90-419, 90th Congress, S.660, July 24, 1968.
3. **Functions/mission:** The Great Lakes Commission is a binational compact agency composed of gubernatorially appointed and legislatively mandated representatives of the eight Great Lakes states. Associate (i.e., non-voting) members include the provinces of Ontario and Quebec. Established by joint legislative action of the Great Lakes states in 1955 and granted congressional consent in 1968, the Great Lakes Commission seeks "to promote the orderly, integrated and comprehensive development, use and conservation of the water resources of the Great Lakes Basin" (*Article I, Great Lakes Basin Compact*).

The Commission pursues this broad mandate via three principal functions: 1) information sharing among the Great Lakes states; 2) coordination of state positions on issues of regional concern; and 3) advocacy of those positions on which the states agree. The Commission addresses a range of issues involving environmental protection, resource management, transportation and economic development. A committee and task force structure, in which Commissioners and Advisors from all states participate, is the vehicle for identifying and developing issues, and subsequently recommending the adoption of positions by the full membership. Federal, regional and tribal government Observers participate, but do not vote, in all Commission activities.

4. **Methods by which commissioners are selected/appointed:** The Great Lakes Basin Compact provides for a delegation of 3 to 5 members from each of eight member states; there are 35 members in total. The number of delegates and nature of the appointment varies from one state to the next. Some states have legislatively mandated appointments (e.g., Attorney General, member of House or Senate); others leave appointments entirely open to the governor. Some states have fixed terms, others have open appointments, and yet others have a mixed arrangement. Each state delegation elects a chair that serves on the Executive Committee and also serves as primary point of contact for the Commission staff and other member states.
5. **Description of gubernatorial appointments to commission or advisory boards and committees:** Commissioners are drawn equally from three sectors: state legislatures; state environmental, natural resource and commerce agencies; and the private sector. In each state, the governor has the discretion of appointing at least one commissioner. These appointments tend to be largely private sector appointments, and include representatives from maritime industry, business, academia and citizen environmental interests. The resultant diverse membership on the Commission ensures that a broad array of Basin interests is represented, and results in significant, consensus-based policy. Appointments to

Commission task forces and committees are made by the Commissioners; these individuals are typically drawn from government, industry, academia and citizen organizations.

- 6. Budget:** The FY2000 budget of the Great Lakes Commission is \$4.34 million; approximately 20% of this total is directed at fundamental policy coordination, development and advocacy activities; the balance is directed at special programs and projects of priority interest to the Commission.

The Commission's budget, programs, and services have grown dramatically in recent years without an attendant increase in state dues (\$45,000 per year). More than 80% of the budget is drawn from grants, contracts and other income from more than 40 sources. Notably, the Commission operates its own grant programs for its members; Commission funding to each state far exceeds annual dues.

- 7. Personnel:** The Great Lakes Commission maintains a staff of 26 individuals at its Ann Arbor, Michigan offices. The Commission has one executive director, three program managers, four project managers, eleven program specialists, two research associates, one manager of financial services, one manager of support services, one administrative assistant, one database administrator and one research director emeritus. Significantly, the Commission presently maintains and staffs 17 active task forces that collectively involve more than 400 individuals from government, industry, academia and citizen organizations that contribute their time and energy to Great Lakes Commission priorities.
- 8. Contributions to nations, states and provinces:** Policymakers, managers, researchers, resource users and citizens in general, benefit from the services provided by the Great Lakes Commission. These services range from policy development and advocacy to communications, coordination and research.

#### *Policy development*

- Advises federal, state and binational agencies on policies, programs and legislative matters.
- Maintains a complete record of official policy positions of its member states for use in advocacy and policy advisory work.

#### *Regional advocacy*

- Provides expert testimony before the U.S. Congress and the Canadian Parliament.
- Works to ensure that the Great Lakes region receives its fair share of federal appropriations for research, management, environmental protection and economic development.
- Participates annually in hundreds of regional, national, and international events; Commission officers and staff are tapped frequently when a regional viewpoint is needed.

### *Communications*

- Publishes technical reports, policy positions, guidebooks, brochures and a bimonthly newsletter (the *ADVISOR*) to keep the region's policymakers and opinion leaders informed.
- Handles thousands of inquiries each year via the Great Lakes Information Clearinghouse, providing Great Lakes data, legislation, publications, research findings, program information, referrals and more.
- Offers an informed voice on Great Lakes issues to the media.
- Provides computerized, one-stop shopping for current regional data and information via the Great Lakes Information Network, which uses the latest technology to link dozens of sources in the states and provinces.

### *Coordination*

- Fosters cooperation and consensus among the eight Great Lakes states regarding policy and research priorities.
- Convenes experts from a variety of disciplines to address issues and solve problems of regional importance.

### *Research*

- Develops and advocates research priorities for the Basin, and promotes linkages between researchers, policymakers and resource managers.
- Conducts and sponsors technical research on specific priority issues, such as oil and hazardous materials spill prevention and response; air and water quality programs; and transportation/industrial policy.
- Compiles and maintains databases, statistics and related information on a broad array of regional topics.

9. **Current issues of interest:** The Commission is responsible for coordinating, developing and advocating policy on an array of regional environmental protection, resource management, transportation and economic development areas. A selective listing of current priorities is presented by program area, below.

Resource Management and Environmental Quality: non-point source pollution; soil erosion and sedimentation; oil and hazardous material spill prevention and response; aquatic nuisance species prevention and control; Areas of Concern clean-up; regional water use data base; watershed management; diversion and consumptive use; pollution prevention.

Transportation and Economic Development: Soo Lock funding; Great Lakes Circle Tour; tourism/travel promotion; maritime commerce promotion; Mayors Conference support;

U.S. Coast Guard funding; brownfields redevelopment; dredging and disposal options; sustainable development; support to State of the Lakes Ecosystem Conference.

Communications and Information Management: Great Lakes Information Network; Great Lakes Information Clearinghouse; Regional Emission Inventory of Toxic Air Contaminants; technical support to other Great Lakes agencies/organizations on electronic communications technology; ADVISOR newsletter; technical reports; outreach and training.

Regional Coordination: federal legislation/appropriations advocacy; A mini-summits on Great Lakes issues; Ecosystem Charter for the Great Lakes-St. Lawrence Basin; Agricultural Profile; Great Lakes research inventory.

- 10. Preparer of fact sheet:** Dr. Michael J. Donahue, Executive Director, Great Lakes Commission, 400 Fourth St., Argus II Bldg., Ann Arbor, MI 48103-4816; Phone: (734)-665-9135, FAX: (734)-665-4370; E-MAIL: [mdonahue@glc.org](mailto:mdonahue@glc.org); <http://www.glc.org>.

## **APPENDIX 2:**

### **Mid-Term Report**

# **MID-TERM REPORT**

## **SfAA/EPA Environmental Anthropology Fellowship Risk Perception Mapping Demonstration Project**

**John V. Stone  
Environmental Anthropology Research Fellow  
Great Lakes Commission**

**December, 1999**

### **INTRODUCTION**

In 1996, the Society for Applied Anthropology (SfAA) and the United States Environmental Protection Agency (EPA) established a cooperative agreement to support an environmental anthropology fellowship program to increase the access of communities and policy makers to anthropological and other social science expertise in the solution of environmental management problems. Under that agreement fellowship projects were initiated in 1999 in EPA Region Five to provide technical assistance and information to enable environmental management staff to better understand the cultural complexity and needs of citizens and other stakeholders in project areas. Environmental anthropology fellows identified beneficiary organizations in the region to host their respective fellowship projects, establish project-specific needs and activities, and negotiate terms of fellow/agency engagement.

I established my fellowship project with the Great Lakes Commission (GLC) in Ann Arbor, Michigan. This project is being conducted in conjunction with the GLC's own Fellowship Program, established in 1998 to create opportunities for Great Lakes professionals to work with GLC staff on issues of shared interest. My project, titled the "Risk Perception Mapping Demonstration Project," began in August 1999, and runs through April 2000. Through this project, I am demonstrating the utility of an ethnographic approach called Risk Perception Mapping (RPM) to the public consultation and social research interests of the GLC and other relevant regional organizations. The RPM project employs a database from an earlier RPM study of ecological awareness and risk perception (EARP) in a five-county area in southeast Michigan and northwest Ohio. I am using the EARP database to demonstrate the methodological capacity to identify the geographical extent and unique sociocultural contexts of populations potentially affected by environmental projects. This work is beneficial to the network of Great Lakes management agencies and organizations (GLM Network) seeking to develop population-specific information/education exchanges through which culturally sensitive social indicators of Great Lakes ecosystem integrity may emerge.

## MID-TERM PROGRESS REPORT

The initial Scope of Work Contract (Contract) for this fellowship, signed August 9<sup>th</sup>, 1999, outlines in broad terms the objectives, schedule, and budget for the fellowship. The Contract required that I prepare a Revised Statement of Work (RSOW) reflecting modifications to the fellowship project that may have arisen through negotiations with the host organization and/or fellowship sponsors and mentors. I submitted my RSOW to fellowship administrators in November, 1999, and included with it a table summarizing the major activities, deliverables, and timelines associated with the RPM demonstration project (see TABLE 1, below). The Contract also required that I prepare a mid-term progress report on these activities. The paragraphs below address Items 1-8 in TABLE 1 (in non-chronological order) and constitute the mid-term report for my fellowship project.

### *ITEM 1: Network with GLC Staff to Refine the Fellowship Project*

One of my first activities in this fellowship – after securing office space and equipment, transferring relevant data and background materials from my home office to the GLC office, and establishing contacts and rapport with my GLC colleagues – was attending the semi-annual meeting of the Great Lakes Commission (GLC). I've included with this report a GLC “fact sheet” distributed at the meeting which describes, among other things, the Commission’s mission, function, and structure (see ATTACHMENT 1). The GLC meeting was significant to the re-negotiation of my project in at least two regards. Firstly, in bringing together state-appointed GLC Commissioners and other people who serve the Commission in advisory or other capacities, the meeting afforded the opportunity for me to describe the fellowship project and receive stakeholder input regarding how the project may best fit within the interests of the GLM Network. Secondly, the meeting was a joint session with the Interstate Council on Water Policy (ICWP) and focused on interstate and international cooperation in water resources management. As such, the meeting presented an opportunity to hear and meet with environmental managers working among the institutional structures that have evolved to collaboratively manage environmental resources across jurisdictional and programmatic boundaries.

One element common to most speakers’ presentations concerned the importance of public participation in environmental management. One presenter observed that public participation receives insufficient methodological consideration given its increasingly central role in environmental decision-making. Yet, aside from general statements in support of public participation, there was very little, if any, substantive discussion of the participatory process. This is not a criticism of the meeting or its speakers; indeed, public participation was not an explicit meeting theme, so one would not expect it to be addressed as such. Rather, I think it illustrates a common appreciation for the participatory dimensions of environmental management, underscoring an opportunity to develop methodological rigor in public consultation similar to that currently brought to bear in physical and biological resource management.

#### *ITEM 4: Identify Key Analytical Issues*

Following the GLC meeting I met on several occasions with Mike Donahue, Executive Director (ED) of the GLC, to discuss these observations and how they might influence the nature and timing of my project and its fit within the interests of the GLM Network. Three interests in particular were identified:

- (1) demonstrate a methodological framework for identifying and characterizing human communities that are potentially affected by Great Lakes management activities. This framework could potentially be used by the GLM Network to
- (2) develop population-specific information and education exchanges between affected populations and responsible agencies. And through the knowledge gained in these exchanges the GLM Network could further its related interest in
- (3) developing more culturally sensitive social indicators of Great Lakes ecosystem integrity.

Thus, the primary goal of my fellowship project is to further develop the methodological rigor that the GLM Network currently brings to its public consultation and social research interests. My project will address this goal by demonstrating how Risk Perception Mapping (RPM) – an ethnographic approach to public consultation – can be used to meet three specific participatory objectives, including:

- (1) defining the geographical boundaries of the potentially affected population (PAP) for a given project or activity;
- (2) identifying “specially affected” communities within the PAP – that is, communities with attributes which may predispose them to unique project related impacts, and;
- (3) developing locally appropriate and culturally sensitive procedures for exchanging information between affected populations and responsible agencies.

In meeting these objectives my demonstration project, and more specifically the RPM methodology, will ultimately provide the GLM Network with an ethnographic methodological framework for identifying and elaborating population-specific social indicators of Great Lakes ecosystem integrity.

#### *ITEM 2: Manage GLC Project-related Expenses*

The contractual agreement with the GLC specifies that it shall not bear any direct costs associated with my fellowship project. Thus, one of my on-going activities involves tracking and tabulating communication (phone, postage, etc.) and office supply (copying, printing, paper, etc.) charges pertaining to the RPM project, which to date have totaled \$61.40. In addition, per the

initial fellowship Contract, the SfAA has reimbursed me \$330 for travel and per diem costs associated with attending the GLC's semi-annual meeting in Pittsburgh.

*ITEM 3: Write A Detailed Description of the RPM Methodology*

As noted earlier in this report, I submitted an RSOW to fellowship administrators in November, 1999. The RSOW contains a detailed description of the RPM demonstration project, including an historical overview of RPM conceptual development and research methodology. That description spans five single-spaced pages in the RSOW and as such is likely beyond the scope of this report. It will, however, be included in the final report due in May, 2000.

It's worth noting that the date of completion for the final project report (Item 12 in TABLE 1) has been extended per the RSOW. The initial Contract specified that the final report would be submitted by mid-April. However, the project to date has been delayed several weeks by difficulties in scheduling meetings with the GLC ED. These meetings have been crucial in clarifying GLC expectations regarding the project, tailoring project activities to meet those expectations, obtaining the ED's approval to proceed with the revised project activities, and framing those activities within the proper institutional management context. Having received the ED's approval on such matters, the project is now back on track, albeit several weeks behind schedule.

I spoke with the ED about the potential impact this delay could have on the completion of the final project report. Although he cannot commit office space and support beyond the period specified in the initial Contract, he is willing to delay receipt of the final report by the amount of delay experienced thus far. In the RSOW I requested and ultimately received approval from fellowship administrators to extend that date accordingly. I note in Table 1 that I could potentially present the project report, or at least be available to respond to questions pertaining to it, at the upcoming semi-annual GLC meeting, scheduled for early to mid-May in Duluth, MN. Perhaps the week prior to that meeting would be acceptable, as it would satisfy the current project delays and would give adequate time for the report (or a synopsis thereof) to be incorporated into the GLC meeting materials. Moreover, I have been invited to present my project findings at a session on public consultation and outreach at the upcoming annual meeting of the International Association for Great Lakes Research (IAGLR), May 21-26, in Cornwall, Ontario (see ATTACHMENT 2). That presentation could also serve as the final report date for the RPM demonstration project.

*ITEM 5: Prepare a Mid-term Progress Report*

This document constitutes the mid-term progress report required by the initial fellowship Contract.

*ITEMS 6--8: Code RPM Database, Develop GIS-based RPM Data Management and Mapping System, and Enter and Verify Key RPM Data*

As indicated in Items 6 through 8 in TABLE 1, I am currently coding the RPM database for key analytical issues and consulting with GLC staff to develop a GIS-based RPM data

management and mapping system. These are highly integrated tasks despite being listed as separate activities in TABLE 1. For example, it is very likely that the RPM data will be managed in an ARC-VIEW GIS format (Item 7). The parameters of that database (i.e., data field specifications, etc.) will be established in the coding process (Item 6) into which the coded data will then be entered and verified (Item 8).

I am currently involved in on-going discussions with GLC staff regarding the best and most efficient means of combining these activities. I anticipate completing them sometime in January, 2000; however, it's worth noting that I am a few weeks further behind schedule than I had initially anticipated at the start of the fellowship (see, e.g., discussion under Item 3, above). I am currently working more than half-time on the project in an effort to compensate for this deficit, but that time will become increasingly limited in coming months as I begin a teaching assignment at the University of Michigan and continue my work with other on-going consulting projects. Suffice it to say, I will keep fellowship administrators and participants informed of my progress on these and other fellowship project activities.

## **REMAINING ACTIVITIES**

Items 9 through 13 in TABLE 1 identify the remaining activities on my fellowship project. These include: (9) analyzing and mapping key issues from the RPM database, (10) interpreting key findings and identifying potential implications for the GLM Network, (11) identifying internal evaluation measures and procedures, (12) preparing a final demonstration project report, and (13) presenting project findings at various scientific conferences and agency seminars. As noted above, I'm a bit behind on the schedule laid out in the table but, if need be, should be able to compensate for delays by extending at no cost the deadline for the final project report.

I have also submitted an abstract of a project presentation to be given at an environmental anthropology session at the annual meeting of the SfAA, March 21-26, in San Francisco (see ATTACHMENT 3). A preliminary report of findings will be prepared for that presentation and will also form the basis of a project presentation at a fellowship seminar to be held in April at the EPA Region Five office in Chicago.

**TABLE 1:  
RPM Demonstration Project Activities, Deliverables, and Timelines**

<u>Key Activities</u>	<u>Outcomes/Deliverables</u>	<u>Timelines</u>
1. <i>Network</i> with GLC staff and fellowship partners (mentors, administrators, liaisons, etc.) regarding project applications, web-site representation, and other project-related issues.	Networking.	Ongoing.
2. <i>Manage</i> GLC-related project expenses. As a no-cost obligation to the GLC, <i>I track</i> and <i>tabulate</i> phone, postage, and other office-related expenses pertaining to demonstration project activities.	Project Management.	Ongoing.
3. <i>Write</i> a detailed description of RPM methodology pertaining to this demonstration project.	RPM methodology.	Ongoing; to be included in final report.
4. In consultation with GLC staff, <i>identify</i> key analytical issues to be addressed through the demonstration project.	List of key analytical issues.	9-10/1999
5. Per the initial Contract, <i>prepare</i> a mid-term report of completed project activities.	Mid-term report.	11/1999
6. <i>Code</i> RPM database for key analytical issues in demonstration project.	Coded RPM database.	11-12/1999
7. In consultation with GLC staff, <i>develop</i> GIS-based RPM data management & mapping system.	GIS-based RPM data management & mapping system.	11/99-1/2000
8. <i>Enter and verify</i> key RPM data in GIS-based RPM data management & mapping system.	Sample RPM database for demonstration project.	12/99-1/2000
9. <i>Analyze and Map</i> key issues from sample RPM database.	Sensitivity Maps: (g) Fermi II RPS, (h) Perceptually-specific communities of environmental risk, (i) Community-specific participatory preferences.	1-2/2000
10. <i>Interpret</i> key findings and <i>identify</i> potential implications for and utility to the GLM Network.	List of Potential Implications: (e.g., participatory equity, targeted outreach, social indicators), and Ethical Issues (e.g., practitioner, project, procedural, and implementation levels).	1-2/2000
11. <i>Identify</i> internal evaluation measures and procedures for RPM in GLM Network activities.	List of Internal RPM Evaluation Measures (e.g., formative, outcome, and monitoring).	1-2/2000
12. Per the initial Contract, <i>prepare</i> a final demonstration project report.	Final Report.	2-4/2000 (TBA), see paragraph above).
13. <i>Present</i> findings from the RPM demonstration project at various scientific conferences and agency seminars.	RPM Demonstration Project Presentations (Required): (i) EPA-5 fellowship project seminar, Chicago; (j) Society for Applied Anthropology annual meeting, San Francisco; (Potential) (k) Great Lakes Commission semi-annual meeting, Duluth; (l) International Association for Great Lakes Research (IAGLR), annual meeting, Cornwall, Ontario.	TBA (4/2000?) 3/21-26/2000 TBA (5/2000) 5/21-26/2000

# **ATTACHMENT 1:**

## **GLC Fact Sheet**

1. **Name of Commission:** Great Lakes Commission
2. **Laws or treaties establishing commission:** The Great Lakes Commission is founded in both state and federal law. Its enabling legislation, the Great Lakes Basin Compact, was ratified by the legislature of each of the eight Great Lakes states between 1955 and 1963. Congressional consent, as required via the U.S. Constitution, was secured through P.L. 90-419, 90th Congress, S.660, July 24, 1968.
3. **Functions/mission:** The Great Lakes Commission is a binational compact agency composed of gubernatorially appointed and legislatively mandated representatives of the eight Great Lakes states. Associate (i.e., non-voting) members include the provinces of Ontario and Quebec. Established by joint legislative action of the Great Lakes states in 1955 and granted congressional consent in 1968, the Great Lakes Commission seeks "to promote the orderly, integrated and comprehensive development, use and conservation of the water resources of the Great Lakes Basin" (*Article I, Great Lakes Basin Compact*).

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4. **Methods by which commissioners are selected/appointed:** The Great Lakes Basin Compact provides for a delegation of 3 to 5 members from each of eight member states; there are 35 members in total. The number of delegates and nature of the appointment varies from one state to the next. Some states have legislatively mandated appointments (e.g., Attorney General, member of House or Senate); others leave appointments entirely open to the governor. Some states have fixed terms, others have open appointments, and yet others have a mixed arrangement. Each state delegation elects a chair that serves on the Executive Committee and also serves as primary point of contact for the Commission staff and other member states.
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Commission task forces and committees are made by the Commissioners; these individuals are typically drawn from government, industry, academia and citizen organizations.

- 6. Budget:** The FY2000 budget of the Great Lakes Commission is \$4.34 million; approximately 20% of this total is directed at fundamental policy coordination, development and advocacy activities; the balance is directed at special programs and projects of priority interest to the Commission.

The Commission's budget, programs, and services have grown dramatically in recent years without an attendant increase in state dues (\$45,000 per year). More than 80% of the budget is drawn from grants, contracts and other income from more than 40 sources. Notably, the Commission operates its own grant programs for its members; Commission funding to each state far exceeds annual dues.

- 7. Personnel:** The Great Lakes Commission maintains a staff of 26 individuals at its Ann Arbor, Michigan offices. The Commission has one executive director, three program managers, four project managers, eleven program specialists, two research associates, one manager of financial services, one manager of support services, one administrative assistant, one database administrator and one research director emeritus. Significantly, the Commission presently maintains and staffs 17 active task forces that collectively involve more than 400 individuals from government, industry, academia and citizen organizations that contribute their time and energy to Great Lakes Commission priorities.
- 8. Contributions to nations, states and provinces:** Policymakers, managers, researchers, resource users and citizens in general, benefit from the services provided by the Great Lakes Commission. These services range from policy development and advocacy to communications, coordination and research.

#### *Policy development*

- Advises federal, state and binational agencies on policies, programs and legislative matters.
- Maintains a complete record of official policy positions of its member states for use in advocacy and policy advisory work.

#### *Regional advocacy*

- Provides expert testimony before the U.S. Congress and the Canadian Parliament.
- Works to ensure that the Great Lakes region receives its fair share of federal appropriations for research, management, environmental protection and economic development.
- Participates annually in hundreds of regional, national, and international events; Commission officers and staff are tapped frequently when a regional viewpoint is needed.

### *Communications*

- Publishes technical reports, policy positions, guidebooks, brochures and a bimonthly newsletter (the *ADVISOR*) to keep the region's policymakers and opinion leaders informed.
- Handles thousands of inquiries each year via the Great Lakes Information Clearinghouse, providing Great Lakes data, legislation, publications, research findings, program information, referrals and more.
- Offers an informed voice on Great Lakes issues to the media.
- Provides computerized, one-stop shopping for current regional data and information via the Great Lakes Information Network, which uses the latest technology to link dozens of sources in the states and provinces.

### *Coordination*

- Fosters cooperation and consensus among the eight Great Lakes states regarding policy and research priorities.
- Convenes experts from a variety of disciplines to address issues and solve problems of regional importance.

### *Research*

- Develops and advocates research priorities for the Basin, and promotes linkages between researchers, policymakers and resource managers.
- Conducts and sponsors technical research on specific priority issues, such as oil and hazardous materials spill prevention and response; air and water quality programs; and transportation/industrial policy.
- Compiles and maintains databases, statistics and related information on a broad array of regional topics.

9. **Current issues of interest:** The Commission is responsible for coordinating, developing and advocating policy on an array of regional environmental protection, resource management, transportation and economic development areas. A selective listing of current priorities is presented by program area, below.

Resource Management and Environmental Quality: non-point source pollution; soil erosion and sedimentation; oil and hazardous material spill prevention and response; aquatic nuisance species prevention and control; Areas of Concern clean-up; regional water use data base; watershed management; diversion and consumptive use; pollution prevention.

Transportation and Economic Development: Soo Lock funding; Great Lakes Circle Tour; tourism/travel promotion; maritime commerce promotion; Mayors Conference support; U.S. Coast Guard funding; brownfields redevelopment; dredging and disposal options; sustainable development; support to State of the Lakes Ecosystem Conference.

Communications and Information Management: Great Lakes Information Network; Great Lakes Information Clearinghouse; Regional Emission Inventory of Toxic Air Contaminants; technical support to other Great Lakes agencies/organizations on electronic communications technology; ADVISOR newsletter; technical reports; outreach and training.

Regional Coordination: federal legislation/appropriations advocacy; A mini-summits on Great Lakes issues; Ecosystem Charter for the Great Lakes-St. Lawrence Basin; Agricultural Profile; Great Lakes research inventory.

**10. Preparer of fact sheet:** Dr. Michael J. Donahue, Executive Director, Great Lakes Commission, 400 Fourth St., Argus II Bldg., Ann Arbor, MI 48103-4816; Phone: (734)-665-9135, FAX: (734)-665-4370; E-MAIL: [mdonahue@glc.org](mailto:mdonahue@glc.org).

**ATTACHMENT 2:**  
**IAGLR Session and Abstract**

**Session Title:** Diving Deeper: Public Education and Outreach Programs that are Making a Difference

**Session Abstract Text:** Public education and outreach on Great Lakes issues has long been recognized as an important component of protection and restoration efforts. As the year 2000 approaches, community planners are looking to implement education and outreach programs that do much more than simply create awareness and knowledge, but also motivate and empower individuals to make more sustainable choices when it comes to using resources -- like water from the Great Lakes. This session will focus on public education and outreach initiatives that have successfully fostered more sustainable behaviours, and the techniques and approaches used to bring about these results. Contributions are invited on public education and outreach programs that are making a difference in efforts to protect and restore the Great Lakes.

**Contact:** David Dilks, Session Chair; ddilks@lura.ca

**Abstract Title: Public Participation in Great Lakes Environmental Management: Seeking Participatory Equity through Ethnographic Inquiry.**

**Abstract Text:** This paper reports the activities and findings of an environmental anthropology fellowship at the Great Lakes Commission (GLC). The fellowship project demonstrated the utility of an ethnographic approach called Risk Perception Mapping (RPM) to public consultation and social research. An RPM demonstration project was conducted in a five county area surrounding the Fermi II nuclear power plant in southeastern Michigan, and focused on cultural, geographical, and social-contextual factors that influence the nature and distribution of perceived risk among potentially affected populations. Key findings pertain to perceptually-specific communities of environmental risk, with implications for participatory equity in environmental planning, impact assessment, and risk management. Parallels are drawn with RPM research applied previously to other environmental management issues. Potential applications to Great Lakes management are discussed in the context of developing population-specific information/education exchanges through which more culturally sensitive indicators of Great Lakes ecosystem integrity may emerge.

**ATTACHMENT 3:**

**SfAA Session and Abstract**

**Session Title:** Environmental Anthropology in U.S. Communities: Reports from the 1999 SfAA Environmental Anthropology Project.

**Session Abstract Text:** In this session we report the findings from some of the technical assistance projects funded in 1999 under the SfAA/EPA Cooperative Agreement. Some of the papers in this session report on the uses of applied anthropology methods to profile the sociocultural dimensions of metropolitan areas in Illinois, Michigan, and Indiana in ways that assist specific planning processes to better achieve public participation and environmental equity goals. Other papers report on technical assistance projects exploring and supporting community-based efforts to protect the source water resources of the city of Memphis, the Iroquois nation, the Elwah Klallam tribe, and the Morro Bay National Estuary. All papers discuss the contributions and difficulties encountered while working with local communities to strengthen representation and voice in environmental planning and decision-making processes. Project sponsors from the Environmental Protection Agency will comment on the applied/praxis dimensions of this work and provide suggestions for enhancing the relevancy and use of applied social science in environmental agency settings. SfAA project mentors will comment on the disciplinary methods, training, and praxis implications of this work.

**Contact:** Barbara Rose-Johnston, Session Chair; [bjohnston@igc.org](mailto:bjohnston@igc.org)

**Abstract Title:** Risk Perception Mapping Demonstration Project: Environmental Risk Perception and its Implications for Participatory Equity in Environmental Management.

**Abstract Text:** This presentation describes the utility of Risk Perception Mapping (RPM) to the sociocultural components of Great Lakes Commission (GLC) priority interests. An RPM study in southeast Michigan/northwest Ohio demonstrates methodological and analytical capacity. Project deliverables include (1) an RPM methodological description, (2) RPM database, (3) GIS-based RPM analysis and display system, (4) "perceptual sensitivity" map of populations in the study area, and (5) potential implications, ethical issues, and evaluation measures. Key findings pertain to perceptually-specific communities of environmental risk, with implications for participatory equity in environmental management. Potential applications to GLC priority interests include developing population-specific information/education exchanges through which more culturally sensitive indicators of Great Lakes ecosystem integrity may emerge.

## **APPENDIX 3:**

### **Project Update**

# **PROJECT UPDATE**

For

**John V. Stone**  
**Environmental Anthropology Research Fellow**  
**Risk Perception Mapping Demonstration Project**

On behalf of

**The Great Lakes Commission**  
**Argus II Bldg., 400 Fourth St.**  
**Ann Arbor, MI 48103-4816**  
**Michael J. Donahue, Ph.D., Executive Director**

Sponsored by

**The Environmental Anthropology Cooperative Fellowship Program**

of

**The Society for Applied Anthropology**  
**Barbara Rose-Johnston, Ph.D., Fellowship Program Director**  
**Richard W. Stoffle, Risk Perception Mapping Demonstration Project Mentor**

and

**The United States Environmental Protection Agency, Region 5**  
**George Clark, EPA Region 5 Social Scientist and Fellowship Program Liaison**

**March, 2000**

## **PROJECT UPDATE: Risk Perception Mapping Demonstration Project**

### **INTRODUCTION**

The initial Scope of Work Contract (Contract) for this fellowship, signed August 9<sup>th</sup>, 1999, summarized the SFAA/EPA Cooperative Agreement, identified the Great Lakes Commission (GLC) as the host/beneficiary organization for my fellowship project, and outlined in general terms the objectives, schedule, and budget for project activities. As required in the Contract, I submitted a Revised Statement of Work (RSOW) in November, 1999, which reflected modifications to my project activities, deliverables, and timelines that arose in the course of negotiating specific project interests and objectives with the GLC. Then in December, 1999, I submitted a mid-term report of my progress in conducting these activities to meet the objectives identified in the RSOW.

This project update continues the reporting process. I present a project chronology to mark progress on remaining negotiated activities, clarify unresolved issues, and identify anticipated end dates. Where applicable, I tie this chronology to the elements identified and discussed previously in the RSOW and Midterm reports; where necessary, I add further discussion to clarify points that I may have only implied in the earlier reports. Following this update, a conference call could be scheduled should any of the major players (i.e., Barbara, Rich, George, Theresa) still see a need for further discussion.

### **CHRONOLOGY OF KEY ACTIVITIES IN THIS PROJECT'S LIFE-CYCLE**

To reiterate from the RSOW, my fellowship project responds to the GLC's stated interest in further developing the methodological rigor that it brings to the public consultation and social research activities it conducts on behalf of the network of agencies and organizations that share an interest in Great Lakes management (i.e., Great Lakes Management Network, or "GLMN") (RSOW:2-3). This specific interest emanates from the GLC's more general commitment to integrating social science within the broader framework of Great Lakes ecosystem management, which by and large served as the basis for negotiating this fellowship. A bit of history on the process of this project's negotiation may help to clarify the nature of the relationship between the GLC's interests and my fellowship project.

#### **Courtship: Discovering Mutual Interests and Unmet Needs**

I was meeting with Mike Donahue, Executive Director of the GLC, as early as 1992 regarding potential social science applications in Great Lakes Basin (GLB) planning and management. He noted that, at that time, the GLC was involved in drafting what later came to be known as the *Ecosystem Charter for the Great Lakes-St. Lawrence Basin* (GLC 10/94). The Charter is important to this fellowship because it explicitly includes human factors as part of the

ecosystem equation, thereby laying the foundation for social science input to Great Lakes ecosystem management programs. Moreover, the Charter defines principles for Great Lakes ecosystem integrity that include, among other things, the development and implementation of public participation procedures (Principles XV-XVII) that incorporate or build upon common data collection measures and indicators of Great Lakes ecosystem health (Principle XI). These principles and definitions specify a purpose for social science methods and data within the broader framework of Great Lakes ecosystem management.

### *Risk Perception Mapping and the Ecological Awareness and Risk Perception Study*

It was during this same time that I was conducting fieldwork on *the Ecological Awareness and Risk Perception* (EARP) study (RSOW:5-8). Mike and I discussed the potential applicability of the EARP study – specifically the research methodology it employed (called Risk Perception Mapping, or “RPM”), but also its potential outcomes -- to the development of public participation processes that incorporate common social science data collection measures and indicators into Great Lakes ecosystem management (RSOW:8).

*It is important to note that the EARP study was supported with National Science Foundation (NSF) and Consortium for International Earth Science Information Network (CIESIN) funds that were left over from related work that had been conducted previously in Brazil (RSOW:5). These remaining funds were committed to EARP study design and fieldwork only; thus, no data management, analysis, or project write-up was ever conducted or completed on the EARP project.*

The EARP project was put on hold as I then left for Tampa to complete doctoral studies in applied anthropology at the University of South Florida (1993-96), after which I returned to southeast Michigan and began work as an applied anthropology research consultant and adjunct instructor of anthropology at the University of Michigan. I never lost the sense that social science in general, and anthropology in particular, could make significant contributions toward ecosystem management in the Great Lakes. This was particularly so because of the philosophical foundation that the Ecosystem Charter (which by this time had been signed into reality) provided for social science in Great Lakes ecosystem management, but also because of the encouraging discussions Mike and I had had on this topic previously. Thus I remained in informal contact with the GLC and I kept my eyes open for potential funding opportunities to further explore this potential.

### **Conception: Merging Resources to Create a Project Framework**

I first learned of potential SfAA/EPA fellowships in Region Five via e-mail late in 1998, which was subsequently confirmed in an article in the February, 1999, edition of the SfAA Newsletter (Johnston 1999:7-8). During this same time period the GLC announced the creation of its unfunded fellowship program in which the GLC provides office space and support to fellows from outside programs to work on issues of shared interest (Donahue 1998:2). The timing and the purpose of the two fellowship programs seemed to mesh very well, so I contacted Mike to see if the GLC would be interested in, and indeed if it still had an opening for, an

environmental anthropology research fellow to follow up on our earlier discussions. The opening was indeed still available, so I contacted Barbara Johnston, the SfAA/EPA fellowship administrator, for guidance in preparing an official fellowship proposal. That proposal, titled “Statement of Interest” (SOI), was submitted via e-mail to Barbara, George Clark (EPA Region 5 staff social scientist and project liaison), and Richard Stoffle (proposed project mentor) on March 9, 1999, and outlined the potential relationship between myself, the GLC, and the SfAA/EPA fellowship (SOI:3-5).

### **Gestation: Establishing Project Form and Function**

I received notice on April 9, 1999, that the SfAA Environmental Anthropology Project Advisory Committee had endorsed my fellowship proposal. Through a process of negotiation between myself, the project mentor, the GLC, and representatives from the SfAA and EPA, the GLC was eventually confirmed as the beneficiary, or “host” agency for this fellowship. Consistent with its fellowship program, the GLC provided office space and support while the SfAA/EPA fellowship provided intellectual, administrative, and financial support. An initial Scope of Work Contract (Contract) was signed for this fellowship on August 9, 1999, and outlined in *general* terms the objectives, schedule, and budget for fellowship activities. Among other things, the Contract required that *specific* goals, objectives, deliverables, and timelines be negotiated with the host agency (GLC) and reported in a Revised Statement of Work (RSOW) once they had been finalized.

### **Birth: Head First and Hungry at Project Start**

The GLC fellowship formally commenced on August 23, 1999, although labor didn’t begin until September 7, pending the availability of office space and equipment. During these first two weeks Mike and I met to discuss the specifics of the fellowship project. He reaffirmed his interest in the potential applicability of RPM to the public consultation and outreach interests of the GLC and its collaborators, and we both agreed that the EARP study would serve as an excellent demonstration project for that purpose (see, e.g., RSOW:8). Thus the Risk Perception Mapping Demonstration Project was born. Mike suggested that I spend the first few weeks of the fellowship “networking” (see, e.g., Item 1 on page 9 of the RSOW) with GLC staff, commissioners, and collaborators to help further clarify GLC interests and the potential applications of the RPM methodology to them. The plan was for me to compile the information obtained through this process, meet with Mike to approve any modifications and confirm the project’s scope and direction, and prepare an RSOW that reflected these modifications.

### **Infancy: Learning Roles, Relationships, and Expectations**

“Networking” in this context took the form of informal participant-observer interviews at Commission meetings, social functions, and general daily operations. I noted in the RSOW (page two) that I began this process at the GLC annual meeting in Pittsburgh. I shared the five-hour rides to and from the meeting with the directors of the Commission’s major program areas and was able to learn much from them about the GLC’s many projects and activities and the potential contributions my project could make to them. While at the annual meeting I met informally over

various meals with the Commission Vice-Chair and other Commissioners. We discussed their respective interests in social science and public participation and how my project might best be implemented to address those interests. Throughout the meeting I was able to meet similarly with GLC collaborators from numerous agencies and organizations. Their input reaffirmed a broad interest in further developing the methodological rigor that the Commission and its collaborators currently bring to the public consultation and outreach efforts of their various programs.

This process of informal participant-observation has continued throughout the fellowship period. Particularly early on in the process I arranged many informal luncheons with various GLC staff members to discuss virtually anything that they felt was important to the Commission, its interests, and my project. One staff member in particular – the Director of the Transportation and Sustainable Development Program – has been especially open and engaging in that regard, and he and I have since formed a solid friendship. For example, we both have four-year-old daughters with whom we shared a “daddy/daughter date” to the University of Michigan Planetarium. Our conversations are no longer restricted to the GLC or my project, although he remains open at all times for such discussions.

I have also attended more formally sponsored GLC social events, such as the Commission holiday luncheon, during which time Commissioners availed themselves to GLC staff, including fellows, to discuss Commission-related activities and initiatives. More recently I participated in a GLC-sponsored meeting on Brownfields Redevelopment/Greenfields Preservation, held at the Legal Institute of the Great Lakes, at the University of Toledo Law College, where I was able to discuss public consultation and the role of social science with numerous GLC collaborators. In addition, I’ve had the opportunity to discuss such matters further by phone with these and other collaborators with whom I did not have the opportunity to meet personally. This style of interaction helped to clarify GLC interests in my project and establish specific goals/objectives for it (see, e.g., RSOW:2-3). Informal participant-observation also presented an important opportunity for me to explain my work in detail, specifically how I see it fitting into GLMN activities. This latter point proved fruitful, as the GLC has since proposed a project that would implement RPM as the base social science methodology for public consultation in risk management throughout the GLB.

### **Adolescence: Developmental Delays and Other Difficulties**

I noted in the RSOW (page 10) that during this period I encountered significant difficulty meeting with Mike Donahue to discuss potential project modifications that arose from the networking process and to receive his permission to continue with project modifications. Because of these delays, I requested a no-cost time extension for the completion of the final project report to coincide with either the GLC’s semi-annual meeting in Duluth, MN, or the annual meeting of the International Association for Great Lakes Research (IAGLR), in Cornwall, Ontario, May 21-26 (see, e.g., items 12 & 13 in Table 1 of the RSOW). I have since been invited to present my project results at the IAGLR conference, so the GLC supports extending receipt of the final report to coincide with that presentation.

## **Middle-Age: Running the Treadmill in Pursuit of Project Goals**

Having submitted the RSOW to the project host, mentor, administrator, and sponsors, I then proceeded with work on the key activities identified in Table 1 of that document. I noted in the Mid-term Project Report (pages 2-5) that items 1-8 were either completed, near completion, or were on-going activities that would occur throughout the fellowship. I further noted that, given the project delays described above, I felt that time was slipping away on the project and so was devoting more than the contracted 20 hours per week to the effort. Moreover, to make up for lost time, I was actively seeking ways to expedite work on the remaining activities, particularly data entry, so as to maximize time spent on key analyses, interpretation, and project utilization in the context of GLC interests.

### *EARP Study Questionnaire*

Still, although I offered significant detail in describing the conceptual development of the RPM methodology (RSOW:3-5), the EARP study elements (RSOW:5-8), and its objectives relative to the GLC interests (RSOW:3, 8-10), I neglected to discuss the “key questions” from the EARP study that will provide the foundation for demonstration project analyses. To that end, I am attaching with this document a copy of the questionnaire used in the EARP study (Kottak and Stone 1992). The EARP questionnaire was developed in consultation with the University of Michigan’s Institute for Social Research and Department of Anthropology. As noted on page seven of the RSOW, it was pre-tested in four iterations among roughly 20 people of varying ages and backgrounds during the two month period immediately preceding the field work portion of the EARP study. Please note that Section Nine – “Attitudes Toward Energy Production” – has been dropped due to previously undetected internal inconsistencies in question design.

### *Key Analytical Questions and Variables*

On page seven of the RSOW, under the heading “Data Collection Instrument,” I identify key analytical *sections* from the EARP questionnaire and note that the most relevant to my fellowship project is a section titled “Perceptions of and Responses to Fermi 2.” Within that section, “project awareness” (question 10.01) – i.e., respondent awareness of the Fermi facility – is used as the key analytical variable. The reasons for this have already been discussed in the RSOW (see, e.g., p. 4). Essentially, the SIA literature has documented that project awareness represents the widest range of potential concerns and impact issues within a project study area (Stoffle, Stone, and Heeringa 1993). Moreover, “awareness” can be spatially mapped rather straightforwardly, so in addition to marking the extent of a project’s risk perception shadow (RPS), it also provides a sound analytical basis upon which to explore potential correlation among this and other key variables.

These “other key variables” might include the 08.05 series of questions in the “Technology and Environment Analogs” section, the 10.20 series of questions on “participatory preferences” in the “Perceptions of and Responses to Fermi 2” section, questions on “Organizational Trustworthiness” from section 11, and various questions from the

“Demographics” section. Of course, one never knows what sorts of interesting correlation may exist among variables; the beauty of science frequently lies in the serendipity that often seems to guide scientific discovery and application. So although I say these are “key” analytical variables, they are so only in the context of expressed GLC interests and typical RPM analytical protocol.

### *Data Entry Request*

To compensate for earlier delays in the project cycle, and thus maximize the amount of time I could spend on data analysis, interpretation, and utilization, I contacted Barbara to see if additional support for data entry could be sought through the fellowship. Having done data entry on past projects, I was well aware that my relatively slow pace and low accuracy levels would pull valuable time away from data analysis on this project. Barbara suggested that unexpended funds from a previous fellow *might* be available, and requested that I write a formal request for a budget transfer. I sized out the job and sought bids for it from a number of data entry services, including the Institute for Social Research, in the Ann Arbor area. The best bid (cheapest and fastest while guaranteeing accuracy and verification) came from Behavioral Data Services, at \$526.08. I included this information in my request, which Barbara then submitted for review and approval to the EPA.

### **Senility: Confusion in the Search for Support**

As I understand it, some confusion arose during EPA review concerning the purpose of data entry in the RPM Demonstration Project, particularly the role of prior NSF and CIESIN support for EARP study activities. Indeed, it was this confusion that largely served as the impetus for this project update. To reiterate from earlier in this document, the EARP study was supported with NSF and CIESIN funds that were left over from related work that had been conducted previously in Brazil (RSOW:5). These remaining funds were committed to EARP study *design and fieldwork only*; thus, no data management, analysis, or project write-up was ever conducted or completed on the EARP project. This “unfinished business” comprises the lion’s share of activity in the RPM Demonstration Project, the end product of which will be a demonstration of methodological capacity to meet the GLC’s interests in public consultation and outreach for Great Lakes ecosystem management (i.e., the project goal).

It’s worth noting that the need for data entry support is more urgent now than ever, given this most current delay. I suspect the delay will affect the content of my SfAA presentation, which now will focus more on methodology, preliminary findings, and potential applications in the Great Lakes management context, rather than on analysis and interpretation, as initially intended. Although data entry and analysis have been on hold during this period, I have continued my work on methodological write-up for the GLC (item 3 in Table 1 of the RSOW), potential implications/utility to the GLMN (item 10), internal evaluation measures (item 11), and the final project report (item 12).

## **Afterlife: Faith in Greener Pastures...**

Perhaps most encouraging to date has been the GLC commitment to incorporating social science into its work, as evidenced in a recent grant proposal that I helped prepare *Pro Bono during non-fellowship hours* (Donahue 2000). If funded, this proposal, submitted to the NSF under its “Biocomplexity Initiative” will enable the GLC to create a Great Lakes Research and Management Collaboratory for Aquatic Nuisance Species (ANS) in the GLB. The proposal explicitly cites this SfAA/EPA fellowship and calls for using RPM as the cornerstone social science methodology for public consultation in ANS risk management. If nothing else, this proposal stands as evidence of the GLC’s support for RPM as a social science methodology that is applicable to Great Lakes ecosystem management.

This is an exciting prospect. Pending funding, the GLC proposal will link this fellowship to the future operations of the GLC. It will meet GLC interests as stated in the RSOW (page 2) while satisfying the demonstration project goal of “enhancing the methodological rigor that the GLC already brings to public consultation and social research in the GLB.” In so doing, it will meet the key social science components of the principles embodied in the Ecosystem Charter for the Great Lakes-St. Lawrence Basin. And to the extent that this work is formally implemented in Great Lakes ecosystem management activities, it will satisfy the SfAA/EPA Cooperative Agreement mission, which is to “increase the access of communities and policy-makers to anthropological and other social science expertise in the solution of environmental problems” (SfAA/EPA Cooperative Agreement:4).

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1999 Mid-Term Report for the Risk Perception Mapping Demonstration Project. Mid-term report of project activities submitted to the SfAA/EPA Fellowship Advisory Committee, December, 1999.

## **APPENDIX 4:**

**RPM Demonstration Project Announcement on the GLC Website**

## Meet the GLC's Environmental Anthropology Fellow

As part of its Great Lakes Commission Fellowship Program, the Great Lakes Commission (GLC) is currently hosting an Environmental Anthropology Fellow on behalf of the network of agencies and organizations that share an interest in Great Lakes environmental management. The GLC Fellowship Program was established in 1998 to create opportunities for Great Lakes professionals to work with GLC staff for up to 12 months on issues of shared interest.

Environmental Anthropology Fellow John Stone, a doctoral candidate in applied anthropology at the University of South Florida, Tampa, comes to the GLC through an Environmental Anthropology Fellowship Program sponsored jointly by the Society for Applied Anthropology (SfAA) and the US EPA. The SfAA/EPA Fellowship Program was established in 1996 to increase the access of communities and policy-makers to anthropological and other social science expertise in the solution of environmental management problems.



Mr. Stone's fellowship project, titled the "Risk Perception Mapping Demonstration Project," runs from August 1999 through October 2000. Through this project, Mr. Stone will demonstrate the utility of an ethnographic approach called Risk Perception Mapping (RPM) to the public consultation and social research interests of the GLC and other relevant regional organizations. The RPM study employs an existing database of environmental risk perception and community response in a five-county area in southeast Michigan and northwest Ohio, and demonstrates the capacity to identify the geographical extent and unique sociocultural contexts of populations potentially affected by environmental projects. Mr. Stone's project will be of interest to agencies and organizations seeking to develop population-specific information/education exchanges through which culturally sensitive social indicators of Great Lakes ecosystem integrity may emerge.

John Stone may be contacted directly at the GLC for information on the RPM Demonstration Project: [jstone@glc.org](mailto:jstone@glc.org); (734)-665-9135. For additional information about the SfAA Environmental Anthropology Fellowship and other joint SfAA/EPA activities, see <http://www.sfaa.net/eap/abouteap.html>.

**APPENDIX 5:**  
**EARP/RPM Code Convergence Table**

## EARP/RPM CODE CONVERGENCE VALUES FOR INTER-RATER RELIABILITY

Question #	Coder #1	Coder #2	Coder #3	Coder #4	Convergence Percentages*
01.02.01	02; 03	02	02	02	100
	04; 03	04	04	04	100
					200/2 = <b>100%</b>
02.10	10(14)	10(14)	10(14)	10(14)	100
	10(14)	10(14)	10	10(14)	100
	10(12)	10(12,13)	10	10(12)	100
					300/3 = <b>100%</b>
02.11.01	10; 20	10	10	10	100/1 = <b>100%</b>
02.12	30; 10; 20	30	30	30	100
	40; 20; 10	40; 20	40; 20	40; 20	100
	20; 10; 30	30; 10(12)	40; 30	40; 30	50
					250/3 = <b>83%</b>
02.13/01	40; 30	40; 30	40	40; 30	100/1 = <b>100%</b>
07.01.01	10; 30	30	30	30	75
	30	10	10; 30	10; 30	75
					150/2 = <b>75%</b>
08.05.01	30(32); 07	30(32); 07	30(32)	30(32)	100
	06; 30(35)	30(36)	30	30(36)	75
	20(21)	20(21)	21	21	100
	07; 10(13)	07	07	07	100
	08; 06	08	08	08	100
	30(32)	30; 04; 03	32	32	100
	08; 06	08; 06	08	08	100
	03; 07	03	03	03	100
	07.03	07; 03; 06	07	07; 03	100
	07; 30(34); 03	07; 30(34); 06	07	07; 03	100
					975/10 = <b>98%</b>

\* All percentages have been rounded to the nearest whole number.

Question #	Coder #1	Coder #2	Coder #3	Coder #4	Convergence Percentages*
08.06.01	30(33); 06	30(33)	33	33; 06	100
	20(23)	20(23); 05	23	23	100
	20(22); 06	20(22); 05	22	22; 06	100
	30(34); 06	30(34); 05	34	34; 03	100
	04	04; 30(34)	04	04	$\frac{100}{500/5} = 100\%$
08.07.01	10(11)	10	10	10(12)	100
	10(12)	10(12)	12	10(12)	100
	30	10	10	10	$\frac{75}{275/3} = 92\%$
09.02.01	20; 30	20; 30	20	20(22)	100
	20(21)	20; 10	20(21); 11	20(21)	100
	30; 10	10(11); 20(22)	30; 10	30; 10	75
	10(12)	10(12)	10	10(12)	$\frac{100}{375/4} = 94\%$
09.03.01	20	20	20	20(22)	100
	10	10	10	10; 31	100
	30	30	30	30; 31	$\frac{100}{300/3} = 100\%$
09.04.01	30; 10	30; 10	30	30	100
	10; 40	10(11); 40	10	10(11); 40	100
	20	20	20	20	$\frac{100}{300/3} = 100\%$
09.05.01	30; 20	20(23)	20	20(23)	75
	20(22)	20(22)	20	20(22)	100
	30	30(32)	30	30(32)	$\frac{100}{275/3} = 92\%$
10.08.01.01	40	40	40	40	100/1 = 100%
10.10	10; 40; 30	10	10; 40	10; 40	100/1 = 100%
10.13.01	30(32)	30(32)	30	30(32)	100/1 = 100%

\* All percentages have been rounded to the nearest whole number.

Question #	Coder #1	Coder #2	Coder #3	Coder #4	Convergence Percentages*
10.14	50; 40; 30	30; 40	30; 40	30; 40	75
	30	30	30	30	$\frac{100}{175/2} = 88\%$
10.15.01	50	50	50	50	100
	30; 50	30; 10	30	30	$\frac{100}{200/2} = 100\%$
11.01	20; 10; 30	10(12)	12	10(12)	75
	10(13)	10(13)	13	10(13)	100
	10; 30	10(12)	10	10(12)	$\frac{100}{275/3} = 92\%$
11.02.01	20; 10(13)	20	20	20	100
	30	30	30	30	$\frac{100}{200/2} = 100\%$
13.07	09; 10	19; 10	09; 10	09; 10	100/1 = 100%
13.09.01.01	97	97	97	97	100/1 = 100%
13.17	20	20	20	20	100
	20; 30	20; 97	20; 97	20; 97	$\frac{100}{200/2} = 100\%$
13.18.01	20	20; 97	20; 97	20; 97	100/1 = 100%
13.21	10	10(11)	10	10(14, 11)	100
	20	20	20(23)	20(23)	100
	-	10(13)	-	13	100
	20	20	20	20(24)	$\frac{100}{400/4} = 100\%$

\* All percentages have been rounded to the nearest whole number.

#### SUMMARY STATISTICS:

**Mean Convergence:** 97% (2,414 total percentage points/by 25 open-ended questions = 96.56%, rounded to 97%).

**Range of Convergence:** 100 - 75% (17 @ 100%; 1 @ 98%; 1 @ 94%; 3 @ 92%; 1 @ 88%; 1 @ 83%; 1 @ 75%).

## **APPENDIX 6:**

### **EARP/RPM Demonstration Project Data Codebook**

## FINAL EARP/RPM DEMONSTRATION PROJECT DATA CODEBOOK

### Notices:

1. This document integrates code categories with the survey questionnaire; code numbers and their corresponding code descriptions are listed for both closed- and open-ended questions.
2. This document also includes code categories for the interview cover sheet; these appear as the last section of this codebook. Cover sheet data were not key-punched and so do not appear in the EARP/RPM Demonstration Project database.
3. Primary-level code categories for each question (e.g., level 10, 20, 30, 40, etc.) are listed in bold-faced print; sub-categorical levels within them (e.g., 21, 22, 23, 24, etc.) are indented and listed in regular print.
4. The variable names for use in data analysis are listed in capital letters, in parentheses, after the questions to which they refer.

## QUESTIONNAIRE HEADER

**Interview Number (IW\_NUMBER):** Range = 001 - 128

**Sample Area Number (TRAN\_ZONE):** (expressed as a three-digit decimal combination of sample transect number and sample zone number).

*Transect Number:* Range = 01 - 14 (Note: 17 transects were randomly assigned @ 21 degree intervals [360 degrees divided by 21 degree intervals equals 17 sample transects]. Transect number 15 extended exclusively through Ontario, CN, and permission was not sought for this study in Canada; transect numbers 16 and 17 extended exclusively over the open waters of Lake Erie and thus crossed no viable sample areas).

*Zone Number:* Range = 1 - 5 (each at 5.4 mi., 8.6 km.; study zone radius = 27 mi., 43 km. -- distance between Fermi II and Davis-Bessey nuclear power plants).

	ZONE				
	01.1	01.2	01.3	01.4	01.5
	02.1	02.2	02.3	02.4	02.5
	03.1	03.2	03.3	03.4	03.5
	04.1	04.2	04.3	04.4	04.5
	05.1	05.2	05.3	05.4	05.5
<b>T</b>	06.1	06.2	06.3	06.4	06.5
<b>R</b>	07.1	07.2	07.3	07.4	07.5
<b>A</b>	08.1	08.2	08.3	08.4	08.5
<b>N</b>	09.1	09.2	09.3	09.4	09.5
<b>S</b>	10.1	10.2	10.3	10.4	10.5
<b>E</b>	11.1	11.2	11.3	11.4	11.5
<b>C</b>	12.1	12.2	12.3	12.4	12.5
<b>T</b>	13.1	13.2	13.3	13.4	13.5
	14.1	14.2	14.3	14.4	14.5

**Date of Interview (IW\_DATE):** Range = 09/15/1992 - 04/26/1993; Missing data = 99/99/9999

**Time at Start of Interview (TIME\_START):** Range = 09.20 - 22.40; Missing data = 99.99

**Length of Interview (IW\_LENGTH):** Range = 0.25 - 5.25; Missing data = 9.99

## QUESTIONNAIRE SECTION 01: INTRODUCTION

Q#: 01.01 Would you have a few minutes for me to explain the study and how your household was selected for participation? (APPOINTMNT)

<u>Code Number</u>	<u>Code Description</u>
01.	No
02.	Yes
96.	Appointment
97.	Other (specify) - No responses in this category
99.	No response/missing data

Q#: 01.02 (If not refused at 01.01) Do you (selected respondent) consent to be interviewed for this study? (CONSENTYPE)

<u>Code Number</u>	<u>Code Description</u>
01.	No consent given
02.	Yes, verbal (skip to 01.03)
03.	Yes, written (skip to 01.03)
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 01.02.01 (If "No consent given" at 01.02) Reason for not consenting to be interviewed. (WHY\_REFUSE)

<u>Code Number</u>	<u>Code Description</u>
01.	No reason given
02.	Reason: Family considerations/obligations - Spouse didn't think family should be bothered - Didn't want to upset spouse - Husband will not allow anyone to speak with her - Husband is ultimate authority, not her - Family policy to never participate in surveys

<u>Code Number</u>	<u>Code Description</u>
03.	Reason: Lack or loss of interest - Just don't come back - Tired of thinking about it - Just not interested in the environment - Just doesn't want to participate -- "nobody does" - Lost interest since first contact; no longer interested - Thought study was going to be about something else
04.	Reason: Unable to participate - Farmer -- unusually wet summer and fall so he's been unable to harvest until now. By the time he finishes he will begin planting cycle; no time until next June (beyond study period) - Moving soon and now in process of packing

- Respondent very ill: family called anthro. office to say respondent is very old and very near death
  - Respondent not well from major surgery
98. **Don't know/no opinion**
99. **No response/skip/not applicable/missing data**

Q#: 01.03 I will take notes as we talk, but I'd like to make sure I record accurately what we say. Would it be all right if I tape record our conversation? (RECORD)

<u>Code Number</u>	<u>Code Description</u>
01.	No
02.	Yes
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 01.04 Have you heard about the interviews we are conducting? (HEARD\_IWS)

<u>Code Number</u>	<u>Code Description</u>
01.	No (skip to 02.01)
02.	Yes
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 01.04.01 (If "yes" to 01.04) Through what sources did you learn of it? (SRC\_LRN1 - SRC\_LRN5)

<u>Code Number</u>	<u>Code Description</u>
01.	Saw a story on television
02.	Heard about it on the radio
03.	Read about it in a newspaper
04.	Read about it in a magazine
05.	At an organized meeting
06.	Informal discussion among family/friends/neighbors
07.	Heard about it from elected official(s)
08.	Religious organization
97.	Other (specify) <ul style="list-style-type: none"> <li>- No responses in this category</li> </ul>
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 01.04.02 (If "yes" to 01.04) What did you hear? (STUDY\_HRD1 - STUDY\_HRD5)

<u>Code Number</u>	<u>Code Description</u>
01.	A study/interviews
02.	A study of risk
03.	A study of the environment
04.	A study of nuclear power
05.	A study of Fermi 2

- 97. **Other (specify)**  
- No responses in this category
- 98. **Don't know/no opinion**
- 99. **No response/skip/not applicable/missing data**

**QUESTIONNAIRE SECTION 02: PERCEPTIONS OF COMMUNITY**

Q#: 02.01 I am going to read you a list of community attributes. Please indicate for each item whether you think the quality of that attribute is very poor, poor, fair, good, or very good.

**Community Attributes, Listed by Question**

- 02.01.01 Drinking water (WATER\_QUAL)
- 02.01.02 Air (AIR\_QUAL)
- 02.01.03 Recreation/play areas (PLAY\_QUAL)
- 02.01.04 Schools (SKOOL\_QUAL)
- 02.01.05 Hospitals/health facilities (HOSP\_QUAL)

<b><u>Code Number</u></b>	<b><u>Code Description</u></b>
01.	<b>Very poor</b>
02.	<b>Poor</b>
03.	<b>Fair</b>
04.	<b>Good</b>
05.	<b>Very good</b>
98.	<b>Don't know/no opinion</b>
99.	<b>No response/skip/not applicable/missing data</b>

Q#: 02.02 Overall, would you say that the quality of life in your community is worsening a lot, worsening a little, staying about the same, improving a little, or improving a lot? (QUAL\_LIFE)

<b><u>Code Number</u></b>	<b><u>Code Description</u></b>
01.	<b>Worsening a lot</b>
02.	<b>Worsening a little</b>
03.	<b>Staying about the same</b>
04.	<b>Improving a little</b>
05.	<b>Improving a lot</b>
98.	<b>Don't know/no opinion</b>
99.	<b>No response/skip/not applicable/missing data</b>

Q#: 02.03 Do you think your community faces any problems today? (COM\_PROBS)

<b><u>Code Number</u></b>	<b><u>Code Description</u></b>
01.	<b>No</b>
02.	<b>Yes</b>
98.	<b>Don't know/no opinion</b>
99.	<b>No response/skip/not applicable/missing data</b>

Q#: 02.04 Do you think racial and ethnic prejudice is a problem in your community? (RACE\_PREJ)

<u>Code Number</u>	<u>Code Description</u>
01.	No
02.	Yes
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 02.05 Do you think racial and ethnic prejudice is a problem in the United States? (US\_PREJ)

<u>Code Number</u>	<u>Code Description</u>
01.	No
02.	Yes
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 02.06 How would you say the level of racial and ethnic prejudice in your community compares to that of the United States? Would you say your community is much less prejudiced, less prejudiced, about the same, more prejudiced, or much more prejudiced than the United States? (PREJ\_LEV)

<u>Code Number</u>	<u>Code Description</u>
01.	Much less prejudiced
02.	Less prejudiced
03.	About the same
04.	More prejudiced
05.	Much more prejudiced
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 02.07 Generally speaking, how dangerous is your community? (COM\_DNGR)

<u>Code Number</u>	<u>Code Description</u>
01.	Not at all dangerous
02.	Not very dangerous
03.	Somewhat dangerous
04.	Very dangerous
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 02.08 Overall, would you say that your community is becoming much less dangerous, a little less dangerous, staying about the same, a little more dangerous, or much more dangerous? (DNGR\_TREND)

<u>Code Number</u>	<u>Code Description</u>
01.	Much less dangerous
02.	A little less dangerous
03.	Staying about the same
04.	A little more dangerous

<u>Code Number</u>	<u>Code Description</u>
05.	<b>Much more dangerous</b>
98.	<b>Don't know/no opinion</b>
99.	<b>No response/skip/not applicable/missing data</b>

Q#: 02.09 Do you think the natural environment and your community are related? (COM\_ENV1)

<u>Code Number</u>	<u>Code Description</u>
01.	<b>No (skip to 02.10)</b>
02.	<b>Yes</b>
98.	<b>Don't know/no opinion</b>
99.	<b>No response/skip/not applicable/missing data</b>

Q#: 02.09.01 (If "yes" to 02.09) Which of the following choices would you say best describes the relationship between your community and the natural environment? (COM\_ENV2)

<u>Code Number</u>	<u>Code Description</u>
01.	<b>Community and environment are not related</b>
02.	<b>Community part of environment</b>
03.	<b>Environment part of community</b>
04.	<b>Environment and community are one in the same</b>
98.	<b>Don't know/no opinion</b>
99.	<b>No response/skip/not applicable/missing data</b>

Q#: 02.10 How do you define the concept of "progress?" (PROG\_DEF1 - PROG\_DEF5)

<u>Code Number</u>	<u>Code Description</u>
10.	<b>Change/Advancement/Improvement upon or from an earlier condition</b>
11.	Economic change
12.	Technological change
13.	Social/community improvement
14.	Change in general/non-specific change
20.	<b>Consequences or secondary effects of economic growth/expansion</b>
30.	<b>Stability of community/moral values</b>
40.	<b>Planning for future/future orientation in general</b>
98.	<b>Don't know/no opinion</b>
99.	<b>No response/skip/not applicable/missing data</b>

Q#: 02.11 Are there any words that have the same or very similar meaning to you as "progress?" (PROG\_WORDS)

<u>Code Number</u>	<u>Code Description</u>
01.	<b>No (skip to 02.12)</b>
02.	<b>Yes</b>
98.	<b>Don't know/no opinion</b>
99.	<b>No response/skip/not applicable/missing data</b>

Q#: 02.11.01 (If "yes" to 02.11) What words would those be? (PROG\_SYN1 - PROG\_SYN5)

<u>Code Number</u>	<u>Code Description</u>
10.	Those which reflect change/advancement/improvement, etc., upon or from an earlier state or condition
20.	<b>Those which reflect a consequence or secondary effect</b>
98.	<b>Don't know/no opinion</b>
99.	<b>No response/skip/not applicable/missing data</b>

Q#: 02.12 People have used the concept of "risk" in various ways. How do you define the concept of risk? (RISK\_DEF1 - RISK\_DEF5)

<u>Code Number</u>	<u>Code Description</u>
10.	<b>As an aspect of chance</b>
11.	Chance
12.	Gamble/willingly taking chances
13.	Probability/likelihood of occurrence
20.	<b>As an aspect of danger/threat/potential harm, powerlessness</b>
30.	<b>As an aspect of potential opportunity/challenge</b>
40.	<b>As an outcome/consequence of questionable decisions, behavior/liability</b>
98.	<b>Don't know/no opinion</b>
99.	<b>No response/skip/not applicable/missing data</b>

Q#: 02.13 Are there any words that have the same or very similar meaning to you as "risk?" (RISK\_WORDS)

<u>Code Number</u>	<u>Code Description</u>
01.	<b>No (skip to Section 03)</b>
02.	<b>Yes</b>
98.	<b>Don't know/no opinion</b>
99.	<b>No response/skip/not applicable/missing data</b>

Q#: 02.13.01 (If "yes" to 02.13) What words would those be? (RISK\_SYN1 - RISK\_SYN5)

<u>Code Number</u>	<u>Code Description</u>
10.	<b>Those which reflect aspects of chance, probability, etc.</b>
20.	<b>Those which reflect aspects of danger, threat, harm, etc.</b>
30.	<b>Those which reflect aspects of opportunity, challenge</b>
40.	<b>Those which reflect outcomes/consequences/liability</b>
98.	<b>Don't know/no opinion</b>
99.	<b>No response/skip/not applicable/missing data</b>

### QUESTIONNAIRE SECTION 03: ENVIRONMENTAL ACTIVISM

Q#: 03.01 Generally speaking, would you say that improving the quality of the natural environment will require some changes in our society? (CHNG\_SOC)

<u>Code Number</u>	<u>Code Description</u>
01.	No (skip to Section 04)
02.	Yes
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 03.02 Are there changes that you would be personally willing to make in behalf of improving the quality of the natural environment? (PERS\_CHNGS)

<u>Code Number</u>	<u>Code Description</u>
01.	No (skip to Section 04)
02.	Yes
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 03.03 I am going to read a list of actions that other people indicated they have taken to improve the quality of their community's natural environment. Please indicate for each item mentioned how willing you would be to engage in these same activities. Would you be not at all willing, somewhat unwilling, somewhat willing, or very willing?

#### Actions Taken to Improve Natural Environment, Listed by Question

03.03.01	Encourage grassroots environmental movements (GRASSROOTS)
03.03.02	Encourage birth control (BIRTH_CNTL)
03.03.03	Support politicians who include environmental concerns on their agenda (POLITICIAN)
03.03.04	Participate in recycling programs (RECYCLE)
03.03.05	Reduce your standard of living (STAND_LIV)
03.03.06	Sacrifice some of your civil rights (CIV_RIGHTS)
03.03.07	Pay higher prices on behalf of pollution saving manufacturing devices (HI_PRICES)
03.03.08	Pay higher taxes (HI_TAXES)
03.03.09	Reduce your level of consumption (CONSUM_LEV)

<u>Code Number</u>	<u>Code Description</u>
01.	Not at all willing
02.	Somewhat unwilling
03.	Somewhat willing
04.	Very willing
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 03.04 Have you heard of ecological movements? (ECOL\_MOVE1)

<u>Code Number</u>	<u>Code Description</u>
01.	No (skip to Section 04)

- 02. Yes
- 98. Don't know/no opinion
- 99. No response/skip/not applicable/missing data

Q#: 03.05 How important to you are ecological movements? (ECOL\_MOVE2)

<u>Code Number</u>	<u>Code Description</u>
01.	Not at all important
02.	Not very important
03.	Somewhat important
04.	Very important
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 03.06 Do you know someone who participates in ecological movements? (ECOL\_MOVE3)

<u>Code Number</u>	<u>Code Description</u>
01.	No
02.	Yes
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 03.07 Do you participate in ecological movements? (ECOL\_MOVE4)

<u>Code Number</u>	<u>Code Description</u>
01.	No
02.	Yes
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

**QUESTIONNAIRE SECTION 04: SCIENCE AND TECHNOLOGY**

Q#: 04.01 Now I would like to get your opinion on a wide range of science and technology issues. I am going to read you a series of statements and, for each, I would like you to tell me whether you strongly disagree, somewhat disagree, neither agree nor disagree, somewhat agree, or strongly agree.

**Science and Technology Statements, Listed by Question**

- 04.01.01 In general, the benefits of scientific research have outweighed the harmful results (SCI\_BENFT)
- 04.01.02 Even if it brings no immediate benefits, scientific research that advances the frontiers of knowledge should be supported by the federal government (FEDGOV\_SUP)
- 04.01.03 Scientific discoveries are making our lives easier and more comfortable (SCI\_DISC)
- 04.01.04 Unless scientists are allowed to study things that don't appear important or useful now, a lot of very beneficial things probably will never be invented (SCI\_STUDY)

<u>Code Number</u>	<u>Code Description</u>
01.	Strongly disagree
02.	Somewhat disagree

- 03. Neither agree nor disagree
- 04. Somewhat agree
- 05. Strongly agree
- 98. Don't know/no opinion
- 99. No response/skip/not applicable/missing data

Q#: 04.02 Do you think that new technologies based on scientific discoveries make our lives change too fast, or has the change been about right? (CHNG\_RATE)

<u>Code Number</u>	<u>Code Description</u>
01.	Not fast enough
02.	About right
03.	Too fast
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 04.03 How knowledgeable would you say you are about potential threats to the environment? (ENV\_KNOW)

<u>Code Number</u>	<u>Code Description</u>
01.	Not at all knowledgeable
02.	Not very knowledgeable
03.	Somewhat knowledgeable
04.	Very knowledgeable
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

#### QUESTIONNAIRE SECTION 05: ENVIRONMENTAL PARADIGM

Q#: 05.01 Now I would like to get your opinion on a wide range of environmental issues. I am going to read you a series of statements and, for each, I would like you to tell me whether you strongly disagree, somewhat disagree, neither agree nor disagree, somewhat agree, or strongly agree.

##### Environmental Issues Statements, Listed by Question

- 05.01.01 We are approaching the limit of the number of people the earth can support (PEOP\_LMT)
- 05.01.02 The balance of nature is very delicate and easily upset (BAL\_NATR)
- 05.01.03 Humans have the right to modify the natural environment to suit their needs (MODFY\_ENV)
- 05.01.04 Humans were created to rule over the rest of nature (RULE\_NAT)
- 05.01.05 When humans interfere with nature it often produces disastrous consequences (DISAS\_CONS)
- 05.01.06 Plants and animals exist primarily to be used by humans (PLNT\_ANML)
- 05.01.07 To maintain a healthy economy we must adhere to a system of "sustainable development" in which the pressures for economic development are balanced with the constraints of environmental protection (SUST\_DEV)
- 05.01.08 Humans must live in harmony with nature in order to survive (HRMNY\_NAT)
- 05.01.09 The earth is like a spaceship with only limited room and resources (SPACESHIP)
- 05.01.10 Humans need not adapt to the natural environment because they can remake it to suit their needs (HUMAN\_ADPT)
- 05.01.11 There are limits to growth beyond which an industrialized society cannot expand (LMTS2\_GRTH)
- 05.01.12 Human beings are severely abusing the environment (ABUSE\_ENV)

<u>Code Number</u>	<u>Code Description</u>
01.	Strongly disagree
02.	Somewhat disagree
03.	Neither agree nor disagree
04.	Somewhat agree
05.	Strongly agree
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

#### QUESTIONNAIRE SECTION 06: WORLD ISSUES

Q#: 06.01 This section addresses a range of issues currently facing this and other countries around the world. Please indicate for each of the following issues whether you are not at all concerned, not very concerned, somewhat concerned, or very concerned?

##### World Issues Statements, Listed by Question

06.01.01	Inflation (INFLATION)
06.01.02	Hunger (HUNGER)
06.01.03	Unemployment (UNEMPLOY)
06.01.04	Violence, crime (VIOLENCE)
06.01.05	Political corruption (CORRUPTION)
06.01.06	Drug abuse (DRUGS)
06.01.07	Racial/ethnic prejudice (PREJUDICE)
06.01.08	AIDS/Incurable diseases (AIDS)
06.01.09	Environmental pollution (ENV_PLUTN)
06.01.10	Global warming (GLOB_WARM)
06.01.11	Acid rain (ACID_RAIN)
06.01.12	Waste disposal (WASTE_DISP)
06.01.13	Loss of natural scenic areas (LOSS_SCENE)

<u>Code Number</u>	<u>Code Description</u>
01.	Not at all concerned
02.	Not very concerned
03.	Somewhat concerned
04.	Very concerned
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

#### QUESTIONNAIRE SECTION 07: DEFORESTATION

Q#: 07.01 Have you heard of deforestation? (DEFOR\_HRD)

<u>Code Number</u>	<u>Code Description</u>
01.	No (skip to Section 08)
02.	Yes
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 07.01.01 (If "yes" to 07.01) What have you heard? (WHAT\_HRD1 - WHAT\_HRD5)

<u>Code Number</u>	<u>Code Description</u>
10.	Destruction of natural resources in general
20.	Depletion of tropical forests, especially in Latin America
30.	Depletion of North American forests
40.	A necessary trade-off for or consequence of progress, economic development
50.	Most general familiarity with the issue/word
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 07.02 Do you think deforestation is a problem? (DEFOR\_PROB)

<u>Code Number</u>	<u>Code Description</u>
01.	No
02.	Yes
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 07.03 Does deforestation pose a problem to your community? (DEFOR\_COM)

<u>Code Number</u>	<u>Code Description</u>
01.	No
02.	Yes
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 07.04 Have you heard of *Amazon* deforestation? (DEFOR\_AMZN)

<u>Code Number</u>	<u>Code Description</u>
01.	No
02.	Yes
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 07.05 Do you think that deforestation is related to any other ecological issues? (DEFOR\_ECOL)

<u>Code Number</u>	<u>Code Description</u>
01.	No
02.	Yes
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

**QUESTIONNAIRE SECTION 08: TECHNOLOGY AND ENVIRONMENT ANALOGS**

Q#: 08.01 Do you think your community *currently* faces any environmental problems? (COM\_ENVPRB)

<u>Code Number</u>	<u>Code Description</u>
01.	No
02.	Yes
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 08.02 Would you say that environmental pollution in your community is decreasing, staying about the same, or increasing? (COM\_ENVPOL)

<u>Code Number</u>	<u>Code Description</u>
01.	Decreasing
02.	Staying about the same
03.	Increasing
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 08.03 Do you think that technological projects and facilities have *social* impacts? (SOCIAL\_IMP)

<u>Code Number</u>	<u>Code Description</u>
01.	No
02.	Yes
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 08.04 Do you think that technological projects and facilities have *environmental* impacts? (ENV\_IMP)

<u>Code Number</u>	<u>Code Description</u>
01.	No
02.	Yes
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 08.05 Are there now or have there ever been any things *locally* -- projects, proposals, facilities, special locations, events, anything at all *locally* -- that influence your perceptions of the quality of your community's natural environment? (ANLGS\_LOC)

<u>Code Number</u>	<u>Code Description</u>
01.	No (skip to 08.06)
02.	Yes
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 08.05.01 (If "yes" to 08.05) Could you name or describe them for me? (LOCL\_ANLG1 - LOCL\_ANLG5)

<u>Code Number</u>	<u>Code Description</u>
03.	General statements, events, conditions, consequences, causes, etc.
04.	Naturally occurring events, conditions, causes, etc.
05.	Transportation issues; transporting hazardous materials
06.	Indicators of and issues associated with environmental and community improvement, integrity, activism, stewardship, regulation
07.	Indicators of and issues associated with illegal, abusive, or irresponsible management of environmental resources
08.	Proposed or planned projects, programs, facilities, etc.
10.	Nuclear facilities, projects, sites, incidents, etc.
11.	Fermi II
12.	Davis-Bessey
13.	Wastes-related
14.	Other; general nuclear
20.	Non-nuclear, energy-related facilities, projects, sites, incidents, etc.
21.	Coal-related
22.	Petroleum-related
23.	Other energy-related (hydro/solar/wind/geothermal, etc.)
30.	Other than energy-related facilities, projects, sites, incidents, etc.
31.	Agricultural
32.	Commercial/industrial
33.	Toxic/hazardous chemicals/wastes
34.	Municipal wastes/landfills
35.	Community infrastructural (excluding transportation incidents/issues, see code #05, above)
36.	Community environmental/recreational
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 08.05.02 I have a map of the county. Would you be able to show me on that map where these are located? (CNTY\_MAP)

<u>Code Number</u>	<u>Code Description</u>
01.	No
02.	Yes (show map)
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 08.06 Are there now or have there ever been any things *worldwide* -- projects, proposals, facilities, special locations, events, anything at all *worldwide* -- that influence your perceptions of the quality of your community's natural environment? (ANLGS\_WRLD)

<u>Code Number</u>	<u>Code Description</u>
01.	No (skip to 08.07)
02.	Yes
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 08.06.01 (If "yes" to 08.06) Could you name or describe them for me? (WRLD\_ANLG1 - WRLD\_ANLG5)

<u>Code Number</u>	<u>Code Description</u>
03.	<b>General statements, events, conditions, consequences, causes, etc.</b>
04.	<b>Naturally occurring events, conditions, causes, etc.</b>
05.	<b>Indicators of and issues associated with environmental and community improvement, integrity, activism, stewardship, regulation</b>
06.	<b>Indicators of and issues associated with illegal, abusive, or irresponsible management of environmental resources</b>
10.	<b>Nuclear facilities, projects, sites, incidents, etc.</b>
11.	Chernobyl
12.	Three-Mile Island (TMI)
13.	Wastes-related
14.	Other; general nuclear
20.	<b>Non-nuclear, energy-related facilities, projects, sites, incidents, etc.</b>
21.	Coal-related
22.	Petroleum-related
23.	Other energy-related (hydro/solar/wind/geothermal, etc.)
30.	<b>Other than energy-related facilities, projects, sites, incidents, etc.</b>
31.	Agricultural
32.	Commercial/industrial
33.	Toxic/hazardous chemicals/wastes
34.	Municipal wastes/landfills
35.	Other (infrastructural/environmental)
40.	<b>Global environmental issues</b>
41.	Deforestation
42.	Global warming/greenhouse effect
43.	Ozone depletion
44.	Acid rain
98.	<b>Don't know/no opinion</b>
99.	<b>No response/skip/not applicable/missing data</b>

Q#: 08.07 How would you describe the effect that these local and worldwide factors have had on your perceptions of the quality of your community's natural environment? (ANLG\_EFCTS)

<u>Code Number</u>	<u>Code Description</u>
01.	<b>Negative</b>
02.	<b>Neither negative nor positive</b>
03.	<b>Both negative and positive</b>
04.	<b>Positive</b>
98.	<b>Don't know/no opinion</b>
99.	<b>No response/skip/not applicable/missing data</b>

Q#: 08.07.01 Why do you consider it to be (positive/negative/neither/both)? (WHY\_EFCT1 - WHY\_EFCT5)

<u>Code Number</u>	<u>Code Description</u>
10.	<b>Issues pertaining to environmental integrity</b>
11.	Concerns over environmental quality (pollution, waste, destruction, etc.)

12. Concerns over environmental management (responsibility, regulation, legislation, programs, etc.)
20. **Issues pertaining to environmental attitudes, awareness, or information**
30. **Issues pertaining to trade-offs between environmental protection and economic growth/technological advancement**
98. **Don't know/no opinion**
99. **No response/skip/not applicable/missing data**

Q#: 08.08 Who do you think *should be responsible* for solving your local environmental problems? (ENV\_RESP1 - ENV\_RESP5)

<u>Code Number</u>	<u>Code Description</u>
01.	No one
02.	City government
03.	Township government
04.	County government
05.	State government
06.	Federal government
07.	A university-based organization
08.	A community-based organization
09.	An environmental interest group
10.	An association of industries
11.	A private management company
12.	Those who cause the pollution
97.	Other (specify) <ul style="list-style-type: none"> <li>- An independent arbitrator</li> <li>- The news media</li> <li>- The people who live there</li> <li>- The citizenry</li> <li>- Individuals</li> <li>- A collaboration of all mentioned in the list</li> </ul>
98.	<b>Don't know/no opinion</b>
99.	<b>No response/skip/not applicable/missing data</b>

Q#: 08.09 Thinking of environmental problems in *other regions of the United States*, how would you say *your community* compares? Would you say your community has many fewer environmental problems, a few less, about the same, slightly more, or many more? (US\_ENVPRB)

<u>Code Number</u>	<u>Code Description</u>
01.	Many fewer
02.	A few less
03.	About the same
04.	Slightly more
05.	Many more
98.	<b>Don't know/no opinion</b>
99.	<b>No response/skip/not applicable/missing data</b>

Q#: 08.10 Would you say that environmental pollution worldwide is decreasing, staying about the same, or increasing? (ENVPOL\_WLD)

<u>Code Number</u>	<u>Code Description</u>
01.	Decreasing
02.	Staying about the same
03.	Increasing
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 08.11 Could environmental pollution cause the end of the world? (ENDOF\_WRLD)

<u>Code Number</u>	<u>Code Description</u>
01.	No
02.	Yes
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

#### QUESTIONNAIRE SECTION 09: ATTITUDES TOWARD ENERGY PRODUCTION

(NOTE: Due to poor question logic, Section 09 is not included in the EARP data base.)

Q#: 09.01 Can energy be produced from different sources? (ENRGY\_SRC)

<u>Code Number</u>	<u>Code Description</u>
01.	No (skip to Section 10)
02.	Yes
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 09.02 Of these potential sources of energy, *which two* do you think are the *most* threatening? (MST\_THRT1 - MST\_THRT2)

<u>Code Number</u>	<u>Code Description</u>
01.	None
02.	Coal
03.	Geo-thermal
04.	Hydrographic (water)
05.	Nuclear (fission only)
06.	Petroleum (oil)
07.	Resource recovery (waste incineration)
08.	Solar
09.	Wind
97.	Other (specify) - No responses in this category
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 09.02.01 Why is that? (Y1\_MST1 - Y1\_MST5; Y2\_MST1 - Y2\_MST5)

<u>Code Number</u>	<u>Code Description</u>
<b>10.</b>	<b>Threats to environmental integrity</b>
11.	Concerns over energy by-products, waste (type, volume, toxicity, containment, etc.)
12.	Concerns over environmental pollution (type, volume, toxicity, etc.)
<b>20.</b>	<b>Issues related to safety/reliability/management</b>
21.	Potential for accidents (technical failure)
22.	Potential for mismanagement (human error; insufficient regulations; political conflicts)
<b>30.</b>	<b>Other (negative public perception; cost-ineffectiveness; non-specific reasons, etc.)</b>
<b>98.</b>	<b>Don't know/no opinion</b>
<b>99.</b>	<b>No response/skip/not applicable/missing data</b>

Q#: 09.03 And which two would you say are the *least* threatening? (LST\_THRT1 - LST\_THRT5)

<u>Code Number</u>	<u>Code Description</u>
<b>01.</b>	<b>None</b>
<b>02.</b>	<b>Coal</b>
<b>03.</b>	<b>Geo-thermal</b>
<b>04.</b>	<b>Hydrographic (water)</b>
<b>05.</b>	<b>Nuclear (fission only)</b>
<b>06.</b>	<b>Petroleum (oil)</b>
<b>07.</b>	<b>Resource recovery (waste incineration)</b>
<b>08.</b>	<b>Solar</b>
<b>09.</b>	<b>Wind</b>
<b>97.</b>	<b>Other (specify)</b>
	- Natural gas
	- Ethanol
	- Soybean oil
<b>98.</b>	<b>Don't know/no opinion</b>
<b>99.</b>	<b>No response/skip/not applicable/missing data</b>

Q#: 09.03.01 And why is that? (Y1\_LST1 - Y1\_LST5; Y2\_LST1 - Y2\_LST5)

<u>Code Number</u>	<u>Code Description</u>
<b>10.</b>	<b>"Natural" sources of energy</b>
<b>20.</b>	<b>Issues related to sustainability</b>
21.	Not harmful to environment/non-polluting/renewable
22.	Not harmful to people/safe
<b>30.</b>	<b>Availability/accessibility/cost/abundance</b>
31.	Accessibility/cost
32.	Abundance/availability
<b>40.</b>	<b>Great potential as future energy sources</b>
<b>98.</b>	<b>Don't know/no opinion</b>
<b>99.</b>	<b>No response/skip/not applicable/missing data</b>

Q#: 09.04 Of these potential sources of energy, which two do you think represent the *greatest degree* of progress?  
(MST\_PRG1 - MST\_PRG5)

<u>Code Number</u>	<u>Code Description</u>
01.	None
02.	Coal
03.	Geo-thermal
04.	Hydrographic (water)
05.	Nuclear (fission only)
06.	Petroleum (oil)
07.	Resource recovery (waste incineration)
08.	Solar
09.	Wind
97.	Other (specify) - Natural gas - "Electric"
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 09.04.01 Why is that? (Y1\_PRG1 - Y1\_PRG5; Y2\_PRG1 - Y2\_PRG5)

<u>Code Number</u>	<u>Code Description</u>
10.	Economic considerations
11.	Cheap/cost-effective/efficient
12.	Jobs/capital/security
20.	High levels of research and technology required in production
30.	Availability/accessibility/abundance
40.	Environmental integrity and health; renewability
50.	Great potential as primary energy sources of the future
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 09.05 And which two do you think represent the *least degree* of progress? (LST\_PRG1 - LST\_PRG2)

<u>Code Number</u>	<u>Code Description</u>
01.	None
02.	Coal
03.	Geo-thermal
04.	Hydrographic (water)
05.	Nuclear (fission only)
06.	Petroleum (oil)
07.	Resource recovery (waste incineration)
08.	Solar
09.	Wind
97.	Other (specify) - No responses in this category
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 09.05.01 And why is that? (Y1\_NOPRG1 - Y1\_NOPRG5; Y2\_NOPRG1 - Y2\_NOPRG5)

<u>Code Number</u>	<u>Code Description</u>
<b>10.</b>	<b>Unappealing/conflict/collusion</b>
<b>20.</b>	<b>Unsustainable</b>
21.	Non-renewable
22.	Not cost-effective/impractical/inefficient
23.	Potential for environmental damage/dirty/overused
24.	Unsafe/unreliable
<b>30.</b>	<b>Old/outdated technology</b>
31.	Low technology
32.	Lack of usage, improvement
33.	Needs more investment, research
<b>98.</b>	<b>Don't know/no opinion</b>
<b>99.</b>	<b>No response/skip/not applicable/missing data</b>

**QUESTIONNAIRE SECTION 10: PERCEPTIONS OF AND RESPONSES TO FERMI 2**

Q#: 10.01 Are you aware of something called Fermi 2, or Fermi? (AWARE\_FERM)

<u>Code Number</u>	<u>Code Description</u>
<b>01.</b>	<b>No (skip to Section 11)</b>
<b>02.</b>	<b>Yes</b>
<b>98.</b>	<b>Don't know/no opinion</b>
<b>99.</b>	<b>No response/skip/not applicable/missing data</b>

Q#: 10.01.01 (If "yes" to 10.01)Could you describe it to me? (FERM\_DESC)

<u>Code Number</u>	<u>Code Description</u>
<b>01.</b>	<b>Something other than a nuclear power plant (specify, then skip to Section 11)</b> <ul style="list-style-type: none"><li>- A nuclear power plant in Cleveland</li><li>- An electrical power plant, but don't know where or what kind</li></ul>
<b>02.</b>	<b>Nuclear power plant (continue with this section)</b>
<b>98.</b>	<b>Don't know/not able to describe (skip to Section 11)</b>
<b>99.</b>	<b>No response/skip/not applicable/missing data</b>

Q#: 10.02 Would you say Fermi 2 is located far from your community, near your community, or in your community? (FERM\_LOC)

<u>Code Number</u>	<u>Code Description</u>
<b>01.</b>	<b>Far from community</b>
<b>02.</b>	<b>Near community</b>
<b>03.</b>	<b>In community</b>
<b>98.</b>	<b>Don't know/no opinion</b>
<b>99.</b>	<b>No response/skip/not applicable/missing data</b>

Q#: 10.03 What would you say is the straight-line (linear) distance in miles between your home and Fermi 2? (FERM\_DIST); *and*,

Q#: 10.04 Actual linear distance in miles between sample area and Fermi 2 (to be calculated by transect/zone) (TRUE\_DIST)

<u>Code Number</u>	<u>Code Description</u>
01.	Less than 2 miles
02.	3 to 4 miles
03.	5 to 6 miles
04.	7 to 8 miles
05.	9 to 10 miles
06.	11 to 12 miles
07.	13 to 14 miles
08.	15 to 16 miles
09.	17 to 18 miles
10.	19 to 20 miles
11.	21 to 22 miles
12.	23 to 24 miles
13.	25 to 26 miles
14.	27 to 28 miles
15.	29 to 30 miles
16.	31 to 32 miles
17.	33 to 34 miles
18.	35 to 36 miles
19.	37 to 38 miles
20.	39 to 40 miles
21.	More than 40 miles
98.	Don't know
99.	No response/skip/not applicable/missing data

Q#: 10.05 What changes have there been in your life as a result of Fermi 2? (LIFE\_CHNG1 - LIFE\_CHNG5)

<u>Code Number</u>	<u>Code Description</u>
01.	No changes
02.	Worried more/increased stress
03.	Conflict within family
04.	Conflict with friends
05.	Conflict with neighbors/community
06.	Tried to relocate residence
07.	Held off investments in home
08.	Held off investments in local business
97.	Other (specify) <ul style="list-style-type: none"><li>- Higher electric bills</li><li>- Water in Lake Erie has been negatively affected</li><li>- Cold weather swimming at Sterling State Park because water has been warmed by the Fermi cooling towers</li><li>- Distress due to the testing of emergency response sirens (on edge of property)</li><li>- A learning process</li><li>- Employment</li><li>- Gave community a positive lift</li><li>- Late rental payments due to higher electric rates</li></ul>

- Scared by rumors of poor craftsmanship at the facility
- Change in income
- Better fishing
- Heightened environmental awareness
- Husband worked at Fermi and died of cancer
- Increased awareness of nuclear power
- Loss of land -- can't hunt there anymore
- Stopped fishing at Point Mouille
- Noticed deformed and bleeding fish
- Before the "halo mist" (from cooling towers) he would eat fish from there; now he won't
- Decrease in electric bills

98. **Don't know/no opinion**

99. **No response/skip/not applicable/missing data**

Q#: 10.06 A number of *advantages* have been raised about nuclear power facilities. I am going to read you a list of some of these and I want you to think how they relate to the Fermi 2 facility. Using a scale from "1" to "5", where "1" indicates "no advantage at all" and "5" indicates "a major advantage," please tell me how much of an *advantage* you think each is.

**Nuclear Power Advantages, Listed by Question**

- 10.06.01 Economic benefits such as employment opportunities, the attraction of high-tech industry, the generation of tax dollars, and local revenues through energy purchases by other communities/states? (ECON\_BNFTS)
- 10.06.02 Decreased dependence on foreign energy sources? (LESS\_DEPND)
- 10.06.03 Cleaner than most other energy sources? (CLN\_ENRGY)
- 10.06.04 Continued scientific advancement in high-technology and nuclear physics? (SCI\_ADVNC)
- 10.06.05 Cheaper electrical rates? (CHEAP\_RTS)

**Code Number**

**Code Description**

- 01. **No advantage at all**
- 02. **Little, if any, advantage**
- 03. **Somewhat of an advantage**
- 04. **Considerable advantage**
- 05. **Major advantage**
- 98. **Don't know/no opinion**
- 99. **No response/skip/not applicable/missing data**

Q#: 10.07 A number of *concerns* have also been raised about nuclear power facilities. I am going to read you a list of some of these and I want you to think how they relate to the Fermi 2 facility. Using a scale from "1" to "5", where "1" indicates "no concern at all" and "5" indicates "a major concern," please tell me how much of a *concern* each is to you.

**Nuclear Power Concerns, Listed by Question**

- 10.07.01 Accidental environmental contamination? (ENV\_CONT)
- 10.07.02 Increased danger to public health and safety? (INC\_DNGR)
- 10.07.03 Technical inadequacy to safely manage waste from energy production activities? (SAFE\_MGT)
- 10.07.04 Technical inadequacy to safely operate and monitor the facility? (SAFE\_OPER8)
- 10.07.05 Lack of concern for and lack of responsiveness to local values and interests? (NO\_CONCERN)

<u>Code Number</u>	<u>Code Description</u>
01.	No concern at all
02.	Little, if any, concern
03.	Somewhat of a concern
04.	Considerable concern
05.	Major concern
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 10.08 How much of a threat do you think Fermi 2 poses to your community? (FERM\_THRET)

<u>Code Number</u>	<u>Code Description</u>
01.	No threat at all (skip to 10.10)
02.	A minor threat
03.	A major threat
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 10.08.01 (If "minor" or "major" to 10.08) Do you think that the threat posed by Fermi 2 is greater to some people than to others? (DIF\_THRET)

<u>Code Number</u>	<u>Code Description</u>
01.	No
02.	Yes
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 10.08.01.01 (If "yes" to 10.08.01) What factors or conditions might expose some people more than others to a greater threat from Fermi 2? (THRT\_FCTR1 - THRT\_FCTR5)

<u>Code Number</u>	<u>Code Description</u>
10.	Awareness/perception of facility
20.	Proximity to facility
30.	Facility operations
40.	Mode of threat
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 10.09 At what distance would you say Fermi 2 does not present an environmental threat? (THRET\_DIST)

<u>Code Number</u>	<u>Code Description</u>
01.	Less than 5 miles
02.	6 to 10 miles
03.	11 to 15 miles
04.	16 to 20 miles
05.	21 to 25 miles

- 06. 26 to 30 miles
- 07. 31 to 35 miles
- 08. 36 to 40 miles
- 09. 41 to 45 miles
- 10. 46 to 50 miles
- 11. 51 to 60 miles
- 12. 61 to 70 miles
- 13. 71 to 80 miles
- 14. 81 to 90 miles
- 15. 91 to 100 miles
- 16. 101 to 500 miles
- 17. 501 to 1,000 miles
- 18. More than 1,000 miles
- 98. Don't know
- 99. No response/skip/not applicable/missing data

Q#: 10.10 How would you define a "major accident" at a nuclear power plant like Fermi 2? (request examples)  
(MJR\_AXDNT1 - MJR\_AXDNT5)

<u>Code Number</u>	<u>Code Description</u>
10.	Issues pertaining to radiation, waste, or contamination
20.	Comparisons with other nuclear accidents (analog)
30.	Human error
40.	Technical malfunctions
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 10.11 What do you think is the likelihood of a major accident at Fermi 2? (AXDNT\_CHNC)

<u>Code Number</u>	<u>Code Description</u>
01.	Very unlikely
02.	Somewhat unlikely
03.	Somewhat likely
04.	Very likely
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 10.12 How soon before you think a major accident will occur at Fermi 2? (WHEN\_AXDNT)

<u>Code Number</u>	<u>Code Description</u>
01.	Less than 5 years
02.	6 to 15 years
03.	16 to 25 years
04.	More than 25 years
05.	Never
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 10.13 Do you think *you* would be affected by a *major accident* at Fermi 2? (AXDNT\_EFCT)

<u>Code Number</u>	<u>Code Description</u>
01.	No (skip to 10.14)
02.	Yes
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 10.13.01 (If "yes" to 10.13) How would the effects of a major accident at Fermi 2 reach you? (EFCT\_RECH1 - EFCT\_RECH5)

<u>Code Number</u>	<u>Code Description</u>
10.	Contamination of specific resource types ( <i>type of contamination</i> )
11.	Water
12.	Air/atmospheric
13.	Land/soil
14.	Agricultural/food/food chain
15.	Other/general
20.	Mechanisms through which specific resources would become contaminated ( <i>mode of contamination</i> )
21.	Water: rain/groundwater/streams/lakes, etc.
22.	Air/wind flow patterns
23.	Radioactive fallout/wastes
24.	Explosion/shock wave
30.	Secondary effects/consequences
31.	Health effects
32.	Changes in lifestyle/social relations/community response
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 10.14 What immediate actions would you take in the event of a major accident at Fermi 2? (MED8\_ACTN1 - MED8\_ACTN5)

<u>Code Number</u>	<u>Code Description</u>
10.	Respond apathetically
20.	Seek information
30.	Locate and contact family members, relatives, or friends
40.	Seek and secure shelter/prepare oneself/get things in order
41.	Seek and secure shelter
42.	Prepare/get things in order
50.	Evacuate from area
51.	By non-specific means/direction
52.	By car to north/west
53.	By car to south/east
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 10.15 Do you think *your community* would be affected by a *major accident* at Fermi 2? (COM\_AFCTD)

<u>Code Number</u>	<u>Code Description</u>
01.	No (skip to 10.16)
02.	Yes
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 10.15.01 (If "yes" to 10.15) How would the effects of a major accident at Fermi 2 reach your community? (REACH\_COM1 - REACH\_COM5)

<u>Code Number</u>	<u>Code Description</u>
10.	Same as it would reach respondent individually
20.	Total community destruction
30.	Emotional/psychological health effects
40.	Physical/biological health effects
50.	Social effects/changes in lifestyle, etc.
60.	Economic effects
70.	Contamination of specific resource types ( <i>type of contamination</i> )
71.	Water
72.	Air
73.	Land/soil
74.	Agricultural/food/food chain
75.	Other/general

<u>Code Number</u>	<u>Code Description</u>
80.	Mechanisms through which specific resources would become contaminated ( <i>mode of contamination</i> )
81.	Water: rain/groundwater/streams/lakes, etc.
82.	Air/wind flow patterns
83.	Other/general
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 10.16 If there were a major accident at Fermi 2, how long would the effects persist in your community? (EFCTS\_PRST)

<u>Code Number</u>	<u>Code Description</u>
01.	Less than 1 week
02.	1 week to 1 month
03.	2 months to 1 year
04.	2 to 5 years
05.	6 to 10 years
06.	11 to 50 years
07.	51 to 100 years
08.	101 to 500 years
09.	501 to 1,000 years
10.	More than 1,000 years

- 98. Don't know/no opinion
- 99. No response/skip/not applicable/missing data

Q#: 10.17 How important do you think it is to have an emergency response plan for Fermi 2? (RESP\_PLAN)

<u>Code Number</u>	<u>Code Description</u>
01.	Not at all important
02.	Not very important
03.	Somewhat important
04.	Very important
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 10.18 Are you aware of any emergency response plans for Fermi 2? (AWARE\_PLAN)

<u>Code Number</u>	<u>Code Description</u>
01.	No (skip to 10.19)
02.	Yes
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 10.18.01 (If "yes" to 10.18) Through what source did you learn of it? (PLAN\_SRC1 - PLAN\_SRC5)

<u>Code Number</u>	<u>Code Description</u>
01.	Saw a story on television
02.	Heard about it on the radio
03.	Read about it in a newspaper
04.	Read about it in a magazine
05.	Telephone book
06.	At an organized meeting
07.	Informal discussion among family/friends/neighbors
08.	Heard about it from elected official(s)
09.	Religious organization
97.	Other (specify) <ul style="list-style-type: none"> <li>- Employment at Fermi</li> <li>- Detroit Edison flyer through the mail (Fermi pamphlet)</li> <li>- Hears evacuation sirens being tested (emergency preparedness)</li> <li>- Spouse is a community monitor of evacuation siren system (emergency preparedness)</li> <li>- Spouse works for Fermi</li> <li>- Evacuation procedure is posted at work</li> <li>- Company flyer</li> <li>- Lives on evacuation route for people in the area</li> <li>- Son's Cub Scout tour of the facility</li> <li>- Evacuation siren at Steward and Raisinville Rds.</li> <li>- Participation on Civil Response Board</li> <li>- Fermi training program in public schools</li> <li>- Evacuation siren located on their private property</li> <li>- Son works with safety at state level -- goes to meetings on this</li> <li>- Helped design the evacuation plan</li> </ul>

- Employed at a nuclear power plant and so knows that to be licensed they must have a response plan in place
- As a township official
- Amateur radio operator -- part of emergency radio services which is connected to the disaster board
- County emergency preparedness system
- Part of his job -- as a job requirement
- Seminars offered at Fermi
- Public tours of Fermi
- Was a student at Jefferson High School, which is next to Fermi

98. **Don't know/no opinion**

99. **No response/skip/not applicable/missing data**

Q#: 10.19 Thinking in terms of miles from Fermi 2, how wide of an area do you think should be covered by *an emergency response plan* for Fermi 2? (PLAN\_DIST)

<u>Code Number</u>	<u>Code Description</u>
01.	Less than 5 miles
02.	6 to 10 miles
03.	11 to 15 miles
04.	16 to 20 miles
05.	21 to 25 miles
06.	26 to 30 miles
07.	31 to 35 miles
08.	36 to 40 miles
09.	41 to 45 miles
10.	46 to 50 miles
11.	51 to 60 miles
12.	61 to 70 miles
13.	71 to 80 miles
14.	81 to 90 miles
15.	91 to 100 miles
16.	More than 100 miles
98.	Don't know
99.	No response/skip/not applicable/missing data

Q#: 10.19.01 Do you think that people living within that area *are consulted* in any way in the preparation of an emergency response plan for Fermi 2? (PPL\_CNSLTD)

<u>Code Number</u>	<u>Code Description</u>
01.	No
02.	Yes
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 10.20 I am going to read you a list of some different strategies for public participation, and I would like you to tell me how *effective* you think each is. Would you say it is not at all effective, not very effective, somewhat effective, or very effective?

**Public Participation Strategies, Listed by Question**

- 10.20.01 Political representation through elected officials (POLTCL\_REP)
- 10.20.02 Public education and information programs (PUBLIC\_ED)
- 10.20.03 Public meetings and hearings (PUBLIC\_MTG)
- 10.20.04 Scientific surveys (SCI\_SURVY)
- 10.20.05 Coalitions between citizens, government, and industry (COALITIONS)
- 10.20.06 Citizen activism and incorporation (ACTIVISM)
- 10.20.07 Legal confrontation or challenge (litigation) (LITIGATION)

<b><u>Code Number</u></b>	<b><u>Code Description</u></b>
<b>01.</b>	<b>Not at all effective</b>
<b>02.</b>	<b>Not very effective</b>
<b>03.</b>	<b>Somewhat effective</b>
<b>04.</b>	<b>Very effective</b>
<b>98.</b>	<b>Don't know/no opinion</b>
<b>99.</b>	<b>No response/skip/not applicable/missing data</b>

Q#: 10.21 Do the energy production activities at Fermi 2 produce waste? (FERM\_WASTE)

<b><u>Code Number</u></b>	<b><u>Code Description</u></b>
<b>01.</b>	<b>No (skip to Section 11)</b>
<b>02.</b>	<b>Yes</b>
<b>98.</b>	<b>Don't know/no opinion</b>
<b>99.</b>	<b>No response/skip/not applicable/missing data</b>

Q#: 10.21.01 (If "yes" to 10.21) Do you think the energy production waste from Fermi 2 is dangerous or threatening? (WASTE\_DNGR)

<b><u>Code Number</u></b>	<b><u>Code Description</u></b>
<b>01.</b>	<b>No</b>
<b>02.</b>	<b>Yes</b>
<b>98.</b>	<b>Don't know/no opinion</b>
<b>99.</b>	<b>No response/skip/not applicable/missing data</b>

Q#: 10.22 How would you classify the waste generated by energy production activities at Fermi 2? (CLSFY\_WSTE)

<b><u>Code Number</u></b>	<b><u>Code Description</u></b>
<b>01.</b>	<b>Solid waste</b>
<b>02.</b>	<b>Hazardous waste</b>
<b>03.</b>	<b>Toxic waste</b>
<b>04.</b>	<b>Radioactive waste</b>

- 97. **Other (specify)**
  - Filtered waste
  - Nuclear waste
- 98. **Don't know/no opinion**
- 99. **No response/skip/not applicable/missing data**

Q#: 10.23 How important do you think it is to have a plan for monitoring the potential *social impacts* of Fermi 2?  
(FERMI\_SIA)

<u>Code Number</u>	<u>Code Description</u>
01.	Not at all important
02.	Not very important
03.	Somewhat important
04.	Very important
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 10.24 Thinking in terms of miles from Fermi 2, how wide of an area do you think should be covered by a *social monitoring plan* for Fermi 2? (SIA\_DIST)

<u>Code Number</u>	<u>Code Description</u>
01.	Less than 5 miles
02.	6 to 10 miles
03.	11 to 15 miles
04.	16 to 20 miles
05.	21 to 25 miles
06.	26 to 30 miles
07.	31 to 35 miles
08.	36 to 40 miles
09.	41 to 45 miles
10.	46 to 50 miles
11.	51 to 60 miles
12.	61 to 70 miles
13.	71 to 80 miles
14.	81 to 90 miles
15.	91 to 100 miles
16.	More than 100 miles
98.	Don't know
99.	No response/skip/not applicable/missing data

Q#: 10.25 How important do you think it is to have a plan for monitoring the potential *environmental impacts* of Fermi 2? (FERMI\_EIA)

<u>Code Number</u>	<u>Code Description</u>
01.	Not at all important
02.	Not very important
03.	Somewhat important
04.	Very important
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

10.26 Thinking again in terms of miles from Fermi 2, how wide of an area do you think should be covered by *an environmental monitoring plan* for Fermi 2? (EIA\_DIST)

<u>Code Number</u>	<u>Code Description</u>
01.	Less than 5 miles
02.	6 to 10 miles
03.	11 to 15 miles
04.	16 to 20 miles
05.	21 to 25 miles
06.	26 to 30 miles
07.	31 to 35 miles
08.	36 to 40 miles
09.	41 to 45 miles
10.	46 to 50 miles
11.	51 to 60 miles
12.	61 to 70 miles
13.	71 to 80 miles
14.	81 to 90 miles
15.	91 to 100 miles
16.	More than 100 miles
98.	Don't know
99.	No response/skip/not applicable/missing data

**QUESTIONNAIRE SECTION 11: ORGANIZATIONAL TRUSTWORTHINESS**

Q#: 11.01 How would you say the concept of "trust" applies to the management of environmentally sensitive facilities and activities? (code "does not apply" as "01.") (TRUST\_DEF1 - TRUST\_DEF5)

<u>Code Number</u>	<u>Code Description</u>
01.	Trust does not apply to environmental management
10.	Placing others' interests above/before one's own
11.	Honesty/believability/truthfulness
12.	Accountability/responsibility/reliability/dependability
13.	Beneficence/doing good for others
14.	Public collaboration/information/decision-making
20.	Possessing technical competence/sufficient knowledge
21.	Technical competence
22.	Sufficient knowledge
30.	Adequate safety/security regulations, precautions (monitoring/testing/inspection, etc.)
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 11.02 Are there any words that have the same or very similar meaning to you as "trust?" (TRUST\_WRDS)

<u>Code Number</u>	<u>Code Description</u>
01.	No (skip to 11.03)
02.	Yes
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 11.02.01 (If "yes" to 11.02) What words would those be? (TRUST\_SYN1 - TRUST\_SYN5)

<u>Code Number</u>	<u>Code Description</u>
<b>10.</b>	<b>Concern/beneficence</b>
11.	Honesty/believability/truthfulness
12.	Accountability/responsibility
13.	Reliability/dependability
<b>20.</b>	<b>Competence/knowledge</b>
<b>30.</b>	<b>Spirituality/faith/values</b>
<b>98.</b>	<b>Don't know/no opinion</b>
<b>99.</b>	<b>No response/skip/not applicable/missing data</b>

Q#: 11.03 I am going to read a list of organizations and groups that *could be* associated with the operation or monitoring of environmentally sensitive projects or facilities. For each organization and group, please tell me how *technically competent* you believe it would be in *operating* such projects or facilities. Would it be not at all competent, somewhat competent, or very competent?

**Organizations and Groups, Listed by Question**

- 11.03.01 City government (TECHOP\_CTY)
- 11.03.02 Township government (TECHOP\_TWP)
- 11.03.03 County government (TECHOP\_CNY)
- 11.03.04 A state government agency (TECHOP\_STA)
- 11.03.05 A federal government agency (TECHOP\_FED)
- 11.03.06 A university-based organization (TECHOP\_UNI)
- 11.03.07 A community-based organization (TECHOP\_COM)
- 11.03.08 An environmental interest group (TECHOP\_ENV)
- 11.03.09 An association of industries (TECHOP\_IND)
- 11.03.10 A private company/business (TECHOP\_BUS)

<u>Code Number</u>	<u>Code Description</u>
<b>01.</b>	<b>Not at all competent</b>
<b>02.</b>	<b>Somewhat competent</b>
<b>03.</b>	<b>Very competent</b>
<b>98.</b>	<b>Don't know/no opinion</b>
<b>99.</b>	<b>No response/skip/not applicable/missing data</b>

Q#: 11.04 Thinking about these same organizations and groups, please tell me how *concerned* each would be about the *interests* of nearby residents when *operating* an environmentally sensitive project or facility. Would it be not concerned at all, somewhat concerned, or very concerned?

**Organizations and Groups, Listed by Question**

- 11.04.01 City government (CONOP\_CTY)
- 11.04.02 Township government (CONOP\_TWP)
- 11.04.03 County government (CONOP\_CNY)
- 11.04.04 A state government agency (CONOP\_STA)
- 11.04.05 A federal government agency (CONOP\_FED)
- 11.04.06 A university-based organization (CONOP\_UNI)

- 11.04.07 A community-based organization (CONOP\_COM)
- 11.04.08 An environmental interest group (CONOP\_ENV)
- 11.04.09 An association of industries (CONOP\_IND)
- 11.04.10 A private company/business (CONOP\_BUS)

<u>Code Number</u>	<u>Code Description</u>
<b>01.</b>	<b>Not at all concerned</b>
<b>02.</b>	<b>Somewhat concerned</b>
<b>03.</b>	<b>Very concerned</b>
<b>98.</b>	<b>Don't know/no opinion</b>
<b>99.</b>	<b>No response/skip/not applicable/missing data</b>

Q#: 11.05 Thinking about these same organizations and groups, please tell me how *technically competent* you believe each would be to conduct *environmental monitoring* of environmentally sensitive projects or facilities.

**Organizations and Groups, Listed by Question**

- 11.05.01 City government (TECHEM\_CTY)
- 11.05.02 Township government (TECHEM\_TWP)
- 11.05.03 County government (TECHEM\_CNY)
- 11.05.04 A state government agency (TECHEM\_STA)
- 11.05.05 A federal government agency (TECHEM\_FED)
- 11.05.06 A university-based organization (TECHEM\_UNI)
- 11.05.07 A community-based organization (TECHEM\_COM)
- 11.05.08 An environmental interest group (TECHEM\_ENV)
- 11.05.09 An association of industries (TECHEM\_IND)
- 11.05.10 A private company/business (TECHEM\_BUS)

<u>Code Number</u>	<u>Code Description</u>
<b>01.</b>	<b>Not at all competent</b>
<b>02.</b>	<b>Somewhat competent</b>
<b>03.</b>	<b>Very competent</b>
<b>98.</b>	<b>Don't know/no opinion</b>
<b>99.</b>	<b>No response/skip/not applicable/missing data</b>

Q#: 11.06 Thinking again of these same organizations and groups, please tell me how *concerned* each would be about the *interests* of nearby residents when conducting *environmental monitoring* of environmentally sensitive projects or facilities.

**Organizations and Groups, Listed by Question**

- 11.06.01 City government (CONEM\_CTY)
- 11.06.02 Township government (CONEM\_TWP)
- 11.06.03 County government (CONEM\_CNY)
- 11.06.04 A state government agency (CONEM\_STA)
- 11.06.05 A federal government agency (CONEM\_FED)
- 11.06.06 A university-based organization (CONEM\_UNI)
- 11.06.07 A community-based organization (CONEM\_COM)
- 11.06.08 An environmental interest group (CONEM\_ENV)
- 11.06.09 An association of industries (CONEM\_IND)

11.06.10 A private company/business (CONEM\_BUS)

<u>Code Number</u>	<u>Code Description</u>
01.	Not at all concerned
02.	Somewhat concerned
03.	Very concerned
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 11.07 In forming your views about the management of environmentally sensitive projects, how *trustworthy* would you find each of the following as *sources of information*? For each source of information, please tell me if you believe it is, in general, very untrustworthy, somewhat untrustworthy, somewhat trustworthy, or very trustworthy.

**Organizations and Groups, Listed by Question**

11.07.01	Television (TRUST_TV)
11.07.02	Radio (TRUST_RDIO)
11.07.03	Newspapers (TRUST_NPAP)
11.07.04	Magazines (TRUST_MAGZ)
11.07.05	Family/friends/neighbors (TRUST_FMLY)
11.07.06	Religious organizations (TRUST_RLGN)
11.07.07	Local environmental groups (TRUST_LENV)
11.07.08	Other community organizations (TRUST_COM)
11.07.09	City government (TRUST_CTY)
11.07.10	Township government (TRUST_TWP)
11.07.11	County government (TRUST_CNTY)
11.07.12	State government agencies (TRUST_STAT)
11.07.13	Federal government agencies (TRUST_FED)
11.07.14	National environmental organizations (TRUST_NENV)
11.07.15	A private company/business (TRUST_BSNS)
11.07.16	An association of industries (TRUST_IND)
11.07.17	University-based organizations (TRUST_UNIV)

<u>Code Number</u>	<u>Code Description</u>
01.	Very untrustworthy
02.	Somewhat untrustworthy
03.	Somewhat trustworthy
04.	Very trustworthy
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

**QUESTIONNAIRE SECTION 12: MEDIA/SOCIAL INTERACTION**

Q#: 12.01 In establishing your opinion regarding the environmental quality of your community would you say you rely more upon the media or people that you know? (MDIA\_PEPL)

<u>Code Number</u>	<u>Code Description</u>
01.	Media (skip to 12.01.01)
02.	People that you know (skip to 12.01.02)

- 98. Don't know/no opinion
- 99. No response/skip/not applicable/missing data

Q#: 12.01.01 (If "Media" to 12.01) What kinds of media do you rely upon the most? (MEDIA\_SRC1 - MEDIA\_SRC5)

<u>Code Number</u>	<u>Code Description</u>
01.	T.V.
02.	Radio
03.	Newspaper
04.	Magazines
97.	Other (specify) <ul style="list-style-type: none"> <li>- CB radio with truck drivers</li> <li>- Organizational newsletters</li> </ul>
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.01.02 (If "Other people" to 12.01) What kinds of people do you rely upon the most? (PEPL\_SRC1 - PEPL\_SRC5)

<u>Code Number</u>	<u>Code Description</u>
01.	Family/friends
02.	Co-workers
03.	People
04.	Local officials/officials
05.	Citizen activists
06.	Club members/membership
07.	Religious organizations
97.	Other (specify) <ul style="list-style-type: none"> <li>- Self</li> <li>- Universities</li> <li>- College professors in environmental programs</li> </ul>
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.02 How many television sets are there in your household? (NUM\_TVSETS)

<u>Code Number</u>	<u>Code Description</u>
01.	None (skip to 12.05)
02.	One
03.	Two
04.	Three
05.	Four
06.	Five
07.	More than five
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.03 About how many years have you watched TV at home? (YRS\_TVHOME)

<u>Code Number</u>	<u>Code Description</u>
01.	Less than 5 years
02.	5 to 10 years
03.	11 to 15 years
04.	16 to 20 years
05.	More than 20 years
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.04 About how many hours each day do you usually watch TV at home? (HRS\_TVHOME)

<u>Code Number</u>	<u>Code Description</u>
01.	Less than 1 hour
02.	1 to 2 hours
03.	3 to 4 hours
04.	5 to 6 hours
05.	7 to 8 hours
06.	More than 8 hours
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.05 About how many years have you been regularly listening to the radio? (YRS\_RADIO)

<u>Code Number</u>	<u>Code Description</u>
01.	Less than 5 years
02.	5 to 10 years
03.	11 to 15 years
04.	16 to 20 years
05.	More than 20 years
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.06 About how many hours each day do you usually spend listening to the radio? (HRS\_RADIO)

<u>Code Number</u>	<u>Code Description</u>
01.	Less than 1 hour
02.	1 to 2 hours
03.	3 to 4 hours
04.	5 to 6 hours
05.	7 to 8 hours
06.	More than 8 hours
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.07 What newspapers do you usually read? (NPAP\_RD1 - NPAP\_RD5)

<u>Code Number</u>	<u>Code Description</u>
01.	None (skip to 12.10)
02.	Monroe Evening News
03.	Toledo Blade
04.	Detroit News
05.	Detroit Free Press
06.	Ann Arbor News
07.	The Guardian (Monroe)
08.	New York Times
09.	Wall Street Journal
10.	Washington Post
11.	USA Today
97.	Other (specify) <ul style="list-style-type: none"><li>- Port-Clinton News-Herald</li><li>- Ottawa County Exponent</li><li>- Cleveland Plain-Dealer</li><li>- Put-in-Bay Gazette</li><li>- Sandusky Herald</li><li>- Down-river News-Herald</li><li>- Dundee Independent</li><li>- Milan Leader</li><li>- Village Voice (New York)</li><li>- Smaller Town Newspaper</li><li>- Southgate Heritage News</li><li>- Taylor News-Herald</li><li>- Wyandotte News-Herald</li><li>- Southgate News-Herald</li><li>- Isle Camera</li><li>- Milan News</li><li>- Romulus Roman</li><li>- Ypsilanti News</li><li>- Canton Observer</li><li>- Plymouth Crier</li><li>- Westland Observer</li><li>- Ypsilanti Press</li></ul>
98.	Don't know/no preference
99.	No response/skip/not applicable/missing data

Q#: 12.08 About how many years have you been regularly reading newspapers? (YRS\_PAPER)

<u>Code Number</u>	<u>Code Description</u>
01.	Less than 5 years
02.	5 to 10 years
03.	11 to 15 years
04.	16 to 20 years
05.	More than 20 years
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.09 About how many hours each day do you usually spend reading newspapers? (HRS\_PAPER)

<u>Code Number</u>	<u>Code Description</u>
01.	Less than 1 hour
02.	1 to 2 hours
03.	3 to 4 hours
04.	5 to 6 hours
05.	7 to 8 hours
06.	More than 8 hours
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.10 How many magazines do you read regularly? (NUM\_MAGZ)

<u>Code Number</u>	<u>Code Description</u>
01.	None (skip to 12.13)
02.	One
03.	Two
04.	Three
05.	Four
06.	Five
07.	More than five
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.11 About how many years have you been regularly reading magazines? (YRS\_MAGZ)

<u>Code Number</u>	<u>Code Description</u>
01.	Less than 5 years
02.	5 to 10 years
03.	11 to 15 years
04.	16 to 20 years
05.	More than 20 years
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.12 About how many hours each day do you usually spend reading magazines? (HRS\_MAGZ)

<u>Code Number</u>	<u>Code Description</u>
01.	Less than 1 hour
02.	1 to 2 hours
03.	3 to 4 hours
04.	5 to 6 hours
05.	7 to 8 hours
06.	More than 8 hours
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.13 To how many clubs, associations, special interest groups, professional organizations, or any other types of group do you belong? (NUM\_GROUPS)

<u>Code Number</u>	<u>Code Description</u>
01.	None (skip to 12.16)
02.	One
03.	Two
04.	Three
05.	Four
06.	Five
07.	More than five
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.14 About how long have you been a member of the group you have belonged to the longest? (YRS\_GROUP)

<u>Code Number</u>	<u>Code Description</u>
01.	Less than 5 years
02.	5 to 10 years
03.	11 to 15 years
04.	16 to 20 years
05.	More than 20 years
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.15 About how many hours a month do you spend at meetings of these groups? (HRS\_GROUP)

<u>Code Number</u>	<u>Code Description</u>
01.	None
02.	1 to 5 hours
03.	6 to 10 hours
04.	11 to 15 hours
05.	More than 15 hours
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.16 In general, which of the following subject areas would you say interests you the most? (SUBJECT\_INT)

<u>Code Number</u>	<u>Code Description</u>
01.	Science and technology (skip to question 12.17 concerning science and technology)
02.	Ecology and the environment (skip to question 12.27 concerning ecology and the environment)
03.	Economic development and expansion (skip to question 12.37 concerning economic development and expansion)
97.	Other (specify, then skip to Section 13)

- Education
- Humanities
- Art
- Music
- Religion, faith
- Social problems
- The fine arts
- Discipline in education
- Farming
- Sports
- Politics

98. **Don't know/no opinion**  
 99. **No response/skip/not applicable/missing data**

Subsection 12a: Science and Technology

Q#: 12.17 How interested are you in television programs concerning science and technology? (SCITV\_INT)

<u>Code Number</u>	<u>Code Description</u>
01.	Not at all interested
02.	Not very interested
03.	Somewhat interested
04.	Very interested
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.18 Roughly how many television programs concerning science and technology have you watched in the last month? (SCITV\_QTY)

<u>Code Number</u>	<u>Code Description</u>
01.	None
02.	1 to 5
03.	6 to 10
04.	11 to 15
05.	More than 15
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.19 How interested are you in radio programs concerning science and technology? (SCIRAD\_INT)

<u>Code Number</u>	<u>Code Description</u>
01.	Not at all interested
02.	Not very interested
03.	Somewhat interested
04.	Very interested
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.20 Roughly how many radio programs concerning science and technology have you listened to in the last month? (SCIRAD\_QTY)

<u>Code Number</u>	<u>Code Description</u>
01.	None
02.	1 to 5
03.	6 to 10
04.	11 to 15
05.	More than 15
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.21 How interested are you in newspaper articles concerning science and technology? (SCIPPR\_INT)

<u>Code Number</u>	<u>Code Description</u>
01.	Not at all interested
02.	Not very interested
03.	Somewhat interested
04.	Very interested
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.22 Roughly how many newspaper articles concerning science and technology have you read in the last month? (SCIPPR\_QTY)

<u>Code Number</u>	<u>Code Description</u>
01.	None
02.	1 to 5
03.	6 to 10
04.	11 to 15
05.	More than 15
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.23 How interested are you in magazine articles concerning science and technology? (SCIMAG\_INT)

<u>Code Number</u>	<u>Code Description</u>
01.	Not at all interested
02.	Not very interested
03.	Somewhat interested
04.	Very interested
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.24 Roughly how many magazine articles concerning science and technology have you read in the last month? (SCIMAG\_QTY)

<u>Code Number</u>	<u>Code Description</u>
01.	None
02.	1 to 5
03.	6 to 10
04.	11 to 15
05.	More than 15
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.25 (If "yes" to 12.13 -- "Do you belong to a club or group, etc.) How interested are you when the groups or organizations you belong to present or discuss information concerning science and technology? (SCIGRP\_INT)

<u>Code Number</u>	<u>Code Description</u>
01.	Not at all interested
02.	Not very interested
03.	Somewhat interested
04.	Very interested
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.26 Roughly how many of these groups' meetings concerning science and technology have you attended in the last month? (SCIGRP\_QTY)

<u>Code Number</u>	<u>Code Description</u>
01.	None
02.	1 to 5
03.	6 to 10
04.	11 to 15
05.	More than 15
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Subsection 12b: Ecology and the Environment

Q#: 12.27 How interested are you in television programs concerning ecology and the environment? (ENVTV\_INT)

<u>Code Number</u>	<u>Code Description</u>
01.	Not at all interested
02.	Not very interested
03.	Somewhat interested
04.	Very interested
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.28 Roughly how many television programs concerning ecology and the environment have you watched in the last month? (ENVTV\_QTY)

<u>Code Number</u>	<u>Code Description</u>
01.	None
02.	1 to 5
03.	6 to 10
04.	11 to 15
05.	More than 15
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.29 How interested are you in radio programs concerning ecology and the environment? (ENVRAD\_INT)

<u>Code Number</u>	<u>Code Description</u>
01.	Not at all interested
02.	Not very interested
03.	Somewhat interested
04.	Very interested
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.30 Roughly how many radio programs concerning ecology and the environment have you listened to in the last month? (ENVRAD\_QTY)

<u>Code Number</u>	<u>Code Description</u>
01.	None
02.	1 to 5
03.	6 to 10
04.	11 to 15
05.	More than 15
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.31 How interested are you in newspaper articles concerning ecology and the environment? (ENVPPR\_INT)

<u>Code Number</u>	<u>Code Description</u>
01.	Not at all interested
02.	Not very interested
03.	Somewhat interested
04.	Very interested
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.32 Roughly how many newspaper articles concerning ecology and the environment have you read in the last month? (ENVPPR\_QTY)

<u>Code Number</u>	<u>Code Description</u>
01.	None
02.	1 to 5
03.	6 to 10
04.	11 to 15
05.	More than 15
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.33 How interested are you in magazine articles concerning ecology and the environment? (ENVMAG\_INT)

<u>Code Number</u>	<u>Code Description</u>
01.	Not at all interested
02.	Not very interested
03.	Somewhat interested
04.	Very interested
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.34 Roughly how many magazine articles concerning ecology and the environment have you read in the last month? (ENVMAG\_QTY)

<u>Code Number</u>	<u>Code Description</u>
01.	None
02.	1 to 5
03.	6 to 10
04.	11 to 15
05.	More than 15
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.35 (If "yes" to 12.13 -- "Do you belong to a club or group, etc.) How interested are you when the groups or organizations you belong to present or discuss information concerning ecology and the environment? (ENVGRP\_INT)

<u>Code Number</u>	<u>Code Description</u>
01.	Not at all interested
02.	Not very interested
03.	Somewhat interested
04.	Very interested
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.36 Roughly how many of these groups' meetings concerning ecology and the environment have you attended in the last month? (ENVGRP\_QTY)

<u>Code Number</u>	<u>Code Description</u>
01.	None
02.	1 to 5
03.	6 to 10
04.	11 to 15
05.	More than 15
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Subsection 12c: Economic Development and Expansion

Q#: 12.37 How interested are you in television programs concerning economic development and expansion? (DEVTV\_INT)

<u>Code Number</u>	<u>Code Description</u>
01.	Not at all interested
02.	Not very interested
03.	Somewhat interested
04.	Very interested
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.38 Roughly how many television programs concerning economic development and expansion have you watched in the last month? (DEVTV\_QTY)

<u>Code Number</u>	<u>Code Description</u>
01.	None
02.	1 to 5
03.	6 to 10
04.	11 to 15
05.	More than 15
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.39 How interested are you in radio programs concerning economic development and expansion? (DEVRAD\_INT)

<u>Code Number</u>	<u>Code Description</u>
01.	Not at all interested
02.	Not very interested
03.	Somewhat interested
04.	Very interested
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.40 Roughly how many radio programs concerning economic development and expansion have you listened to in the last month? (DEV RAD\_QTY)

<u>Code Number</u>	<u>Code Description</u>
01.	None
02.	1 to 5
03.	6 to 10
04.	11 to 15
05.	More than 15
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.41 How interested are you in newspaper articles concerning economic development and expansion? (DEVPPR\_INT)

<u>Code Number</u>	<u>Code Description</u>
01.	Not at all interested
02.	Not very interested
03.	Somewhat interested
04.	Very interested
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.42 Roughly how many newspaper articles concerning economic development and expansion have you read in the last month? (DEVPPR\_QTY)

<u>Code Number</u>	<u>Code Description</u>
01.	None
02.	1 to 5
03.	6 to 10
04.	11 to 15
05.	More than 15
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.43 How interested are you in magazine articles concerning economic development and expansion? (DEV MAG\_INT)

<u>Code Number</u>	<u>Code Description</u>
01.	Not at all interested
02.	Not very interested
03.	Somewhat interested
04.	Very interested
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.44 Roughly how many magazine articles concerning economic development and expansion have you read in the last month? (DEV MAG\_QTY)

<u>Code Number</u>	<u>Code Description</u>
01.	None
02.	1 to 5
03.	6 to 10
04.	11 to 15
05.	More than 15
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.45 (If "yes" to 12.13 -- "Do you belong to a club or group," etc.) How interested are you when the groups or organizations you belong to present or discuss information concerning economic development and expansion? (DEVGRP\_INT)

<u>Code Number</u>	<u>Code Description</u>
01.	Not at all interested
02.	Not very interested
03.	Somewhat interested
04.	Very interested
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 12.46 Roughly how many of these groups' meetings concerning economic development and expansion have you attended in the last month? (DEVGRP\_QTY)

<u>Code Number</u>	<u>Code Description</u>
01.	None
02.	1 to 5
03.	6 to 10
04.	11 to 15
05.	More than 15
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

### QUESTIONNAIRE SECTION 13: DEMOGRAPHICS

Q#: 13.01 What is your gender? (see cover sheet, #11) (GENDER)

<u>Code Number</u>	<u>Code Description</u>
01.	Female
02.	Male
99.	Missing data

Q#: 13.02 What is your age? (see cover sheet, #11) (RESP\_AGE)

<u>Code Number</u>	<u>Code Description</u>
01.	Less than 20 years
02.	21 to 25 years
03.	26 to 30 years
04.	31 to 35 years
05.	36 to 40 years
06.	41 to 45 years
07.	46 to 50 years
08.	51 to 55 years
09.	56 to 60 years
10.	61 to 65 years
11.	66 to 70 years
12.	71 to 75 years
13.	More than 75 years
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 13.03 How many people are in your household? (see cover sheet, #11) (NUM\_INHOME)

<u>Code Number</u>	<u>Code Description</u>
01.	1 person
02.	2 people
03.	3 people
04.	4 people
05.	5 people
06.	6 to 10 people
07.	More than 10 people
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 13.04 How long have you lived in this county? (YRSIN\_CNTY)

<u>Code Number</u>	<u>Code Description</u>
01.	Less than 1 year
02.	1 to 5 years
03.	6 to 10 years
04.	11 to 15 years
05.	16 to 20 years
06.	21 to 25 years
07.	More than 25 years
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 13.05 How would you describe the place where you live? Would you say it is rural, exurban, suburban, urban, or what? (HOME\_DESC)

<u>Code Number</u>	<u>Code Description</u>
01.	Rural
02.	Exurban
03.	Suburban
04.	Urban
97.	Other (specify) - Country
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 13.06 Skin color scale (assigned by interviewer) (SKIN\_CLR)

<u>Code Number</u>	<u>Code Description</u>
01.	Very light
02.	Light
03.	Somewhat light
04.	Somewhat dark
05.	Dark
06.	Very dark

Q#: 13.07 What is your race or ethnic origin? (open-ended) (ETHNC\_OPN1 - ETHNC\_OPN5)

<u>Code Number</u>	<u>Code Description</u>
01.	Black
02.	African
03.	African-American
04.	Mexican-American
05.	Native American
06.	Cherokee
07.	East Indian
08.	Lebanese
09.	White
10.	Armenian
11.	Belgian
12.	British
13.	Caucasian
14.	Dutch
15.	French
16.	German
17.	Greek
18.	Hungarian
19.	Irish
20.	Italian
21.	Macedonian
22.	Maltese
23.	Romanian

- 25. **Russian**
- 26. **Scottish**
- 27. **Slovakian**
- 28. **Spanish**
- 29. **Ukrainian**
- 30. **Welsh**
- 97. **Other**
  - "Heinz 57"
  - "Hillbilly"
  - "Mixed"
- 98. **Don't know/no opinion**
- 99. **No response/skip/not applicable/missing data**

Q#: 13.08 What is your race or ethnic origin? (read all options) (RACE\_CLSD)

<u>Code Number</u>	<u>Code Description</u>
01.	<b>White, except hispanic</b>
02.	<b>Black, except hispanic</b>
03.	<b>Hispanic</b>
04.	<b>American Indian or Alaskan Native</b>
05.	<b>Asian or Pacific Islander</b>
97.	<b>Other (specify)</b> <ul style="list-style-type: none"> <li>- Lebanese</li> </ul>
98.	<b>Don't know/no opinion</b>
99.	<b>No response/skip/not applicable/missing data</b>

Q#: 13.09 What is your religious preference? (RELIGION)

<u>Code Number</u>	<u>Code Description</u>
01.	<b>Agnostic/Atheist (skip to 13.10)</b>
02.	<b>Muslim</b>
03.	<b>Jewish</b>
04.	<b>Christian</b>
97.	<b>Other (specify)</b> <ul style="list-style-type: none"> <li>- Buddhist</li> <li>- Just believes in Christ</li> </ul>
98.	<b>Don't know/no preference</b>
99.	<b>No response/skip/not applicable/missing data</b>

Q#: 13.09.01 If Christian, are you... (CHRISTIAN)

<u>Code Number</u>	<u>Code Description</u>
01.	<b>Roman Catholic (skip to 13.10)</b>
02.	<b>Protestant</b>
97.	<b>Other (specify)</b> <ul style="list-style-type: none"> <li>- No responses in this category</li> </ul>
98.	<b>Don't know/no opinion</b>
99.	<b>No response/skip/not applicable/missing data</b>

Q#: 13.09.01.01 If protestant, what is your denomination? (PROTESTANT)

<u>Code Number</u>	<u>Code Description</u>
01.	Presbyterian
02.	Methodist
03.	Baptist
04.	Lutheran
97.	Other <ul style="list-style-type: none"><li>- Protestant</li><li>- Full Gospel</li><li>- Pentecostal</li><li>- United Church of Christ</li><li>- Non-denominational</li><li>- Congregational</li><li>- Community</li><li>- Episcopalian</li><li>- Bethesda Christian Church</li></ul>
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 13.10 (For any religious preference) On average, how often would you say you go to (church/temple/worship)? (CHRCH\_FRQ)

<u>Code Number</u>	<u>Code Description</u>
01.	Never
02.	At least once a year
03.	A few times a year
04.	Once or twice a month
05.	Almost every week
06.	Once a week
07.	More than once a week
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 13.11 In general, what political party do you prefer the most? (POLIT\_PRTY)

<u>Code Number</u>	<u>Code Description</u>
01.	No preference
02.	Independent
03.	Republican (skip to 13.12)
04.	Democrat (skip to 13.12)
97.	Other (specify) <ul style="list-style-type: none"><li>- Libertarian</li></ul>
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 13.11.01 (If "Independent," "No preference," or "Other" to 13.11) Do you think of yourself as closer to the Republican Party or the Democratic Party? (REPUB\_DEM)

<u>Code Number</u>	<u>Code Description</u>
01.	Neither
02.	Closer to Republican Party
03.	Closer to Democratic Party
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 13.12 Are you (or anyone in your family living there) a union member? (UNION\_MBR)

<u>Code Number</u>	<u>Code Description</u>
01.	No, no one is a member
02.	Yes, respondent only
03.	Yes, respondent and someone else
04.	Yes, other members(s)
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 13.13 Social class scale (assigned by interviewer) (SOC\_SCALE)

<u>Code Number</u>	<u>Code Description</u>
01.	Abjectly poor
02.	Lower
03.	Lower middle
04.	Middle
05.	Upper middle
06.	Upper
07.	Exorbitant wealth

Q#: 13.14 What is the highest grade of school or year of college you completed? (YRS\_SCHOOL)

<u>Code Number</u>	<u>Code Description</u>
01.	Grade school: 1 - 8
02.	High school: 9 - 12
03.	Associate/Trade: 13 - 14
04.	Bachelor/Technical: 15 - 16
05.	Graduate/Professional: 17+
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 13.15 To get a picture of people's financial situation, we need to know the general range of household incomes for the people we interview. Thinking about your household income from all sources, *approximately* how much did your household receive in 1991: (INCOME\_LEV)

<u>Code Number</u>	<u>Code Description</u>
01.	Less than \$5,000
02.	\$5,000 to \$10,000
03.	\$10,001 to \$15,000
04.	\$15,001 to \$20,000
05.	\$20,001 to \$25,000
06.	\$25,001 to \$30,000
07.	\$30,001 to \$35,000
08.	\$35,001 to \$40,000
09.	\$40,001 to \$45,000
10.	\$45,001 to \$50,000
11.	\$50,001 to \$55,000
12.	\$55,001 to \$60,000
13.	\$60,001 to \$65,000
14.	\$65,001 to \$70,000
15.	\$70,001 to \$75,000
16.	\$75,001 to \$80,000
17.	\$80,001 to \$85,000
18.	\$85,001 to \$90,000
19.	\$90,001 to \$95,000
20.	\$95,001 to \$100,000
21.	More than \$100,000
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 13.16 Are you working now, temporarily laid off, unemployed, retired, a student, a homemaker, or what? (WORK\_STAT1 - WORK\_STAT5)

<u>Code Number</u>	<u>Code Description</u>
01.	Unemployed; looking for work
02.	Temporarily laid off
03.	Retired; disabled
04.	Homemaker
05.	Student
06.	Working now; on strike; sick leave
97.	Other (specify) - Worker's Compensation recipient
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 13.17 What is/was your primary occupation? (what sort of work do or did you do?) (OCCUPATION)

<u>Code Number</u>	<u>Code Description</u>
10.	Agricultural/farming related
20.	Industrial/heavy equipment/factory related

- 30. Retail/sales/general services related
- 40. Public services/government/education, etc.
- 97. Other/Health related
- 98. Don't know/no opinion
- 99. No response/skip/not applicable/missing data

Q#: 13.18 Do/did you have a secondary occupation? (SECOND\_JOB)

<u>Code Number</u>	<u>Code Description</u>
01.	No (skip to 13.19)
02.	Yes
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 13.18.01 What occupation is/was that? (JOB2\_TYPE)

<u>Code Number</u>	<u>Code Description</u>
10.	Agricultural/farming related
20.	Retail/sales/general services related
97.	Other
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 13.19 Does/did your work (for either occupation) involve regular outdoor activity or do/did you work inside a building? (IN\_OUTDOOR)

<u>Code Number</u>	<u>Code Description</u>
01.	Work outside
02.	Work inside
97.	Other (specify) - Both inside and outside equally.
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 13.20 Would you be willing to participate in a follow-up study of these same issues about a year or two from now? (FOLLOW\_UP)

<u>Code Number</u>	<u>Code Description</u>
01.	No
02.	Yes
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 13.21 And finally, do you have any comments, questions, or suggestions regarding this survey?  
(COMMENT\_1 - COMMENT\_5)

<u>Code Number</u>	<u>Code Description</u>
01.	None
02.	Did not enjoy the survey experience
03.	Requested copy or summary of reported findings
04.	Observations regarding environmental issues
10.	Questions regarding the study
11.	Concerning its purpose, practicality
12.	Concerning the selection procedure/legitimacy
13.	Concerning the development of survey questions
14.	Concerning the management and execution of survey
20.	Statements in support of the study
21.	Demonstrates concern for people and environment
22.	Increases public awareness and involvement in these issues
23.	This kind of research is important
24.	Enjoyed participating in this study
98.	Don't know/no opinion
99.	No response/skip/not applicable/missing data

Q#: 13.22 Environmental risk perception scale (assigned by interviewer) (RISK\_SCALE)

<u>Code Number</u>	<u>Code Description</u>
01.	Perceives no environmental risk
02.	Perceives minimal environmental risk
03.	Perceives moderate environmental risk
04.	Perceives considerable environmental risk
05.	Perceives major environmental risk
99.	Missing data

## INTERVIEW COVER SHEET

(NOTE: this section is not included in the EARP/RPM Demonstration Project database.)

**Transect/Sample Area Number (TRAN\_ZONE):** (the codes for this variable are identical to those for "Sample Area Number" under the "Questionnaire Header" section on page one of this codebook).

**Number of Residential Structures in Sample Area (RETCR\_QTY):**

Range = 001 - 180; vacant (e.g., possible, but no residential structures present) = 997;  
not applicable or possible (e.g., sample area over open water) = 998; missing data = 999

**Residential Structure Number Selected for Interview (RETCR\_NUM):**

Range = 001 - 145; missing data = 999

**Residential Structure Description (RETCR\_DES):**

<u>Code Number</u>	<u>Code Description</u>
1.	Single family home
2.	Apartment
3.	Condominium
4.	Rental house
5.	Vacation/recreational house
6.	Assisted living/elderly care/senior center
9.	Missing data

### Call Record

**Total Number of Calls (NMBR\_CALLS):** (number of calls required to obtain the disposition of interview Range = 01 - 12; Missing data = 99

**Call Number (CALL1 - CALL12)** (this variable is subsumed in the following four variables and therefore does not constitute a separate analytical category): Range = 01 - 12; Missing data = 99

**Call Date (CALL1\_DTE - CALL12\_DTE):** Range = 09/15/92 - 04/26/93; Missing data = 99/99/99

**Day of Week that Call Was Made (CALL1\_DAY - CALL12\_DAY):**

<u>Code Number</u>	<u>Code Description</u>
1.	Sunday
2.	Monday
3.	Tuesday
4.	Wednesday
5.	Thursday
6.	Friday
7.	Saturday
9.	Missing data

**Time of Day Call Was Made (CALL1\_TME - CALL12\_TME):** Range = 09.00 - 22.40;  
Missing data = 99.99

**Call Result (CALL1\_RSL - CALL12\_RSL):**

**Code Number**      **Code Description**

- 1.            **Refusal**
- 2.            **No one home**
- 3.            **Respondent not home**
- 4.            **Appointment**
- 5.            **Reschedule**
- 6.            **Interview**
- 9.            **Missing data**

**Interview Number (IW\_NUMBER):**    Range = 001 - 128

**Date of Interview (IW\_DATE):**      Range = 09/15/92 - 04/26/93; Missing data = 99/99/99

**Time at Start of Interview (TIME\_START):**    Range = 09.20 - 22.40; Missing data = 99.99

**Length of Interview (IW\_LENGTH):**    Range = 00.01 - 05.15; Missing data = 99.99

**Number of Household Units in Residential Structure (RESHU\_QNTY):**  
Range = 001 - 136; Missing data = 999

**Household Unit Number Selected for Interview (HU\_FORIW):**  
Range = 001 - 056; Missing data = 999

**Number of Occupants (over 18 years of age) Currently Living in Selected Household Unit (NUM\_OCPTS):**Range = 01 - 06; Missing data = 99

**Code Number**      **Code Description**

- 1.            **1 person**
- 2.            **2 people**
- 3.            **3 people**
- 4.            **4 people**
- 5.            **5 people**
- 6.            **6 people**
- 8.            **Don't know/no opinion**
- 9.            **Missing data**

**Randomly Assigned Occupant Number (OCPT1 - OCPT6)** (this variable is subsumed in the following five variables and therefore does not constitute a separate analytical category): Range = 1 - 6; Missing data = 9

**Gender of Occupants (OCPT1\_GDR - OCPT6\_GDR)**

**Code Number**      **Code Description**

- 1.            **Female**
- 2.            **Male**
- 9.            **Missing data**

**Age of Occupants (OCPT1\_AGE - OCPT6\_AGE)**

**Code Number**      **Code Description**

- 01.            **Less than 20 years**
- 02.            **21 to 25 years**

03.	26 to 30 years
04.	31 to 35 years
05.	36 to 40 years
06.	41 to 45 years
07.	46 to 50 years
08.	51 to 55 years
09.	56 to 60 years
10.	61 to 65 years
11.	66 to 70 years
12.	71 to 75 years
13.	More than 75 years
98.	Don't know/no opinion
99.	No response/skip/missing data

**Occupants Home at Time of Interview (OCPT1\_HME - OCPT6\_HME)**

<u>Code Number</u>	<u>Code Description</u>
1.	No
2.	Yes
8.	Don't know/no opinion
9.	No response/skip/not applicable/missing data

**Occupant Selected for Interview (OCPT1\_SEL - OCPT6\_SEL)**

<u>Code Number</u>	<u>Code Description</u>
1.	No
2.	Yes
9.	Not applicable/skip/missing data

**Selected Occupant Consent to Interview (OCPT1\_CNS - OCPT6\_CNS)**

<u>Code Number</u>	<u>Code Description</u>
1.	No
2.	Yes
9.	Not applicable/skip/missing data

## **APPENDIX 7:**

**GLC Proposal to the NSF Biocomplexity Initiative:  
A Collaborative Approach to Aquatic Nuisance Species Research,  
Prevention, and Control**

**Biocomplexity -- Incubation Activity:**  
**A Collaborative Approach to Aquatic Nuisance Species Research, Prevention, and Control**

Submitted to : Directorate for Biological Sciences  
Submitted by: Dr. Michael J. Donahue, Ph.D.,  
Executive Director, Great Lakes Commission

**Summary Statement**

The introduction and spread of aquatic nuisance species (ANS) within the Great Lakes St. Lawrence River system is a case study in biocomplexity. This insidious form of biological pollution has had increasingly well-documented – yet poorly understood – impacts on biological, physical and socio-economic systems. The expansiveness of the resource – the largest system of freshwater on the face of the earth – belies its ecological fragility. Its socio-economic status is equally fragile; even a modest alteration in ecosystem quality or composition has pronounced impacts on social and economic systems, given the pervasive influence of water and water-related activity in the region. Understanding the nature and dynamics of this biocomplexity and its system impacts is an essential step in addressing what many consider to be the greatest threat to the ecological integrity of the Great Lakes St. Lawrence River system.

Understanding and addressing the biocomplexity of the ANS issue demands a multi-disciplinary, multi-institutional approach. Within the Great Lakes St. Lawrence River system is an “institutional ecosystem” comprised of two federal governments, ten states and provinces, four principal regional/binational agencies, multiple tribal authorities and an array of substate/provincial entities, and non-governmental, university, and business/industry interests. A comprehensive and coordinated approach to understanding the biocomplexity of ANS introduction and spread is a precursor to effective prevention and control measures. Consequently, a collaborative structure featuring the varied disciplines of multiple institutions is needed to achieve this understanding through integrated research that characterizes system dynamics and interactions.

The Great Lakes Commission proposes to enhance understanding of the nature and dynamics of biocomplexity by forming a unique multi-institutional collaborative to address identified public policy priorities that concern the biological, physical and socio-economic system impacts of ANS introduction, spread and management. The collaborative will build upon, and significantly enhance the potential of the Great Lakes Commission-sponsored Great Lakes Panel on Aquatic Nuisance Species. The Panel, a multi-institutional assembly of public agencies ranging from the federal to local level (including tribal authorities, binational organizations and university consortia), serves as a forum for regional coordination and information exchange on ANS prevention and control. However, its potential for integrated research into biocomplexity and the biological, physical and socio-economic system impacts of ANS is untested. “Incubation activity” support through the National Science Foundation (NSF) will demonstrate the potential of a multi-institutional, multi-disciplinary collaborative in addressing a leading – and highly complex – public policy issue with profound ecological, economic and social impacts.

## Issue Overview

The Great Lakes and connecting channels and rivers form the largest surface freshwater system in the world. The system's water and related land resources provide the foundation for recreation and tourism activity valued at \$15 billion annually, \$6.89 billion of which is related to the fishing industry. Approximately 75,000 jobs are supported by sport fisheries, and commercial fisheries provide an additional 9,000 jobs (Great Lakes Fishery Resource Restoration Study, 1994). This valuable fishery is threatened by the infestation of harmful nonindigenous aquatic nuisance species, which alter the number and distribution of native species and have broad economic and societal impacts extending far beyond shoreline residents and recreational users of the resource.

The Great Lakes Fishery Resource Restoration Study has documented the extent of the threat posed by ANS in the Great Lakes Ecosystem. The Laurentian Great Lakes have been subject to the invasion of nonindigenous aquatic nuisance species since the settlement of the region by Europeans. Since the 1800s, approximately 145 nonindigenous aquatic organisms have become established in the Great Lakes. The bulk of these organisms have been represented by plants (fifty-nine percent), fish (twenty-five percent), algae (twenty-four percent), mollusks (fourteen percent) and oligochaetes (seven percent). About fifty-five percent of these species are native to Eurasia; thirteen percent are native to the Atlantic Coast.

As human activity has increased in the Great Lakes watershed, so too has the rate of introduction of ANS. More than one-third of the organisms have been introduced in the past 40 years, a surge coinciding with the opening of the St. Lawrence Seaway. The major entry mechanisms, unintentional releases and ships, were responsible for all but one introduction in the period from 1960 to 1990.

Approximately 10 percent of the nonindigenous species introduced into the Great Lakes have had significant impacts, both economic and ecological. The impacts of certain species have been enormous. The presence of the sea lamprey has resulted in substantial economic losses to recreational and commercial fisheries, requiring annual expenditures of millions of dollars to finance control programs. Alewife once littered beaches each spring and altered food webs, thereby increasing water turbidity before salmonids such as chinook salmon (themselves nonindigenous) were stocked as predators and became the foundation of a new recreational fishery. The ruffe, a small percid fish, became the most abundant fish species in Lake Superior's St. Louis River within five years of first detection in 1986. Its range has recently expanded to include Lake Huron. This expansion poses a significant threat to the lower lakes fishery. Five years after first being observed in the St. Clair River, the round goby can now be found in all of the Great Lakes. The goby is considered undesirable for several reasons. It preys upon bottom-feeding fishes, overruns optimal habitat, spawns multiple times a season, and can survive poor water quality conditions.

Another nonindigenous aquatic species, the spiny water flea (*Bythotrephes cederstroemi*), a tiny crustacean with a sharply barbed tail spine, was most likely introduced through ballast water. The northern European native was first found in Lake Huron in 1984. Although researchers do not know what effect the invader will have on the ecosystem, resource managers suspect that the water flea competes directly for food with small fish such as perch. The spiny water flea is now found throughout the Great Lakes and in some inland lakes.

The zebra mussel, another ballast water introduction, has caused serious economic and ecosystem impacts as well. Municipal treatment and power plants, commercial and recreational vessels, and beach areas are all vulnerable to the negative impacts of the zebra mussel. The cost to large water users in the Great Lakes alone totals an average of \$360,000 per year. From 1989-1994, documented cumulative

costs for users associated with the zebra mussel were \$120 million. The consequences of the zebra mussel are not confined to economic burdens alone; the potential impact of the zebra mussel on ecology is profound. For example, infestations of zebra mussels limit the availability of food and decrease spawning areas, harming fishery ecosystems.

Exotic plants also have been introduced to the Great Lakes Basin. Purple loosestrife, a wetland plant from Europe and Asia, was introduced to the east coast of North America in the 1800s. The plant invades marshes and lakeshores, replacing cattails and other wetland plants. Purple loosestrife is unsuitable as cover, food or nesting sites for a wide range of native wetland animals including ducks, geese, rails, bitterns, muskrats, frogs, toads and turtles.

Eurasian watermilfoil, accidentally introduced to North America from Europe, has spread westward into inland lakes, primarily by boats and waterfowl. In shallow areas, the plant can interfere with water recreation such as boating, fishing and swimming. The plant's floating canopy can also crowd out important native water plants.

In 1993 the Office of Technology Assessment issued a report to Congress entitled *Harmful Nonindigenous Aquatic Nuisance Species in the United States* (OTA-1993) which concluded that the total number of harmful nonindigenous species and their cumulative impacts create a growing economic and environmental burden for the country. Furthermore, the report concluded that "continued research and development of new ways to manage harmful nonindigenous species remains essential."

Dozens of public and nongovernmental agencies and organizations work on research, use, prevention, or control of desirable and harmful nonindigenous species. The need for a coordinated effort is therefore essential. A 1994 report to Congress, entitled *Findings, Conclusions and Recommendations of the Intentional Introductions Policy Review* (National Aquatic Nuisance Species Task Force 1994), concluded that a regional approach was needed to ensure ecologically sound decisions.

### **Proposed Elements**

As noted in the Grants Competition Announcement for the NSF Biocomplexity Initiative (NSF 1999:6-10), biocomplexity results from dynamic interactions among the biological, physical, and social components of the Earth's diverse environmental systems. Biological invasions, for example, involve complex human and biological interactions at a variety of scales, from the very local and short term to the international and long term. Advancing our understanding of biocomplexity will therefore require new collaborations of researchers from a broad spectrum of fields, including the biological, physical, and social sciences. To this end, NSF is supporting Incubation Activities through its Biocomplexity Initiative to "enable groups of researchers... to develop management and research interactions that could have a large payoff relative to the resources required" (NSF 1999:10). This proposal responds to this call for incubation activities through the NSF Biocomplexity Initiative.

In an effort to bring this proposal in line with the NSF's expectations, the Great Lakes Commission communicated by phone with representatives from various NSF program sections to present and discuss ideas for incubation activities. Through these discussions, seven "key emphases" were identified for this proposal, and are addressed throughout this document. These emphases include:

- 1) A specific research issue, for example, biological invasions/aquatic nuisance species, in the Great Lakes;

- 2) Number and type of disciplines being brought to bear on the issue, rather than number and type of organizations and agencies;
- 3) Promoting collaborative and integrated research, especially mechanisms to bridge the social and natural sciences;
- 4) Applicability of social science methodologies, most notably in terms of risk management involving “multiple publics,” to address social science information gaps in ANS management;
- 5) Workshops and virtual meetings to identify information gaps and unmet needs pertaining to ANS, the major players, roles and responsibilities in addressing these, and how this information will be used to develop future NSF research proposals;
- 6) Public availability of the information produced through the incubation activity; and,
- 7) The role of outside experts not salaried by member institutions that will bring an external advisory capacity to increase credibility.

The proposed project will bring collaborative efforts to bear on five distinct yet related aspects of ANS prevention and control. These project elements – all identified as priority “unmet needs” by the Great Lakes Panel and larger scientific and policy communities – will yield: 1) a formal collaboration agreement and institutional structure for integrated ANS research; 2) science-based standards (and associated socio-economic assessment) to guide prevention and control measures; 3) a dedicated web site to provide continuing collaboration support; 4) a collaboration-generated inventory of ANS-related research and associated gap analysis that yields research and management priorities for collaboration members; and 5) social science methodologies for identifying population-specific issues associated with ANS impacts. Each of these five elements is briefly described below, followed by further detail on the collaborators and their approach to biocomplexity research.

- A) A Great Lakes Action Plan for Aquatic Nuisance Species Prevention and Control: A growing body of research, laws and programs has been pursued at various levels of government to advance ANS prevention and control efforts. However, while the issue is receiving increased attention within the scientific, management and policy communities, the overall prevention and control effort has lacked a well-defined and coordinated strategy. To address this problem, and provide a framework for project collaborators and the larger community of Great Lakes St. Lawrence interests, the Great Lakes Commission will develop an Action Plan for ANS Prevention and Control.

The overall goal of the Action Plan is to enhance the health of the Great Lakes St. Lawrence Basin ecosystem by designing and implementing scientifically sound, research-based prevention and control measures. The Plan will include a vision statement, a set of fundamental principles, and a series of goals and objectives to guide the individual and collective actions of collaborators. In so doing, the Action Plan will strengthen multi-institutional, multi-disciplinary collaboration; ensure an appreciation for (and understanding of) biocomplexity as it relates to ANS; provide guidance for collaboration in designing and undertaking integrated research; and generally strengthen the collective research, prevention and control effort.

- B) Science-based Standards for Ballast Water: Ballast water from commercial vessels is widely considered to be the leading pathway for the introduction of nonindigenous aquatic nuisance

species into the Great Lakes and other U.S. waters. Efforts to address the problem have been significantly hampered by the absence of science-based standards to guide technologies and management practices that may offer effective alternatives to the current reliance on high-seas ballast exchange. The development of such standards requires a collaborative approach that includes a socio-economic assessment of identified alternatives. This project element will yield a detailed briefing paper on ballast water standards and associated issues, and will feature a workshop yielding recommendations for policymakers at the state/provincial, federal and international levels. Drawing from the briefing paper and their own experience, experts from the regulatory, maritime, research and business communities will evaluate the role of standards in developing pollution prevention technologies; the utility and limitations of existing ballast water regulations; issues and criteria to be incorporated into a strengthened regulatory regime for ballast water; and mechanisms that can compel and assist the maritime industry in complying with new standards without undue economic hardship. Detailed recommendations, as well as a framework for the standards development process, will be prepared and broadly disseminated.

- C) Supporting the Collaborative Through Electronic Communications Technology: The key to effective multi-institutional collaboration is open and continuous communication on relevant research and policy issues. To ensure such effectiveness, this project element will feature the development of a web site associated with the Commission-coordinated Great Lakes Information Network, the region's leading gateway to the Internet for all Great Lakes-related issues. The site, to be developed and maintained for the benefit of project collaborators and other interested parties, will feature text, graphics and extensive links for immediate access to ANS-related research, monitoring activities, laws, programs, policies, public information materials and related items. An emphasis will be placed on biocomplexity considerations, and the biological, physical and socio-economic dimensions of the issue. The Great Lakes Commission will also maintain a listserv for project collaborators to ensure effective communication. Significantly, the Great Lakes Commission commits to maintaining/enhancing the site and associated services over the long term.
- D) Inventory and Analysis of ANS-Related Research: A fourth project element features the development of a comprehensive research inventory to assess current and recently completed ANS research relevant to the Great Lakes Basin and identify gaps and other unmet needs. This initiative will build upon and expand a 1996 inventory effort (Great Lakes Panel on Aquatic Nuisance Species 1997), with emphasis being placed on socio-economic as well as biological and physical science research. The descriptive inventory (generated via online survey forms, personal inquires and data base review) will provide the basis for both virtual and in-person workshops at which the assessment will take place. These "by-invitation" activities will be multi-institutional and multi-disciplinary in nature, and yield findings and recommendations for broad dissemination.
- E) Social Science Methodologies for Risk Assessment and Management: Project collaborators will explore and develop social science methodologies for identifying population-specific issues pertaining to ANS spread and management, thereby strengthening informational links among the sociocultural, biological, and physical components of the ANS problem in the Great Lakes Basin. Such methodologies will focus on styles of public consultation that are sensitive to sociocultural variation in order to develop a greater understanding of how sociocultural values and practices contribute to the spread and/or control of ANS and how they can differentially expose populations to the detrimental effects of ANS. For example, Risk Perception Mapping (RPM) is an ethnographic research technique for identifying the spatial, cultural, and social-contextual characteristics of potentially affected populations. It is currently the focus of a methodological

demonstration project being conducted through an environmental anthropology research fellowship at the Great Lakes Commission and, as such, may serve as a model for future research on the sociocultural components of the ANS problem. RPM applications are well established in the scientific literature (Stoffle, Stone, and Heeringa 1993; Stoffle et al., 1991), and it is currently the central method for sociocultural consultation and assessment in the Science and Technology Roadmap Volume of the Hanford Groundwater Vadose Zone Integration Project (United States Dept. of Energy 2000).

The project initiatives identified above will be pursued by a multi-institutional, multi-disciplinary collaborative as embodied in the Great Lakes Panel on Aquatic Nuisance Species. Among others, collaborators will include representatives from the eight Great Lakes states; two Canadian provinces (Ontario, Quebec); U.S. federal agencies (U.S. FWS, NOAA, U.S. EPA, USDA; USCG); Canadian federal agencies (Fisheries and Oceans, Transport; regional organizations (Great Lakes Fishery Commission); tribal authorities; university research institutes (Sea Grant Programs); and private sector/citizen groups. The collaborative will include access to all relevant biological, physical and social science disciplines.

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